



Eastern Interconnection Planning Collaborative

Phase 2 Report:

**Interregional Transmission Development and
Analysis for Three Stakeholder Selected
Scenarios
And
Gas-Electric System Interface Study**

**DOE Award Project
DE-OE0000343**

July 2, 2015

**Volume 8
Appendices to Section 9**

FINAL

Acknowledgement

This material is based upon work supported by the Department of Energy, National Energy Technology Laboratory, under Award Number DE-OE0000343.

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Appendix 14

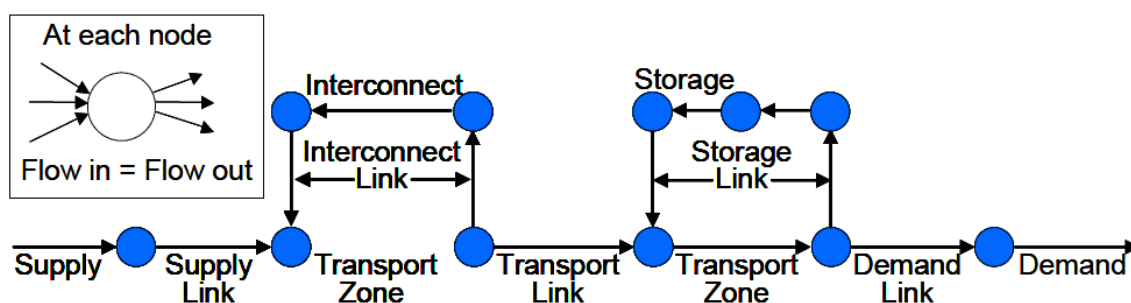
GPCM Model Structure

The GPCM model framework is a node-arc network. Some key definitions utilized in the report are indicated below:

“Nodes” and “arcs” are generic terms. Generally speaking, a node is any physical asset. Suppliers and customers are both represented by nodes, one where gas is produced and one where gas is consumed. Pipelines are also represented by nodes. They are divided into sections called “pipeline zones” – sometimes “transport zones” – across which gas flows according to the associated physical characteristics of that part of the pipeline. These physical characteristics are defined in the database.

Arcs are the connections between any two nodes in the model. For example, two pipeline zones (nodes) are connected by a “pipeline link,” sometimes called a “transport link,” which defines the amount of gas that can flow between the two zones on the same pipeline. An “interconnect link” joins zones (nodes) on different pipelines. A supplier is connected to the pipeline system via a “supply link” and a customer is connected via a “demand link,” both of which serve the same function. The diagram below shows the layout.

Figure A14-1. GPCM Node-Arc Structure



Nodes represent production regions and supply basins, pipeline zones, interconnects, storage facilities, delivery points, and either specific large customers or groupings of smaller customers. Arcs represent gas transactions and flows, and are constrained by capacity limitations. Compressors, delivery meters, and receipt meters are rolled up into pipeline zones and arcs connect the pipeline zones to form the regional pipeline networks. Figure A14-1 is a schematic of the node-arc structure of the GPCM model.

In general, constraints occur in the nodes, often certain pipeline segments, but also interconnects, rather than the arcs that connect the nodes. In the case of interconnect links, or arcs that connect nodes on different pipelines, the total size of the link is, in many cases, smaller than the total capacity on either side. While increasing the capacity of some interconnect links may have changed flows, there were no instances in which the size of the interconnect link constituted a constraint as we’ve defined it for purposes of Target 2. As such, our analysis of the constraints has focused almost entirely on the pipeline nodes, *i.e.*, pipeline zones.

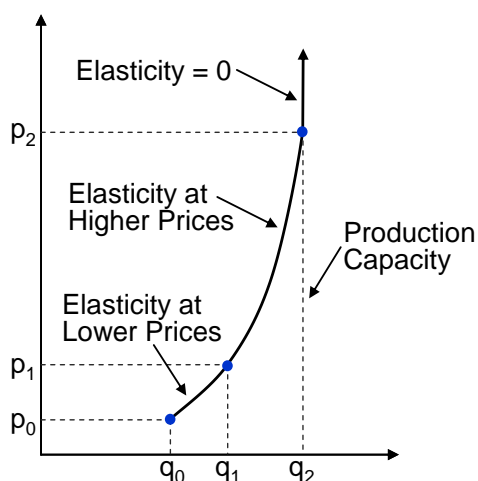
All major interstate, intrastate, inter-provincial, and cross-border pipelines are included in GPCM. Pipeline zones form the basic building block for modeling each pipeline. Long-haul pipelines, even those with postage stamp rates, are differentiated by zones, enabling flows between contiguous market areas to be defined, capacity constraints to be identified, and price

differentials within relevant boundaries to be modeled. Each pipeline's tariff provides the basis for estimating the minimum and maximum transportation prices, as well as relevant fuel retention rates by location, *i.e.*, shrinkage. Pipeline transportation service is prioritized in accord with character of service: all firm transportation is cleared first before any non-firm transportation is cleared in zonal markets. The clearing of non-firm transportation is performed under volumetric rates that range from a high equal to the 100% equivalent load factor rate, including transport commodity and shrinkage, to a low equal to a pipeline's firm transport commodity charge.

GPCM reflects storage dynamics as three distinguishable transaction components: injection, storage and withdrawal. Storage is constrained by total storage capacity and daily injection and withdrawal capacities and is shaped by a monthly schedule with a constant unit cost per period. The ability to model individual storage facilities on a monthly basis allowed consideration of inventory balances, withdrawal and injection rates, and facility constraints. Storage transactions were modeled as bundled under a single rate structure.

GPCM supply curves relate the amount of gas produced to the price: the higher the price the more gas that will be produced subject to resource and reservoir limitations. The slope of the supply curve determines price elasticity, *i.e.* the change in gas supply that can be obtained for a small change in price. In the customary monthly reporting mode, GPCM supply curves are made up of segments that exhibit high elasticity at lower prices, low elasticity at higher prices, and at some point zero elasticity, where resource and production limits mean that no additional supply can be obtained regardless of price as illustrated in Figure A14-2.

Figure A14-2. GPCM Supply Curves



The behavior of gas customers is captured via demand curves that are also embedded in the model. For purposes of this analysis, the demand for both RCI and electric generators are *a priori* inputs on a winter or summer peak day. Vertical demand curves were utilized to capture this dynamic. The objective function of the LP model is system cost minimization, which determines the economic equilibrium of prices and flows across all the market locations and for all time periods. Model solutions identify congestion points, locations where additional gas cannot move from one point to the other despite a downstream demand for that gas.

Appendix 15

Pipeline Expansion Projects

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In reviewing the list of pipeline expansion projects included in the RGDS, LAI has identified pipeline projects that have pre-filed or filed Natural Gas Act Section 7(c) certificate applications at FERC prior to April 22, 2014. To the extent the applicant included proof of market support in the form of executed precedent agreements to provide the pipeline with the credit and revenue assurance to commit capital, LAI has made the simplifying assumption that the precedent agreements constitute proof of market support for the pipeline to proceed with construction upon FERC approval. No independent analysis of either the certificate application or the precedent agreement(s) has been conducted.

The projects enumerated in this Appendix are described by location. Project costs are disaggregated by component where such detail is included in a project's certificate application. Pipeline expansion projects are listed alphabetically rather than sorted by PPA. Therefore readers may find it useful to scroll to the map of project facilities in order to identify the general location by state or province. The pipeline expansion projects identified in this Appendix have been incorporated in the Target 2 build out represented in GPCM and will therefore serve as the starting point in the Target 4 analysis oriented around the frequency and magnitude of locational constraints across the Study Region. Also in Target 4, the capital costs of these future expansion projects, along with recently completed expansion projects, will be used as the basis for estimating the costs of incremental firm transportation capacity by location.

A discussion of the highlights of the proposed pipeline expansion projects incorporated in the expanded RGDS pipeline topology across six PPAs follows. Additional expansion projects which are under development but did not meet the criteria for inclusion in the RGDS as of April 22, 2014 have been included in S13 and are summarized in Appendix 19.¹

Algonquin

Three Algonquin projects have been included in the RGDS: the AIM Project, the Salem Lateral Project, and a portion of the Atlantic Bridge Project.² Known facility improvements associated with these projects are illustrated in Figure A15-1.

¹ Pipelines that have projects included in S13 but which do not have any projects included in the RGDS include: CNYO&G/Stagecoach (Northern Expansion Project), Columbia Gulf (Rayne Xpress Project), NEXUS Gas Transmission (new pipeline), Northern Border (Bakken Header Project), and PNGTS (Continent to Coast Project).

² Spectra also recently announced the Access Northeast Project, which would add up to an incremental 1 Bcf/d of capacity on Algonquin and M&N in 2018.

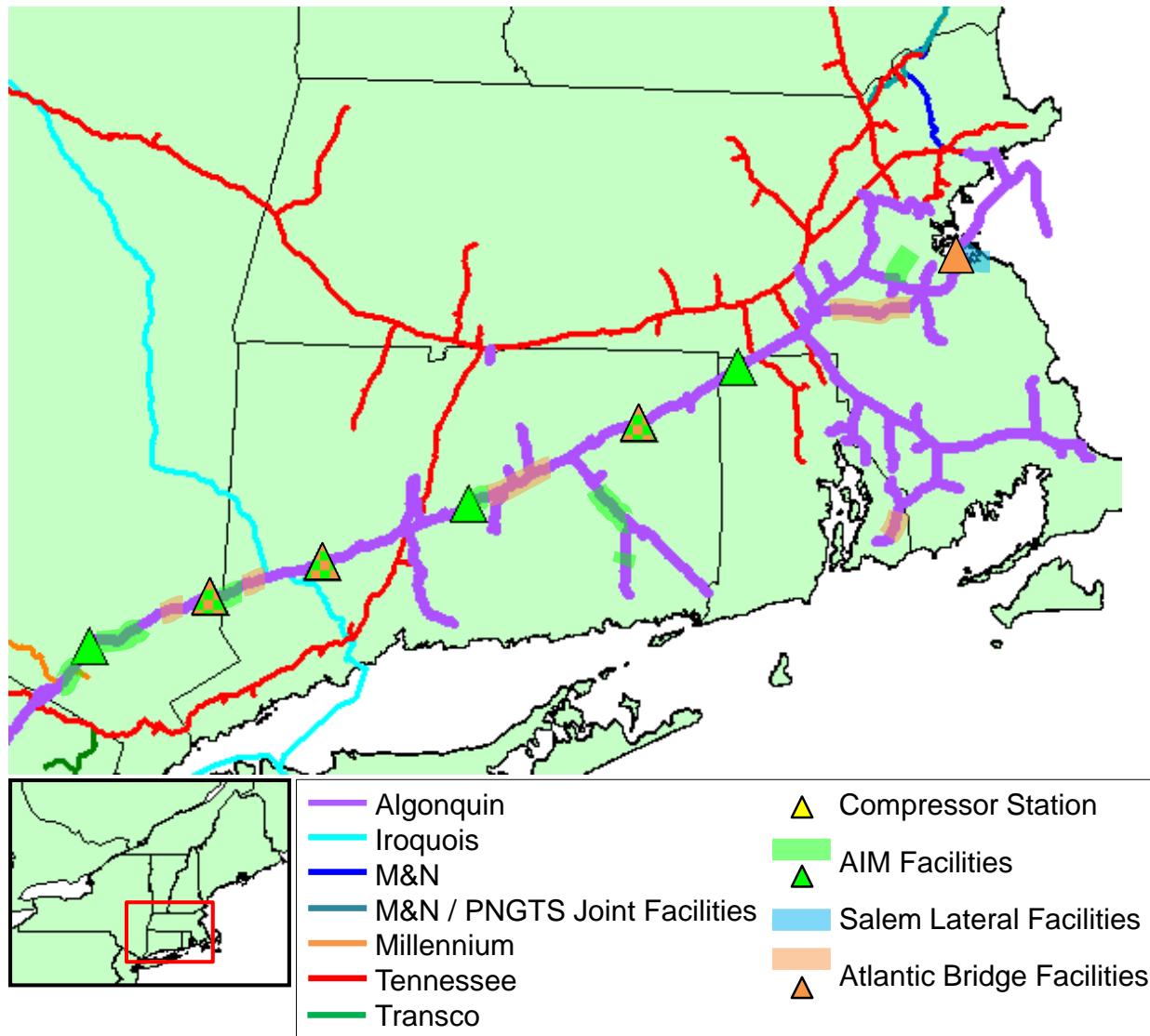


Figure A15-1. Algonquin Expansion Project Facilities³

The AIM Project will allow Algonquin to provide 342 MDth/d of incremental firm transportation service from its interconnection with Millennium in Ramapo, NY to delivery points in Connecticut, Rhode Island and Massachusetts.⁴ The capacity has been contracted by eight LDCs and two municipal utilities,⁵ and is currently undergoing FERC review for an anticipated in-

³ The facilities shown for the Atlantic Bridge Project are preliminary, the project is still under development and has not yet been filed at FERC.

⁴ FERC Docket No. CP14-96

⁵ The contracting shippers are Columbia Gas of Massachusetts, National Grid (Boston Gas, Colonial Gas and Narragansett Electric), Connecticut Natural Gas, Middleborough Gas and Electric, Norwich Public Utilities, NSTAR Gas, Southern Connecticut Gas and Yankee Gas.

service date of November 1, 2016.⁶ The total project cost is expected to be approximately \$971.6 million. Significant project components and associated costs are listed in Table A15-1.

Table A15-1. AIM Project Costs

Project Component	Cost
Burrillville Compressor Station: 15,900 HP and modifications	\$55,547,958
Cromwell Compressor Station: 15,900 HP and modifications	\$50,001,502
Chaplin Compressor Station: 7,700 HP and modifications	\$49,718,001
Stony Point Compressor Station: 15,900 HP and modifications	\$81,950,579
Southeast Compressor Station: 10,320 HP and modifications	\$49,066,882
Haverstraw to Stony Point: Replacement of 3.3 miles of 26" pipe with 42" pipe	\$61,655,825
Stony Point to Yorktown: Replacement of 12.3 miles of 26" pipe with 42" pipe	\$245,416,864
Southeast to MLV 19: Replacement of 4.5 miles of 26" pipe with 42" pipe	110,608,147
Cromwell to Connecticut Loop: 2.0 miles of 26" pipe	\$24,892,995
E-1 System: Replacement of 9.1 miles of 6" pipe with 16" pipe	\$59,113,181
E-1 System Loop: 1.3 miles of 12" pipe	\$13,695,787
Two new meter stations in CT and MA and modifications at 24 meter stations in NY, CT, MA	\$74,590,858
West Roxbury Lateral: 4.2 miles of 16" pipe and 0.9 miles of 24" pipe	\$86,998,703
West Roxbury meter station	\$ 8,294,402

The Salem Harbor Lateral Project will enable Algonquin to deliver 115 MDth/d to Footprint Power's re-developed Salem Harbor power plant in Essex County, MA via a new 1.2-mile lateral.⁷ The target in-service date for the lateral is November 1, 2015. Cost information is not yet publicly available. The capacity associated with this project is lateral-only; no incremental mainline capacity has been contracted by the generator. The estimated cost of the facilities is \$63 million.

As announced, the Atlantic Bridge Project will enable Algonquin and M&N to add 100 to 600 MDth/d of mainline transportation capacity from receipt points as far upstream as Algonquin's interconnection with Texas Eastern in Lambertville, NJ to delivery points as far downstream as Maine.⁸ Because the open season notice for the project indicated that an anchor shipper precedent agreement has been executed with Unifil Corporation, 100 Dth/d of incremental capacity have been included in the RGDS, with the remainder of the capacity included in Sensitivity 13. Preliminary project facilities have been announced for the planned November 2017 in-service date.

⁶ No generators executed precedent agreements for firm transportation entitlements as part of the AIM Project.

⁷ FERC Docket No. CP14-522

⁸ Source: Description of Atlantic Bridge Project on Spectra Energy website: <http://www.spectraenergy.com/Operations/New-Projects-and-Our-Process/New-Projects-in-US/Atlantic-Bridge/>

ANR

Two ANR projects have been included in the RGDS: the Glen Karn 2015 Project and the Southeast Mainline Flow Reversal Project.⁹ The Glen Karn 2015 Project is designed to increase the capacity of the Lebanon Lateral by 134 MDth/d and provide up to 400 MDth/d of incremental transportation service from ANR's interconnection with Texas Eastern at Glen Karn, OH to points on ANR's system. The target in-service date is November 1, 2015.

ANR has announced that the Southeast Mainline Flow Reversal Project has been fully subscribed up to 2 Bcf/d, with 1.25 Bcf/d of flow reversal commencing in 2014 and the remaining volume commencing in 2015.

Cheniere Creole Trail

Two Cheniere Creole Trail expansion projects have been included in the RGDS: the Creole Trail Expansion Project and the CCTPL Expansion Project. The facilities associated with these projects are illustrated in Figure A15-2.

⁹ The Lebanon Lateral 2014 Reversal Project commenced service in April 2014.

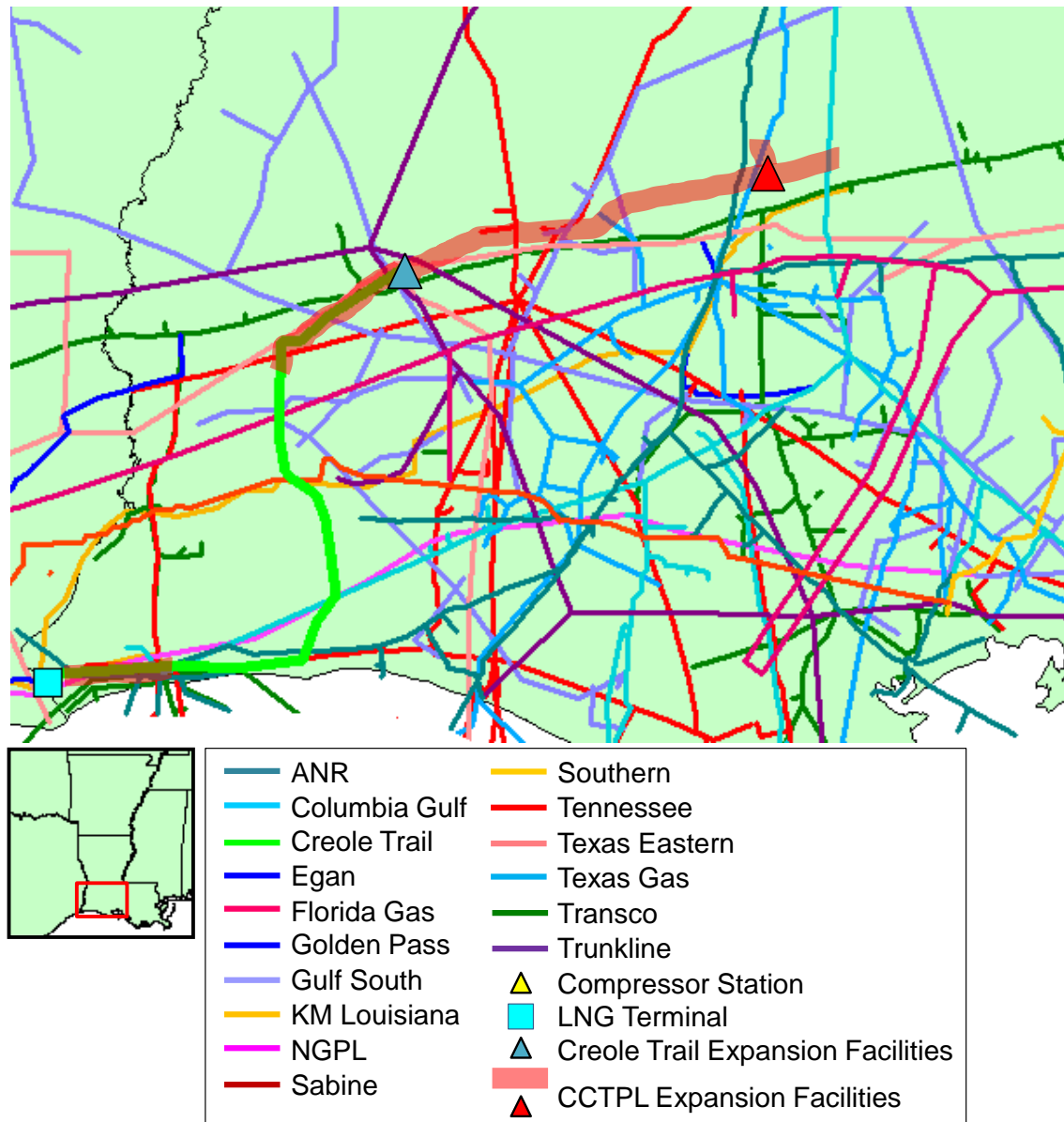


Figure A15-2. Creole Trail Expansion Project Facilities

The Creole Trail Expansion Project is designed to enable bi-directional flow on the existing Creole Trail system to support Stages 1 and 2 of the Sabine Pass LNG export terminal.¹⁰ The project facilities are separated into in two phases, each of which will create 765 MDth/d of firm reverse flow capacity for a total of 1,530 MDth/d at an anticipated cost of \$104.3 million. The Phase 1 project facilities are currently under construction for a 2014 Q4 in-service date, while the Phase 2 facilities are targeted for an early 2016 in-service date. The primary project facilities and associated costs are listed in Table A15-2.

¹⁰ FERC Docket No. CP12-351

Table A15-2. Creole Trail Expansion Project Costs

Project Component	Cost
Gillis Compressor Station: New station, 53,125 HP	\$99,766,536
Meter station modifications at existing receipt points	\$ 4,538,619

The CCTPL Expansion Project is designed to provide up to 1.5 Bcf/d of additional firm reverse flow capacity on the Creole Trail system to support Stage 3 of the Sabine Pass LNG export terminal.¹¹ This project also involves a 48.5-mile extension of the existing pipeline system to new interconnections with ANR, Columbia Gulf, Texas Gas and the Pine Prairie Energy Center. The total estimated cost of the project is \$610.5 million and Creole Trail proposes to complete the facilities by the end of 2015, although Train 5 of the Sabine Pass export terminal is not anticipated to begin operations until December 2018. The primary project facilities and associated costs are listed in Table A15-3.

Table A15-3. CCTPL Expansion Project Costs

Project Component	Cost
Zone 1 facilities: 38.4 miles of 42" pipe (loop line)	\$207,465,821
Zone 2 pipeline facilities: 52.5 miles of 42" pipe, 13.4 miles of 36" pipe	\$284,689,949
Mamou Compressor Station: New station, 53,125 HP	\$102,828,453
Four new meter stations	\$ 15,559,549

Columbia Gas

Four Columbia Gas projects have been included in the RGDS: the Giles County Project, the Smithfield III Expansion Project, the Line 1570 Project and the East Side Expansion Project.^{12,13,14} The known facilities associated with these projects are illustrated in Figure A15-3.

¹¹ FERC Docket No. CP13-552

¹² The VEPCO-Warren County Project was previously listed as an expansion project to be included in this study, but this project has already been constructed and placed in service. Therefore it has been included as part of the infrastructure baseline rather than as an expansion project, although the power plant served by the project is not expected to begin commercial operation until late 2014 or early 2015.

¹³ Columbia Gas has also filed several Modernization Program projects to be completed over the study horizon, which do not impact capacity, including FERC Docket Nos. CP13-254, CP13-32, CP13-8 (Line MB Extension Project), CP13-81, CP14-124, CP14-66, CP14-77 and CP14-99.

¹⁴ Columbia Gas's Leach Xpress and QuickLink Projects are included in S13 and summarized in Appendix 19.

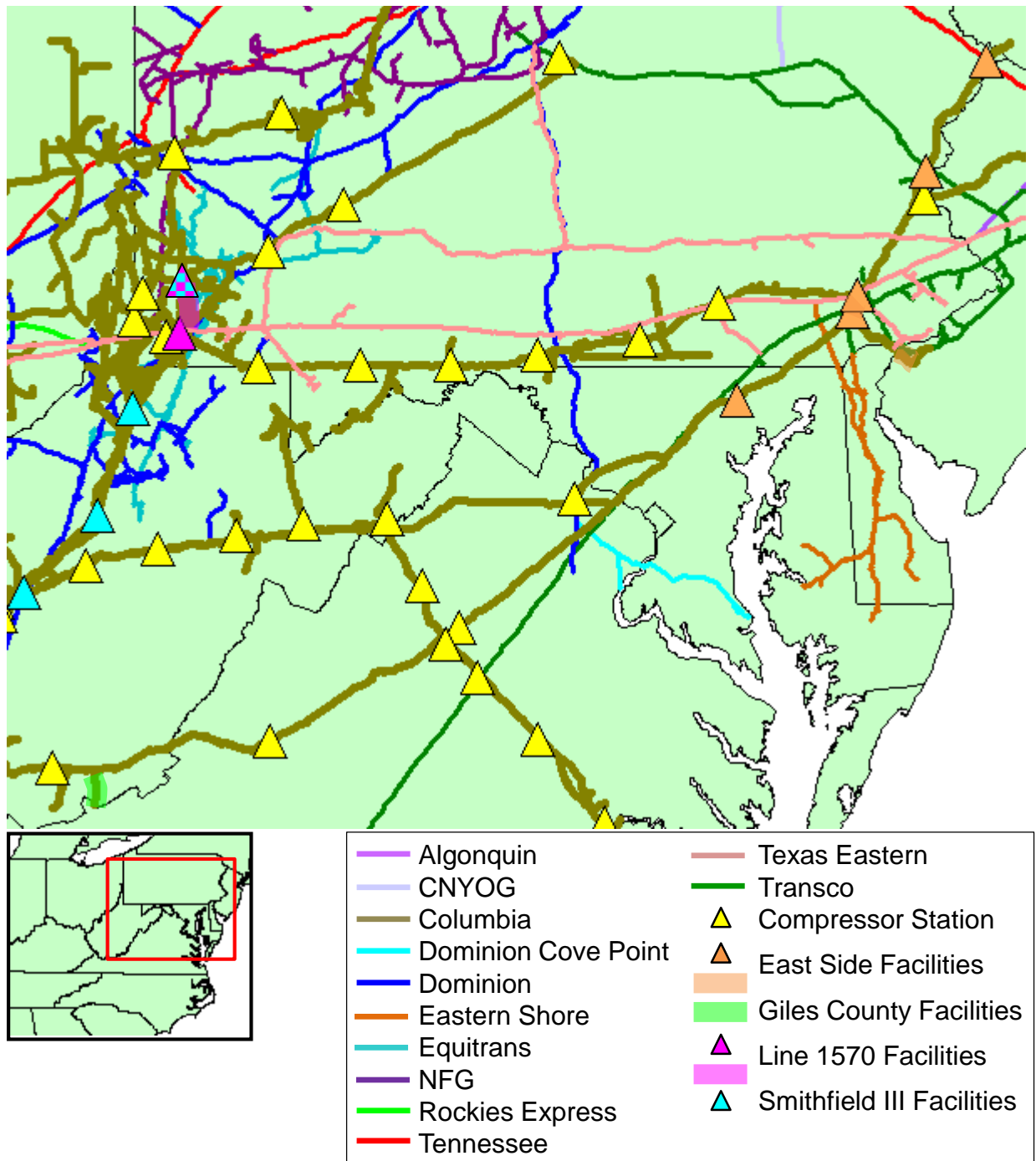


Figure A15-3. Columbia Gas Expansion Project Facilities¹⁵

The Giles County Project will enable Columbia Gas to provide 46 MDth/d of incremental lateral capacity to Celanese Acetate LLC, an industrial customer located in Giles County, VA that is

¹⁵ Compressor stations shaded in a multi-color pattern indicate that multiple projects (corresponding to the colors used) involve facility modifications at those stations.

converting its coal-fired boilers with natural gas-fired boilers.¹⁶ The 12.6 miles of 8” loop line and associated facilities are estimated to cost \$22.7 million. The project is currently under construction for an October 1, 2014 in-service date.

The Smithfield III Expansion Project will enable Columbia Gas to transport 444 MDth/d from receipt points in southwestern Pennsylvania and West Virginia to its interconnection with Columbia Gulf at Leach, KY.¹⁷ The shippers for this project are three shale producers, Antero Resources Appalachian Corporation, Rice Drilling B LLC and PetroEdge Energy, LLC. The project facilities are currently under construction, with all components expected to be in service by November 1, 2014. The total project cost is estimated to be \$81.8 million. The primary cost components are listed in Table A15-4.

Table A15-4. Smithfield III Expansion Project Costs

Project Component	Cost
Redd Farm Compressor Station: New station, 9,400 HP ¹⁸	\$20,102,469
Glenville Compressor Station: 15,600 HP and associated facilities	\$44,071,844
Appurtenant and Auxiliary Facilities: Valve settings and compressor station modifications	\$17,604,765

The Line 1570 Project is a system modernization project that was expanded to create 99 MDth/d of incremental capacity on Columbia Gas’s Line 1570 in southwestern Pennsylvania.¹⁹ The incremental capacity has been contracted by two producers, Range Resources – Appalachia, LLC and Rice Drilling B, LLC. The total project cost is estimated to be \$121.7 million, of which \$17.8 million is allocated to expansion capacity. The cost components are listed in Table A15-5. The project is currently under construction for a November 1, 2014 in-service date.

Table A15-5. Line 1570 Project Costs

Project Component	Cost
Pipeline: Replacement of 18.52 miles of 20” pipe with 24” pipe	\$86,696,898
Waynesburg Compressor Station: Replacement of three 1,080 HP compressor units with a single 4,700 HP compressor	\$24,993,354
Redd Farm Compressor Station: ²⁰ 6,400 HP	\$10,049,170

The East Side Expansion Project will expand the Columbia Gas system by 312 MDth/d to serve mid-Atlantic and northeast citygate markets.²¹ The contracted shippers for this project include producers, marketers and LDCs: Cabot Oil & Gas Corporation, New Jersey Natural Gas

¹⁶ FERC Docket No. CP13-125

¹⁷ FERC Docket No. CP13-477

¹⁸ 3,000 HP at the Redd Farm Compressor Station will be allocated to the Smithfield III Expansion Project, with the remainder allocated to the Line 1570 Project

¹⁹ FERC Docket No. CP13-478

²⁰ A portion of the Redd Farm Compressor Station constructed as part of the Smithfield III Expansion Project has been allocated to the Line 1570 Project.

²¹ FERC Docket No. CP14-17

Company, Southwestern Energy Services Company, South Jersey Gas Company, and South Jersey Resources Group, LLC. The project, which shown in Table A15-6, is estimated to cost \$268.5 million, is currently undergoing FERC review for an anticipated September 1, 2015 in-service date.

Table A15-6. East Side Expansion Project Costs

Project Component	Cost
Pipeline: 9.5 miles of 26" loop line, 9.5 miles of 20" loop line	\$163,372,000
Compression: Replacement of 680 HP with 9,400 HP at Milford Compressor Station, replacement of 4,480 HP with 21,604 HP at Easton Compressor Station, modifications to allow bi-directional operations at Eagle and Rutledge Compressor Stations	\$ 99,579,000
Meter stations: Modifications at three stations	\$ 6,544,000

Constitution & Iroquois

The Constitution Pipeline has been included in the RGDS.²² Constitution is a new 122-mile pipeline that will transport 650 MDth/d of natural gas from the Marcellus shale production area in northeastern Pennsylvania an interconnection with Iroquois and Tennessee near Wright, NY, as illustrated in Figure A15-4.²³ The project has been fully contracted by two producers, Cabot Oil & Gas Corporation and Southwestern Energy Services Company, and is estimated to cost \$683 million; the cost components are listed in Table A15-7. The target in-service date listed in the project's certificate application is March 31, 2015.²⁴

Table A15-7. Constitution Project Costs

Project Component	Cost
Pipeline: 122 miles of 30" pipe	\$668,554,840
Two meter stations	\$ 14,256,160

In conjunction with the Constitution Pipeline Project, Iroquois has proposed the Wright Compressor Station Project, which would enable the existing Wright Compressor Station to flow gas bi-directionally, receiving up to 650 MDth/d from Constitution for delivery into Iroquois and Tennessee.²⁵ The capacity created by the compressor station modifications will be leased to Constitution following construction, the project facilities will enter service simultaneously with the Constitution pipeline. The estimated cost of the modifications is \$75 million.

²² Iroquois's South to North Project is included in S13 and summarized in Appendix 19.

²³ FERC Docket No. CP13-499

²⁴ Constitution requested FERC approval of the project by April 27, 2014 to meet the March 31, 2015 in-service date. On December 13, 2013, FERC announced a planned schedule that calls for issuance of the project's final Environmental Impact Statement by June 13, 2014, with the resultant 90-day Federal Authorization Decision Deadline on September 11, 2014. The draft Environmental Impact Statement was issued on February 12, 2014.

²⁵ FERC Docket No. CP13-502

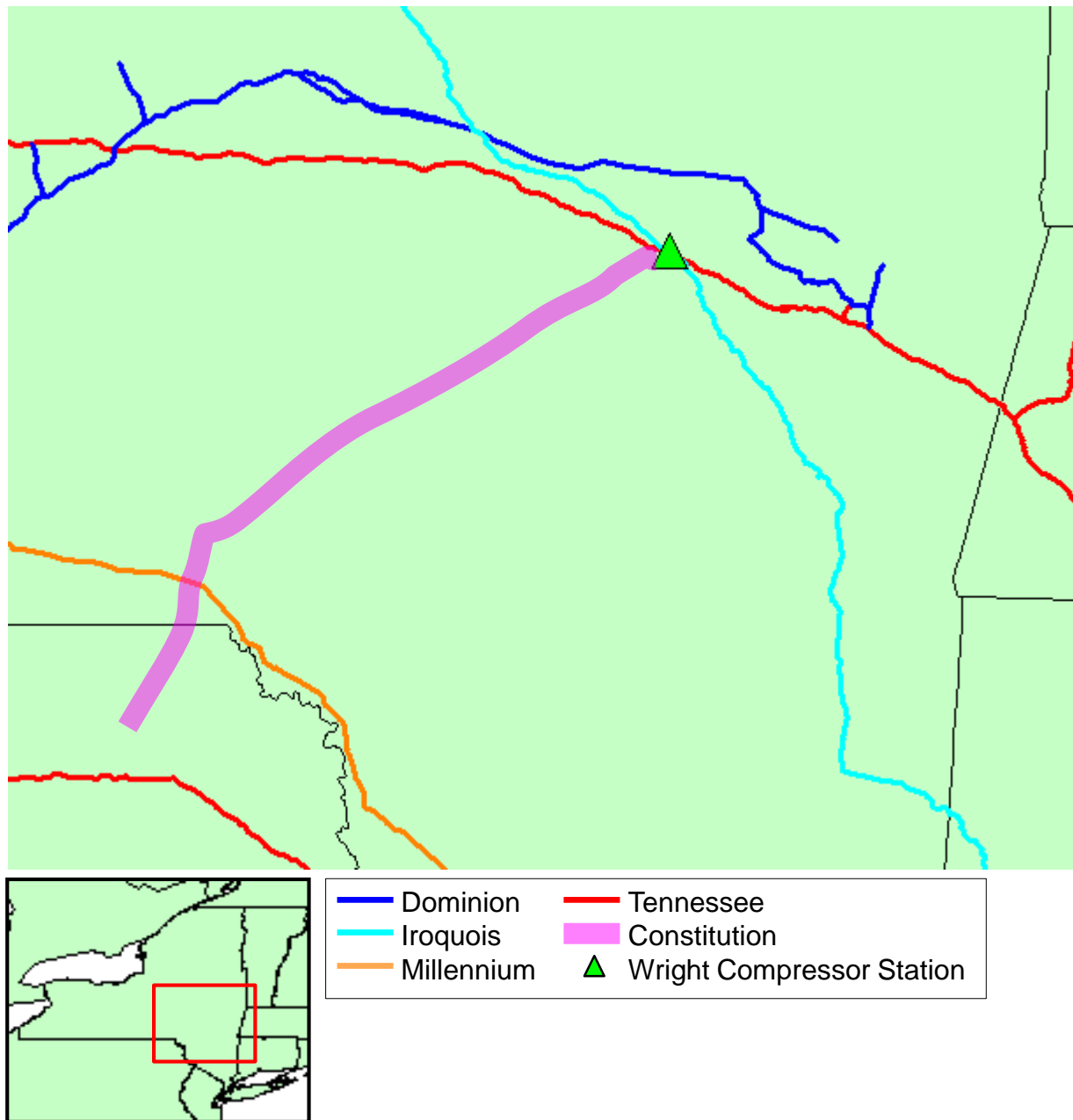


Figure A15-4. Constitution and Iroquois Expansion Project Facilities

Crossroads

One Crossroads project, the Unity Pipeline Diluent Project has been included in the RGDS. This project involves the conversion of the Crossroads pipeline, shown in Figure A15-5, from a natural gas transporter to diluent, or natural gas liquids, service as one component of a new pipeline system.²⁶ The project’s open season notice reports an anticipated mid-2015 in-service date for the liquids pipeline.

²⁶ <http://www.unitypipeline.com/>

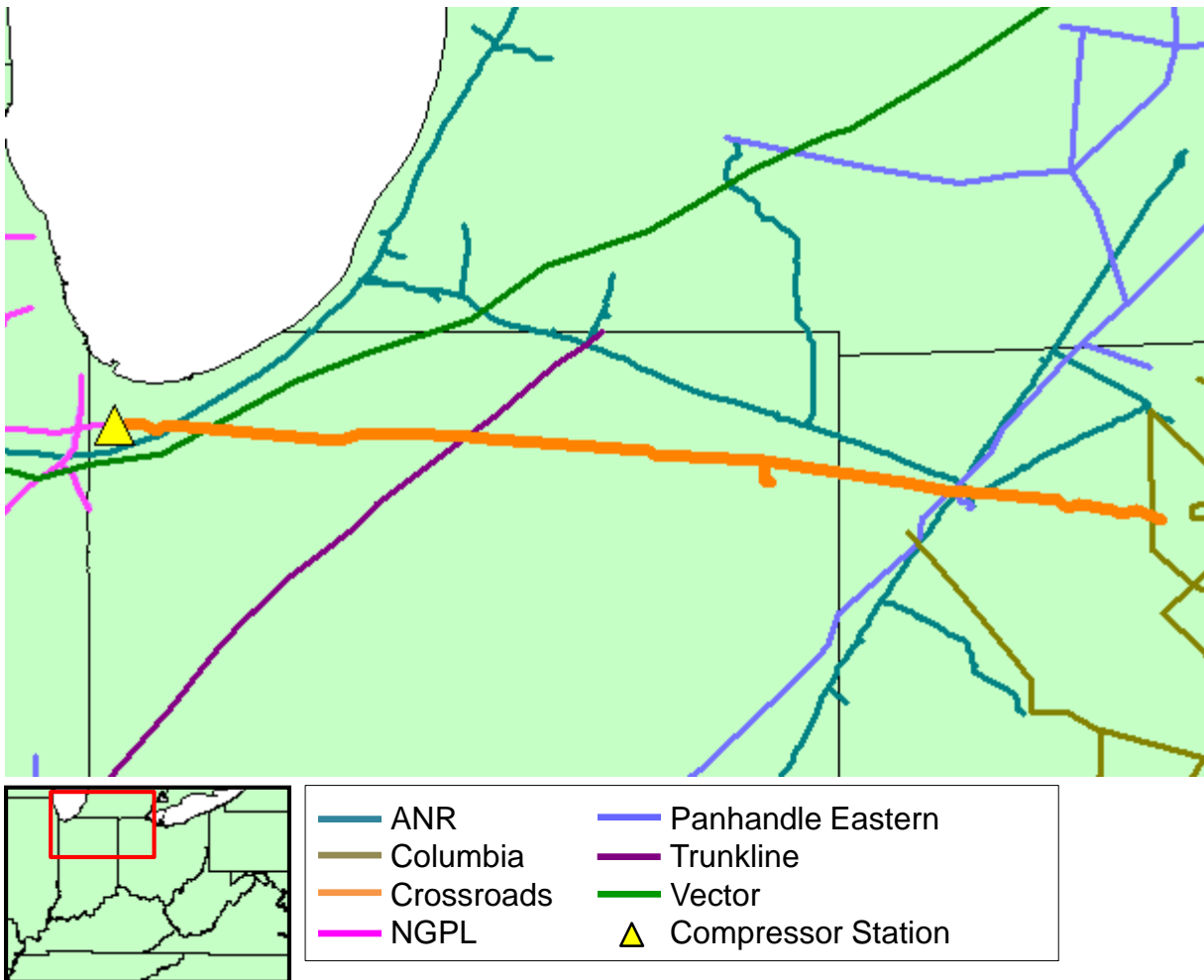


Figure A15-5. Location of Crossroads Facilities

Dominion

Three Dominion projects have been included in the RGDS: the Allegheny Storage Project, the Natrium to Market Project and the Clarington Project.²⁷ The known facilities associated with these projects are illustrated in Figure A15-6.

²⁷ Dominion’s New Market to Albany and Lebanon West Projects are included in S13 and summarized in Appendix 19.

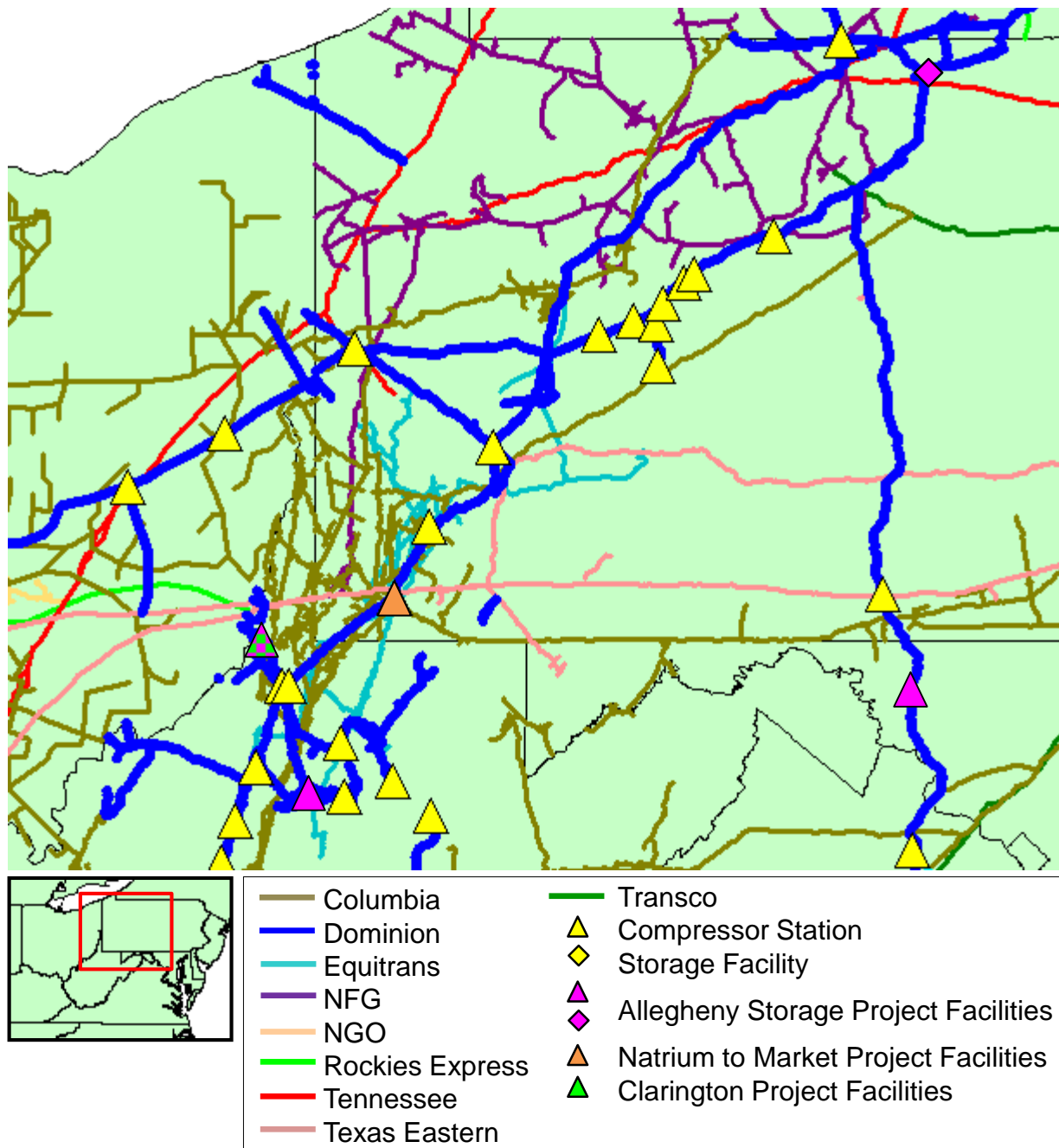


Figure A15-6. Dominion Expansion Project Facilities

The Allegheny Storage Project will enable Dominion to provide a total of 115 MDth/d of incremental firm transportation service and 125 MDth/d of incremental storage service to three LDCs in PJM (Baltimore Gas & Electric, TW Phillips, and Washington Gas and Light), primarily through the addition of compression.^{28,29} The estimated total construction cost for the

²⁸ FERC Docket No. CP12-72

²⁹ TW Phillips contracted for 10 MDth/d of firm transportation capacity that did not require facility upgrades.

proposed facilities is \$112 million, the major components are listed in Table A15-8. The project is currently under construction for a November 1, 2014 in-service date.

Table A15-8. Allegheny Storage Project Costs

Project Component	Cost
Myersville Compressor Station: New station, 16,000 HP	\$61,089,151
Mullett Compressor Station: New station, 3,550 HP	\$26,538,362
Wolf Run Compressor Station: Incremental dehydration capability	\$ 3,262,925
Sabinsville Storage Station and Pool modifications	\$19,373,996
Meter station facilities	\$ 2,050,871

The Natrium to Market Project will enable Dominion to provide 185 MDth/d of incremental firm transportation from the Dominion Natrium processing facility in Marshall County, WV to an interconnection with Texas Eastern in Greene County, PA.³⁰ Four producers have executed precedent agreements for the full capacity: Chesapeake Energy Marketing, Inc., HG Energy, LLC, BP Energy Company and TOTAL Gas and Power North America, Inc. The project facilities, the major component of which is 7,700 HP of incremental compressor at the Crayne Compressor Station, are currently under construction for a November 1, 2014 in-service date. The total project cost is estimated to be \$41.7 million.

The Clarington Project will enable Dominion to transport 250 MDth/d from a producer interconnection in Marshall County, WV to new interconnections with Rockies Express and Texas Eastern in Monroe County, OH.^{31,32} The customer for the full volume of the project is CNX Gas Company, LLC. The incremental capacity will be created through incremental compression at two existing stations, detailed in Table A15-9, and other appurtenant facilities. The facilities are estimated to cost \$76.7 million, and the target in-service date for the project is November 1, 2016.

Table A15-9. Clarington Project Costs

Project Component	Cost
Burch Ridge Compressor Station: 6,130 HP and modifications	\$30,117,287
Mullett Compressor Station: 10,000 HP and modifications	\$29,622,371
Two new meter stations and pipeline connections	\$16,821,90

³⁰ FERC Docket No. CP13-13

³¹ FERC Docket No. CP14-496

³² This project has been previously referred to as the WV West Project. The project's open season notice was for up to 500 MDth/d, the other half of which was to be modeled as part of S13. Because the incremental 250 MDth/d is not included in the project as filed at FERC, it has been removed from S13.

Dominion Cove Point

One Dominion Cove Point expansion project, the Cove Point Liquefaction Project, has been included in the RGDS. This project includes modifications to an existing compressor station on the Dominion Cove Point pipeline that will enable up to 860 MDth/d to flow in from west to east on the existing pipeline facilities to serve the Cove Point LNG terminal's proposed export capability.³³ The LNG terminal's export customers – Pacific Summit Energy, LLC, which is a subsidiary of Sumitomo Corporation, and a U.S. subsidiary of GAIL (India) Limited – have also contracted for the corresponding transportation capacity on the pipeline. The pipeline facility modifications listed in Table A15-10 are expected to cost \$126.3 million, and the receipt point allocation at the time the certificate application was filed with FERC calls for 490 MDth/d to be received from Transco at Pleasant Valley and 360 MDth/d to be received at Loudoun, split evenly between Columbia and Dominion. The anticipated in-service date for the pipeline facilities is March 2017. The Environmental Assessment for the project was issued on May 15, 2014.

Table A15-10. Cove Point Liquefaction Project Costs

Project Component	Cost
Pleasant Valley Compressor Station: 62,500 HP and modifications	\$119,269,647
Pleasant Valley meter station modifications	\$ 4,916,713
Loudoun meter station modifications	\$ 2,106,175

³³ FERC Docket No. CP13-113

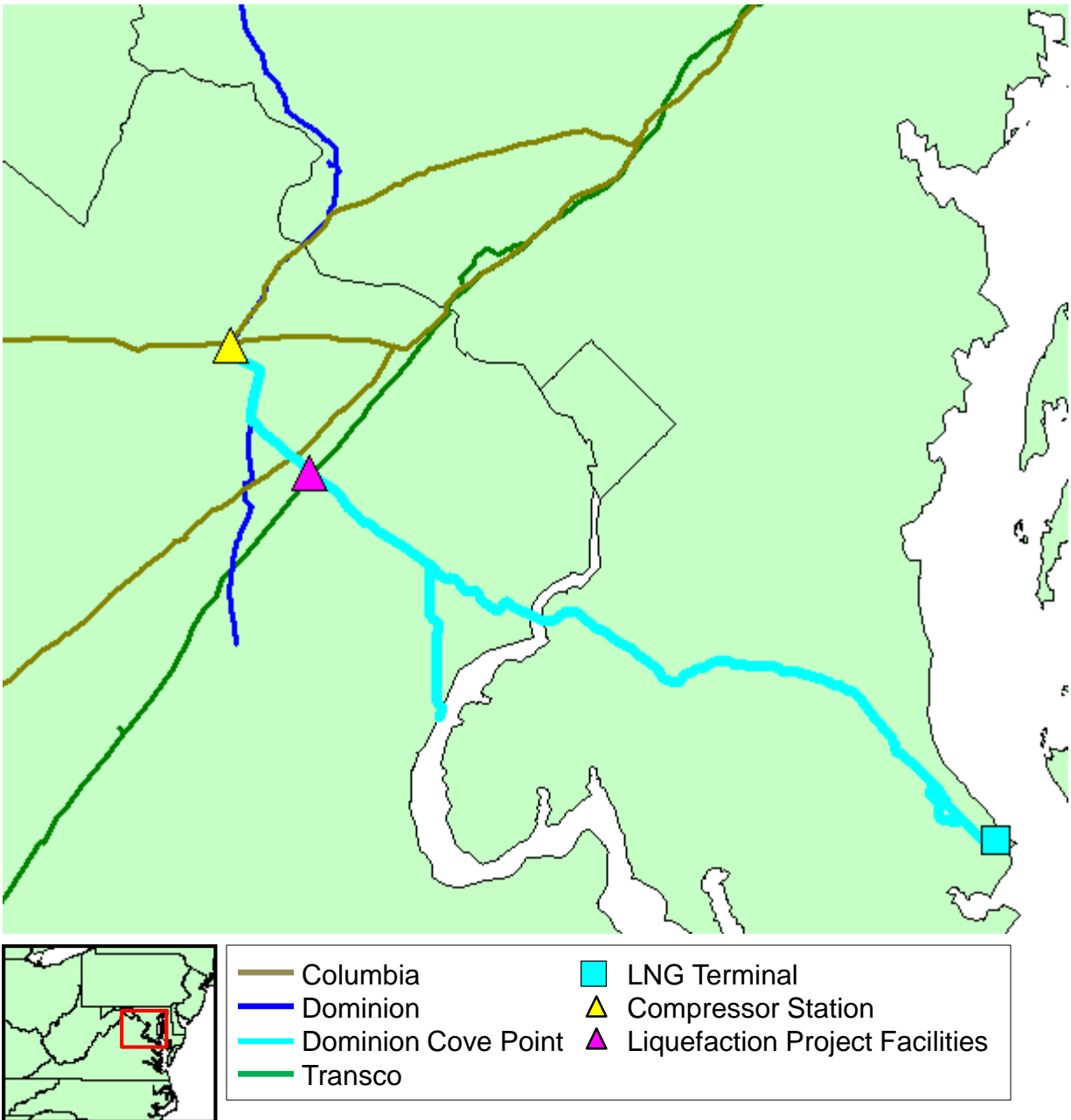


Figure A15-7. Dominion Cove Point Expansion Project Facilities

East Tennessee

Two East Tennessee projects have been included in the RGDS: the Kingsport Expansion project and the Wacker Project. The facilities associated with these projects are illustrated in Figure A15-8.

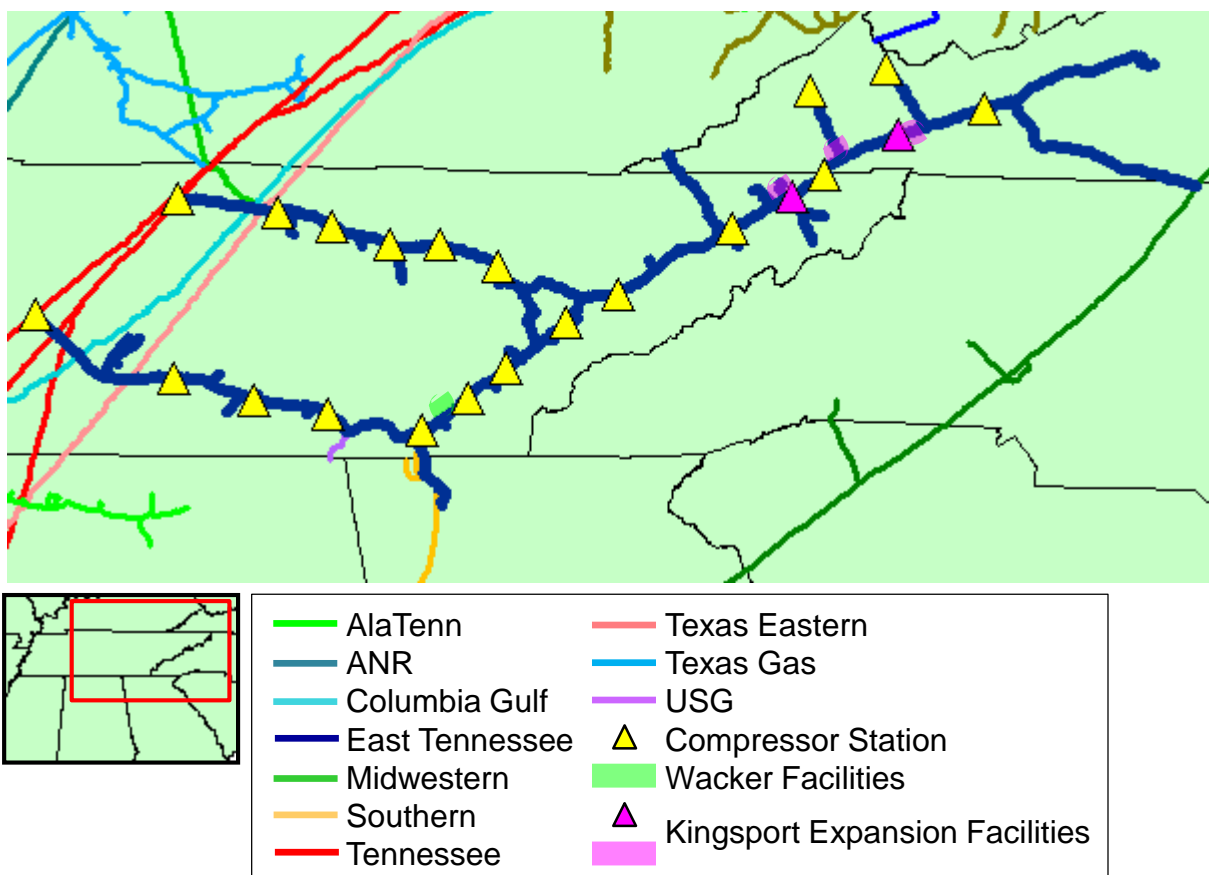


Figure A15-8. East Tennessee Expansion Project Facilities

The Wacker Project will enable East Tennessee to provide 5.7 MDth/d of firm transportation service to the new Wacker Polysilicon North America LLC manufacturing facility in Bradley County, TN, of which 3 MDth/d is existing unsubscribed capacity and 2.7 MDth/d is incremental capacity from East Tennessee’s Mount Pleasant interconnection with Texas Eastern.³⁴ The total project cost, broken down by component in Table A15-11, is estimated to be \$4.8 million. Facilities are currently under construction for a summer 2014 in-service date.

Table A15-11. Wacker Project Costs

Project Component	Cost
Lateral: 2,800 feet of 8” pipe ³⁵	\$2,248,645
New meter station and appurtenant facilities	\$2,526,523

The Kingsport Expansion Project is designed to provide 61 MDth/d of incremental firm transportation service to the Eastman Chemical Company from East Tennessee’s existing Cascade Creek interconnection with Transco to a new delivery point in Sullivan County, TN.³⁶

³⁴ FERC Docket No. CP12-484

³⁵ Following approval by FERC, the lateral route was adjusted to be 2,666 feet long, but an updated cost estimate was not provided with the re-route request.

³⁶ FERC Docket No. CP13-534

Eastman Chemical is converting the boilers at an existing chemical plant from coal to natural gas. Project facilities include loop line, new right-of-way and compression, as detailed in Table A15-12. The total estimated cost of the facilities, which is currently under construction for a January 1, 2015 in-service date, is \$113.5 million.

Table A15-12. Kingsport Expansion Project Costs

Project Component	Cost
Eastman Mainline Extension: 6.5 miles of 16" pipe	\$47,613,454
Glade Spring Relay: Replacement of 5.7 miles of 8" pipe with 24" pipe	\$35,233,535
Nora Line Loop: 3.3 miles of 16" pipe	\$21,357,149
Fordtown and Glade Spring Compressor Station modifications	\$ 3,645,782
New meter station and other appurtenant facilities	\$ 5,688,802

Eastern Shore

Two Eastern Shore projects have been included in the RGDS: the TETCO Supply Expansion Project and the White Oak Lateral Project. The facilities associated with these projects are illustrated in Figure A15-9.

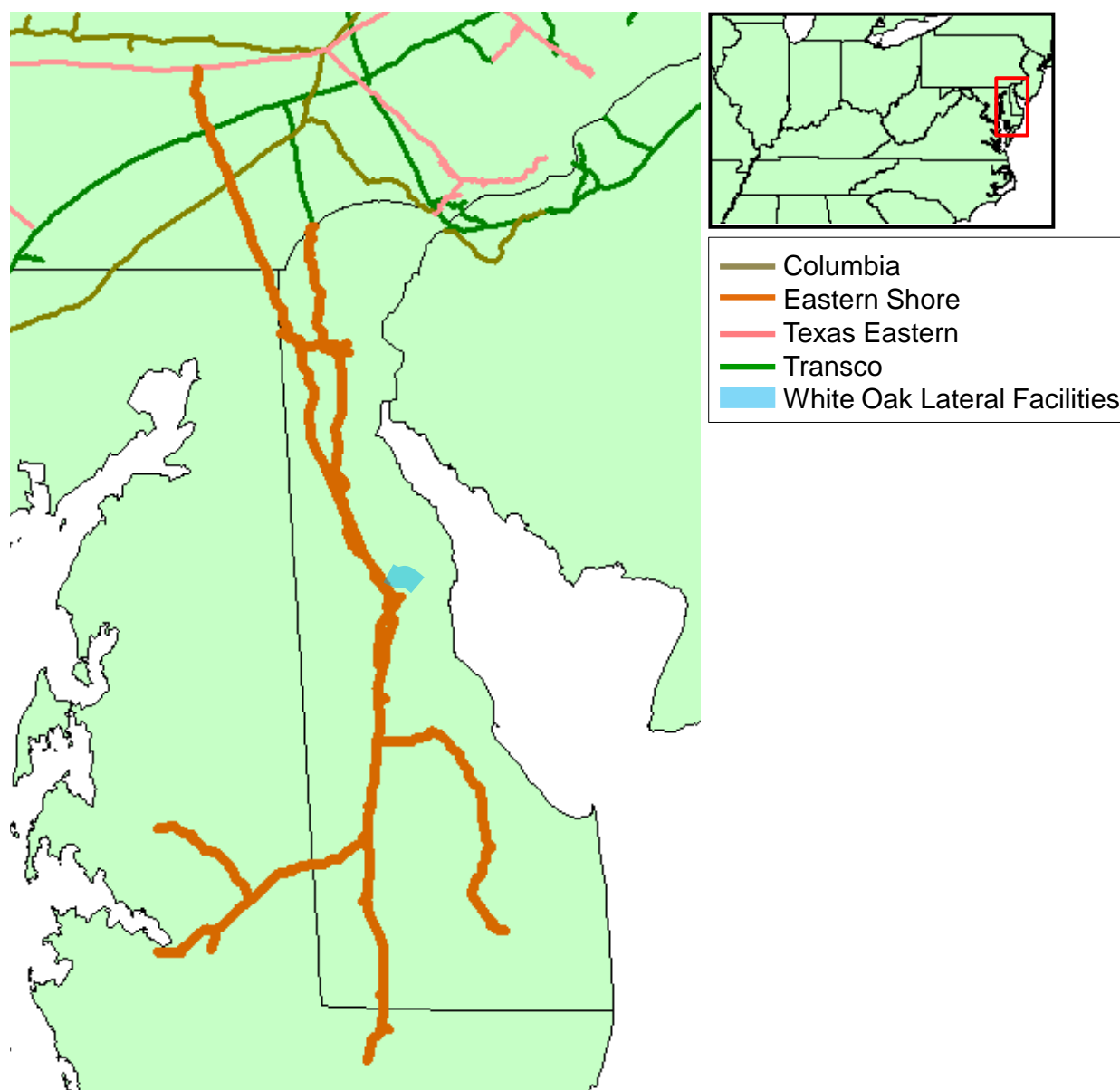


Figure A15-9. Eastern Shore Expansion Project Facilities

The TETCO Supply Expansion Project is designed to increase Eastern Shore's receipt capacity at the Honey Brook interconnect with Texas Eastern from 50 MDth/d to 107 MDth/d by the target in-service date of April 1, 2014.³⁷ This project, which requires only minor modifications to the existing interconnection facilities, allows the shipper, Delaware City Refinery Company, to have additional receipt point flexibility for its existing transportation contracts, but does not increase the delivery capacity of the Eastern Shore system. The estimated cost of the interconnection improvements is \$0.3 million.

³⁷ FERC Docket No. CP14-67

The White Oak Lateral Project will enable Eastern Shore to provide up to 55.2 MDth/d of firm lateral transportation service to Calpine Energy's Garrison Energy Center.³⁸ No upstream incremental transportation capacity is created through the construction of this project. The total project cost, including the 5.5-mile 16" lateral, is expected to be \$11.2 million. The project facilities are currently under construction for an October 1, 2014 in-service date.

Empire / NFG

The RGDS includes one joint Empire/NFG project, the Tuscarora Lateral Project, and three NFG projects: the Mercer Expansion Project, the Northern Access 2015 Project, and the West Side Expansion and Modernization Project.^{39,40} The facilities associated with these projects are illustrated in Figure A15-10.

³⁸ FERC Docket No. CP13-498

³⁹ Two additional NFG projects, the Line KNY and KM3 Replacement Project (FERC Docket No. CP14-107) and the Line TNY Replacement Project (FERC Docket No. CP14-89), are scheduled to come online in September and October 2014, respectively, but will not create any incremental capacity.

⁴⁰ Empire's Central Tioga County Extension and Clermont to Chippawa Projects and NFG's Clermont to Transco Project are included in S13 and summarized in Appendix 19.

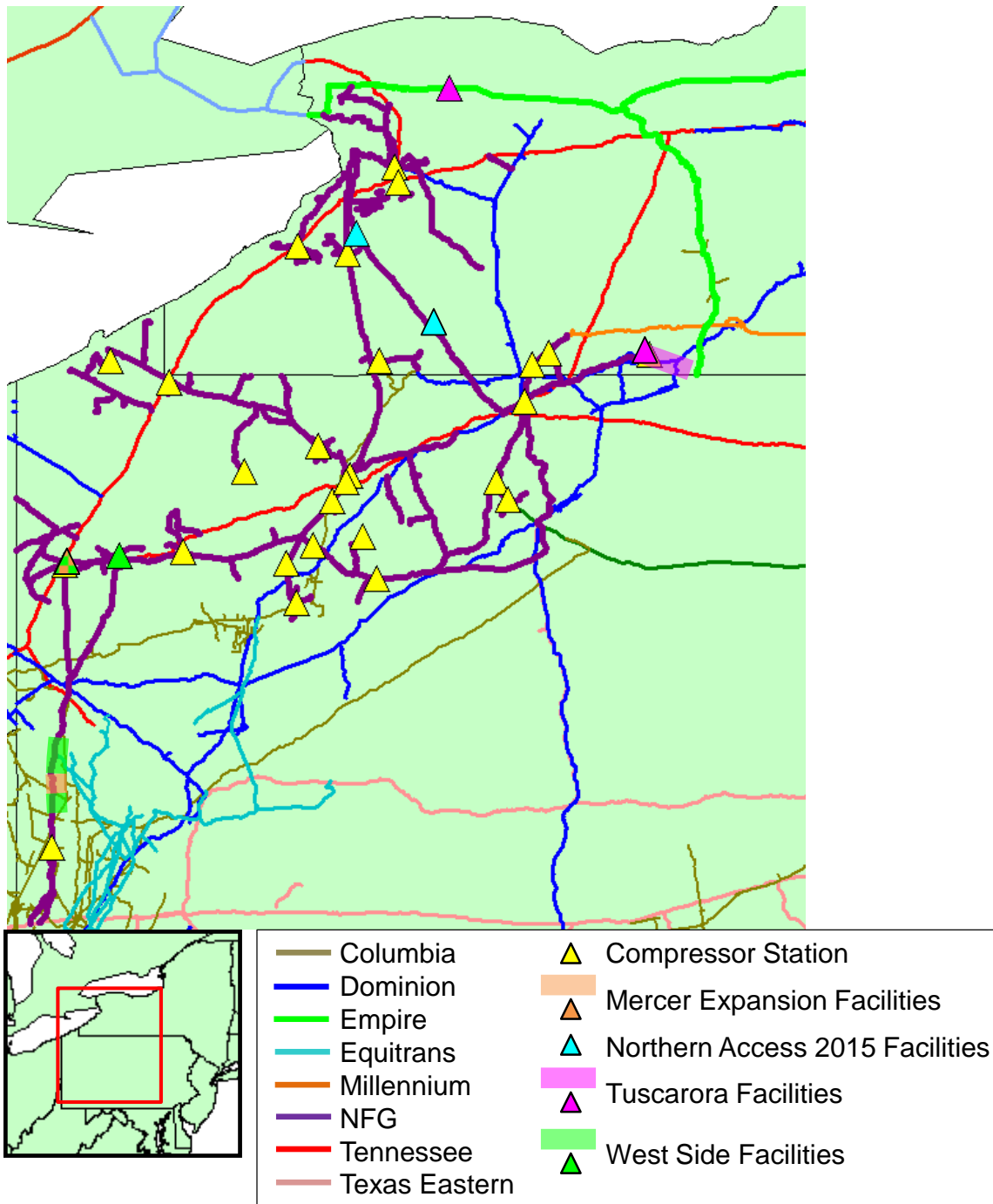


Figure A15-10. Empire / NFG Expansion Project Facilities

The Tuscarora Lateral Project involves the construction of a new 17-mile lateral between the NFG and Empire.⁴¹ By leasing facilities from NFG, Empire will be able to offer firm no-notice and storage service to New York State Electric & Gas and Rochester Gas & Electric, both LDCs operating in New York. The total estimated

⁴¹ FERC Docket No. CP14-112

cost of the project is \$34.1 million, most of which is related to construction of the lateral, as shown in Table A15-13. The project is currently under FERC review, for a November 1, 2015 in-service date.

Table A15-13. Tuscarora Lateral Project Costs

Project Component	Cost
Tuscarora Lateral: 16.35 miles of 12" pipe and 0.77 miles of 16" pipe	\$30,068,659
Oakfield Compressor Station modifications	\$ 1,500,000
New meter station	\$ 2,493,280

The Mercer Expansion Project will allow NFG to provide 105 MDth/d of incremental firm transportation service to a Marcellus shale producer from a receipt point in southwestern Pennsylvania to a new interconnection with Tennessee in Mercer County, PA.⁴² The estimated project costs are listed in Table A15-14, the total cost is expected to be \$30.4 million. The facilities are currently under construction for a November 1, 2014 in-service date.

Table A15-14. Mercer Expansion Project Costs

Project Component	Cost
Pipeline: Replacement of 2.05 miles of 20" pipe with 24" pipe	\$ 5,800,000
Mercer Compressor Station: New station, 3,550 HP	\$21,500,000
Interconnection facilities	\$ 3,100,000

The Northern Access 2015 Project involves the creation of 140 MDth/d of incremental capacity between two interconnections with Tennessee that will be subsequently leased to Tennessee in conjunction with the Niagara Expansion Project.⁴³ The project facilities, listed in Table A15-15, are expected to cost \$65.7 million. The project is currently under review by FERC for a November 1, 2015 in-service date, with issuance of the Environmental Assessment currently scheduled for mid-July 2014.

Table A15-15. Northern Access 2015 Project Costs

Project Component	Cost
Hinsdale Compressor Station: New station, 15,400 HP	\$42,573,859
Concord Compressor Station: 7,700 HP and modifications	\$21,819,292
East Eden interconnection modifications	\$ 1,352,650

The West Side Expansion and Modernization Project will enable NFG to provide 175 MDth/d of incremental capacity between production receipt points and interconnections with Tennessee at Mercer and Texas Eastern at Holbrook.⁴⁴ Two producers have executed precedent agreements for project capacity: Range Resources – Appalachia, LLC (145 MDth/d) and Seneca Resources Corporation (30 MDth/d). The incremental capacity is created by upsizing the pipe as part of NFG's ongoing maintenance and replacement program. The total cost of the project

⁴² FERC Docket No. CP13-530

⁴³ FERC Docket No. CP14-100

⁴⁴ FERC Docket No. CP14-70

components, which is listed in Table A15-16, is expected to be \$76.1 million. The target in-service date, is November 1, 2015.

Table A15-16. West Side Expansion and Modernization Project Costs

Project Component	Cost
Line N Pipeline: Replacement of 23.23 miles of 20" pipe with 24" pipe	\$65,233,035
Mercer Compressor Station: 3,550 HP and modifications	\$10,240,433
Henderson Compressor Station modifications	\$ 649,219

Enable

The Central Arkansas Pipeline Enhancement Project, which will modernize segments of Enable's system to ensure continued reliable service to existing customers and has an October 2014 target in-service date, has not been included in the RGDS because no incremental capacity is created.

Equitrans

Four Equitrans projects have been included in the RGDS: the H-164 Pipeline Project, the H-305 Pipeline Project, the Jefferson Compressor Station Expansion Project and the West Update and Blacksville Compressor Station Expansion Project.⁴⁵ The known facilities associated with these projects are illustrated in Figure A15-11.

⁴⁵ Equitrans' Ohio Valley Connector Project has been included in S13 and is summarized in Appendix 19.

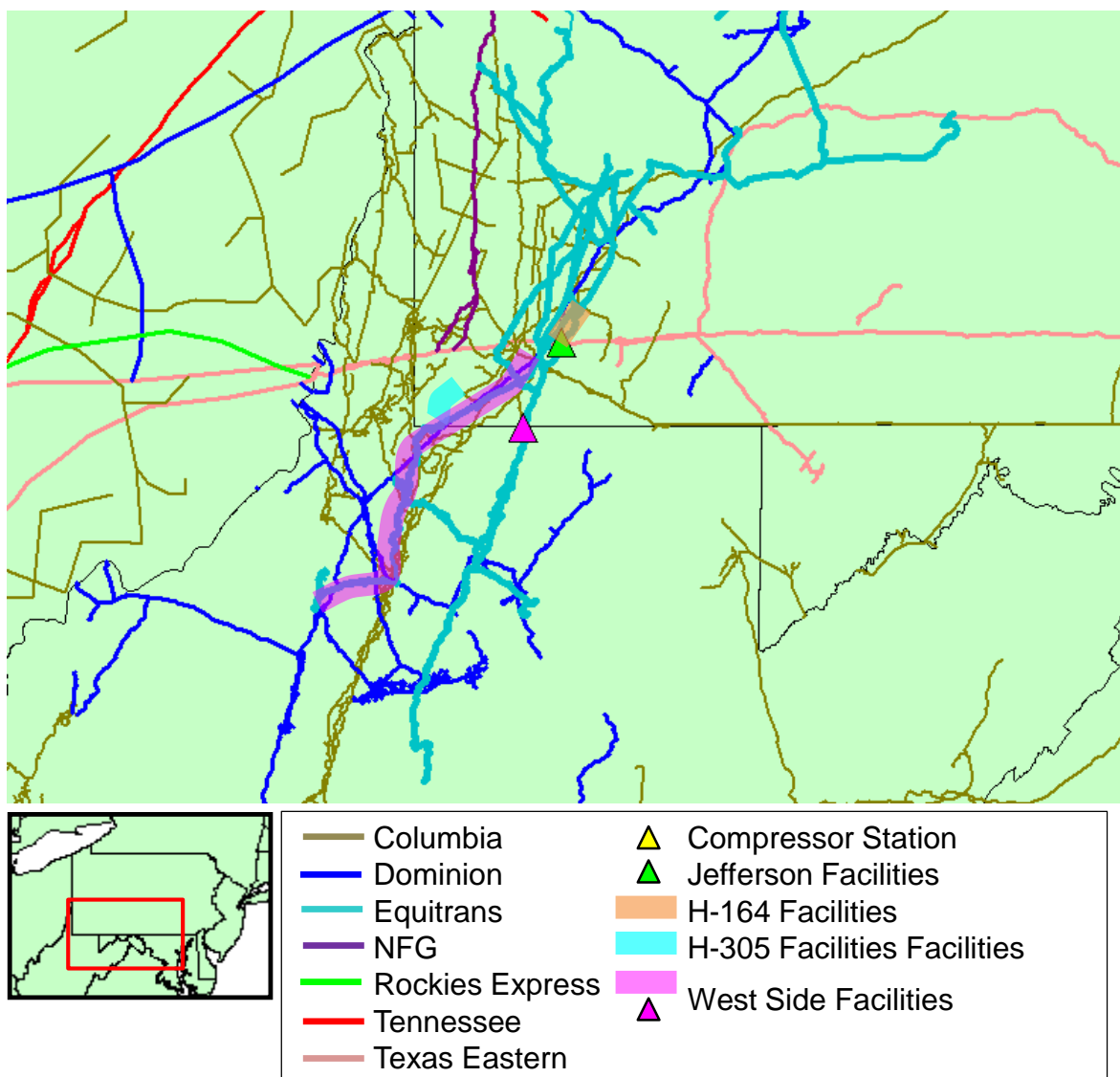


Figure A15-11. Equitrans Expansion Project Facilities

The Jefferson Compressor Station Expansion Project involves the addition a 12,913 HP to the Jefferson Compressor Station in Greene County, PA, allowing the station to increase its throughput capacity by approximately 600 MDth/d.⁴⁶ One shipper has signed a precedent agreement for 295 MDth/d. The cost of the incremental horsepower and related facilities is estimated to be \$30.8 million. The project is currently under construction for an in-service date in the third quarter of 2014.

The H-164 Pipeline Project will enable Equitrans to transport 475 MDth/d on a new 3.3-mile 12” line in Greene County, PA between the Jupiter Gathering System and the Morris interconnection

⁴⁶ FERC Docket No. CP13-547

with Texas Eastern.⁴⁷ The project facilities are estimated to cost \$11.1 million and targeted to be in service on October 15, 2014.

The H-305 Pipeline Project will enable Equitrans to transport 100 MDth/d between the Jupiter Gathering System in Greene County, PA and the Braden Run interconnection with Texas Eastern.⁴⁸ One-half of the contracted capacity will be new, created by the construction of a 3.4-mile 24” pipe between the Jupiter Gathering System and the Braden Run interconnection. The new line is estimated to cost \$13.8 million. The projected in-service date is November 15, 2014.

For the West Uprate and Blacksville Compressor Station Expansion Project, Equitrans proposes to increase the MAOP of several segments from 605 psig to 655 psig and install two additional units totaling 9,470 HP and related modifications at the Blacksville Compressor Station in Monongalia County, WV.⁴⁹ These facilities will create up to 100 MDth/d of incremental capacity on the Equitrans mainline for delivery to interconnections with Dominion and Texas Eastern. The cost of the facilities is estimated to be \$26.6 million, and the target in-service date is December 31, 2014.

Great Lakes

The Great Lakes MAOP Reduction Project has been included in the RGDS. The project includes a reduction in the operating pressure of the Great Lakes system between the Canada/US border and Compressor Station 5 in Minnesota that will reduce summer and winter daily design capacity by 193 MDth/d and 229 MDth/d, respectively.⁵⁰ The location of the derated segment is shown in Figure A15-12. Due to system decontracting, which occurs when transportation contracts end and are not renewed or picked up by another shipper, the de-rate is not expected to affect Great Lakes’ ability to meet firm customer demands. The de-rate will be temporary for three years while Great Lakes determines whether market conditions warrant maintaining certificated capacity levels or permanent abandonment of the capacity.

⁴⁷ FERC Docket No. CP14-90

⁴⁸ FERC Docket No. CP14-130

⁴⁹ FERC Docket No. CP14-492

⁵⁰ FERC Docket No. CP14-116

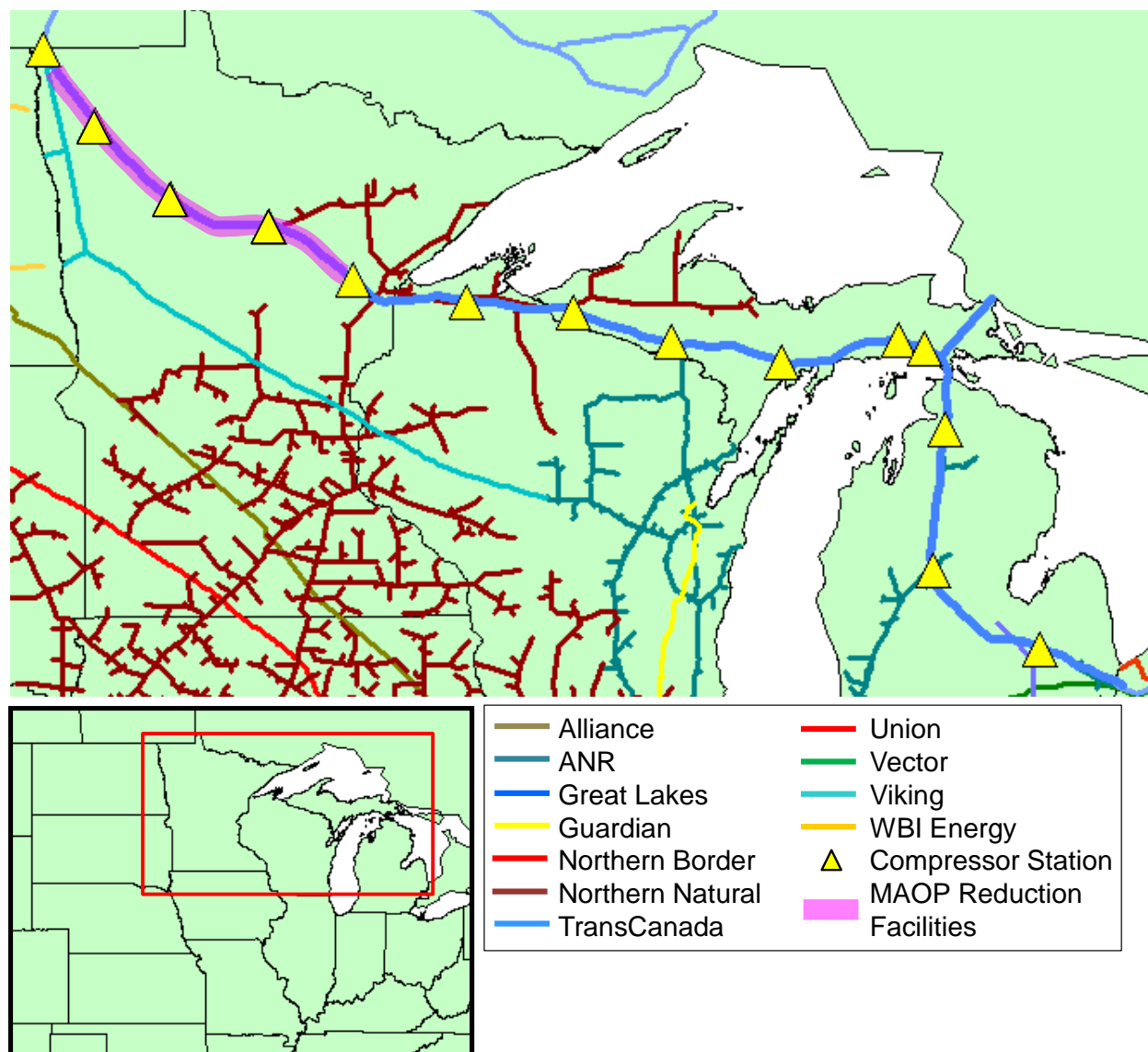


Figure A15-12. Great Lakes MAOP Reduction Project Facilities

Gulf Crossing Pipeline

Gulf Crossing’s Panda Power Lateral Project was previously targeted for inclusion in the RGDS. However, the lateral and power plant served by the lateral are outside of the Study Region, and no incremental upstream capacity is created.⁵¹ The project has therefore not been included in the RGDS.

⁵¹ FERC Docket No. CP13-64

Gulf South

Gulf South’s Southeast Market Expansion Project has been included in the RGDS. This project involves the construction of 70 miles of new pipe and the lease of existing capacity on the Petal Gas Storage system to transport gas produced in Texas, Oklahoma and Louisiana to southeast markets.⁵² The new facilities to be constructed for this project are illustrated in Figure A15-13. The estimated cost of building the facilities to provide 510.5 MDth/d of capacity to the project shippers is \$283.8 million. Four shippers have contracted for the full project capacity, Gulf South describes them as electric power generators and industrial end-users. The new facility components of the project are listed in Table A15-17.

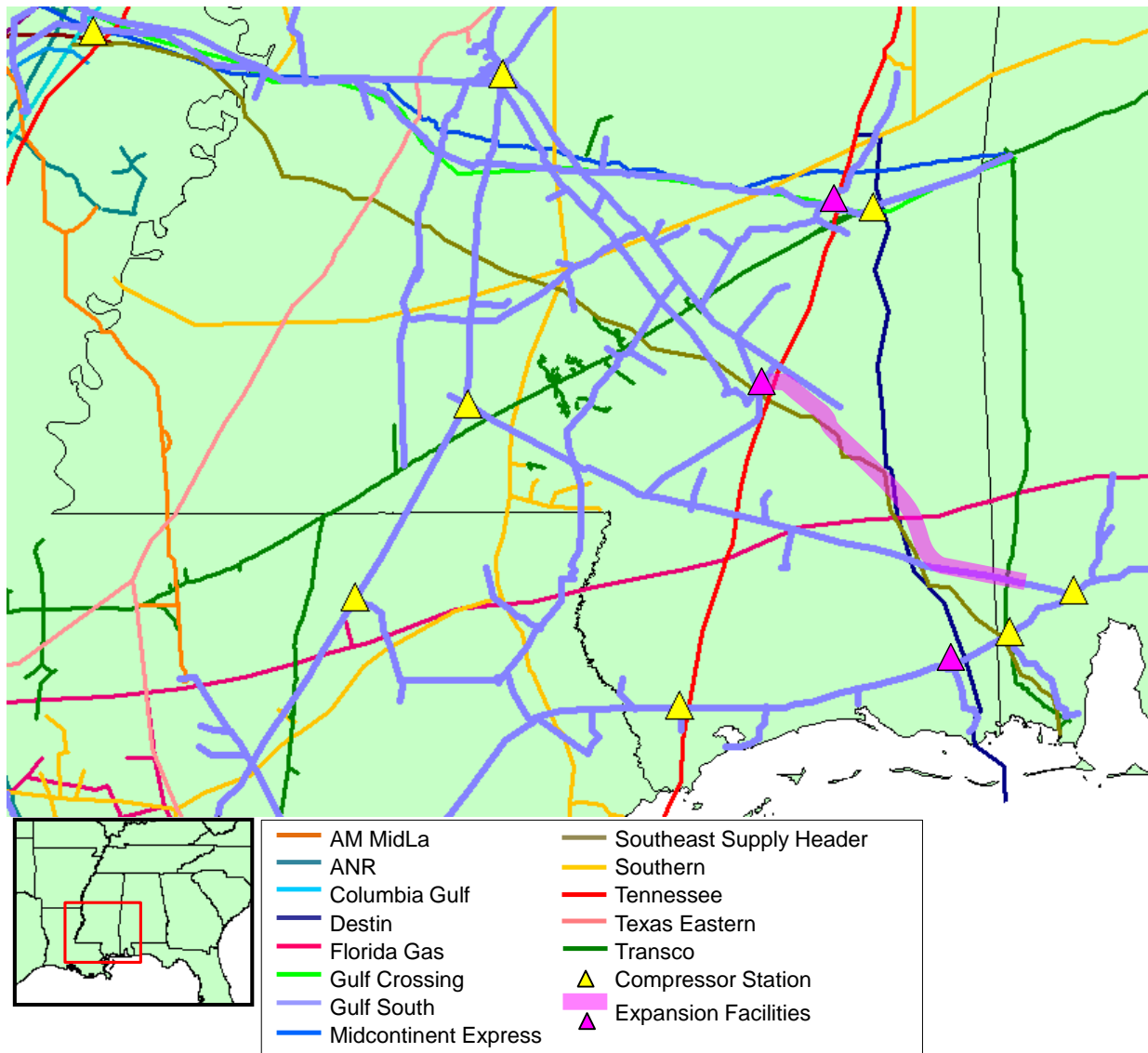


Figure A15-13. Gulf South Expansion Project Facilities

⁵² FERC Docket No. CP13-96

Table A15-17. Southeast Market Expansion Project Costs

Project Component	Cost
Pipeline: 42 miles of 30" pipe and 28 miles of 24" pipe	\$201,148,000
Jasper Compressor Station: New station, 15,900 HP	\$ 30,091,000
Forrest Compressor Station: New station, 15,900 HP	\$ 31,539,000
Moss Point Compressor Station: 2,415 HP and modifications	\$ 13,690,000
Other related facilities: Interconnection and tie-in	\$ 7,377,000

Midwestern

Midwestern's MGT Lateral was previously announced for inclusion in the RGDS. However, the project, which involved a new lateral to serve a power plant in Paradise, KY, has been withdrawn from the FERC pre-filing process due to notification from the customer that the lateral was no longer needed.^{53,54} This project has therefore not been included from the RGDS.

NGPL

NGPL's 2012 Storage Optimization Project has been included in the RGDS.⁵⁵ This project involves incremental compression at an existing station in Iowa and a new compressor station in Illinois, as shown in Figure A15-14, along with abandonment of selected units at two other existing compressor stations.⁵⁶ NGPL will also reduce cushion gas inventory at a storage field in Texas by 5 Bcf and retain the cushion gas capacity for pipeline operational needs. The new compressor station will increase capacity of the Gulf Coast Mainline in Illinois by 100 MDth/d. The total cost of the facilities is expected to be \$57.5 million, as shown in Table A15-18. The project is currently under construction for a November 2014 in-service date.

⁵³ FERC Docket No. PF14-9

⁵⁴ Midwestern's Arsenal Road Project (FERC Docket No. CP14-26), which will be placed into service in Q2 2014, has not been included because it involves a pipe segment relocation to accommodate highway construction and will not create any incremental capacity.

⁵⁵ NGPL's Gulf Coast Market Expansion Project is included in S13 and summarized in Appendix 19.

⁵⁶ FERC Docket No. CP11-547

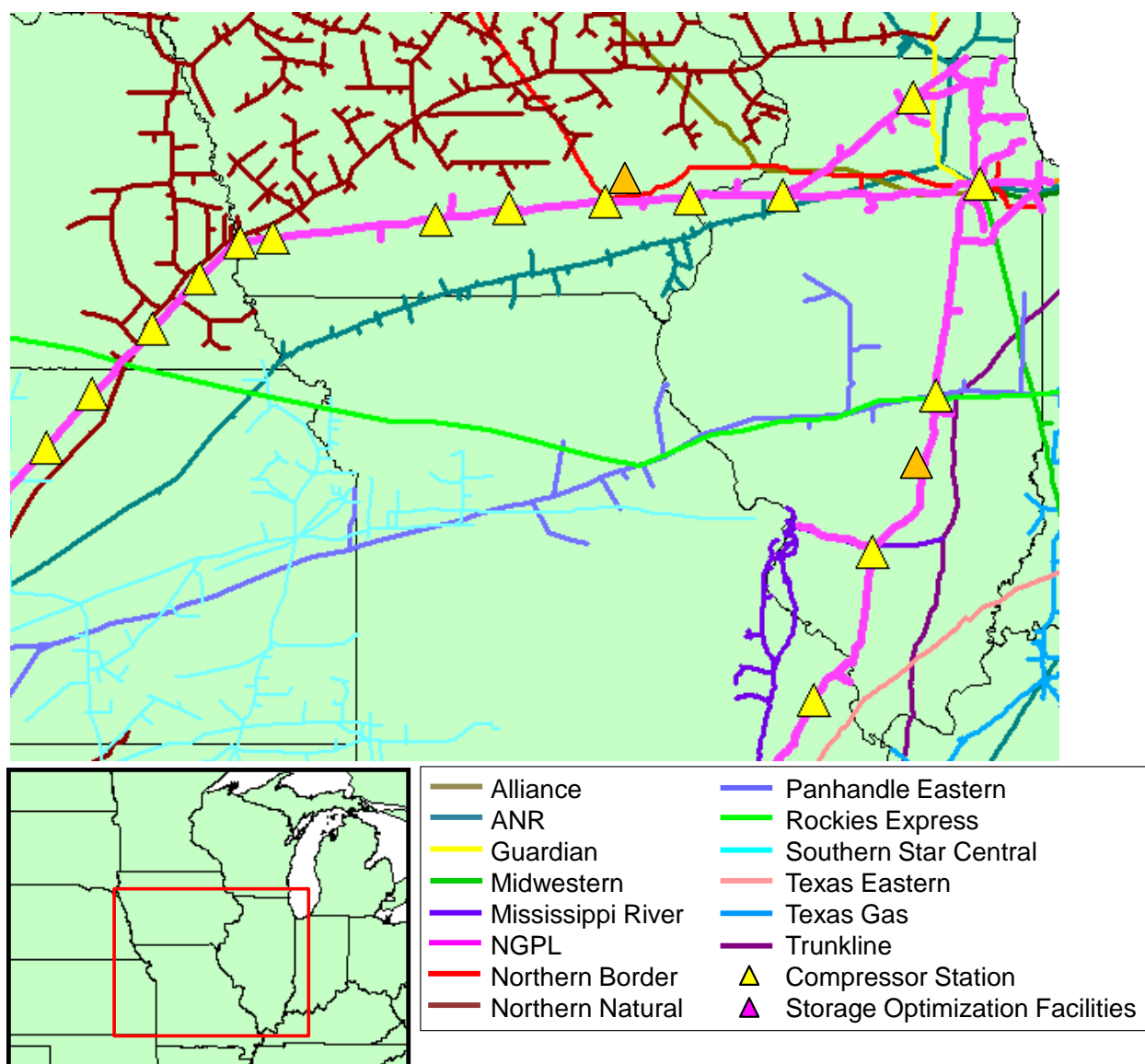


Figure A15-14. NGPL Expansion Project Facilities

Table A15-18. 2012 NGPL Storage Optimization Project Costs

Project Component	Cost
Compressor Station 205: 3,550 HP and modifications	\$12,338,821
Compressor Station 206A: New station, 22,000 HP	\$45,247,018

Northern Natural

Northern Natural’s West Leg 2014 Project, which is designed to increase transportation capacity for market area customers, has been included in the RGDS.⁵⁷ The project facilities are illustrated in Figure A15-15. The facilities will provide for a total of 88.4 MDth/d of incremental winter peak day firm service, which has been contracted by CF Industries Nitrogen LLC, and industrial

⁵⁷ FERC Docket No. CP13-528

customer (88 MDth/d), and Interstate Power and Light, an LDC (0.4 MDth/d). The project facilities are currently under construction for a November 1, 2014 in-service date.

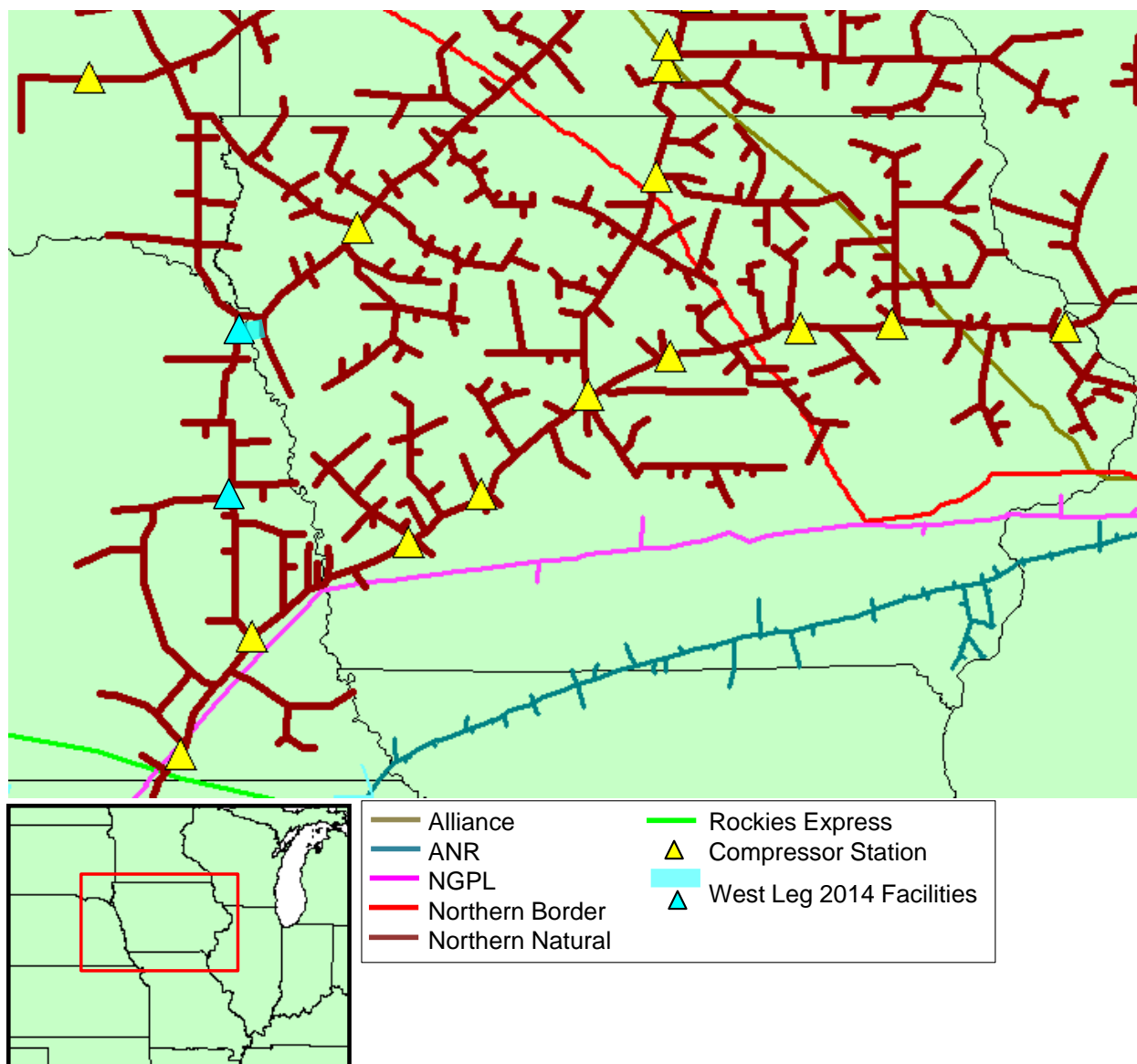


Figure A15-15. Northern Natural Expansion Project Facilities

Table A15-19. West Leg 2014 Project Costs

Project Component	Cost
Fremont Compressor Station: New station, 4,700 HP	\$18,015,126
Homer Compressor Station: New station, 9,480 HP	\$32,923,975
Pipelines: 1.17 miles of parallel 24" pipe	\$19,224,180
New meter station	\$ 717,121

Rockies Express

Rockies Express’s Seneca Lateral Project has been included in the RGDS. This project involves the construction of a new 14.3-mile lateral connecting the Rockies Express mainline with a gas processing plant in Noble County, OH, and with a new 3,730 HP compressor station.⁵⁸ These facilities will be able to transport up to 250 MDth/d of natural gas into the Rockies Express mainline for redelivery in Ohio, Indiana and Illinois. The locations of the lateral and compressor station are shown in Figure A15-16. The estimated cost of constructing the project facilities is \$75 million. The project is currently under construction.

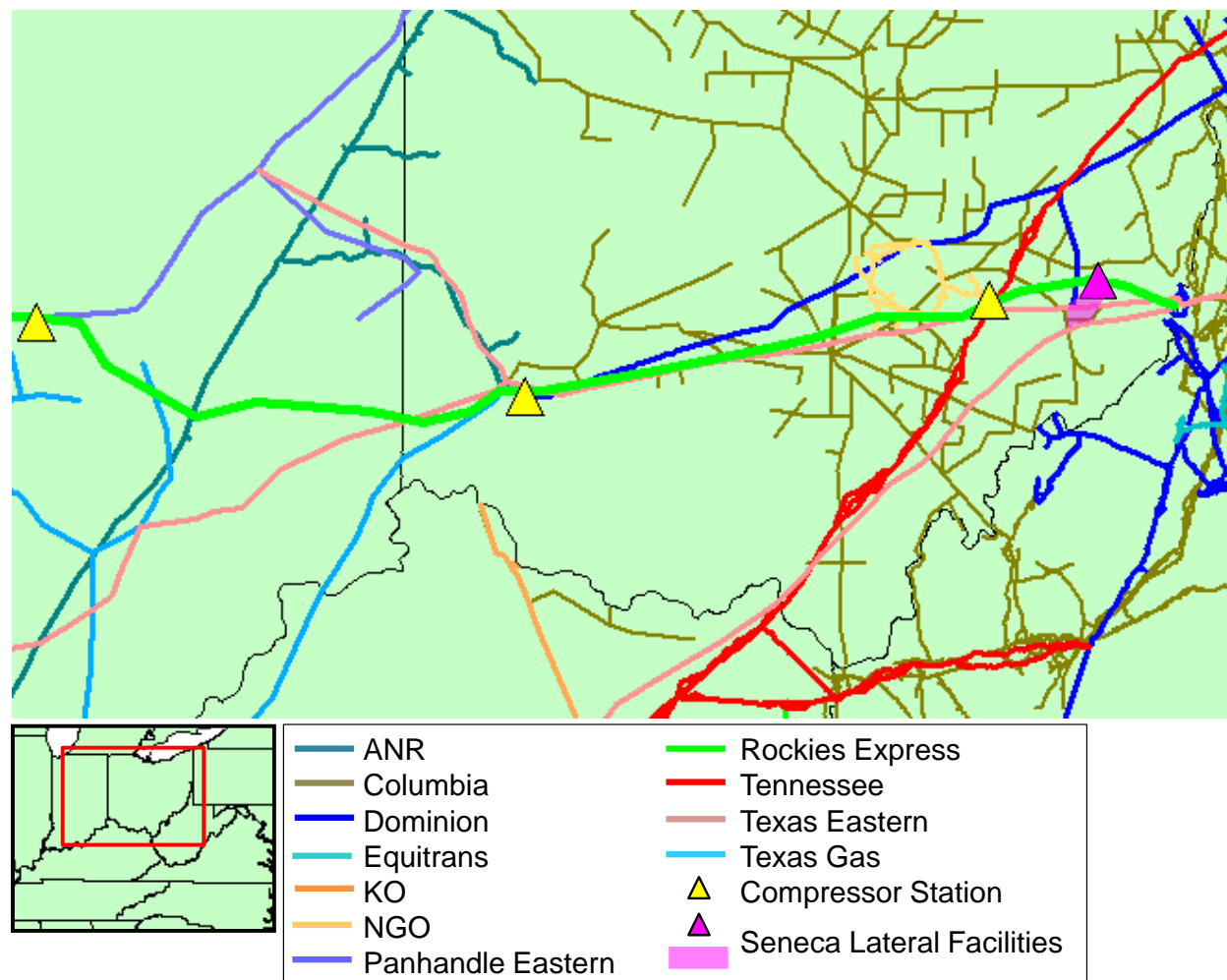


Figure A15-16. Rockies Express Expansion Project Facilities

Sabal Trail

The new Sabal Trail pipeline has been included in the RGDS. This new pipeline, a joint venture between affiliates of Spectra Energy and NextEra Energy, will extend 460 miles from an interconnection with Transco in Tallapoosa County, AL to the new Central Florida Hub, as

⁵⁸ FERC Docket No CP13-539

illustrated in Figure A15-17. Project facilities include the lease of the capacity created by Transco’s Hillabee Expansion Project, 460 miles of 36” mainline, 14 miles of 36” pipe to an interconnection with Florida Gas, and five new compressor stations. The project’s 1,100 MDth/d capacity is scheduled to begin operation in phases: Phase 1 for 800 MDth/d in May 2017, Phase 2 for 200 MDth/d in May 2020 and Phase 3 for 100 MDth/d in May 2021. Sabal Trail is currently undergoing environmental review through the FERC pre-filing process. Although the project’s facilities are outside the Study Region, it is included due to boundary flow effects.

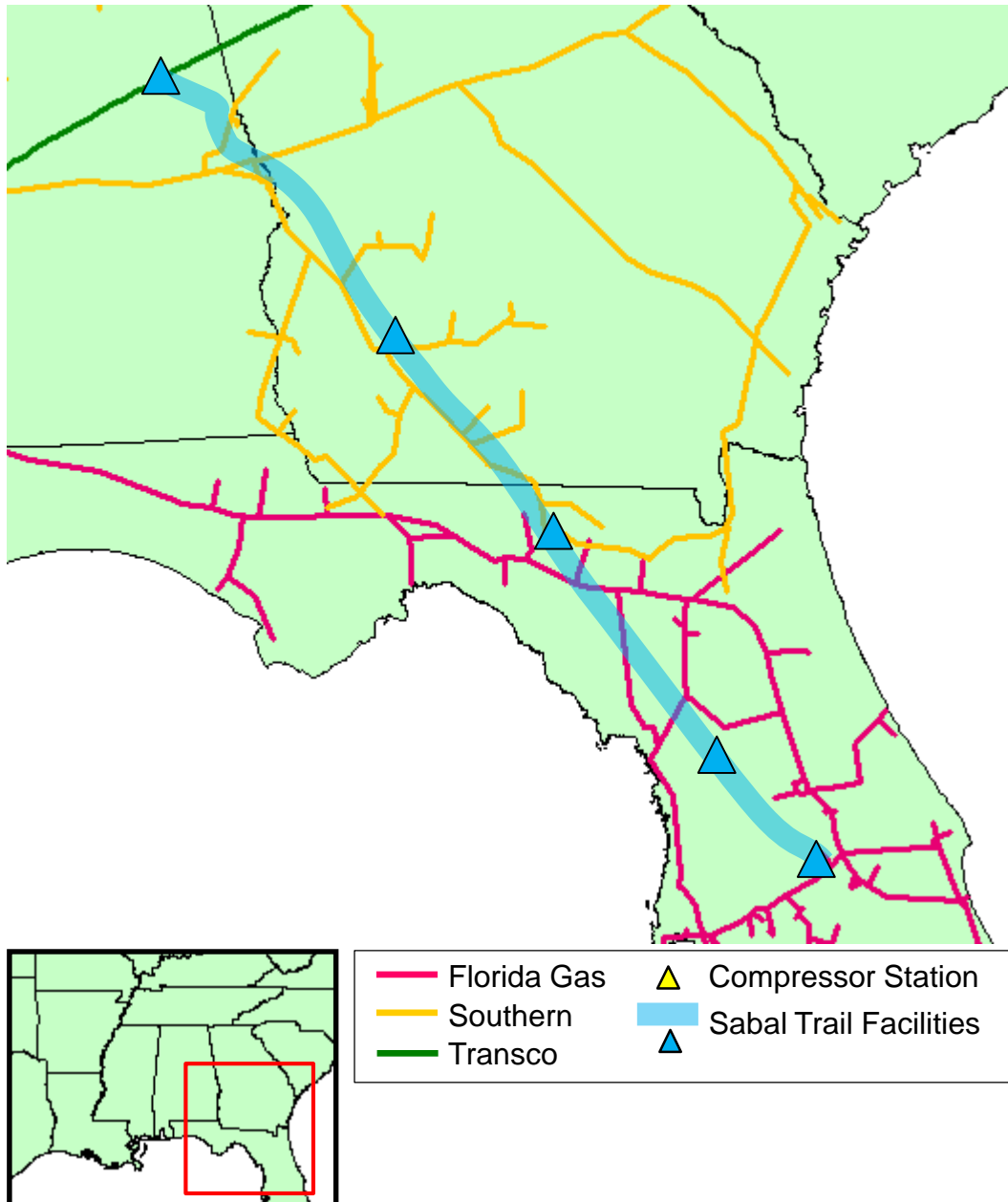


Figure A15-17. Sabal Trail Pipeline Facilities

Southeast Supply Header

The Southeast Supply Header's SESH Expansion Project has been included in the RGDS. This project will expand the capacity of the Southeast Supply Header mainline by 45 MDth/d based on a receipt point pressure commitment from Enable at an existing interconnection and the construction of a new compressor station.⁵⁹ Southern Company has executed a precedent agreement for 25 MDth/d of the project's capacity, and the remaining 20 MDth/d will be available for subscription under the tariff. The total project cost is estimated to be \$48 million, as shown in Table A15-20. The term of Southern Company's contract begins on September 1, 2015, and the new compressor station is expected to be in place by November 1, 2015.

Table A15-20. SESH Expansion Project Costs

Project Component	Cost
Pipeline: 4,000 feet of 20" pipeline connecting the compressor station	\$ 4,521,672
Dentville Compressor Station: New station, 8,000 HP	\$43,355,148

⁵⁹ FERC Docket No. CP14-87

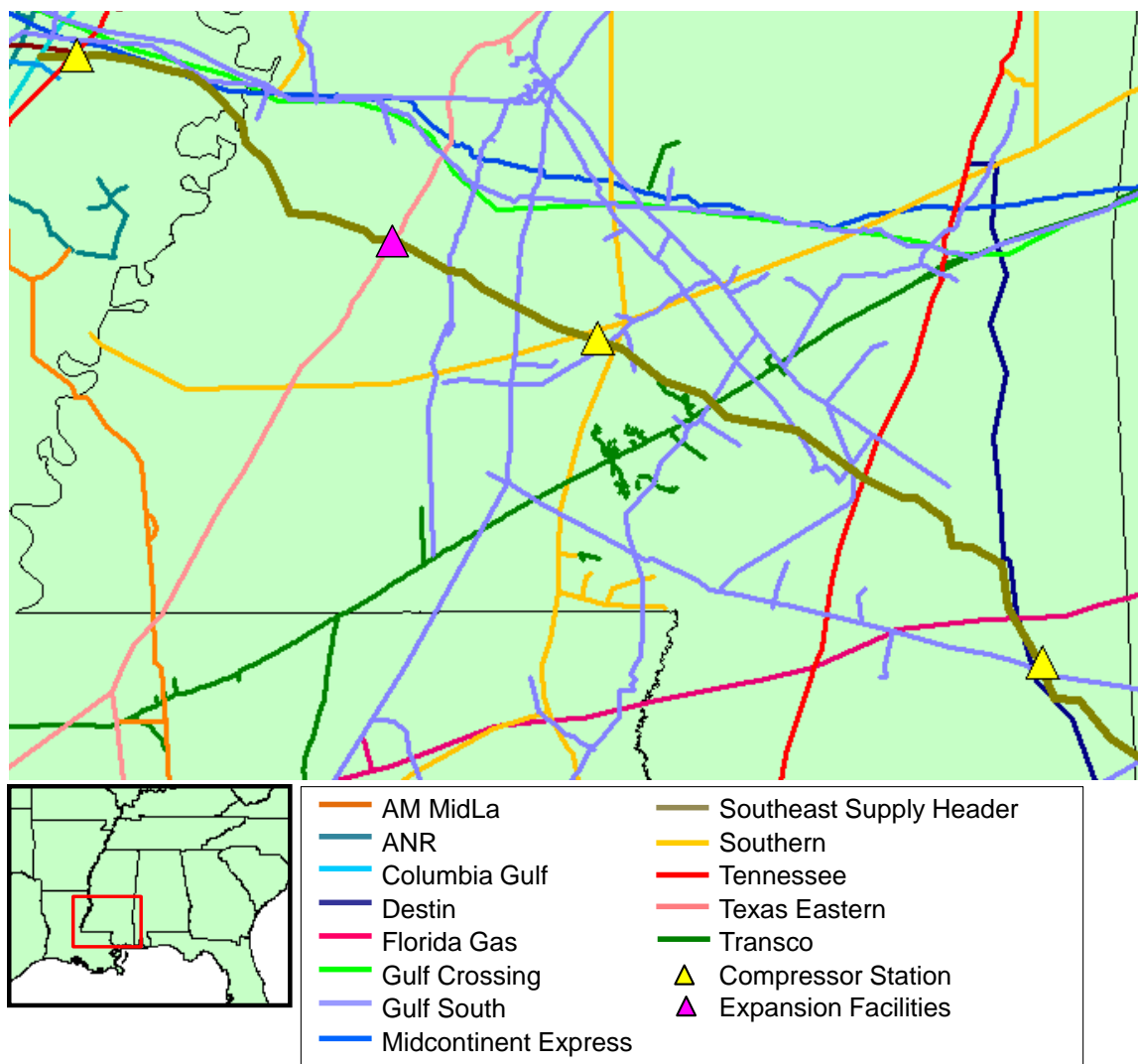


Figure A15-18. Southeast Supply Header Expansion Project Facilities

Southern

Southern’s Zone 3 2016 Expansion Project has been included in the RGDS. This project will create 235 MDth/d of incremental capacity from Elba Express’s interconnections with Transco to delivery points on Southern’s pipeline system.⁶⁰ Project facilities include a pipeline loop and 13,400 of total incremental system compression. Expansion facility locations are shown in Figure A15-18 and costs are presented in Table A15-21. While the expansion facilities are located largely outside the Study Region, the modifications can impact boundary flows.

⁶⁰ FERC Docket No. CP14-493

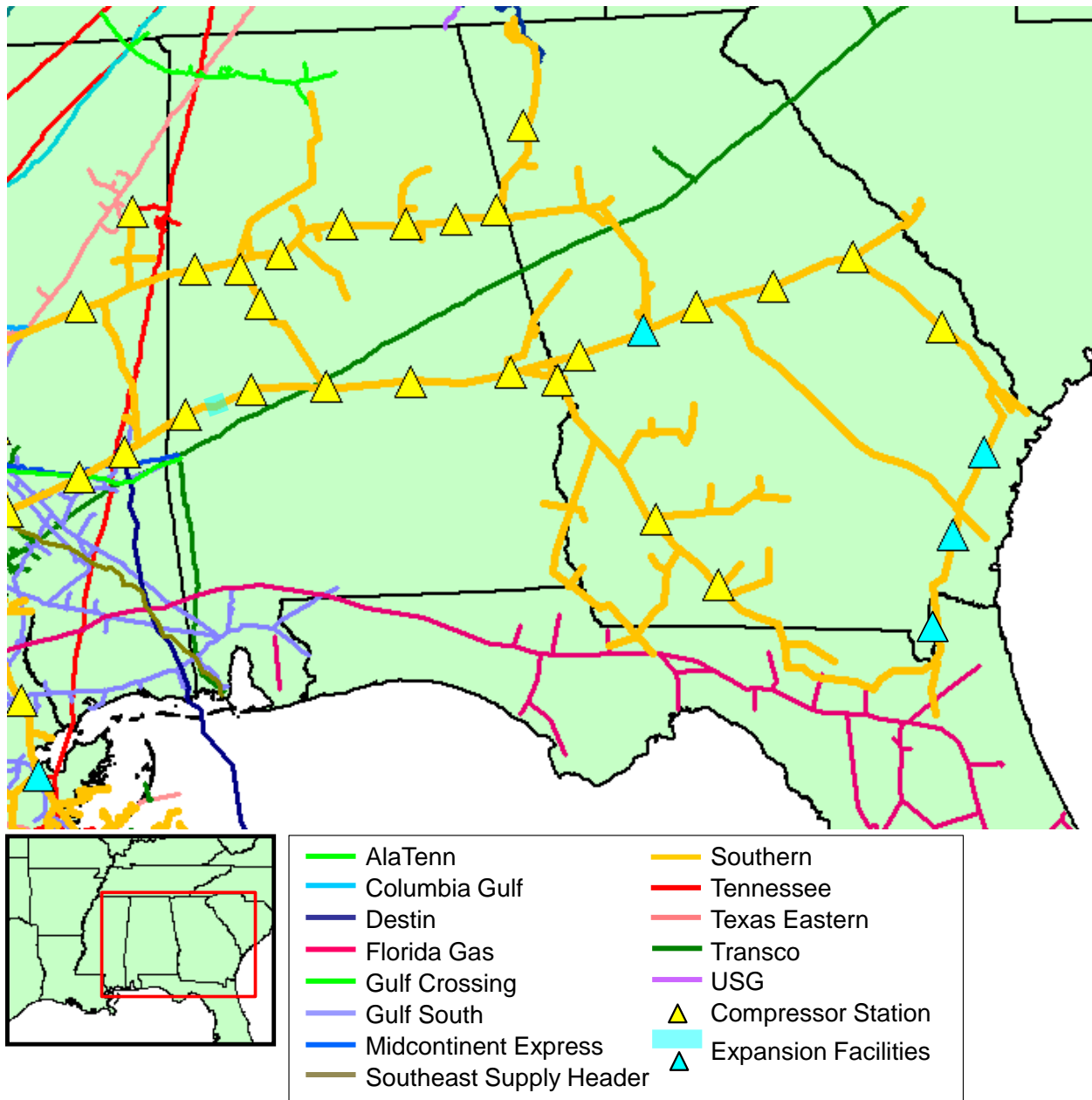


Figure A15-19. Southern Zone 3 2016 Expansion Project Facilities

Table A15-21. Zone 3 Expansion Project Costs

Project Component	Cost
Thomaston Compressor Station: 4,000 HP	\$23,207,453
Riceboro Compressor Station: 4,700 HP relocated from Toca Station	\$22,473,987
Hilliard Compressor Station: New station, 4,700 HP	\$26,345,165
Gallion Loop: 3.3 miles of 36" pipe	\$18,776,326
Other facilities: SCADA, compressor station and meter station modifications	\$ 2,666,000

Tennessee

Six Tennessee expansion projects have been included in the RGDS: the Broad Run Expansion Project, the Broad Run Flexibility Project, the Connecticut Expansion Project, the Niagara Expansion Project, the Rose Lake Expansion Project and the Uniondale Expansion Project.^{61,62} Known facilities associated with these projects are illustrated in Figure A15-20.

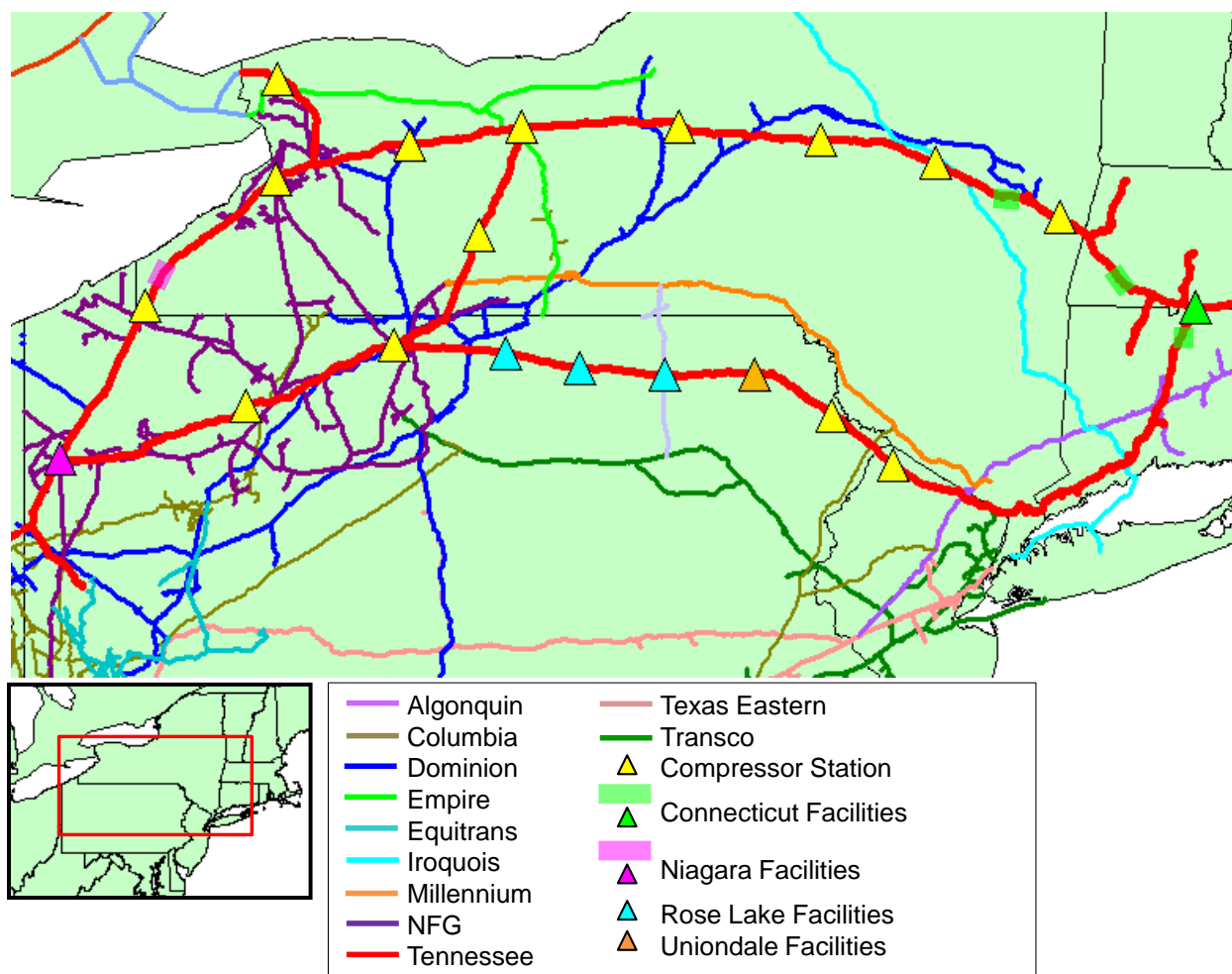


Figure A15-20. Tennessee Expansion Project Facilities

The Rose Lake Expansion Project will create 230 MDth/d of capacity on Tennessee’s 300 Line from receipt points between Compressor Stations 321 and 313 to the Rose Lake interconnection with NFG and the Station 219 Pool.⁶³ The two project shippers are Statoil Natural Gas LLC (175 MDth/d) and South Jersey Resources Group LLC (55 MDth/d). The primary project

⁶¹ The Utica Backhaul Transportation Project, which created 500 MDth/d of north-to-south capacity on Tennessee, was placed into service on April 1, 2014.

⁶² Tennessee’s Northeast Energy Direct Project is included in S13 and summarized in Appendix 19.

⁶³ FERC Docket No. CP13-3

facilities include installation of a 12,630-HP compressor unit at Station 315, and installation of a 12,661-HP compressor unit at Station 319, which will result in a net incremental capacity of 3,661 HP after the abandonment of two 4,500-HP units at the station. The total construction cost associated with the project facilities is \$91.8 million, detailed in Table A15-22. The project facilities are currently under construction for a November 1, 2014 in-service date.

Table A15-22. Rose Lake Expansion Project Costs

Project Component	Cost
Compressor Station 315: 12,630 HP and modifications	\$38,642,399
Compressor Station 319: 12,661 HP and modifications, including abandonment of 9,000 HP	\$41,922,074
Compressor Station 317: Compressor unit replacement and other modifications	\$11,210,231

The Uniondale Expansion Project will enable Tennessee to provide 34 MDth/d of incremental firm transportation to UGI Penn Natural Gas, a Pennsylvania LDC, through facility modifications at Compressor Station 321 in Susquehanna County, PA.⁶⁴ The compressor modifications are estimated to cost \$8.5 million. The anticipated in-service date for the project is November 1, 2014.

The Niagara Expansion Project will enable Tennessee to provide 158 MDth/d of incremental firm transportation service to Seneca Resources Corporation for delivery at the Niagara interconnection with TransCanada.⁶⁵ This capacity will be created through construction of 3.1 miles of 30" loop line, modifications to existing compression and meter station facilities, and the lease of the Northern Access 2015 Project capacity from NFG. The total estimated cost of the project facilities is \$27.5 million. The project is currently under review by FERC with a target in-service date of November 1, 2015. The Environmental Assessment is scheduled to be issued in mid-July 2014.

The Broad Run Flexibility Project and the Broad Run Expansion Project will create 590 MDth/d and 200 MDth/d, respectively, of incremental firm transportation capacity from the Broad Run Lateral in Zone 3 to delivery points in Zone 1. The total cost of both projects' proposed facilities, which include three new compressor stations and modifications to existing compressor stations, is expected to be approximately \$782 million. Antero Resources has contracted for the full capacity of both projects. The in-service dates are staggered, with the Broad Run Flexibility Project beginning operating on November 1, 2015 and the Broad Run Expansion Project beginning operating on November 1, 2017. Certificate applications are expected to be filed with FERC in early 2015.

The Connecticut Expansion Project will add 72 MDth/d of firm transportation capacity from Tennessee's interconnection with Iroquois at Wright to delivery points in Connecticut for a November 2016 in-service date.⁶⁶ The project facilities include 13.26 miles of loop line in

⁶⁴ FERC Docket No. CP13-526

⁶⁵ FERC Docket No. CP14-88

⁶⁶ FERC Docket No. CP14-529

Connecticut, Massachusetts and New York and modifications at the Agawam Compressor Station in Massachusetts. The total estimated cost of the project is \$85.7 million.

Texas Eastern

Four Texas Eastern projects have been included in the RGDS: the Gulf Market Expansion Project, the OPEN Project, the TEAM 2014 Project, the Union to Gas City Project.^{67,68} Known facilities associated with these projects are illustrated in Figure A15-21.

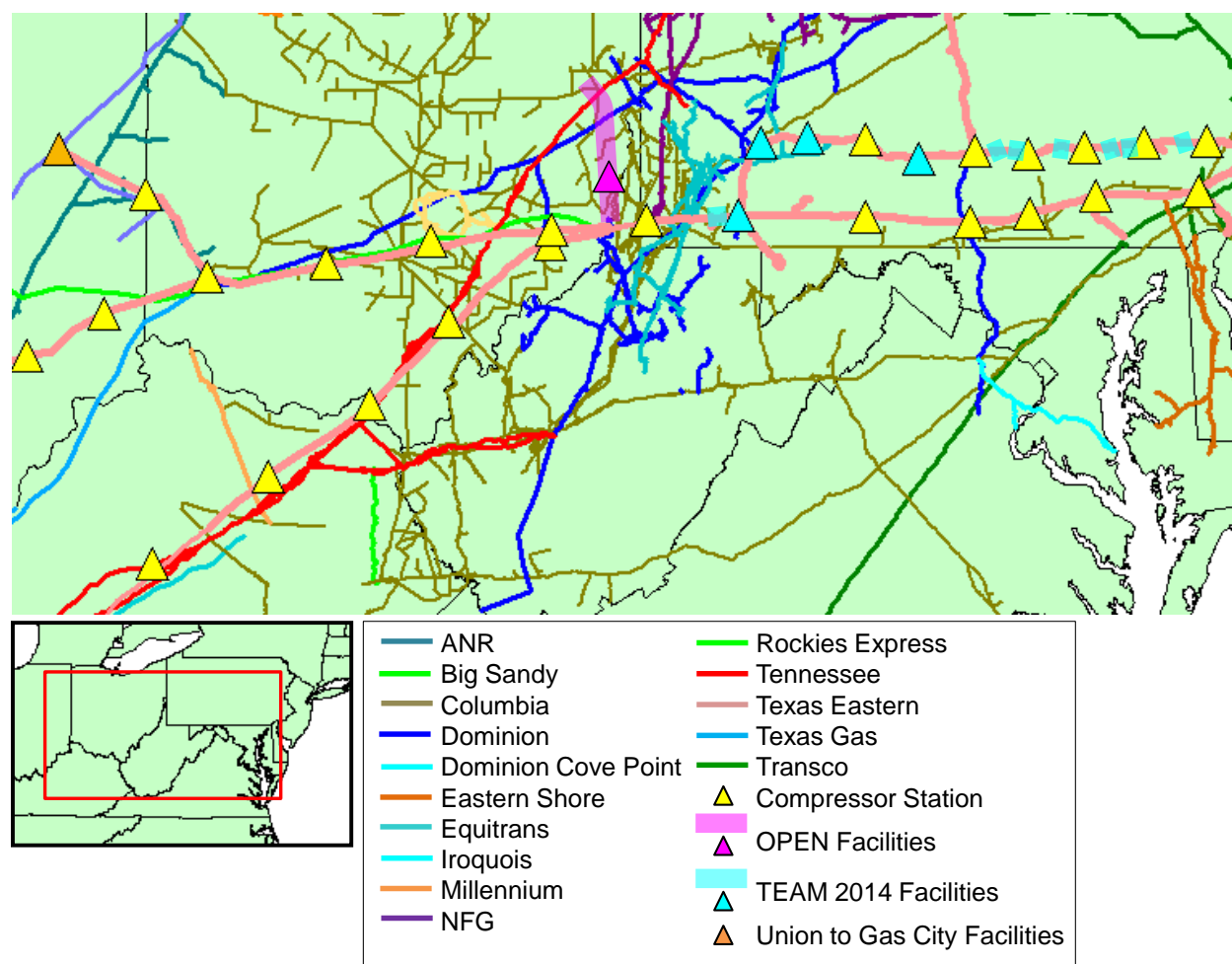


Figure A15-21. Texas Eastern Expansion Project Facilities

The TEAM 2014 Project will create 600 MDth/d of incremental firm transportation capacity from receipt points in western Pennsylvania and West Virginia to delivery points in New Jersey,

⁶⁷ The Bailey East Mine Panel L1 Project (FERC Docket No. CP14-9) and the Emerald Longwall Mine Panel D1 Project (CP14-4) have not been included because no capacity is created.

⁶⁸ Texas Eastern’s Natrium Lateral and Renaissance Projects have been included in S13 and are summarized in Appendix 19.

New York, Ohio, Mississippi and Louisiana.⁶⁹ 300 MDth/d will flow east to Lambertville, NJ and Staten Island, NY, 50 MDth/d will flow west to Lebanon, OH, and 250 MDth/d will flow south to Louisiana. Two producers, Chevron USA, Inc., and EQT Energy, LLC, have each contracted for 300 MDth/d of capacity, which will be created through loop line and incremental compression. The total estimated cost of the facilities, which is summarized in Table A15-23, is \$519.7 million. The project is currently under construction for a November 1, 2014 in-service date.

Table A15-23. TEAM 2014 Project Costs

Project Component	Cost
Holbrook Discharge Loop: 6.7 miles of 36" pipe	\$42,650,756
Bernville Discharge Loop: 5.6 miles of 36" pipe	\$44,546,418
Grantville Discharge Loop: 6.1 miles of 36" pipe	\$44,788,969
Perulack Discharge Loop: 8.1 miles of 36" pipe	\$49,072,066
Shermansdale Discharge Loop: 7.1 miles of 36" pipe	\$43,547,619
Armagh Compressor Station: 18,100 HP	\$56,994,115
Delmont Compressor Station: 52,000 HP (two units), abandonment of 25,100 HP	\$101,994,990
Enriken Compressor Station: 26,000 HP	\$62,705,694
Uniontown Compressor Station: 6,100 HP of uprated compression (three units)	\$19,064,806
Other compressor station modifications	\$43,525,390
Other facility modifications: Launcher/receiver modifications, chromatograph installation	\$10,845,815

The OPEN Project will enable Texas Eastern to provide 550 MDth/d from a new production lateral in Ohio to Louisiana, with 275 MDth/d each deliverable to the Egan Hub Storage facility and the Gillis Compressor Station.⁷⁰ Four producers have contracted for the full volume of the project: Chesapeake Energy Marketing, Inc. (350 MDth/d), CNX Gas Company LLC (50 MDth/d), Rice Drilling B LLC (50 MDth/d) and Total Gas & Power North America, Inc. (100 MDth/d). The total cost of the project facilities, which is listed in Table A15-24, is \$468,487,746. The project is currently being reviewed by FERC, and has a target in-service date of November 1, 2015.

Table A15-24. OPEN Project Costs

Project Component	Cost
Kensington Pipeline: 75.8 miles of 30" pipe	\$349,601,283
Colerain Compressor Station: New station, 18,800 HP	\$ 62,146,967
Other compressor station modifications	\$ 36,567,607
Three new meter stations	\$ 20,171,889

The Uniontown to Gas City Project will create 425 MDth/d of incremental firm transportation capacity from receipt points in southwestern Pennsylvania to an interconnection with Panhandle

⁶⁹ FERC Docket No. CP13-84

⁷⁰ FERC Docket No. CP14-68

Eastern in Indiana.⁷¹ Five producers have contracted for the full volume of the project: Range Resources-Appalachia, LLC, Rice Drilling B LLC, CNX Gas Company LLC, East Resources, Inc., and EQT Energy, LLC. The facility modifications required to permit bi-directional flow on this segment are relatively minor; the total estimated project cost is \$56.5 million. The project is currently under FERC review, and has a November 1, 2015 target in-service date.

The Gulf Market Expansion Project is designed to deliver up to 650 MDth/d of incremental supplies to the Gulf Coast region by continuing the conversion of the Texas Eastern mainline to bi-directional flow. Facility improvements include one new compressor station in Texas, incremental compression at an existing station in Louisiana, and modifications at seven other existing compressor stations to allow bi-directional flow. Five shippers have signed long-term service contracts: EQT Corporation (100 MDth/d), GDF Suez SA (200 MDth/d), Mitsubishi Corporation (100 MDth/d), MMGS, Inc. (100 MDth/d) and Range Resources-Appalachia LLC (150 MDth/d). The project is designed in two phases, with 250 MDth/d of capacity available in November 2016 and 400 MDth/d available in September 2017.

Texas Gas

One Texas Gas project, the Ohio-Louisiana Access Project, has been included in the RGDS.^{72,73} Texas Gas has received binding commitments for 625 MDth/d of expansion capacity to serve end-use markets, including LNG exports and power generators. Facilities have not been announced, but the capital cost of the project is estimated to be \$115 million, with facilities online in the first half of 2016.

TransCanada

Two TransCanada projects have been included in the RGDS: the Energy East Expansion Project and the Parkway to Maple Project.⁷⁴

TransCanada expects to file the Parkway to Maple Project with the NEB in 2014 to meet customer requests for new pipeline capacity to serve Eastern Canadian markets with a target in-service date of November 1, 2015.

The Energy East Expansion Project involves the conversion of one of TransCanada's 42" mainlines to oil transportation service. This conversion will remove approximately 1 Bcf/d of

⁷¹ FERC Docket No. CP14-104

⁷² The Texas Gas Abandonment Project (FERC Docket No. CP13-485) has been previously listed among the projects included in the *Reference Gas Demand Scenario*, but has been removed following Texas Gas's withdrawal of the certificate application from the FERC review process due to insufficient market interest in the liquids pipeline that the abandoned segments were to be used for. Texas Gas's Bear Run Mine Relocation Project (FERC Docket No. CP12-481) has not been included because no capacity is created.

⁷³ Texas Gas's Northern Supply Access and Southern Indiana Market Lateral Projects are included in S13 and summarized in Appendix 19.

⁷⁴ TransCanada's Eastern Triangle Expansion Project is included in S13 and summarized in Appendix 19.

mainline capacity, with the remaining capacity varying from 5 Bcf/d at the western end of TransCanada’s system to 1.9 Bcf/d across northern Ontario. Construction is expected to begin in 2016. The mainline segments impacted by the Energy East conversion are shown in Figure A15-22.

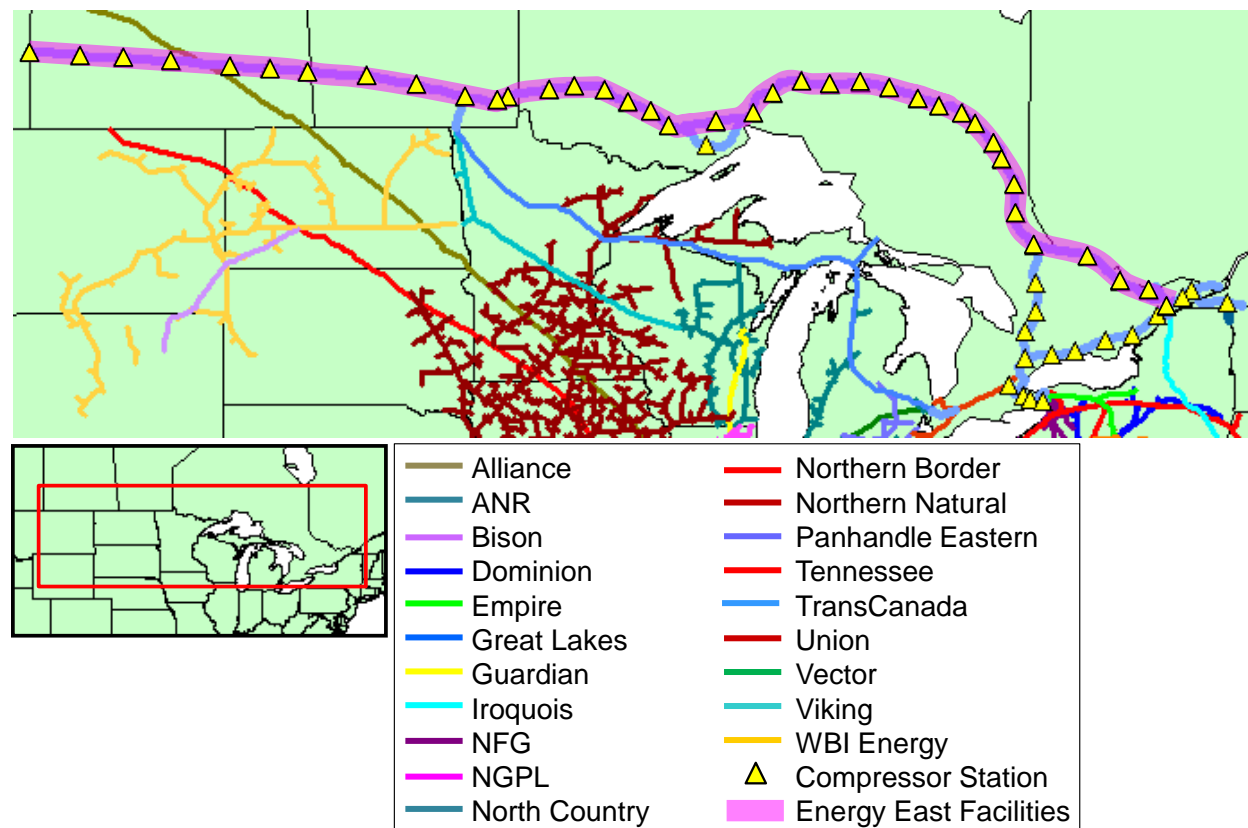


Figure A15-22. TransCanada Energy East Pipeline Facilities

Transco

Eleven Transco projects have been included in the RGDS: the Atlantic Sunrise Project, the Dalton Expansion Project, the Gulf Trace Project, the Hillabee Expansion Project, the Leidy Southeast Project, the Mobile Bay South III Expansion Project, the Northeast Connector Project, the Rock Springs Expansion Project, the Rockaway Delivery Lateral Project, the Virginia Southside Expansion Project and the Woodbridge Delivery Lateral Project.⁷⁵ The known primary facilities associated with these projects are illustrated in Figure A15-23 through Figure A15-25.⁷⁶

⁷⁵ The Brandywine Creek mainline “A” Replacement Project (CP12-497), which will allow internal inspection of a pipe segment in Pennsylvania and is expected to begin service in August 2014, has not been included in the RGDS because no capacity is created.

⁷⁶ Locations where the only facilities are modifications to allow bi-directional flow are not indicated on the maps.

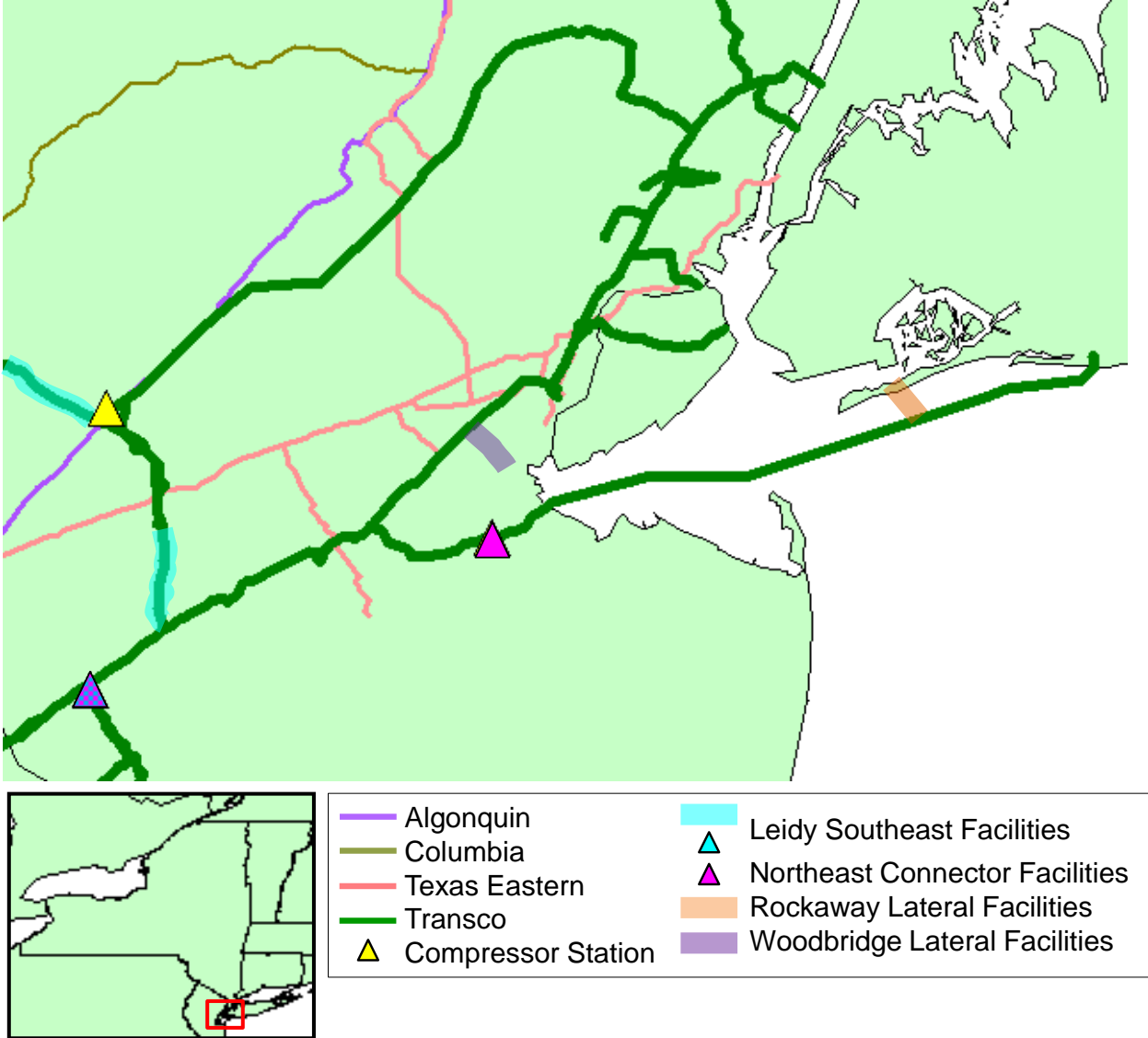


Figure A15-23. Transco Expansion Project Facilities in NJ/NY

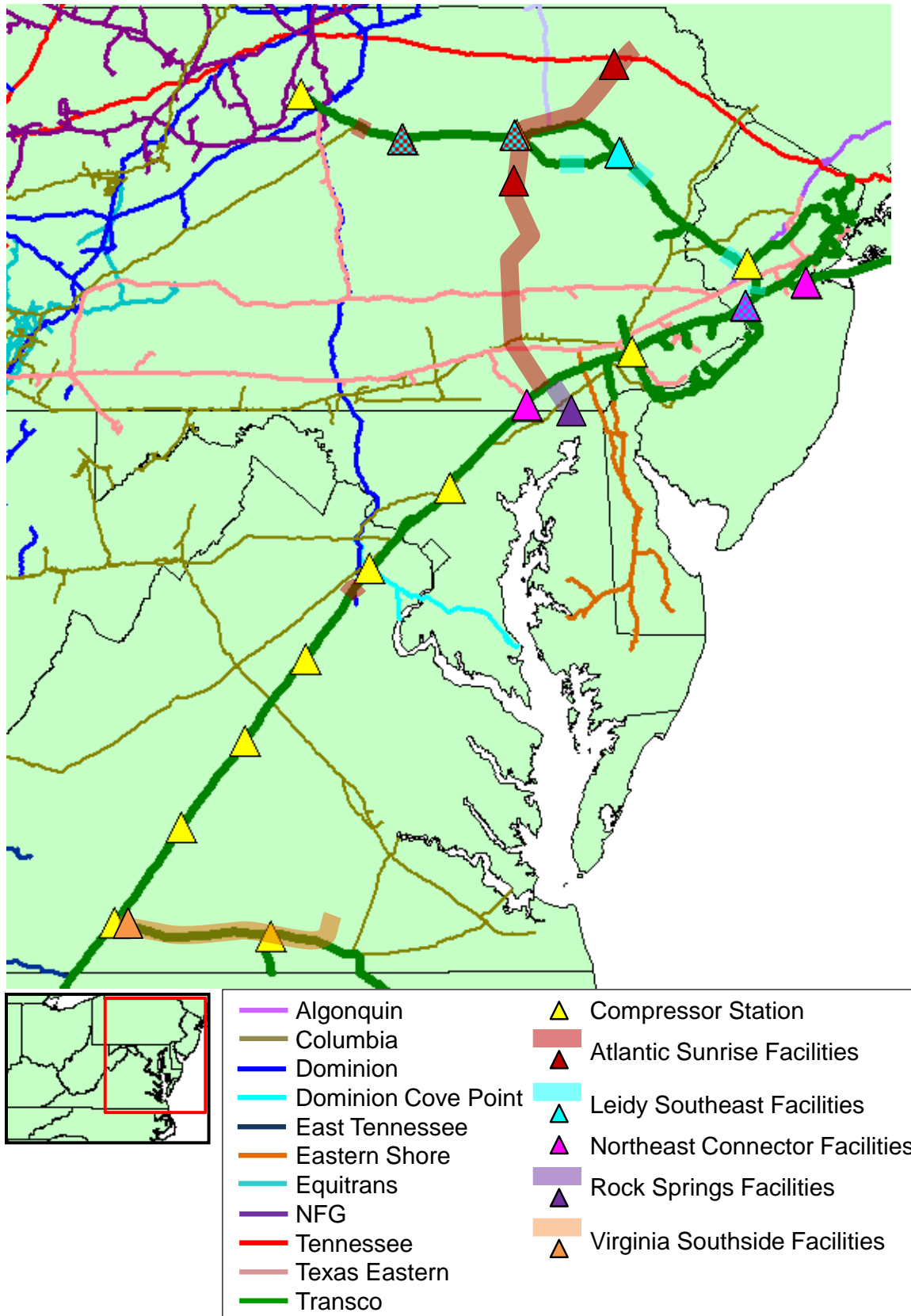


Figure A15-24. Transco Expansion Project Facilities in NJ/PA/Md/VA

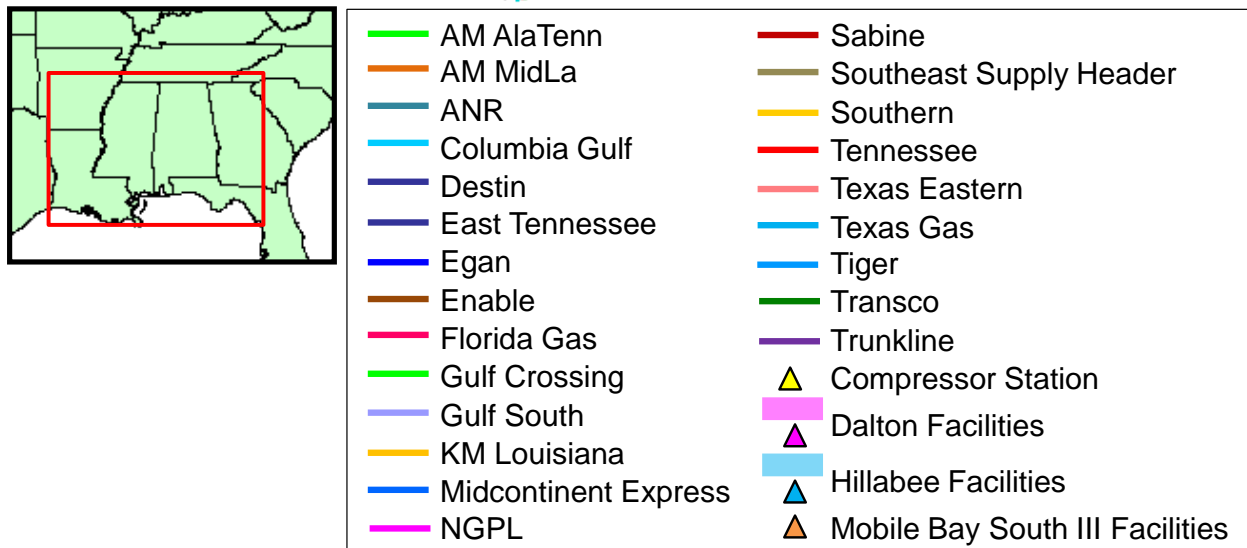
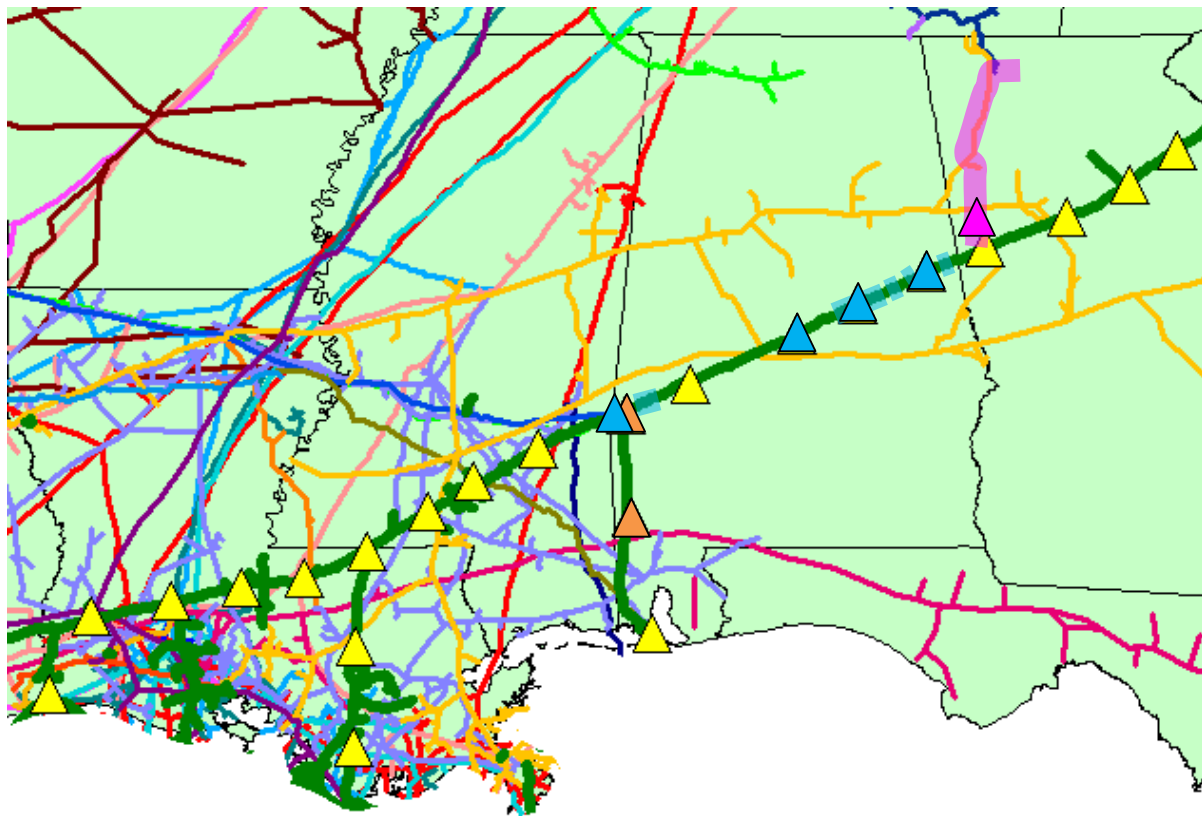


Figure A15-25. Transco Expansion Project Facilities in AL/GA

The Northeast Connector Project will create 100 MDth/d of incremental firm transportation capacity between Compressor Station 195 in York County, PA and the offtake point of the Rockaway Delivery Lateral, described below, from the Lower New York Bay Lateral that serves Long Island.⁷⁷ The contracting shipper for the full volume of the project is National Grid. The

⁷⁷ FERC Docket No. CP13-132

incremental firm transportation service will be provided through the addition of compression at existing stations, as described in Table A15-25. The project facilities, which are estimated to cost \$48.5 million, are currently under construction for a November 1, 2014 in-service date.

Table A15-25. Northeast Connector Project Costs

Project Component	Cost
Compressor Station 195: Replacement of three existing gas-fired units with two electric drive units, resulting in an incremental 6,540 HP	\$43,360,814
Compressor Station 205: Uprates to two existing electric drive units, resulting in an incremental 5,000 HP	\$1,778,200
Compressor Station 207: Uprates to two existing electric drive units, resulting in an incremental 5,400 HP	\$3,330,995

The Rockaway Delivery Lateral Project involves construction of a new 3.2 mile lateral from a tap on Transco's Lower New York Bay Lateral to a new delivery point on Rockaway Peninsula in Queens County, NY.⁷⁸ The lateral will have a transportation capacity of 647 MDth/d, which is fully contracted by National Grid. This project does not involve any upstream capacity, the new lateral will be fed by National Grid's existing transportation entitlements to Long Island and the 100 MDth/d of incremental capacity created by the Northeast Connector Project. The total cost of the project is estimated to be \$182.8 million, as detailed in Table A15-26. The facilities are currently under construction for a November 1, 2014 in-service date.

Table A15-26. Rockaway Delivery Lateral Project Costs

Project Component	Cost
Offshore Lateral: 2.84 miles of 26" pipe	\$103,013,723
Onshore Lateral: 0.36 miles of 26" pipe	\$ 13,340,188
Meter Station	\$ 37,631,836
Hangar Rehabilitation: Meter station will be located inside an existing historic structure	\$ 28,814,254

The Woodbridge Delivery Lateral Project involves construction of a new 2.4-mile lateral from the Transco mainline to CPV Shore's Woodbridge Energy Center in Middlesex County, NJ.⁷⁹ The new lateral will be sized to transport up to 264 MDth/d and is estimated to cost \$32.3 million. The project will not create any incremental mainline firm transportation capacity. Transco has requested FERC approval to meet the project's April 1, 2015 target in-service date.

Table A15-27. Woodbridge Delivery Lateral Project Costs

Project Component	Cost
Lateral: 2.4 miles of 20" pipe	\$28,741,076
Meter station	\$ 3,345,525

⁷⁸ FERC Docket No. CP13-36

⁷⁹ FERC Docket No. CP14-18

The Mobile Bay South III Expansion Project will expand the southbound transportation capacity of Transco's Mobile Bay Lateral in Alabama.⁸⁰ The project facilities, including 20,500 HP of new compression at Compressor Station 85 and 1,000 HP of updated compression at Compressor Station 83, will create 225 MDth/d of incremental firm transportation capacity from interconnections with Gulf South and Midcontinent Express to interconnections with Florida Gas and the Bay Gas Storage facility. The total estimate cost is \$49.4 million. The project facilities are currently under construction and scheduled to begin operation in December 2014 (Compressor Station 83) and February 2015 (Compressor Station 85), prior to the April 1, 2015 target in-service date included in the certificate application.

The Virginia Southside Expansion Project will create 270 MDth/d of incremental firm transportation capacity from the Station 210 Pooling Point in Mercer County, NY to delivery points in southern Virginia and North Carolina.⁸¹ Project facilities include a 91-mile loop along the existing South Virginia Lateral and a 7-mile lateral to serve Virginia Electric and Power Company's Brunswick County Power Station. The contracting shippers are Virginia Power Services Energy Corp., a marketing affiliate of Virginia Electric and Power (250 MDth/d), and Piedmont Natural Gas Company, an LDC (20 MDth/d).⁸² The project facilities, listed in Table A15-28 are estimated to cost \$298.7 million. The project is currently under construction for a September 1, 2015 in-service date.

Table A15-28. Virginia Southside Expansion Project Costs

Project Component	Cost
Pipelines: 98 miles of 24" pipe	\$234,927,920
Compressor Station 166: New station, 21,830 HP	\$ 48,061,435
Compressor Stations 190, 195 and 205: Modifications to enable bi-directional flow	\$ 8,704,205
Meter stations: One new and one modified	\$ 7,032,592

The Leidy Southeast Project will enable Transco to provide 525 MDth/d of incremental firm transportation service from Leidy Line receipt points, including the interconnection with CNYOG / Stagecoach to mainline delivery points as far south as Alabama.⁸³ Seven shippers have contracted for the full capacity of the project: Anadarko Energy Services Company (50 MDth/d), Capitol Energy Ventures Corp. (20 MDth/d), MMGS Inc. (50 MDth/d), Piedmont Natural Gas Company, Inc. (100 MDth/d), Public Service Company of North Carolina Inc. (100 MDth/d), South Carolina Electric & Gas Company (40 MDth/d) and Washington Gas Light Company (165 MDth/d). Project facilities include both loop line and compression, as listed in Table A15-29. The total estimated project cost is \$607.3 million. The project is currently under review by FERC and has a target in-service date of December 1, 2015.

⁸⁰ FERC Docket No. CP13-523

⁸¹ FERC Docket No. CP13-30

⁸² Virginia Power Services Energy's contracted delivery points are the Brunswick County Power Station and the Cascade Creek interconnection with East Tennessee. Piedmont Natural Gas's delivery point is an existing meter station in North Carolina.

⁸³ FERC Docket No. CP13-551

Table A15-29. Leidy Southeast Project Costs

Project Component	Cost
Dorrance Loop: 5.27 miles of 42" pipe	\$ 53,652,972
Franklin Loop: 11.47 miles of 42" pipe	\$137,845,527
Pleasant Run Loop: 6.92 miles of 42" pipe	\$ 82,086,751
Skillman Loop: 6.31 miles of 42" pipe	\$ 94,049,019
Compressor Station 520: 20,500 HP and modifications	\$ 48,686,803
Compressor Station 517: 33,400 net HP (one replacement unit, one new unit) and modifications	\$ 80,291,180
Compressor Station 515: 16,000 HP and modifications	\$ 48,754,510
Compressor Station 205: 2,000 HP (uprates to two units)	\$ 2,586,510
Related facility modifications	\$ 59,390,281

The Rock Springs Expansion Project will allow Transco to provide 192 MDth/d of firm transportation capacity from the Station 210 Pool in Mercer County, NJ to Old Dominion Electric Cooperative's Windcat Point Generating Facility in Cecil County, MD.⁸⁴ The project facilities described in the pre-filing letter include a 10.65 mile 20" lateral, a 4,000 HP compressor station, and other related modifications. The proposed in-service date is August 1, 2016.

The Gulf Trace Project is a 1,200 MDth/d expansion to serve the Cheniere Energy Partners Sabine Pass Liquefaction project and export terminal. The project involves modifications to enable bi-directional flow on the Transco mainline in Louisiana from Compressor Station 65 to Compressor Station 44, an 8-mile 36" lateral and two new compressor stations. The estimated cost of the project is approximately \$300 million, and the target in-service date is early 2017.

The Dalton Expansion Project will enable Transco to provide 448 MDth/d of incremental firm transportation from the Station 210 Pool in Mercer County, NJ to an interconnection with Gulf South in Pike County, MS and via a new 106-mile lateral to delivery points in Georgia.⁸⁵ Two shippers have contracted for the expansion capacity: Atlanta Gas Light (240 MDth/d) and Oglethorpe Smith (208 MDth/d).⁸⁶ Proposed facility modifications include a new 21,360 HP compressor station, 6.5 miles of 30" pipe, 4.7 miles of 24" pipe, 47.35 miles of 20" pipe, 5.23 miles of 16" pipe, three new meter stations and mainline modifications to accommodate bi-directional flow between New Jersey and Georgia. The target in-service date for the project is May 1, 2017.

The Hillabee Expansion Project will create approximately 1,132 MDth/d of incremental transportation capacity from Compressor Station 85 to a mainline tap in Tallapoosa County, AL for lease to Sabal Trail Transmission.⁸⁷ The project is expected to be completed in phases: 818

⁸⁴ FERC Docket No. PF14-3

⁸⁵ FERC Docket No. PF14-10

⁸⁶ The location of the Oglethorpe Smith meter station appears to line up with the location of the Thomas A. Smith power plant in Murray County, GA, which is currently connected to East Tennessee.

⁸⁷ FERC Docket No. 14-6.

MDth/d in May 2017, 207 MDth/d in May 2020 and 107 MDth/d in May 2021. Proposed Phase 1 facilities include 16,000 HP of incremental compression at Station 95, 20,500 HP of incremental compression at Station 105, a new 32,000 HP compressor station (Station 84), 15.6 miles of 42” loop line, 4.6 miles of 48” loop line, three pipeline taps at the new interconnection, and other related modifications. Phase 2 facilities include 16,000 HP of incremental compression at Station 95, 3,500 HP of uprated compression at Station 100, 10.6 miles of 42” loop line and other related modifications. Phase 3 facilities include 12.8 miles of 42” loop line and other related modifications.

The Atlantic Sunrise Project will create 1,700 MDth/d of incremental firm transportation capacity along two paths from Pennsylvania to Alabama and Virginia.⁸⁸ The first path, which has eight contracted shippers, will create 850MDth/d of capacity from receipt points on the Leidy Line to Compressor Station 85 in Alabama. The second path, which has one contracted shipper, will create 850,000 MDth/d from a new receipt point north of the Leidy Line in Susquehanna County, PA to Transco’s Cascade Creek interconnection with Dominion Cove Point. Project facilities include 56.4 miles of 30” pipe from the new receipt point north of the Leidy Line to the Leidy Line, 122.2 miles of 42” pipe from the Leidy Line to Transco’s mainline in Lancaster County, PA, 5.5 miles of 36” loop line, 9.0 miles of 42” loop line, replacement of 2.5 miles of 30” pipe, a new 30,000 HP compressor station (Station 605), a new 40,000 HP compressor station (Station 610), 16,000 HP of incremental compression at Station 520, 16,000 HP of incremental compression at Station 517, 25,000 HP of incremental compression at Station 190, and other related facilities. The target in-service date for all facilities is July 1, 2017.

Trunkline

Trunkline’s Mainline Abandonment Project has been included in the RGDS. This project involves the abandonment by sale of 770 miles of loopline for conversion to an oil pipeline, as illustrated in Figure A15-26.⁸⁹ Following abandonment, the certificated winter capacity of Trunkline’s mainline will be reduced by 597 MDth/d to 958 MDth/d. The cost of abandonment is estimated to be \$30.0 million. The project’s implementation plan calls for construction to begin on the oil pipeline in late August 2014.

⁸⁸ FERC Docket No. PF14-8

⁸⁹ FERC Docket No. CP12-491

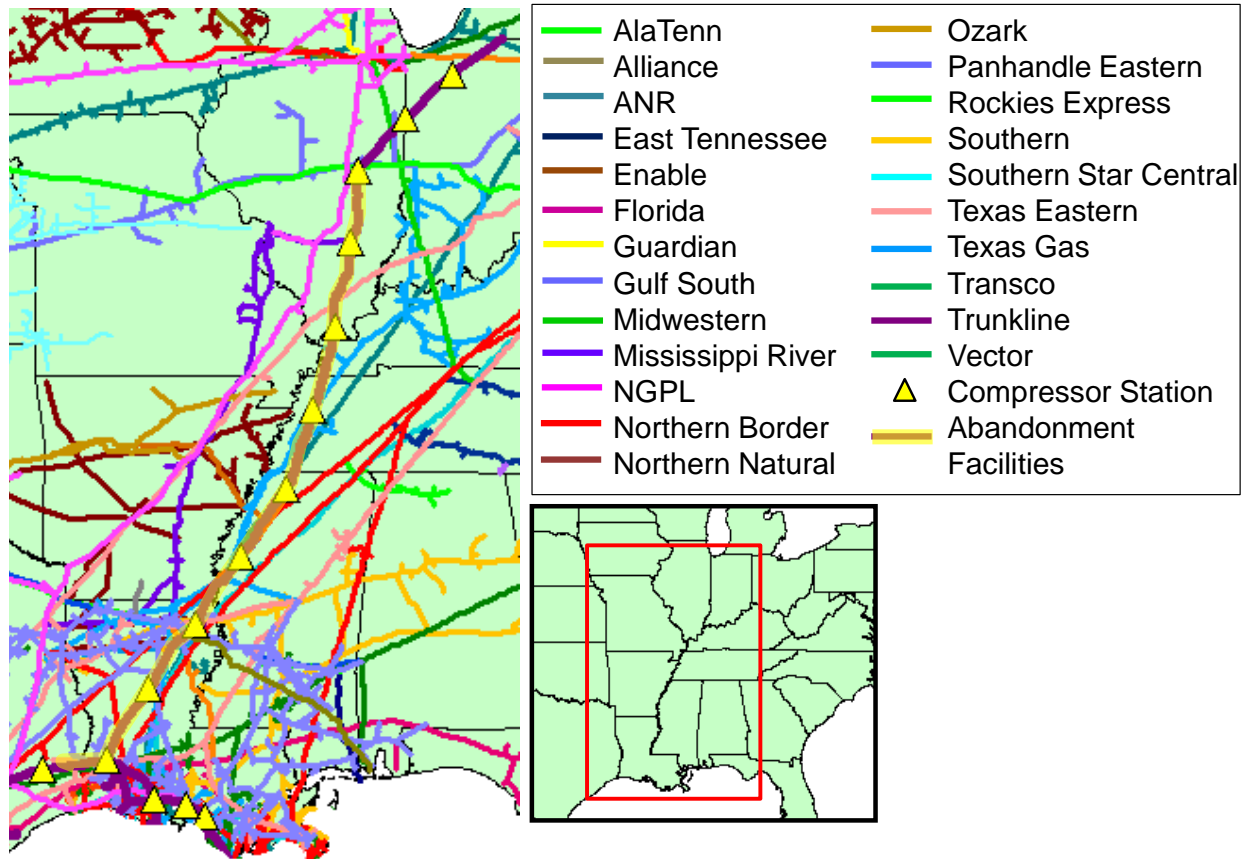


Figure A15-26. Trunkline Mainline Abandonment Facilities

Union

Two Union projects have been included in the RGDS: the Parkway D and NPS 48 Brantford-Kirkwall Project and the Parkway West Project.⁹⁰ The facilities associated with these projects are illustrated in Figure A15-27.

⁹⁰ Union's Dawn Parkway System Expansion (Parkway E), Hamilton-Milton and Lobo Compressor Station Expansion Projects are included in S13 and summarized in Appendix 19.

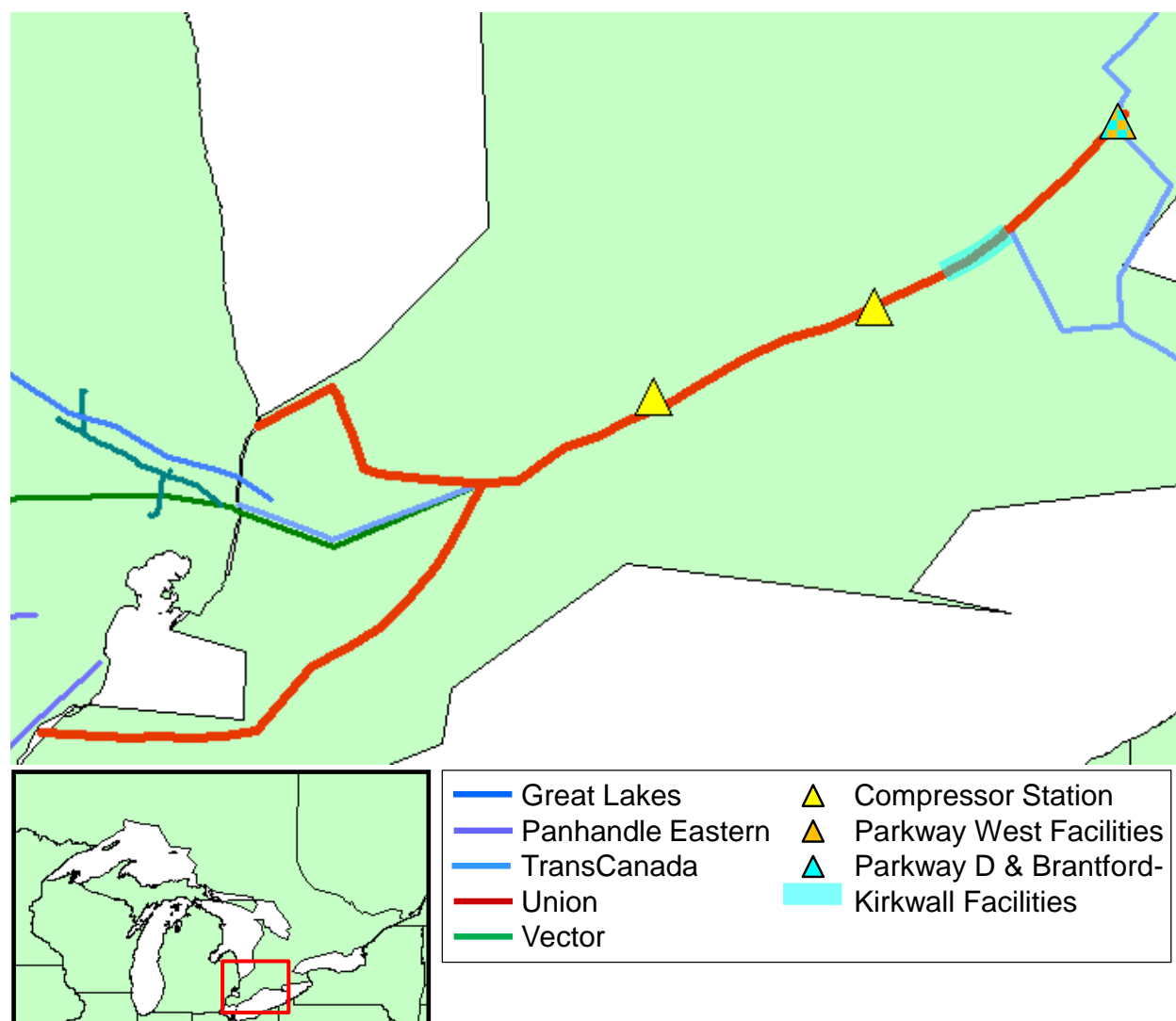


Figure A15-27. Union Expansion Projects

The Parkway West Project involves the construction of a new compressor station and an additional connection to the Enbridge system.⁹¹ The Enbridge connection is expected to be in service in 2014, with the new compressor station following in 2015. Of the project's C\$203 million capital cost, C\$118 million is allocated to the Enbridge connection and C\$85 million to the new compressor station.

The Parkway D and NPS 48 Brantford-Kirkwall Looping Projects, scheduled to begin service in fall 2015, involve 44,500 HP of incremental compression at Parkway and 8.6 miles of 48" loopline between Dawn and Parkway.⁹² Of the project's C\$204 million capital cost, C\$108 million is allocated to compression and C\$96 million to pipeline. The total incremental capacity associated with these projects is 433 TJ/d, or 410.4 MDth/d.

⁹¹ OEB Docket No. EB 2012-0433

⁹² OEB Docket No. EB-2013-0074

WBI Energy

WBI Energy's Garden Creek II Project has been included in the RGDS.⁹³ This project involves the construction of a new 15-mile 16" lateral that will transport up to 75 MDth/d from ONEOK Rockies Midstream, LLC's Garden Creek II gas processing plant to an interconnection with Northern Border, illustrated in Figure A15-28.⁹⁴ The lateral capacity will also be able to transport natural gas from other gas processing plants, including ONEOK's Garden Creek III processing plant, expected to be in service in early 2015. The lateral is estimated to cost \$13 million, and has a target in-service date of August 1, 2014.

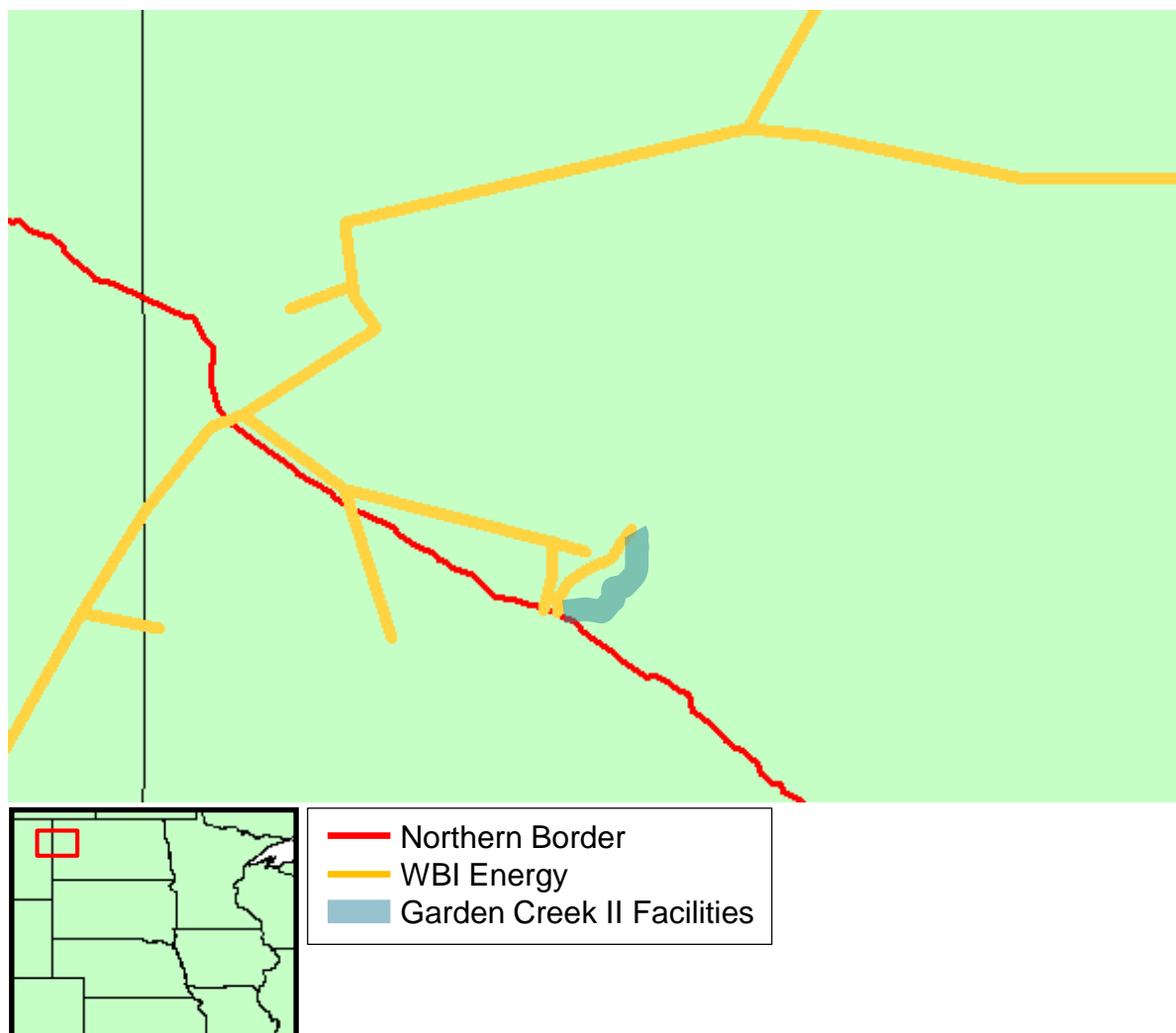


Figure A15-28. WBI Energy Expansion Project Facilities

⁹³ WBI Energy's Dakota Pipeline Project is included in S13 and summarized in Appendix 19.

⁹⁴ FERC Docket No. CP14-50

Appendix 16

RGDS Chronological and Descending Demand Figures

(Contains CEII – Not included in this Volume)

Appendix 17

HGDS and LGDS Frequency and Duration of Constraints

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HGDS S0 Analysis

HGDS S0 Winter 2018

Alliance

The 100% peak hour utilization on Alliance’s mainline, which is modeled with a capacity of 1,800 MDth/d, potentially affects generators behind LDCs served by Alliance and generators behind LDCs served by Guardian. The locations of these generators are shown in Figure A17-1.

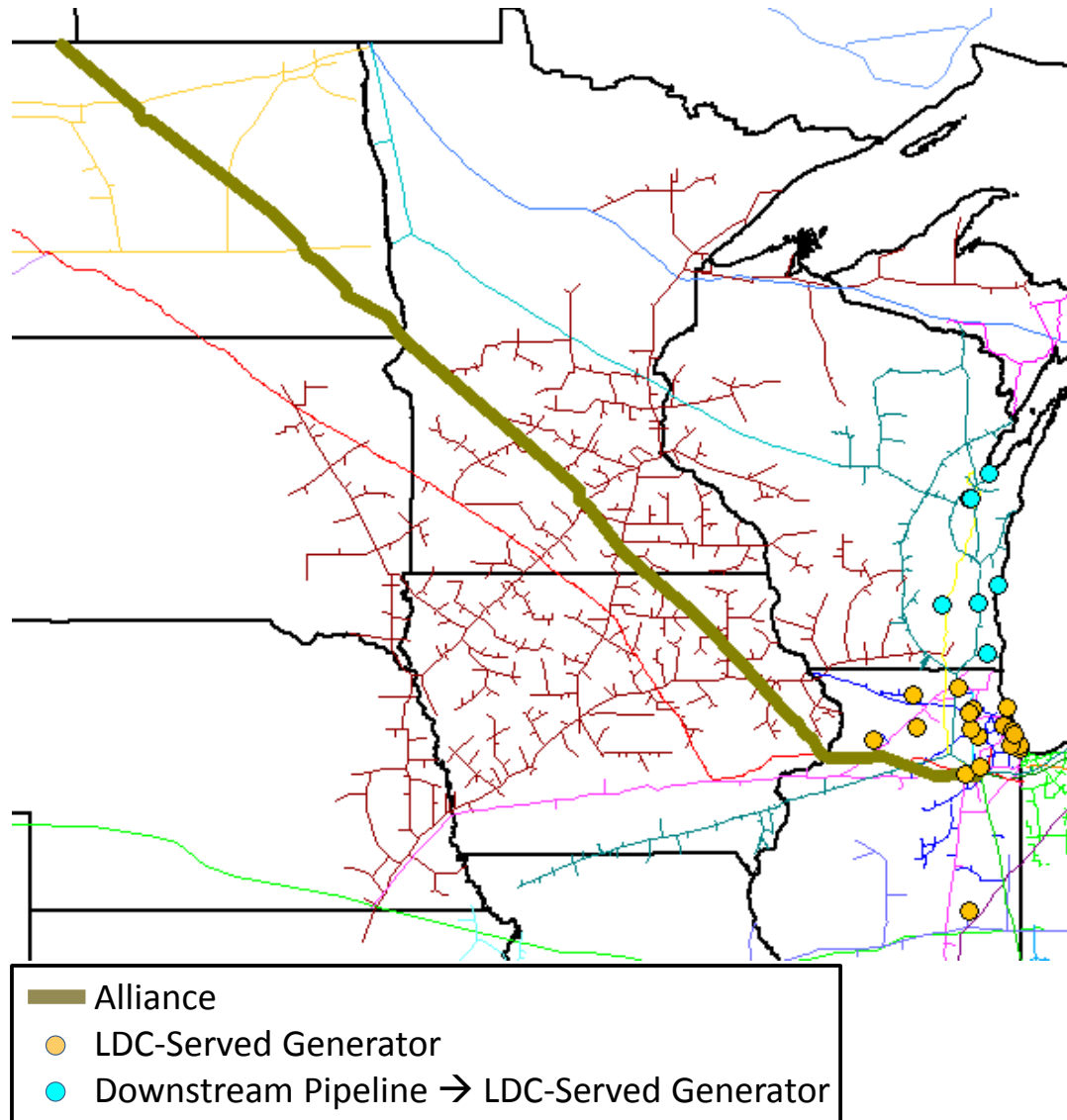


Figure A17-1. Generators Affected by Alliance Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-1 and Figure A18-2 relative to the capacity of the segment.

ANR Northern Illinois

The 100% peak hour utilization on ANR’s Northern Illinois segment, which is modeled with a capacity of 1,337 MDth/d, potentially affects generators directly connected to ANR in Illinois and Wisconsin and generators behind LDCs served by ANR in Illinois and Wisconsin. The locations of these generators are shown in Figure A17-2.

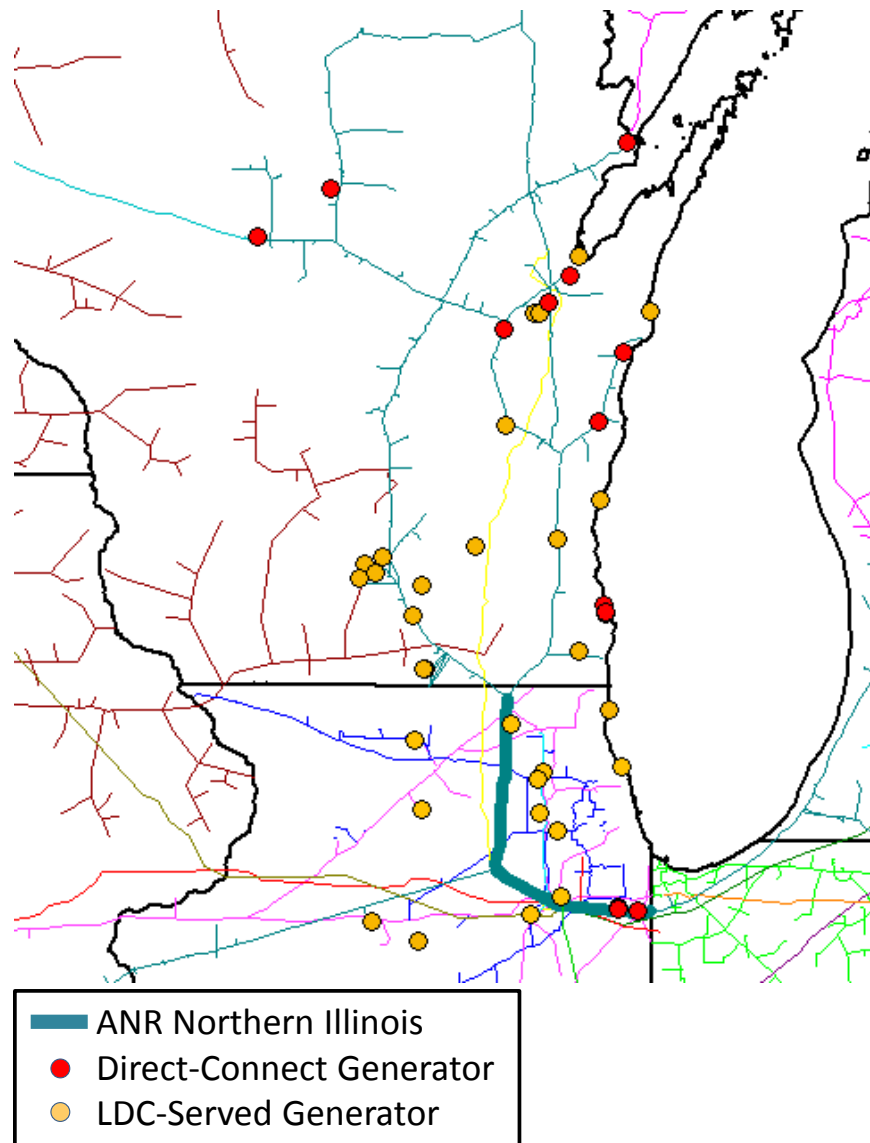


Figure A17-2. Generators Affected by ANR Northern IL Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-3 and Figure A18-4 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas’s Virginia/Maryland segment, which is modeled with a capacity of 2,679 MDth/d, potentially affects generators directly connected to

Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-5 and Figure A18-6 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-7 and Figure A18-8 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-9 and Figure A18-10 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-11 and Figure A18-12 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-13 and Figure A18-14 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 M_Dth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-15 and Figure A18-16 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 M_Dth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-17 and Figure A18-18 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 M_Dth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A18-19 and Figure A18-20 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 M_Dth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-21 and Figure A18-22 relative to the capacity of the segment.

Great Lakes East

The 100% peak hour utilization on Great Lakes Gas's East segment, which is modeled with a capacity of 1,164 M_Dth/d, potentially affects generators directly connected to Great Lakes in Michigan, generators behind LDCs served by Great Lakes in Michigan, generators directly connected to Vector, and generators behind Union Gas. The locations of these generators are shown in Figure A17-3.

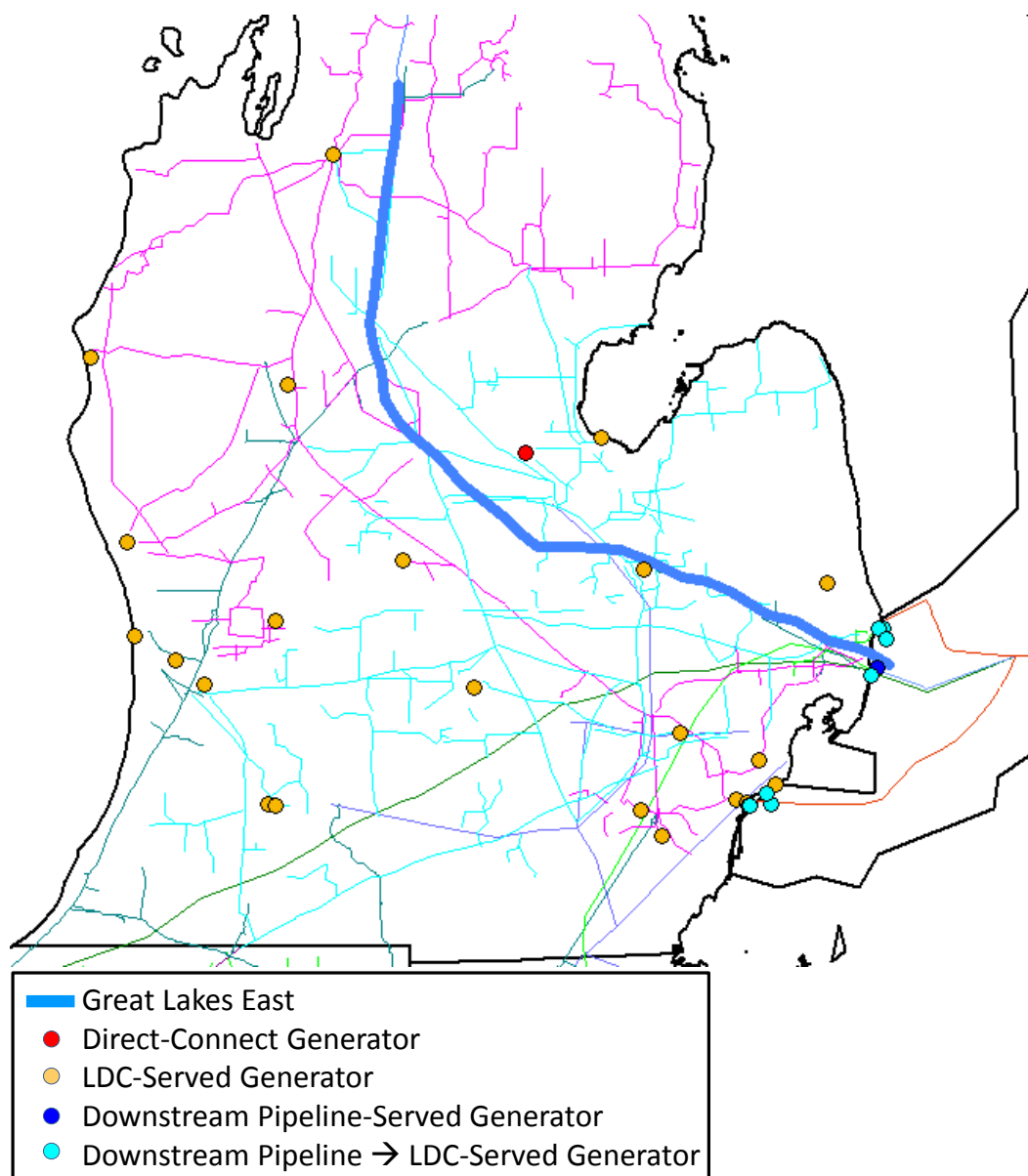


Figure A17-3. Generators Affected by Great Lakes East Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-23 and Figure A18-24 relative to the capacity of the segment.

Midwestern

The 100% peak hour utilization on Midwestern's mainline segment, which is modeled with a capacity of 635 MDth/d, potentially affects generators that are directly connected to Midwestern in Indiana and Indiana, generators behind LDCs served by Midwestern in Indiana and Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-4.

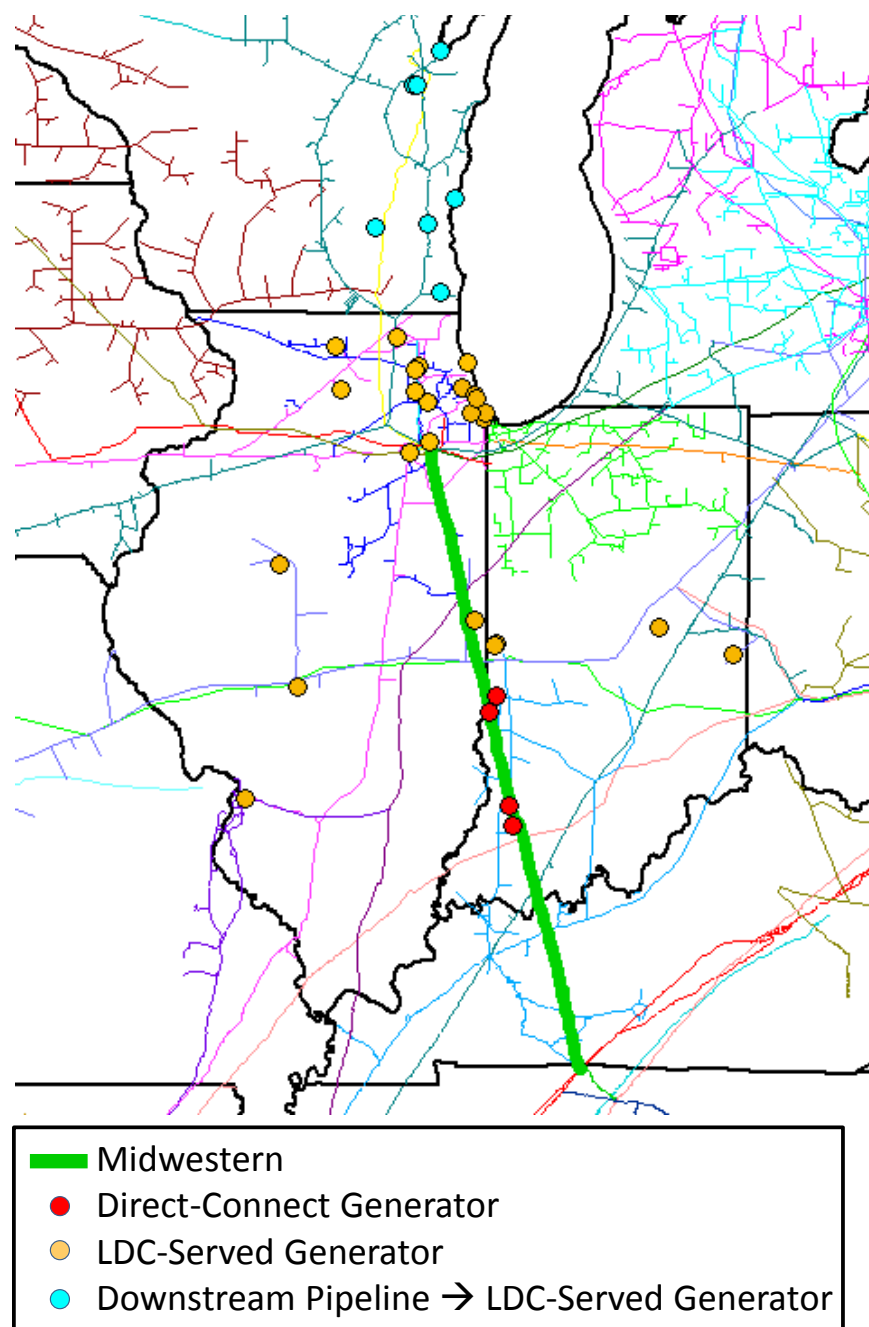


Figure A17-4. Generators Affected by Midwestern Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-25 and Figure A18-26 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, in

particular, in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-27 and Figure A18-28 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 623 MDth/d in 2018. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A18-29 and Figure A18-30 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

NGPL Iowa/Illinois North

The 100% peak hour utilization on NGPL's Iowa/Illinois North segment, which is modeled with a capacity of 1,677 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Iowa, Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-5.

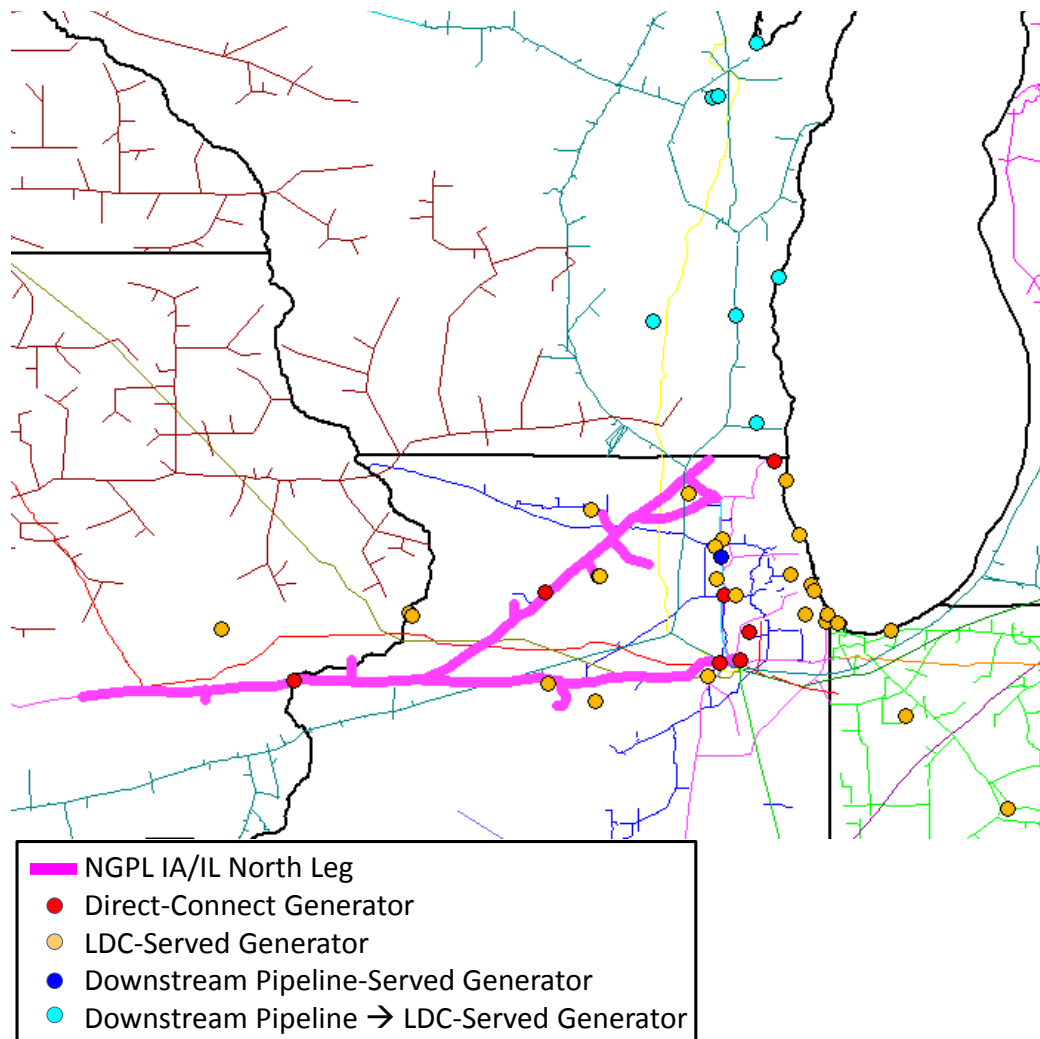


Figure A17-5. Generators Affected by NGPL IA/IL North Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-31 and Figure A18-32 relative to the capacity of the segment.

NGPL Iowa/Illinois South

The 100% peak hour utilization on NGPL's Iowa/Illinois South segment, which is modeled with a capacity of 1,624 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-6.

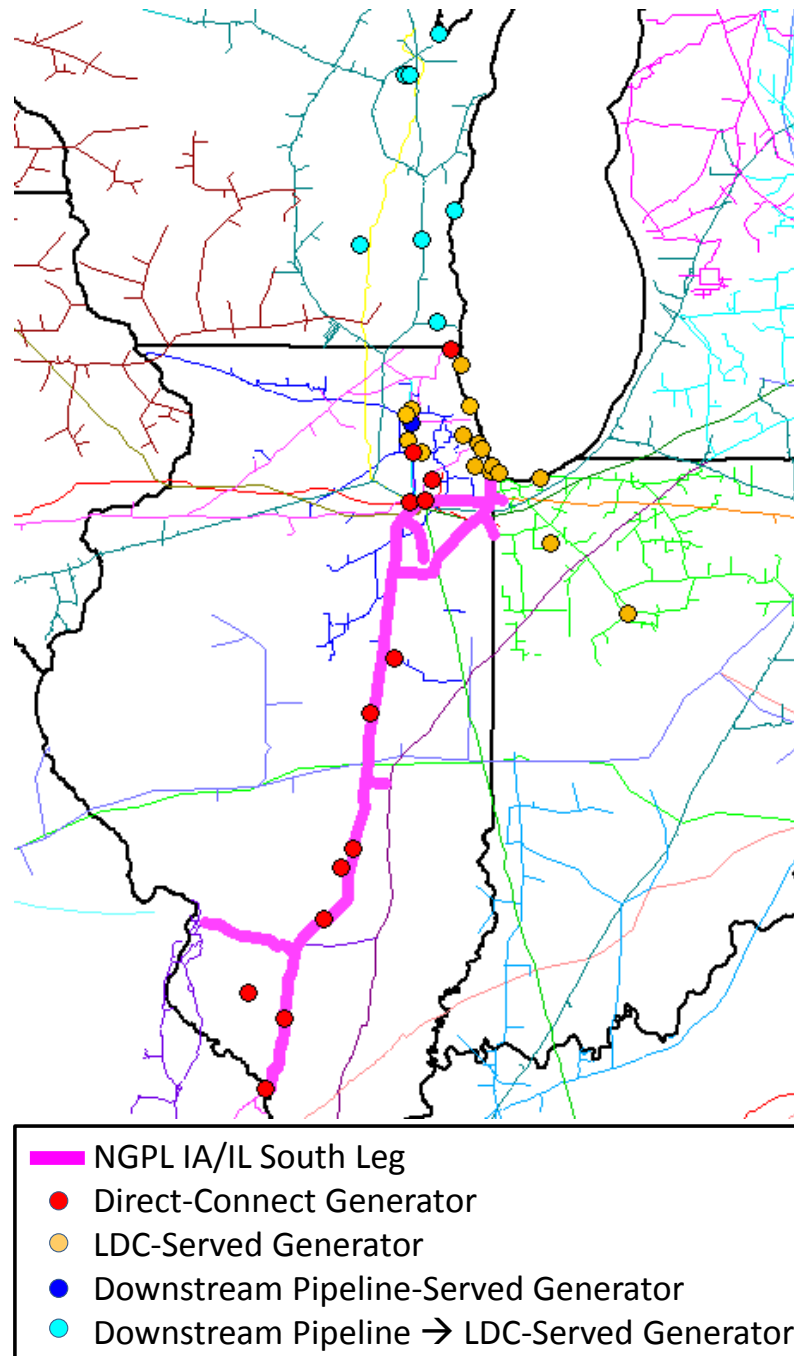


Figure A17-6. Generators Affected by NGPL IA/IL South Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-33 and Figure A18-34 relative to the capacity of the segment.

Northern Border Chicago

The 100% peak hour utilization on Northern Border’s Chicago segment, which is modeled with a capacity of 987 MDth/d, potentially affects generators directly connected to Northern Border in Illinois, generators behind LDCs served by Northern Border in Illinois and Indiana, and

generators behind LDCs served by Guardian. The locations of these generators are shown in Figure A17-7.

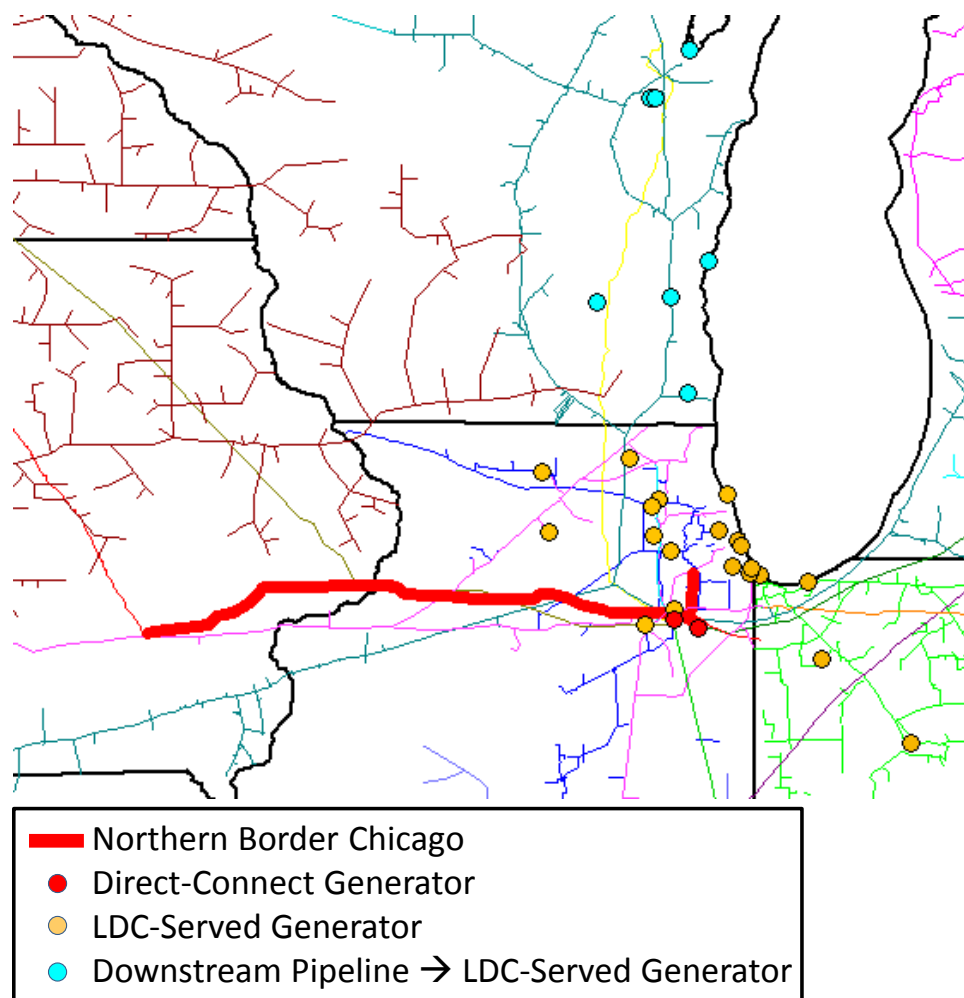


Figure A17-7. Generators Affected by Northern Border Chicago Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-35 and Figure A18-36 relative to the capacity of the segment.

Northern Natural Zone D

The 100% peak hour utilization on Northern Natural's Zone D segment, which is modeled with a capacity of 800 MDth/d, potentially affects generators directly connected to Northern Natural in Wisconsin, generators behind LDCs served by Northern Natural in Illinois and Wisconsin, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-8.

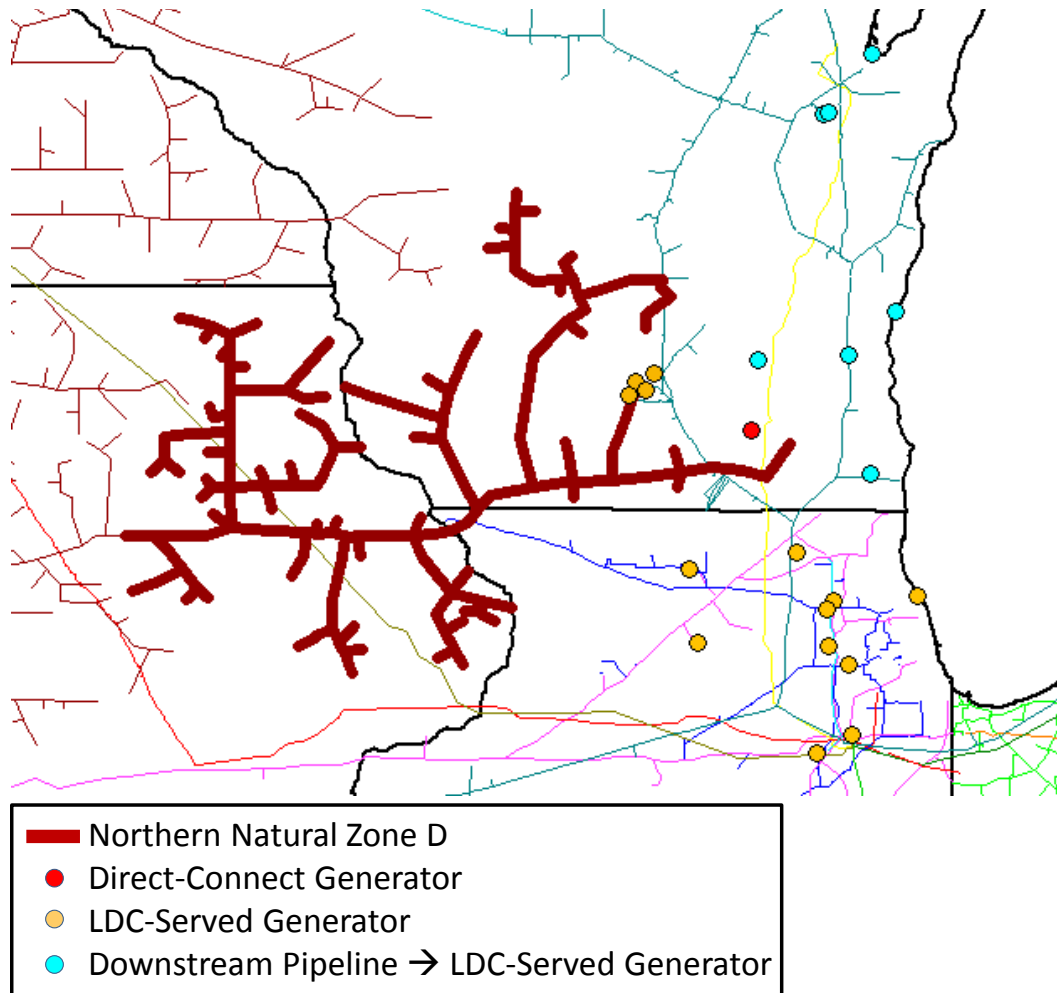


Figure A17-8. Generators Affected by Northern Natural Zone D Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-37 and Figure A18-38 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC. The locations of these generators are shown in Figure 9-91 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-39 and Figure A18-40 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-41 and Figure A18-42 relative to the capacity of the segment.

Texas Eastern M2 Pennsylvania – Southern Branch

The Texas Eastern M2 Pennsylvania – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York that are served by Texas Eastern, and generators that are served by Algonquin and Eastern Shore, either directly or behind an LDC. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-43 and Figure A18-44 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on Texas Eastern's Zone M3 northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, and generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-45 and Figure A18-46 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-47 and Figure A18-48 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Generators in Quebec could also be affected by this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-49 and Figure A18-50 relative to the capacity of the segment.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-51 and Figure A18-52 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-53 and Figure A18-54 relative to the capacity of the segment. The electric demand data set in these figures includes only gas demand at generators in the Study Region.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station segment is modeled with a capacity of 3,430 MDth/d. The 100% peak hour utilization on Transco's Leidy Line to Station 210 segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania and both New York City and Long Island. Locations of these generators are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-55 and Figure A18-56 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-57 and Figure A18-58 relative to the capacity of the segment.

Viking Zone 1

The 100% peak hour utilization on Viking's Zone 1 segment, which is modeled with a capacity of 543 MDth/d, potentially affects generators directly connected to Viking, generators behind LDCs served by Viking, generators directly connected to ANR, and generators behind LDCs served by ANR. The locations of these generators are shown in Figure A17-9.

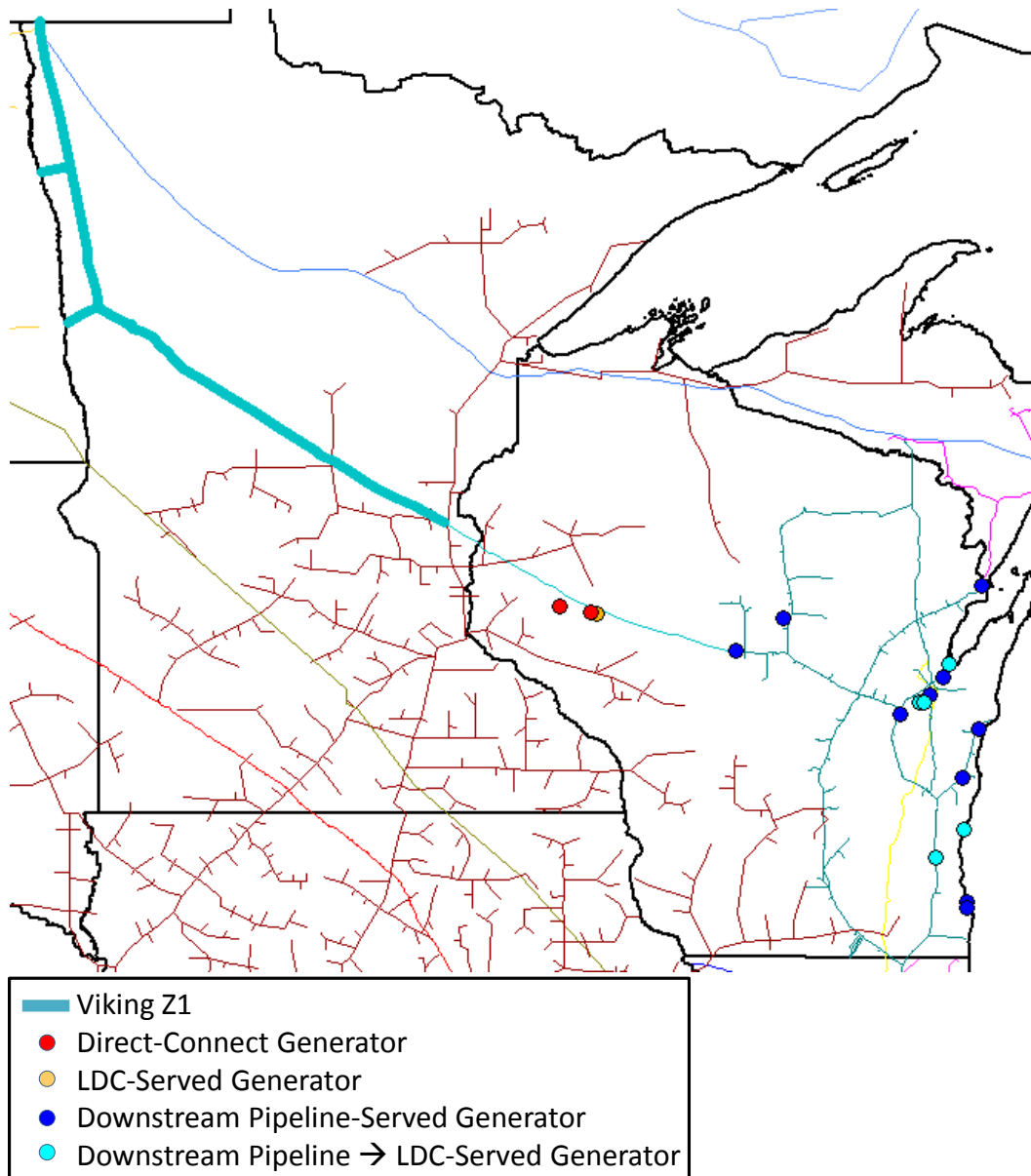


Figure A17-9. Generators Affected by Viking Zone 1 Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-59 and Figure A18-60 relative to the capacity of the segment.

HGDS S0 Summer 2018

Algonquin Connecticut

The 100% peak hour utilization on Algonquin’s Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report..

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-61 and Figure A18-62 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-63 and Figure A18-64 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-65 and Figure A18-66 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A18-67 and Figure A18-68 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 623 MDth/d in 2018. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A18-69 and Figure A18-70 relative to the total production

capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-71 and Figure A18-72 relative to the capacity of the segment.

PNGTS South of Westbrook

The 100% peak hour utilization on PNGTS's South of Westbrook segment, which is modeled with a capacity of 300 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire, generators served by Maine LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-113 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-73 and Figure A18-74 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-75 and Figure A18-76 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-77 and Figure A18-78 relative to the capacity of the segment.

HGDS S0 Winter 2023

Alliance

The 100% peak hour utilization on Alliance's mainline, which is modeled with a capacity of 1,800 MDth/d, potentially affects generators behind LDCs served by Alliance and generators behind LDCs served by Guardian. The locations of these generators are shown in Figure A17-1 on page A17-1.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-79 and Figure A18-80 relative to the capacity of the segment.

ANR Northern Illinois

The 100% peak hour utilization on ANR's Northern Illinois segment, which is modeled with a capacity of 1,337 MDth/d, potentially affects generators directly connected to ANR, generators behind LDCs served by ANR. The locations of these generators are shown in Figure A17-2 on page A17-2.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-81 and Figure A18-82 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,867 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-83 and Figure A18-84 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-85 and Figure A18-86 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-87 and Figure A18-88 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-89 and Figure A18-90 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-91 and Figure A18-92 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-93 and Figure A18-94 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-95 and Figure A18-96 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A18-97 and Figure A18-98 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-99 and Figure A18-100 relative to the capacity of the segment.

Great Lakes East

The 100% peak hour utilization on Great Lakes Gas's East segment, which is modeled with a capacity of 1,164 MDth/d, potentially affects generators directly connected to Great Lakes in Michigan, generators behind LDCs served by Great Lakes in Michigan, generators directly connected to Vector, and generators behind Union Gas. The locations of these generators are shown in Figure A17-3 on page A17-5.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-101 and Figure A18-102 relative to the capacity of the segment.

Iroquois Zone 1

The 100% peak hour utilization on Iroquois's Zone 1, which is modeled with a capacity of 1,195 MDth/d, potentially affects generators directly connected to Iroquois and generators behind LDCs served by Iroquois. The locations of these generators are shown in Figure A17-10.

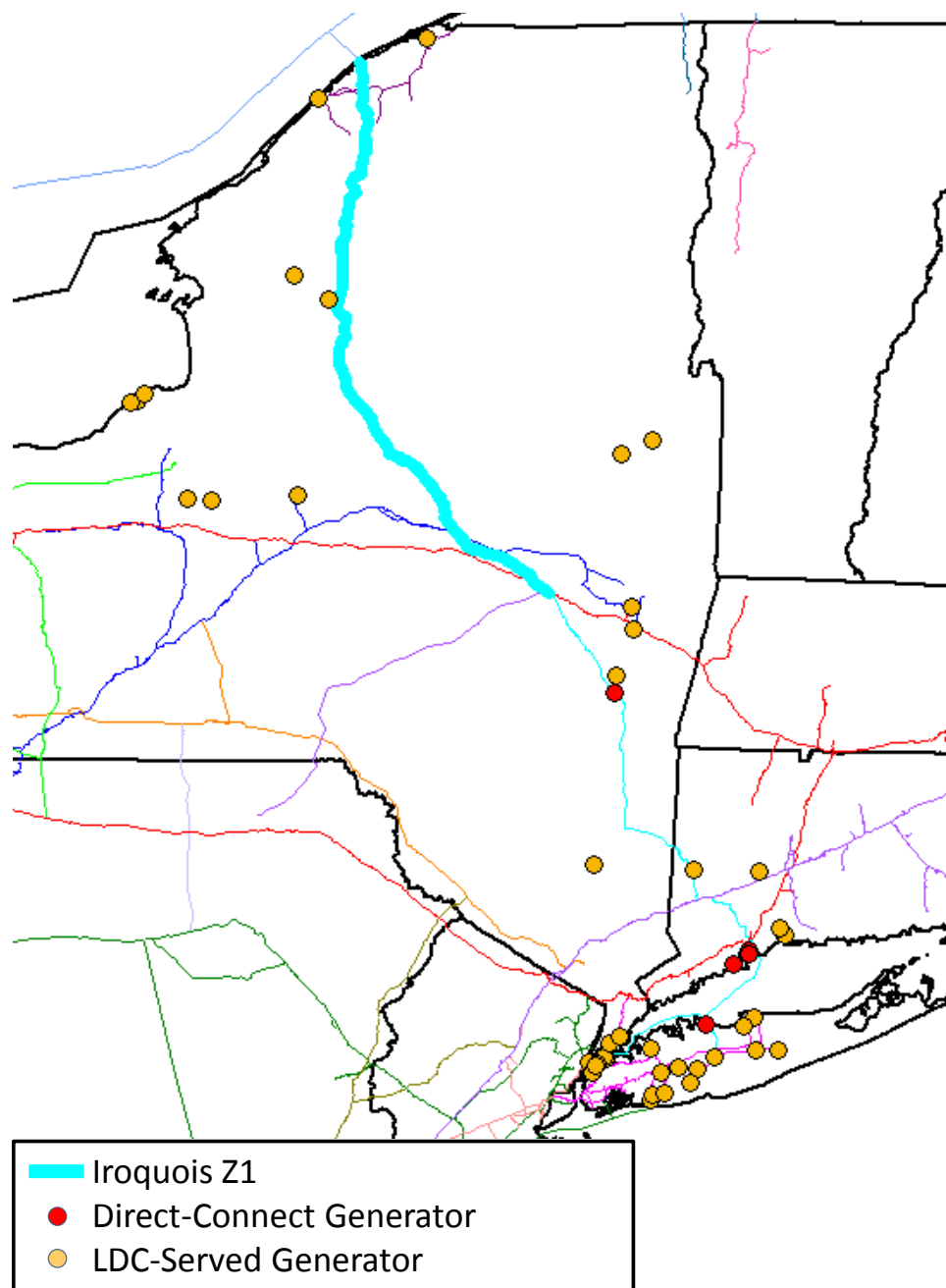


Figure A17-10. Generators Affected by Iroquois Zone 1 Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-103 and Figure A18-104 relative to the capacity of the segment.

Midwestern

The 100% peak hour utilization on Midwestern's mainline segment, which is modeled with a capacity of 635 MDth/d, potentially affects generators behind LDCs served by Midwestern and

behind LDCs served by Guardian downstream of the Joliet Hub. The locations of these generators are shown in Figure A17-4 on page A17-6.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-105 and Figure A18-106 relative to the capacity of the segment

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, in particular, in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-107 and Figure A18-108 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 283 MDth/d in 2023. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A18-109 and Figure A18-110 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

NGPL Iowa/Illinois North

The 100% peak hour utilization on NGPL's Iowa/Illinois North segment, which is modeled with a capacity of 1,677 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Iowa, Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-5 on page A17-8.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-111 and Figure A18-112 relative to the capacity of the segment.

NGPL Iowa/Illinois South

The 100% peak hour utilization on NGPL's Iowa/Illinois South segment, which is modeled with a capacity of 1,624 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-6 on page A17-9.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-113 and Figure A18-114 relative to the capacity of the segment.

Northern Border Mainline

The 100% peak hour utilization on Northern Border's mainline, which is modeled with a capacity of 2,311 MDth/d, potentially affects generators directly connected to Northern Border in Minnesota and Illinois, generators behind LDCs served by Northern Border in Minnesota, Iowa, Illinois and Indiana, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-11.

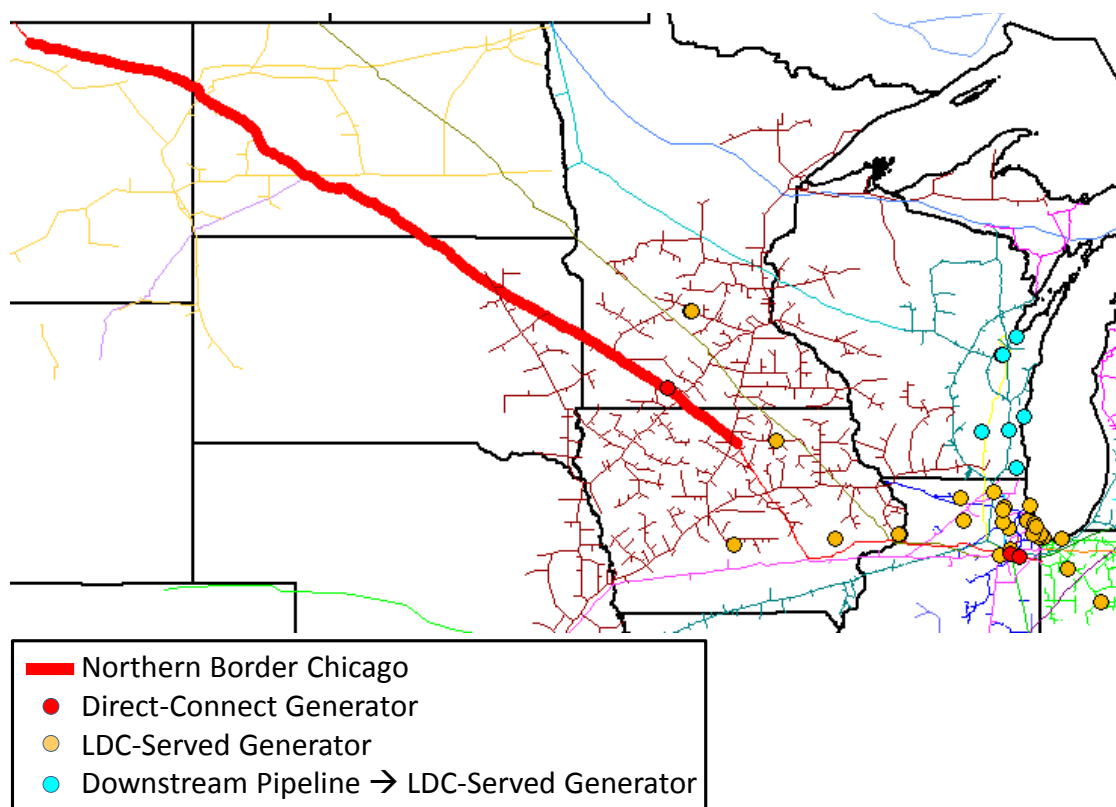


Figure A17-11. Generators Affected by Northern Border Mainline Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-115 and Figure A18-116 relative to the capacity of the segment.

Northern Natural Zone ABC

The 100% peak hour utilization on Northern Natural’s Zone ABC segment, which is modeled with a capacity of 2,138 MDth/d, potentially affects generators directly connected to Northern Natural in Iowa, South Dakota, Wisconsin and Minnesota, generators behind LDCs served by Northern Natural in Iowa, Wisconsin and Minnesota, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-12.

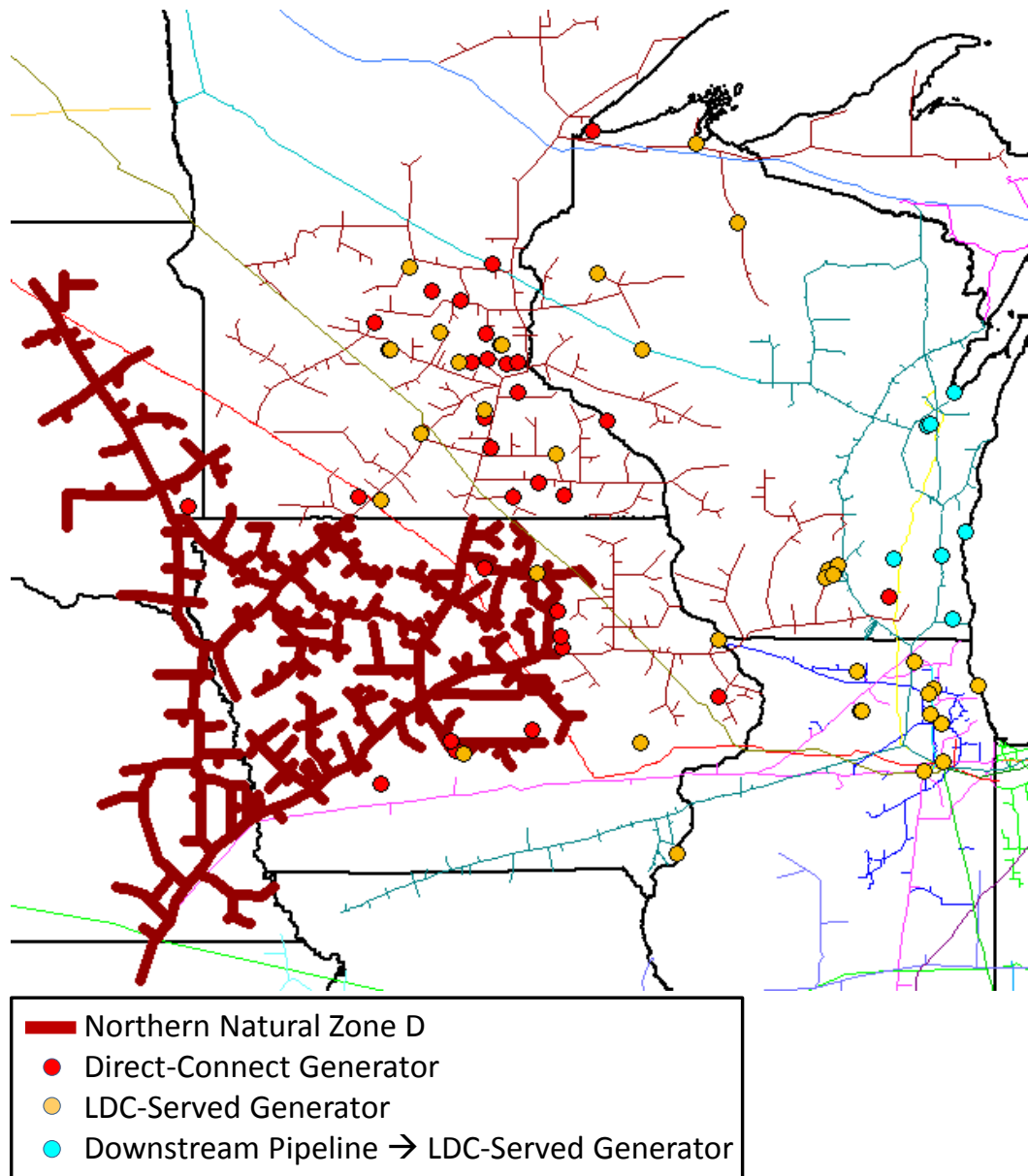


Figure A17-12. Generators Affected by Northern Natural Zone ABC Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-117 and Figure A18-118 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC. The locations of these generators are shown in Figure 9-91 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-119 and Figure A18-120 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,404 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-121 and Figure A18-122 relative to the capacity of the segment.

Texas Eastern M2 Pennsylvania – Southern Branch

The Texas Eastern M2 Pennsylvania – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York that are served by Texas Eastern, and generators that are served by Algonquin and Eastern Shore, either directly or behind an LDC. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-123 and Figure A18-124 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 3,357 MDth/d. The 100% peak hour utilization on Texas Eastern's Zone M3 northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, and generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-125 and Figure A18-126 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada’s Western Ontario segment is modeled with a capacity of 3,508 MDth/d. The 100% peak hour utilization on TransCanada’s Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-127 and Figure A18-128 relative to the capacity of the segment.

TransCanada Quebec to PNGTS

TransCanada’s Quebec to PNGTS segment is modeled with a capacity of 270 MDth/d. The 100% peak hour utilization on this segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure A17-13.

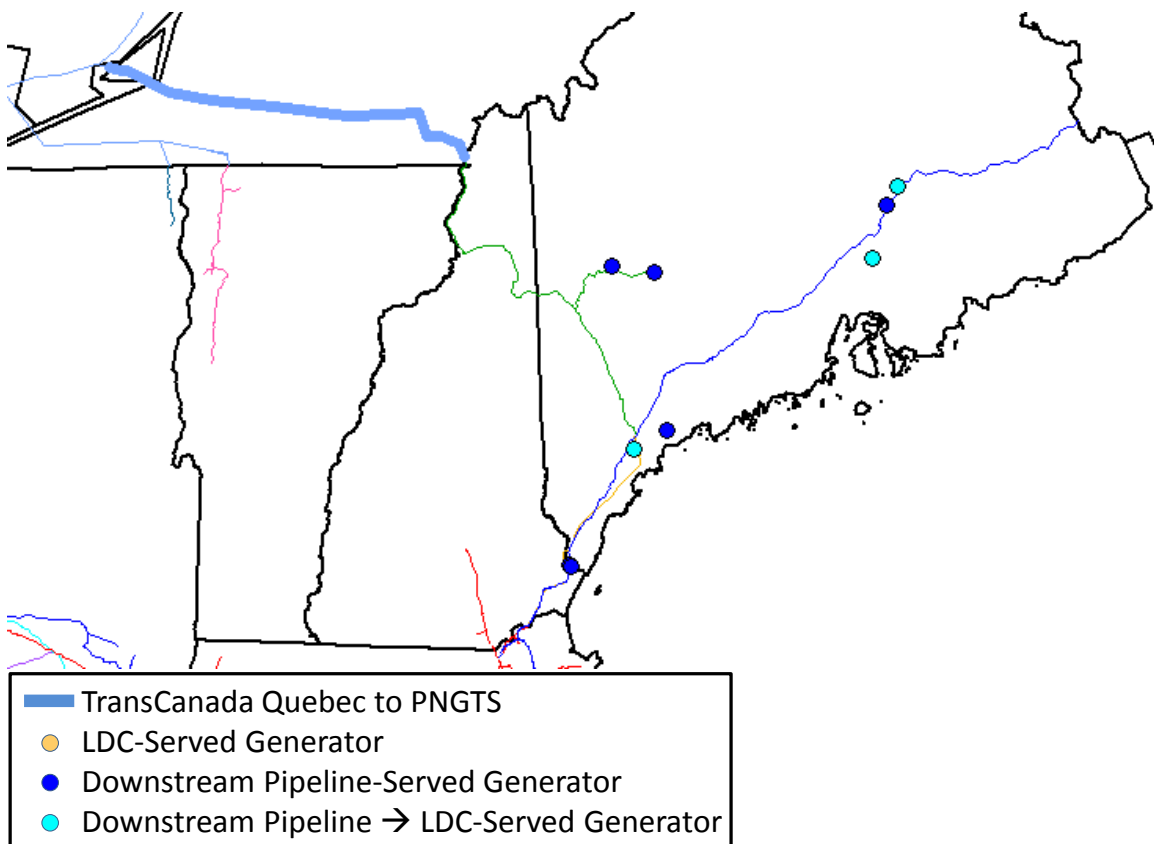


Figure A17-13. Generators Affected by TransCanada Quebec to PNGTS Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-129 and Figure A18-130 relative to the capacity of the segment.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-131 and Figure A18-132 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 4,117 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-133 and Figure A18-134 relative to the capacity of the segment. The electric demand data set in these figures includes only gas demand at generators in the Study Region.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station segment is modeled with a capacity of 3,430 MDth/d. The 100% peak hour utilization on Transco's Leidy Line to Station 210 segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania and both New York City and Long Island. Locations of these generators are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-135 and Figure A18-136 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-137 and Figure A18-138 relative to the capacity of the segment.

Vector Zone 1

The 100% peak hour utilization on Vector's Zone 1 segment, which is modeled with a capacity of 1,600 MDth/d, potentially affects generators directly connected to Vector in Illinois, Indiana, Michigan and Ontario and generators behind LDCs served by Vector in Indiana and Michigan. The locations of these generators are shown in Figure A17-14.

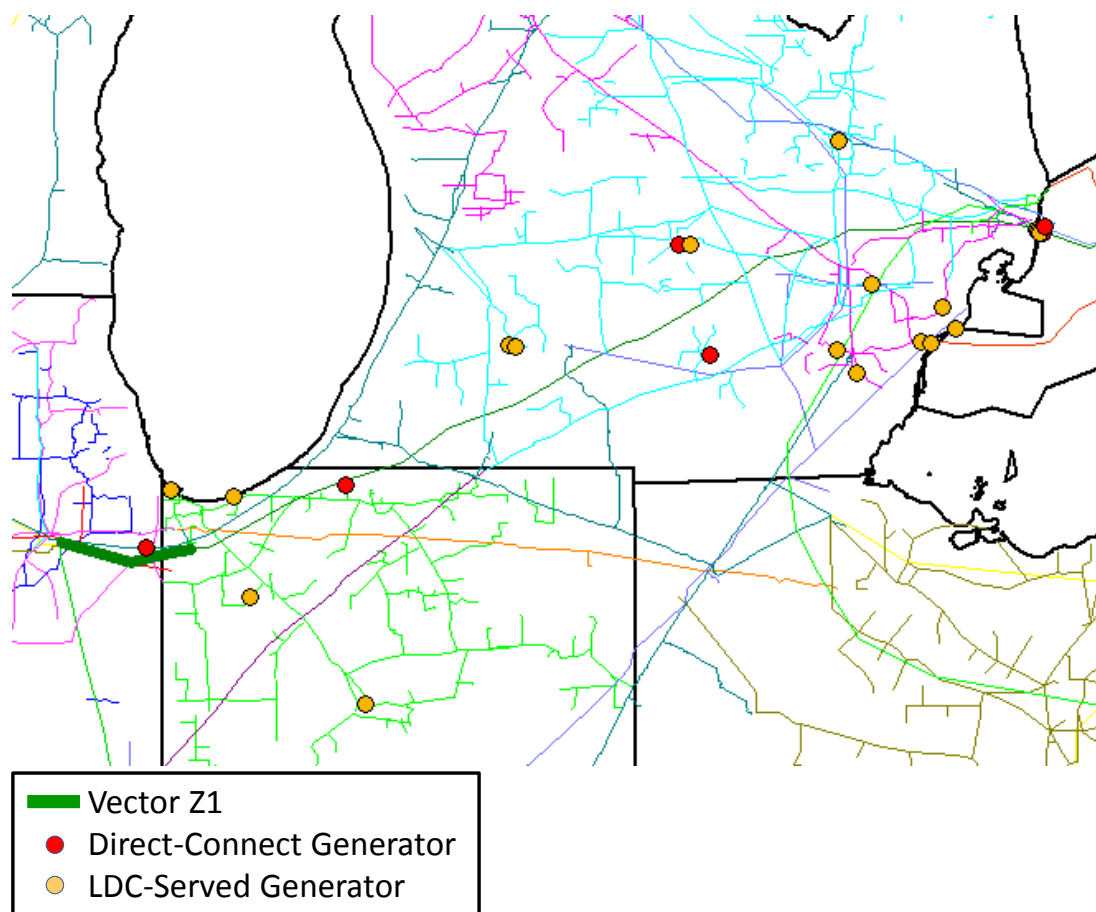


Figure A17-14. Generators Affected by Vector Zone 1 Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-139 and Figure A18-140 relative to the capacity of the segment.

Viking Zone 1

The 100% peak hour utilization on Viking's Zone 1 segment, which is modeled with a capacity of 543 MDth/d, potentially affects generators directly connected to Viking, generators behind

LDCs served by Viking, generators directly connected to ANR, and generators behind LDCs served by ANR. The locations of these generators are shown in Figure A17-9 on page A17-15.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-141 and Figure A18-142 relative to the capacity of the segment.

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Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-143 and Figure A18-144 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,867 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-145 and Figure A18-146 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-147 and Figure A18-148 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A18-149 and Figure A18-150 relative to the capacity of the segments.

Gulf South Zone 2 Henry Hub

The 100% peak hour utilization on the Henry Hub segment of Gulf South Zone 2, which is modeled with a capacity of 700 MDth/d, potentially affects generators directly connected to Gulf South in Louisiana, and generators behind LDCs served by Gulf South in Louisiana. The locations of these generators are shown in Figure A17-15.

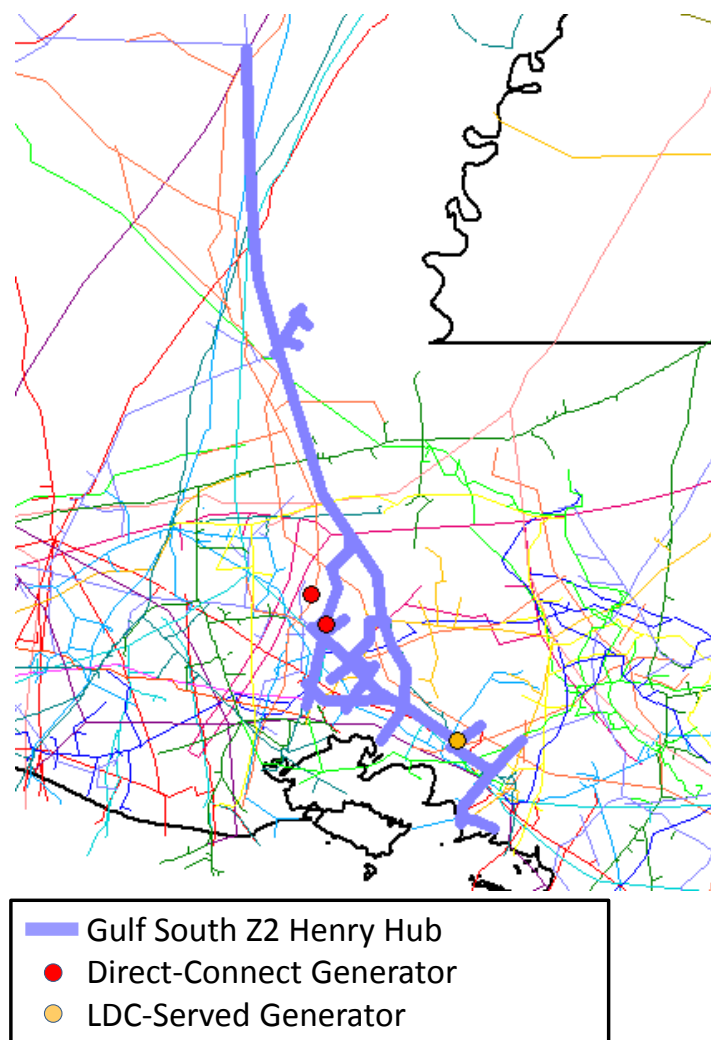


Figure A17-15. Generators Affected by Gulf South Z2 HH Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-151 and Figure A18-152 relative to the capacity of the segment.

Iroquois Zone 1 to Zone 2

The 100% peak hour utilization of the link between Iroquois Zone 1 and Iroquois Zone 1, which is modeled with a capacity of 855 MDth/d, potentially affects generators directly connected to Iroquois in New York and Connecticut, and generators behind LDCs served by Iroquois in New York and Connecticut. The locations of these generators are shown in Figure A17-16.

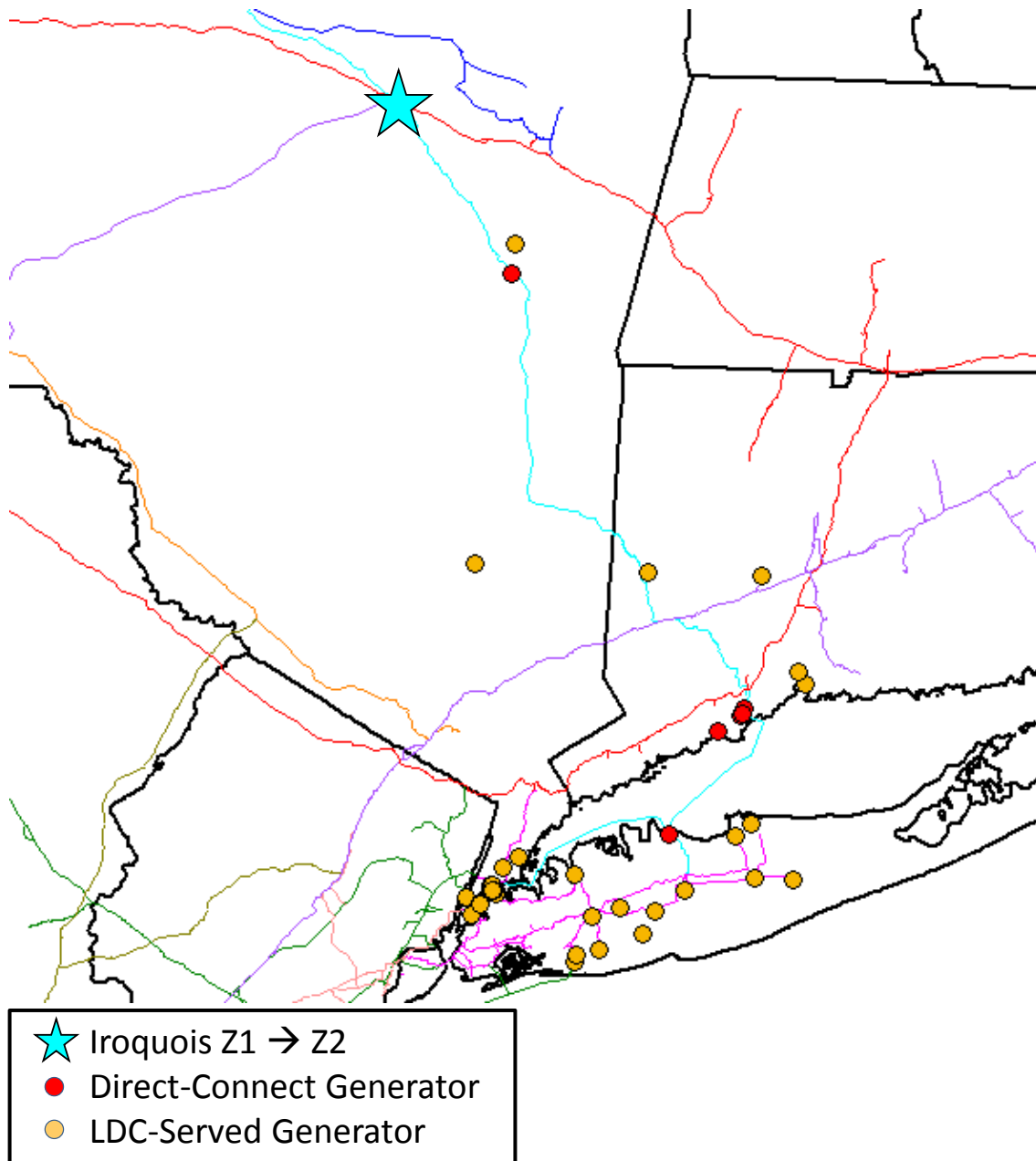


Figure A17-16. Generators Affected by Iroquois Z1 → Z2 Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-153 and Figure A18-154 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 283 MDth/d in 2023. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A18-155 and Figure A18-156 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-157 and Figure A18-158 relative to the capacity of the segment.

PNGTS South of Westbrook

The 100% peak hour utilization on PNGTS's South of Westbrook segment, which is modeled with a capacity of 300 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire, generators served by Maine LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-113 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-159 and Figure A18-160 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut

and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-161 and Figure A18-162 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-163 and Figure A18-164 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-165 and Figure A18-166 relative to the capacity of the segment.

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Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-167 and Figure A18-168 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-169 and Figure A18-170 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A18-171 and Figure A18-172 relative to the capacity of the segments.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, in particular, in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-173 and Figure A18-174 relative to the capacity of the

segment. Because it links Marcellus supply to markets in New York, New England and Ontario, Millennium's capacity factor is expected to be high.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 623 MDth/d in 2018. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A18-175 and Figure A18-176 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC. The locations of these generators are shown in Figure 9-91 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-177 and Figure A18-178 relative to the capacity of the segment. As a supply segment connected to Marcellus, additional interconnection flows to downstream pipelines would likely utilize the remaining available capacity on days shown here as unconstrained.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-179 and Figure A18-180 relative to the capacity of the segment.

Texas Eastern M2 Pennsylvania – Southern Branch

The Texas Eastern M2 Pennsylvania – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern’s Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York that are served by Texas Eastern, and generators that are served by Algonquin and Eastern Shore, either directly or behind an LDC. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-181 and Figure A18-182 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on Texas Eastern’s Zone M3 northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, and generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-183 and Figure A18-184 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada’s Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada’s Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-185 and Figure A18-186 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada’s Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Generators in Quebec could also be affected by this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-187 and Figure A18-188 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on Transco's Leidy Line to Station 210 segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania and both New York City and Long Island. Locations of these generators are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-189 and Figure A18-190 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-191 and Figure A18-192 relative to the capacity of the segment.

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Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-193 and Figure A18-194 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators

served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-195 and Figure A18-196 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 200 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A18-197 and Figure A18-198 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-199 and Figure A18-200 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-201 and Figure A18-202 relative to the capacity of the segment.

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Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in

Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-203 and Figure A18-204 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-205 and Figure A18-206 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-207 and Figure A18-208 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-209 and Figure A18-210 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-211 and Figure A18-212 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-213 and Figure A18-214 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-215 and Figure A18-216 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A18-217 and Figure A18-218 relative to the capacity of the segments.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, in particular, in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-219 and Figure A18-220 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 283 MDth/d in 2023. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A18-221 and Figure A18-222 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC. The locations of these generators are shown in Figure 9-91 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-223 and Figure A18-224 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-225 and Figure A18-226 relative to the capacity of the segment.

Texas Eastern M2 Pennsylvania – Southern Branch

The Texas Eastern M2 Pennsylvania – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2

segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York that are served by Texas Eastern, and generators that are served by Algonquin and Eastern Shore, either directly or behind an LDC. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-227 and Figure A18-228 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on Texas Eastern's Zone M3 northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, and generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-229 and Figure A18-230 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-231 and Figure A18-232 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Generators in Quebec could also be affected by this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-233 and Figure A18-234 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-235 and Figure A18-236 relative to the capacity of the segment. The electric demand data set in these figures includes only gas demand at generators in the Study Region.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on Transco's Leidy Line to Station 210 segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania and both New York City and Long Island. Locations of these generators are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-237 and Figure A18-238 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-239 and Figure A18-240 relative to the capacity of the segment.

LGDS S0 Summer 2023

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-241 and Figure A18-242 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-243 and Figure A18-244 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-245 and Figure A18-246 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 200 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A18-247 and Figure A18-248 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 283 MDth/d in 2023. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A18-249 and Figure A18-250 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

PNGTS South of Westbrook

The 100% peak hour utilization on PNGTS's South of Westbrook segment, which is modeled with a capacity of 300 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire, generators served by Maine LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-113 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-251 and Figure A18-252 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-253 and Figure A18-254 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A18-255 and Figure A18-256 relative to the capacity of the segment.

Appendix 18

HGDS and LGDS Chronological and Descending Demand Figures

(Contains CEII – Not included in this Volume)

Appendix 19

RGDS S13 Pipeline Expansion Projects

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Sensitivity 13 adds several pipeline projects that are currently under development, but that did not meet the criteria for inclusion in the RGDS, to the GPCM infrastructure. These projects did not have publicly-demonstrated market support prior to April 22, 2014. A discussion of the highlights of the proposed pipeline expansion projects incorporated in the incremental Sensitivity 13 pipeline topology across six PPAs follows. The projects enumerated in this Appendix are described by location, and cost data is provided where it is available.

Algonquin

One Algonquin project has been included in Sensitivity 13.¹ As described in Appendix 15, the Atlantic Bridge Project will enable Algonquin and M&N to add 100 to 600 MDth/d of mainline transportation capacity from receipt points as far upstream as Algonquin's interconnection with Texas Eastern in Lambertville, NJ to delivery points as far downstream as Maine.² Because the open season notice for the project indicated that an anchor shipper precedent agreement has been executed with Unifil Corporation, 100 Dth/d of incremental capacity, the minimum project size, was included in the RGDS. The incremental 500 MDth/d was included in Sensitivity 13. Preliminary project facilities have been announced for the planned November 2017 in-service date, and are illustrated in Figure A19-1.

¹ Spectra recently announced development of the Northeast Access Project, which would add up to an incremental 1 Bcf/d of capacity on Algonquin and M&N in 2018.

² Source: Description of Atlantic Bridge Project on Spectra Energy website.
<http://www.spectraenergy.com/Operations/New-Projects-and-Our-Process/New-Projects-in-US/Atlantic-Bridge/>

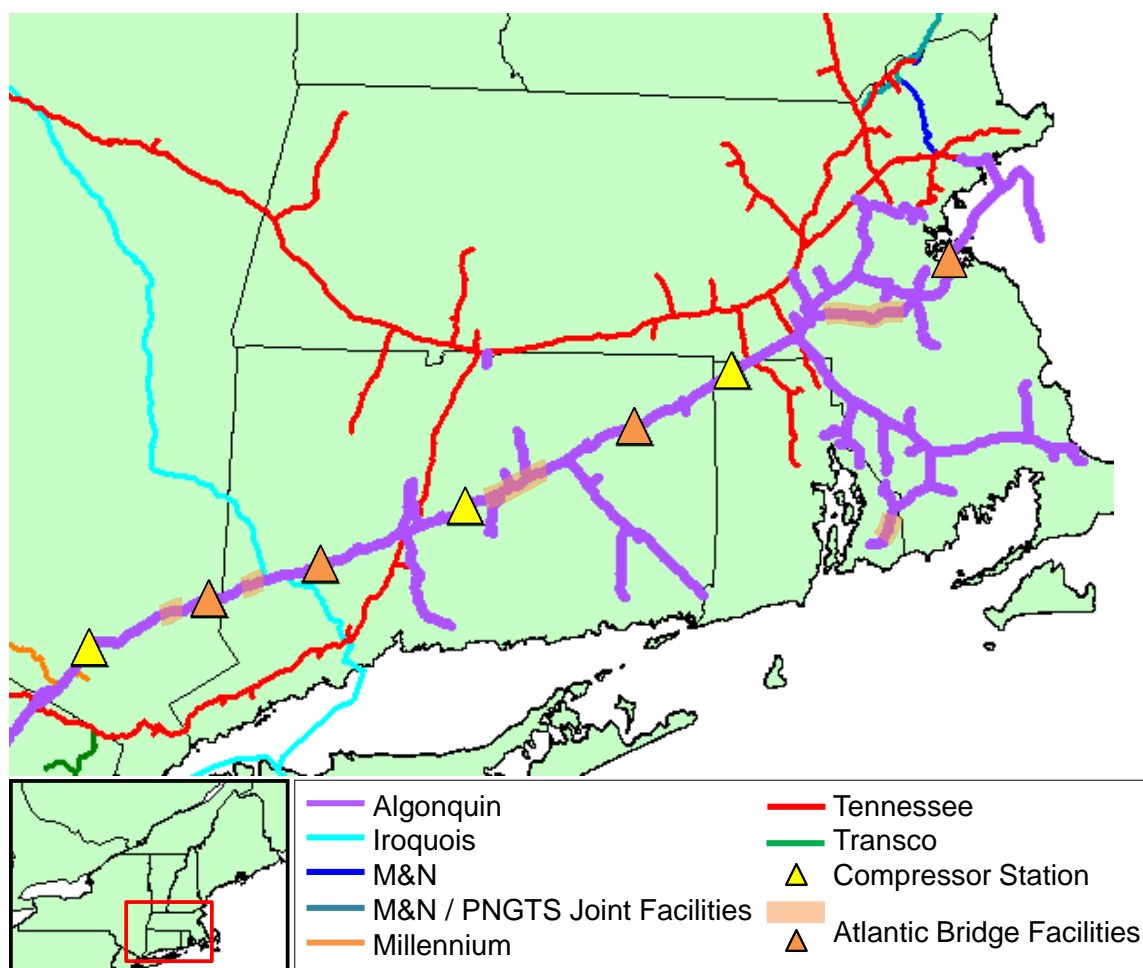


Figure A19-1. Atlantic Bridge Project Preliminary Facilities

Central New York Oil & Gas

Central New York Oil & Gas held an open season for the Northern Expansion Project in May 2013.³ This project would add up to 250 MDth/d of incremental wheeling capacity on the Stagecoach system between existing connections with Millennium, Tennessee and Transco, and would also extend the system to a new interconnection with Dominion in Tompkins County, NY. Additional firm storage capacity is also contemplated under the terms of the open season.

Columbia Gas

Two Columbia Gas expansion projects have been included in Sensitivity 13: the QuickLink Project and the Leach XPress Project. The QuickLink Project was designed to transport up to 500 MDth/d of Utica shale gas to interconnections with Dominion, Rockies Express and Texas Eastern for a November 2015 in-service date. The Leach XPress Project involves approximately

³ Source: Northern Expansion Project open season notice.

<http://www.stagecoachstorage.com/ExternalFiles/SitesIP/stagecoach/notices/CYNOG%20Northern%20Expansion%20Project2.pdf>

160 miles of new pipeline and compression facilities between southeastern Ohio and northern West Virginia.⁴ The locations of these new facilities are shown in Figure A19-2. The capacity of the project is 1.5 Bcf/d and the estimated cost is \$1.4 billion. An open season was held in early 2014 for a projected in-service date in the second half of 2017.

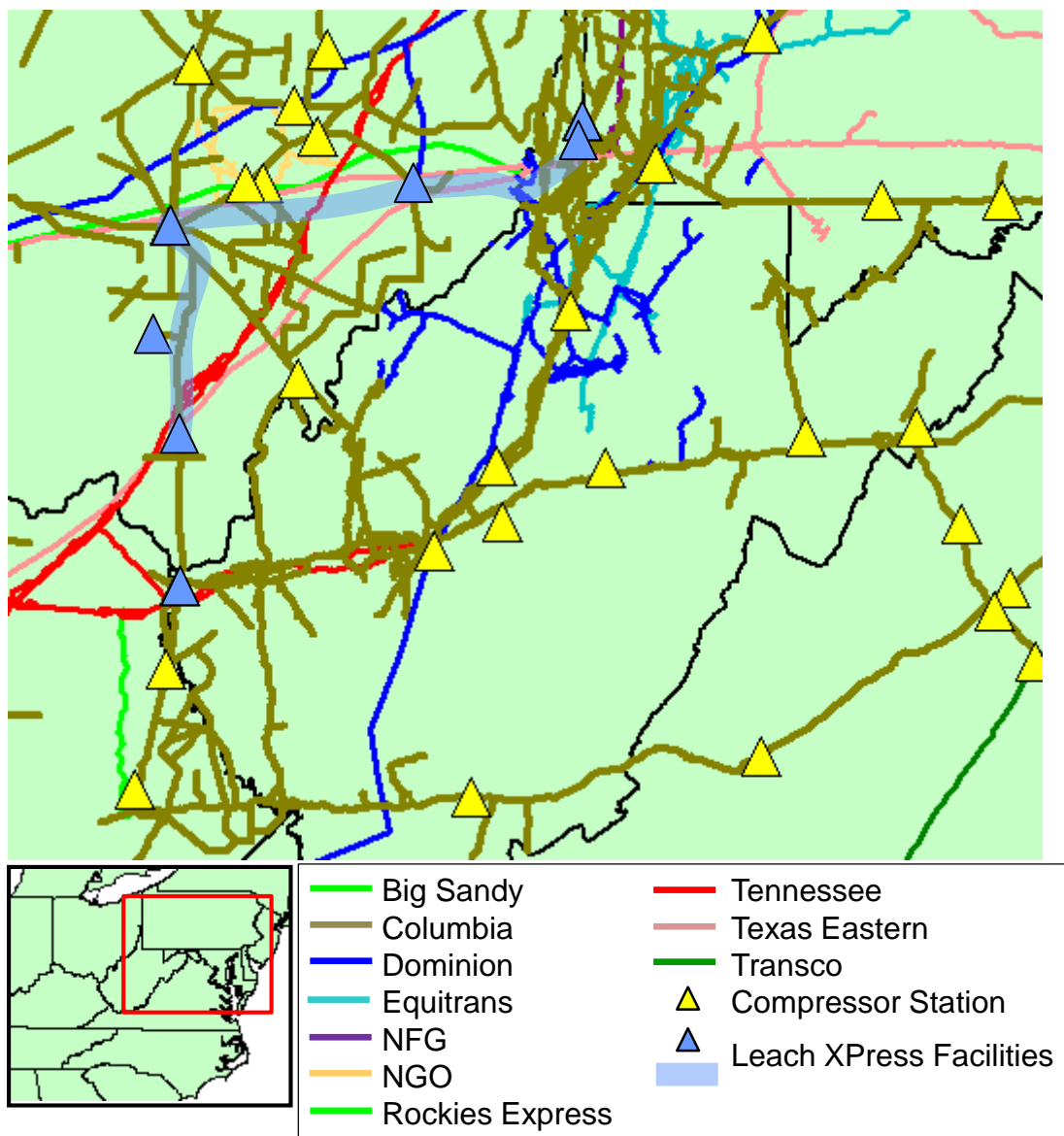


Figure A19-2. Leach XPress Project Facilities

Columbia Gulf

The Rayne XPress Project represents the last 1.2 Bcf/d of available capacity on Columbia Gulf for north to south flow, from receipt points in Kentucky to delivery points in Mississippi and

⁴ Source: Columbia Gas Leach XPress Project information site: <https://www.columbiapipelinegroup.com/current-projects/leach-xpress-project>

Louisiana. An open season was held in early 2014 for a projected November 1, 2016 in-service date.

Dominion

Two Dominion projects are included in Sensitivity 13: the New Market Project and the Lebanon West II Project.⁵ The New Market Project, which was filed with FERC in June 2014, would add two new 11,000 HP compressor stations and expand another compressor station by 11,000 HP, to add 112 MDth/d of capacity from interconnections with Texas Eastern and Transco at Leidy to delivery points in upstate New York, including 82 MDth/d to the Brookman Corners / Canajoharie interconnection with Iroquois.⁶ The estimated construction cost is \$159 million, and the planned in-service date is November 2016. The locations of the New Market Project facilities are shown in Figure A19-3.

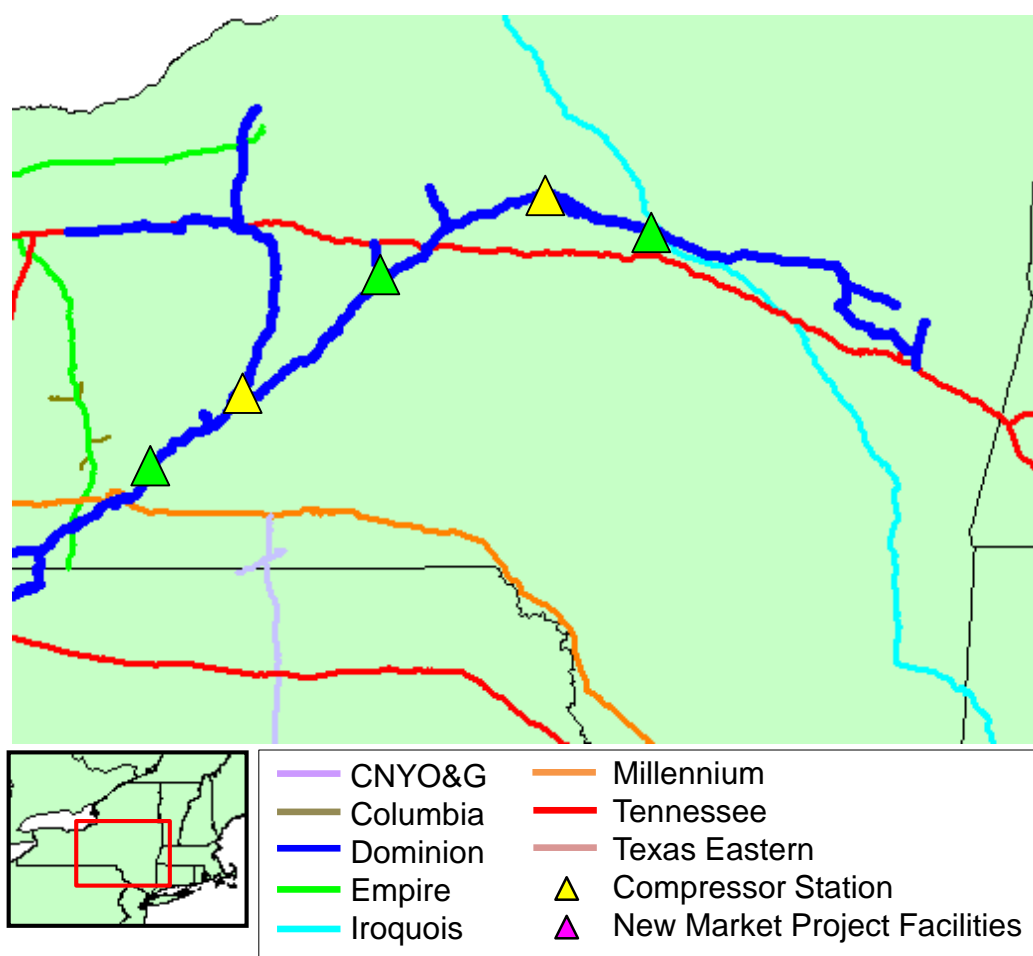


Figure A19-3. New Market Project Facilities

⁵ Dominion also recently announced development of the Atlantic Coast Pipeline Project, which would build a new 550-mile pipeline from central West Virginia to southern North Carolina via southeastern Virginia. The capacity of the pipeline is projected to be 1.5 Bcf/d, with a late-2018 in-service date.

⁶ FERC Docket No. CP14-497

The Lebanon West II Project would allow 130 MDth/d of shale-produced gas to be transported from Butler, PA to Lebanon, OH, beginning in late 2016.

Empire and NFG

Three Empire and NFG projects have been included in Sensitivity 13: the Central Tioga County Extension Project, the Clermont to Transco Project, and the Northern Access 2016 Project.⁷ Known proposed facilities associated with these projects are shown in Figure A19-4.

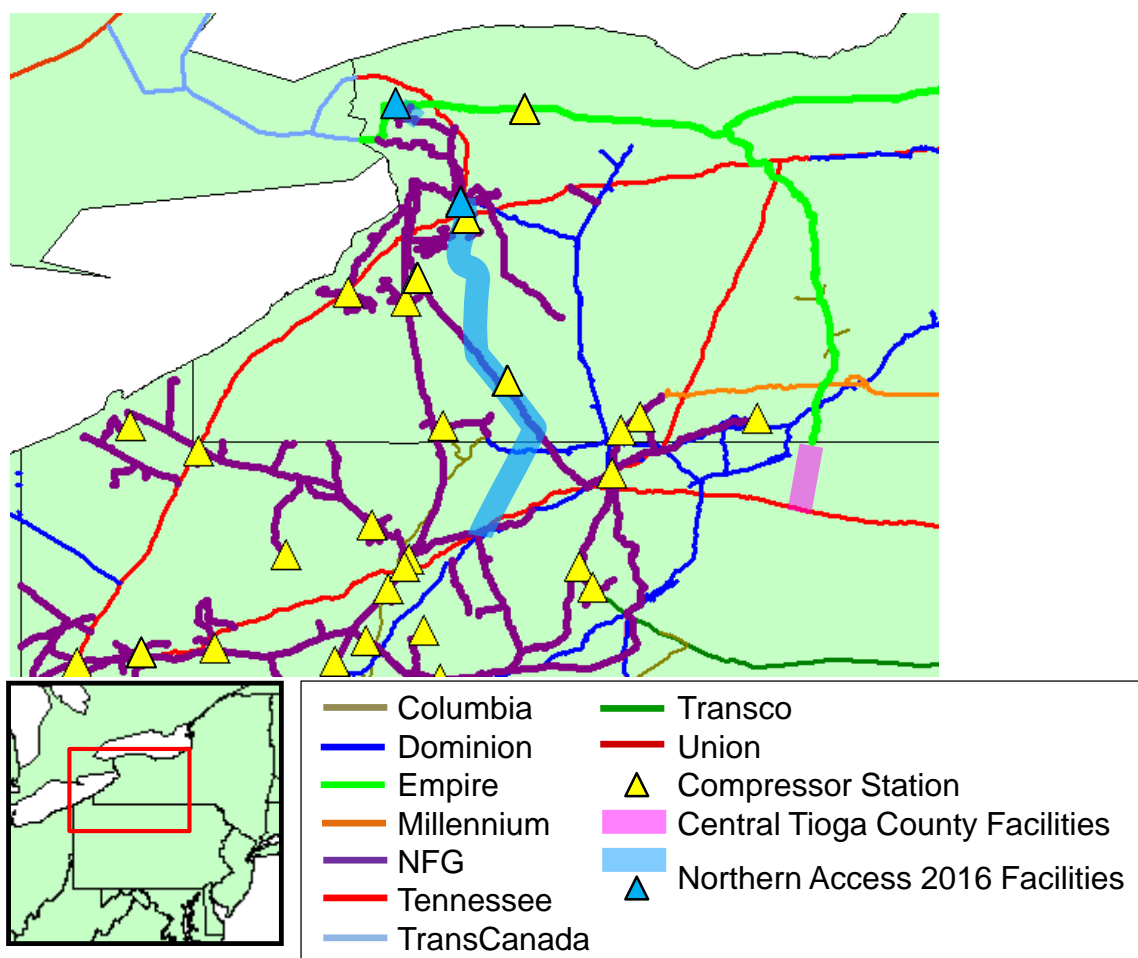


Figure A19-4. Empire / NFG Expansion Projects (Sensitivity 13)

The Northern Access 2016 Project would create 350 MDth/d of incremental capacity from Marcellus production to delivery points on Tennessee’s 200 Line and Empire’s Chippawa interconnection with TransCanada.⁸ Proposed NFG facilities include 97 miles of new 24” pipeline from McKean County, PA to Erie County, NY, 2,500 HP of incremental compression at the Portersville Compressor Station in Erie County, NY, and a new interconnection with

⁷ The Northern Access 2016 Project was previously referred to as the Clermont to Chippawa expansion project.

⁸ FERC Docket No. PF14-18

Tennessee, also in Erie County, NY. Empire's proposed facilities include 4 miles of 24" pipeline in replacement of existing 16" pipeline, a new 15,000 HP compressor station, and a natural gas dehydration facility, all in Niagara County, NY. The target in-service date for these facilities is November 1, 2016.

The Central Tioga County Extension Project is designed to connect Empire's existing system to additional Marcellus production via a 20-mile pipeline extension in Pennsylvania.⁹ Two compressor stations are also included in the preliminary facilities. The incremental supply would be deliverable to interconnections with Millennium at Corning, with Tennessee at Hopewell, and with TransCanada at Chippawa. The planned capacity of the project is 200 to 250 MDth/d, for an in-service date in 2016 or later.

The Clermont to Transco Project is designed to create 300 to 500 MDth/d of incremental transportation from shale receipt points to an interconnection with Transco at Leidy for a 2017 in-service date.¹⁰

Equitrans

The Ohio Valley Connector Project consists of approximately 35.5 miles of new 30-inch pipeline from Wetzel County, West Virginia to Monroe County, OH, a total of 40,000 HP at two new compressor stations and a 14-mile 24-inch diameter pipeline loop in West Virginia, as shown in Figure A19-5.¹¹ The projected capacity addition associated with these facilities is 900 MDth/d, for a May 2016 in-service date. The project is designed to expand transportation of Marcellus shale production to the interstate pipeline grid.

⁹ Source: NFG's project information summary.

http://www.nationalfuelgas.com/empire/docs/Tioga_2013.pdf

¹⁰ Source: NFG Analyst Day Presentation, November 19, 2013.

<http://www.sec.gov/Archives/edgar/data/70145/000119312513446286/d630969dex99.htm>

¹¹ FERC Docket No. PF14-13

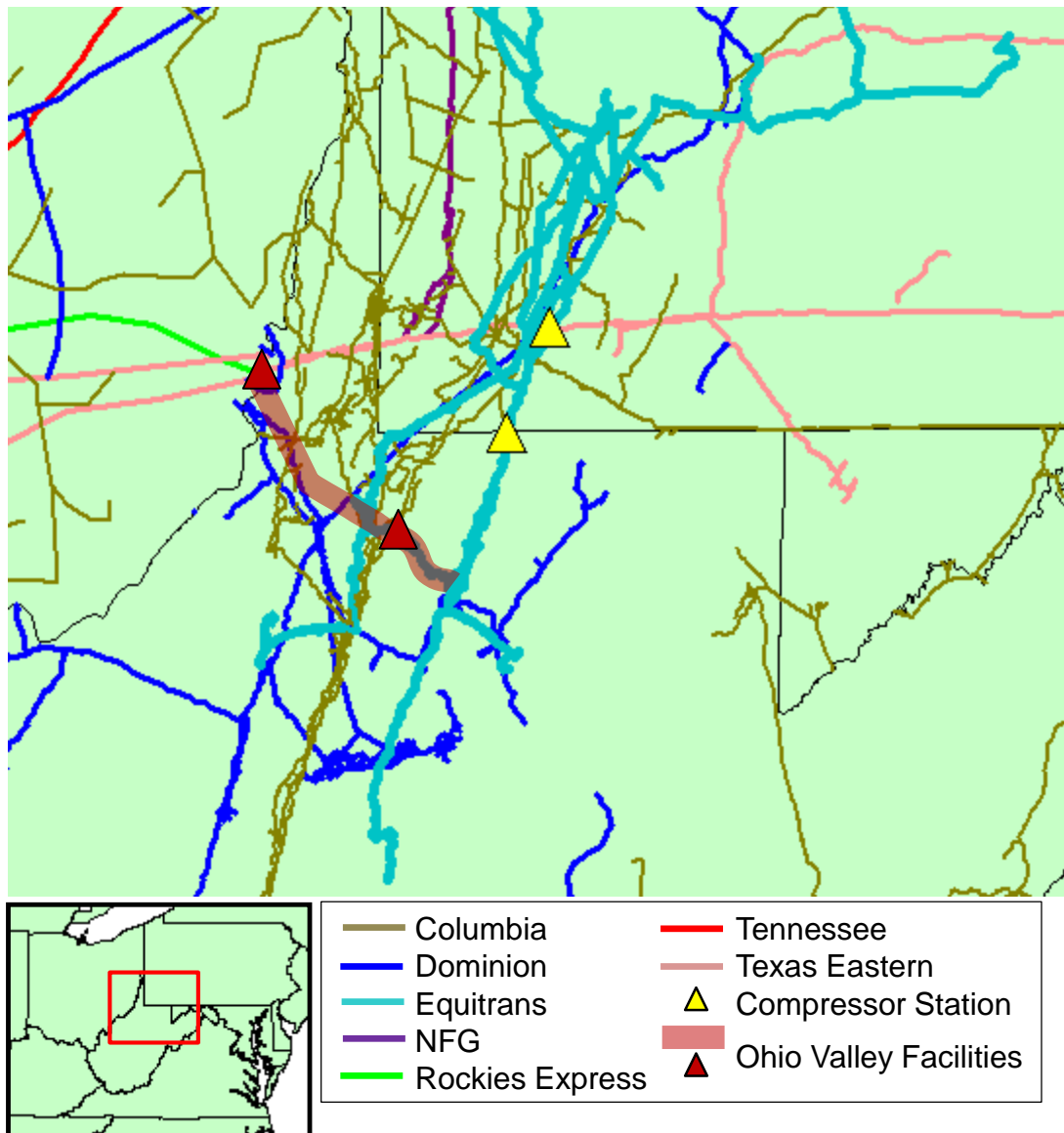


Figure A19-5. Ohio Valley Connector Project Facilities

Iroquois

Iroquois’s South to North Project would allow shippers to move up to 300 MDth/d from south-to-north on the Iroquois mainline, from interconnections with Algonquin at Brookfield, Constitution at Wright and Dominion at Canajoharie to delivery points in Zone 1 and a new physical delivery/export point at the Waddington interconnection with TransCanada. A non-binding season with a proposed November 2016 in-service date was held for the project capacity in late 2013 and early 2014, no executed precedent agreements or preliminary expansion facilities have been announced, although modifications to allow flow reversal are typically minimal.

NGPL

The Gulf Coast Market Expansion Project was designed to provide up to 750 MDth/d of incremental firm transportation capacity from NGPL's Moultrie interconnection with Rockies Express in southern Illinois to markets in Texas and Louisiana for a July 2016 in-service date.¹² A non-binding open season was held for this capacity in early 2014.

NEXUS Gas Transmission

NEXUS is a new pipeline developed by DTE Energy and Spectra Energy to transport Marcellus and Utica shale supplies to customers in Ohio, Michigan, Chicago and southwestern Ontario.¹³ The primary infrastructure is a greenfield 250-mile pipeline from eastern Ohio to southeastern Michigan, shown in Figure A19-6. An initial season in late 2012 resulted in over 1 Bcf/d of interest in the project, and a supplemental open season was held during summer 2014 to solicit additional interest up to the full 2 Bcf/d design capacity. The in-service date for the new pipeline could be as early as November 2017.

¹² Source: NGPL Gulf Coast Market Expansion open season notice. http://pipeline.kindermorgan.com/info_postings/matrix/NGPL%20Open%20Season%2002%2018final.pdf

¹³ Source: NEXUS Gas Transmission Project Supplemental Open Season Notice for Firm Service. <http://nexusgastransmission.files.wordpress.com/2014/07/nexus-supplemental-open-season.pdf>

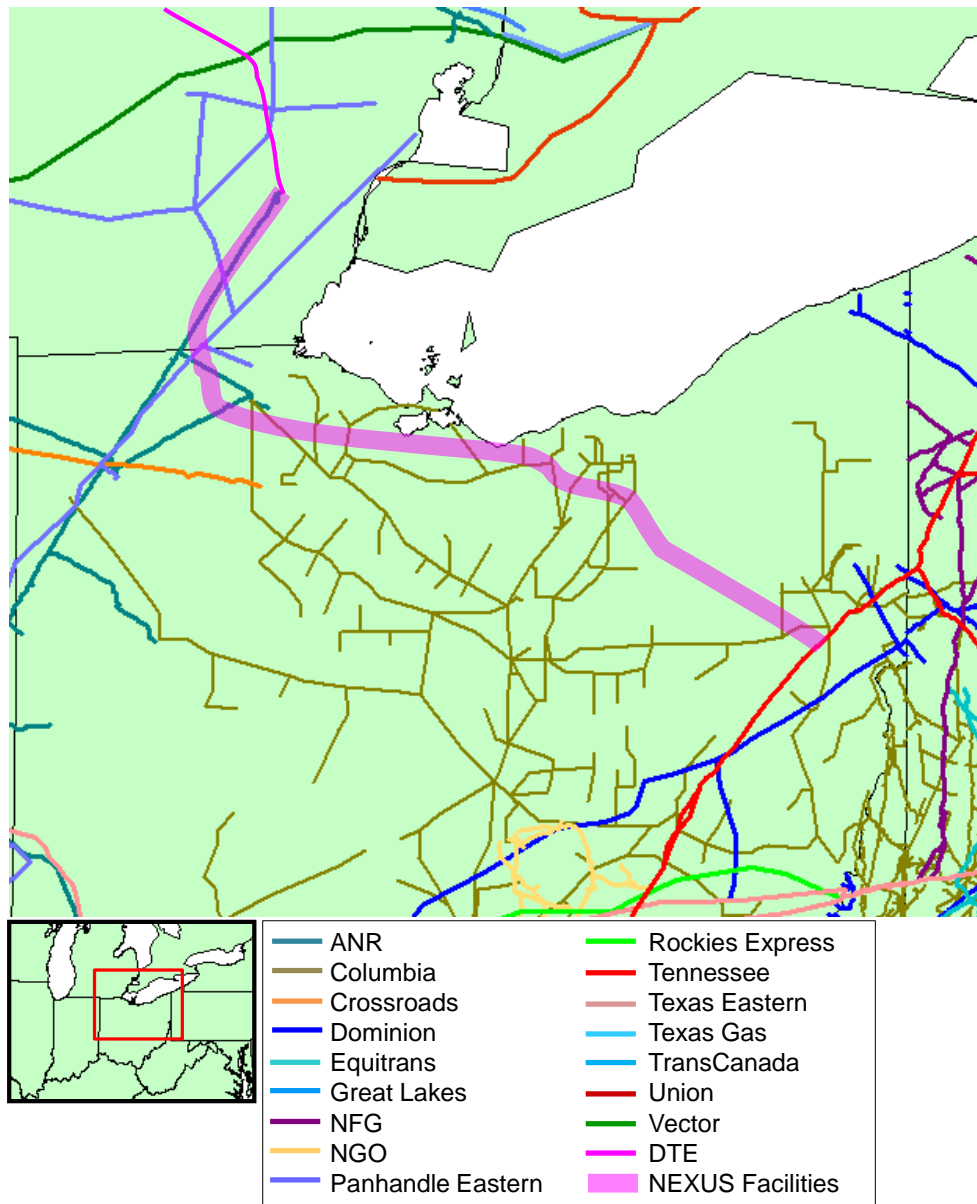


Figure A19-6. NEXUS Facilities

Northern Border

Northern Border’s Bakken Header Project would increase access to the Bakken shale production area for markets served by Northern Border. Available project information indicates that project facilities consist of 55 miles of 20-inch pipe between a Tioga receipt point and the Northern Border mainline, and a 25-mile extension between Tioga and Stanley, shown in Figure A19-7. Approximately 20,000 HP of incremental compression is also planned. The capacity of the new line would be 400 MDth/d, and the expected in-service date is as early as November 2016.

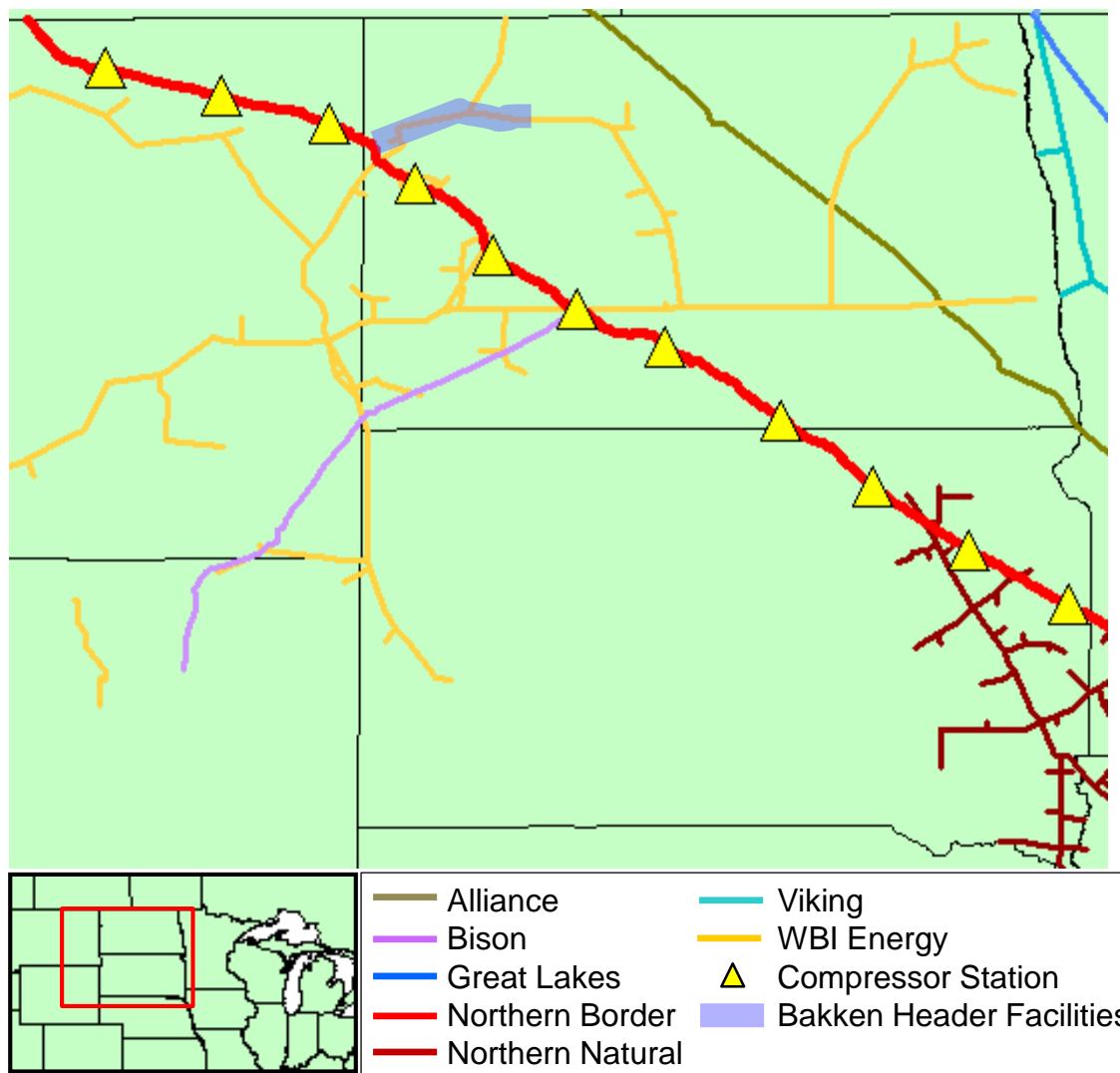


Figure A19-7. Bakken Header Project Facilities

PNGTS

PNGTS’s Continent to Coast Project is designed to increase the firm capacity of the Pittsburg to Westbrook portion of its system to 300 to 350 MDth/d, in conjunction with an upstream expansion on TransCanada.¹⁴ This expansion has been characterized as requiring minimal infrastructure changes, with a November 2016 in-service date.

¹⁴ Source: PNGTS Continent to Coast Open Season Documents.
<http://www.gasnom.com/ExternalFiles/SitesIP/pngts/OpenSeasonDocumentAndBindingRequest.pdf>

Tennessee

One Tennessee project has been included in Sensitivity 13, the Northeast Energy Direct Project.¹⁵ This project is designed to transport up to 2.2 Bcf/d from central Pennsylvania to eastern New England.¹⁶ An open season was held during the first quarter of 2014. To date, Tennessee has announced that 500 MDth/d of precedent agreements have been executed with New England LDCs, and that negotiations with other potential shippers are ongoing. Planned project facilities are illustrated in Figure A19-8, and include 32 miles of pipeline looping in Pennsylvania, 135 miles of greenfield pipeline from Pennsylvania to Wright, NY, 52 miles of new pipeline co-located with the existing Tennessee system in New York and Massachusetts, 125 miles of greenfield pipeline in Massachusetts, several new compressor stations, modifications to existing compressor stations, and various new laterals and meter stations. The estimated in-service date is November 2018.

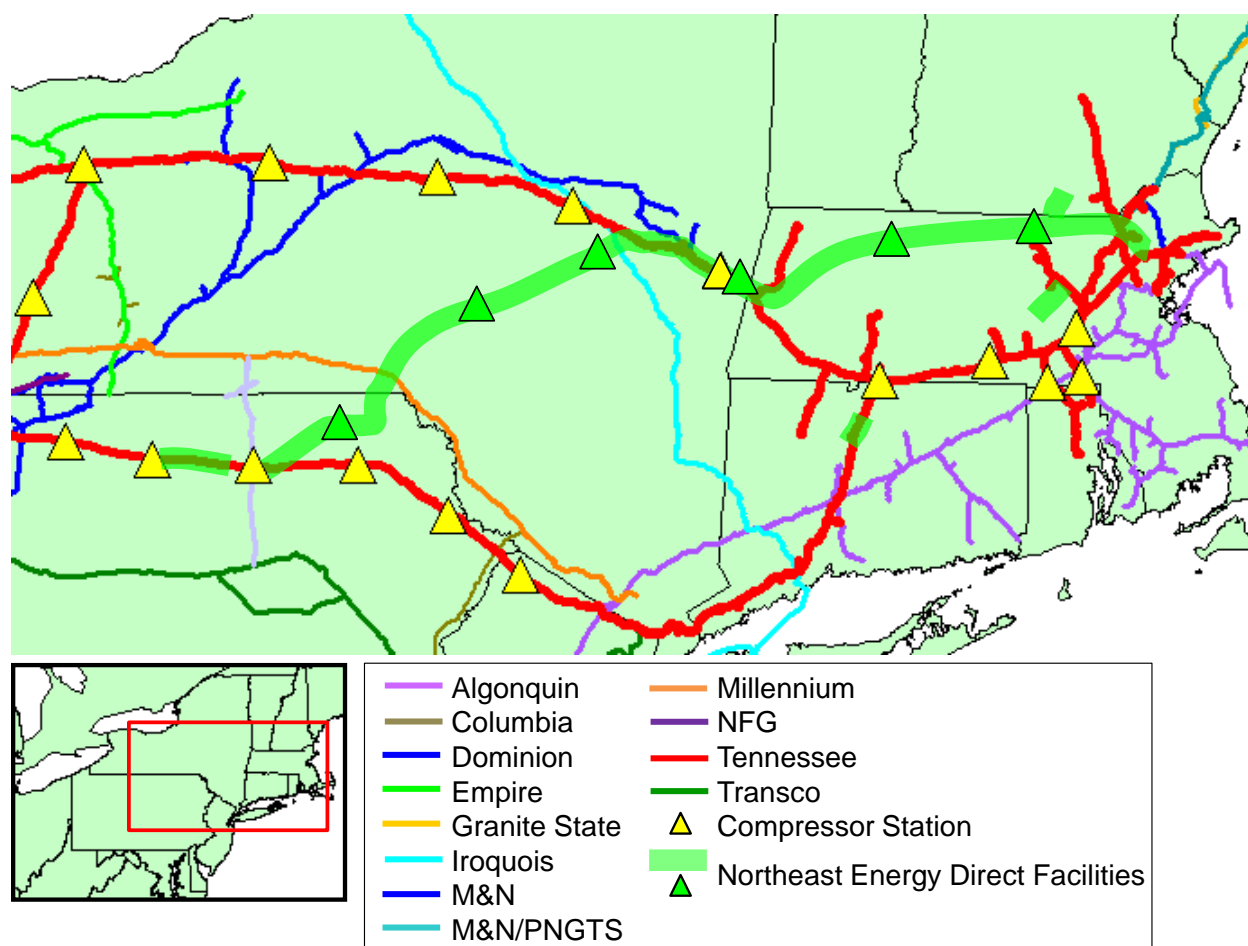


Figure A19-8. Northeast Energy Direct Facilities

¹⁵ In prior listings of Sensitivity 13 projects, this project has been referred to by its previous name, the Northeast Expansion Project.

¹⁶ FERC Docket No. PF14-22

Texas Eastern

Two Texas Eastern projects have been included in Sensitivity 13: the Renaissance Project and the Natrium Lateral Project.¹⁷ The Renaissance Project was designed to create up to 1 Bcf/d of incremental capacity from the Marcellus and Utica shale production areas to delivery points as far south as central Mississippi, including a connection to a new 290-mile pipeline extending from Mount Pleasant, TN through northeast Alabama and northern Georgia to connections with Southern and Transco in west central Georgia.¹⁸ A non-binding open season for this capacity was held in early 2013.

The Natrium Lateral Project was designed to move up to 400 MDth/d of firm supply from the Dominion's Natrium Processing Plant in northern West Virginia along a new 10-mile lateral to Texas Eastern's mainline just east of Clarington, OH. From Clarington, the gas could flow to the east or west along the Texas Eastern system. A non-binding open season for this capacity was held in early 2012.

Texas Gas

Two incremental Texas Gas expansion projects are included in Sensitivity 13. The first, the Southern Indiana Market Lateral Project, would construct a 30-mile 20-inch diameter pipeline from the Texas Gas mainline in Kentucky to two new industrial customers just over the border into Illinois, as shown in Figure A19-9. The capacity of the lateral will be determined by the results of the open season that was held in the first quarter of 2014 for a July 2016 in-service date.

¹⁷ Texas Eastern also recently completed open seasons for three new projects. The Access South Project would provide up to 320 MDth/d of incremental firm transportation capacity from the Marcellus and Utica shale production areas to markets in the Southeast, with a delivery point in central Mississippi and a November 2017 in-service date. The Adair Southwest Project would provide up to 200 MDth/d of incremental firm transportation capacity from the Marcellus and Utica shale production areas to an interconnection with Columbia Gulf in northern Kentucky, also for a November 2017 in-service date. The Appalachia to Market Project, also known as the A2M Project, would provide up to 1 Bcf/d of incremental firm transportation capacity from the Marcellus and Utica shale production areas to markets in the Northeast for a November 2018 in-service date.

¹⁸ Source: Renaissance Project open season notice.

<https://infopost.spectraenergy.com/GotoLINK/GetLINKdocument.asp?Pipe=10076&Environment=Production&DocumentType=Notice&FileName=Renaissance+2nd+Open+Season.pdf&DocumentId=2c9080a83c00608e013c3fc746380417>

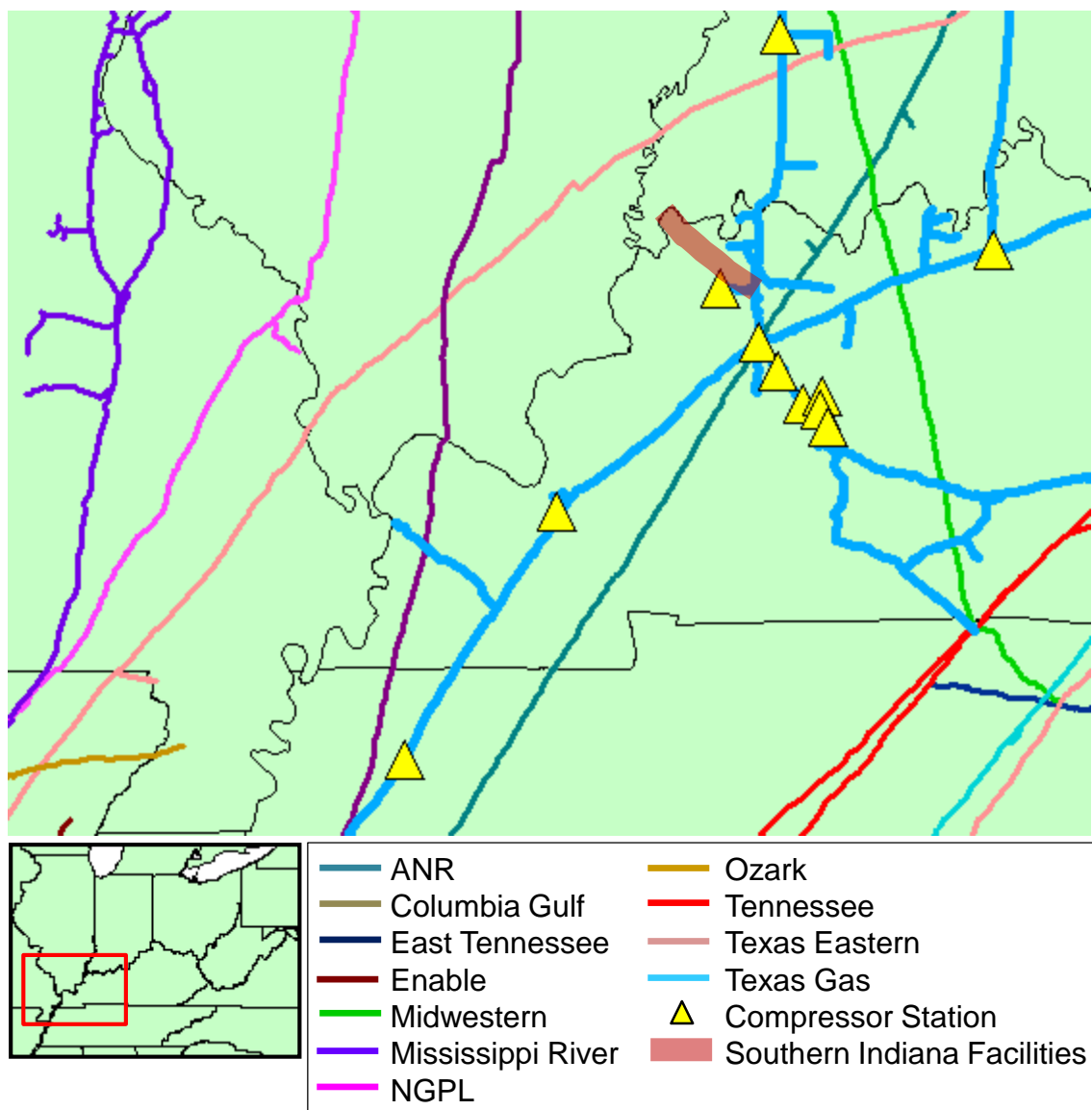


Figure A19-9. Southern Indiana Market Lateral Project Facilities

Texas Gas held a binding open season for the Northern Supply Access Project during summer 2014 for up to 584 MDth/d of capacity from receipt points in Ohio and Indiana to delivery points to southern mainline points, providing an additional outlet for Marcellus and Utica shale producers to reach new markets beginning in April 2017.

TransCanada

TransCanada’s Eastern Mainline Project would construct approximately 155 miles (250 km) of new 36-inch pipeline in southern Ontario, essentially looping the existing system.^{19,20} Compression would also be added at five existing stations. The locations of these facilities are

¹⁹ This project has previously been referred to as the Eastern Triangle Expansion Project.

²⁰ Source: Project information website. <http://easternmainline.com/>

shown in Figure A19-10. This project is designed to enable TransCanada to continue to meet its commercial obligations following the pipeline conversion associated with the Energy East Project using shale gas received from the Chippawa and Niagara interconnections.

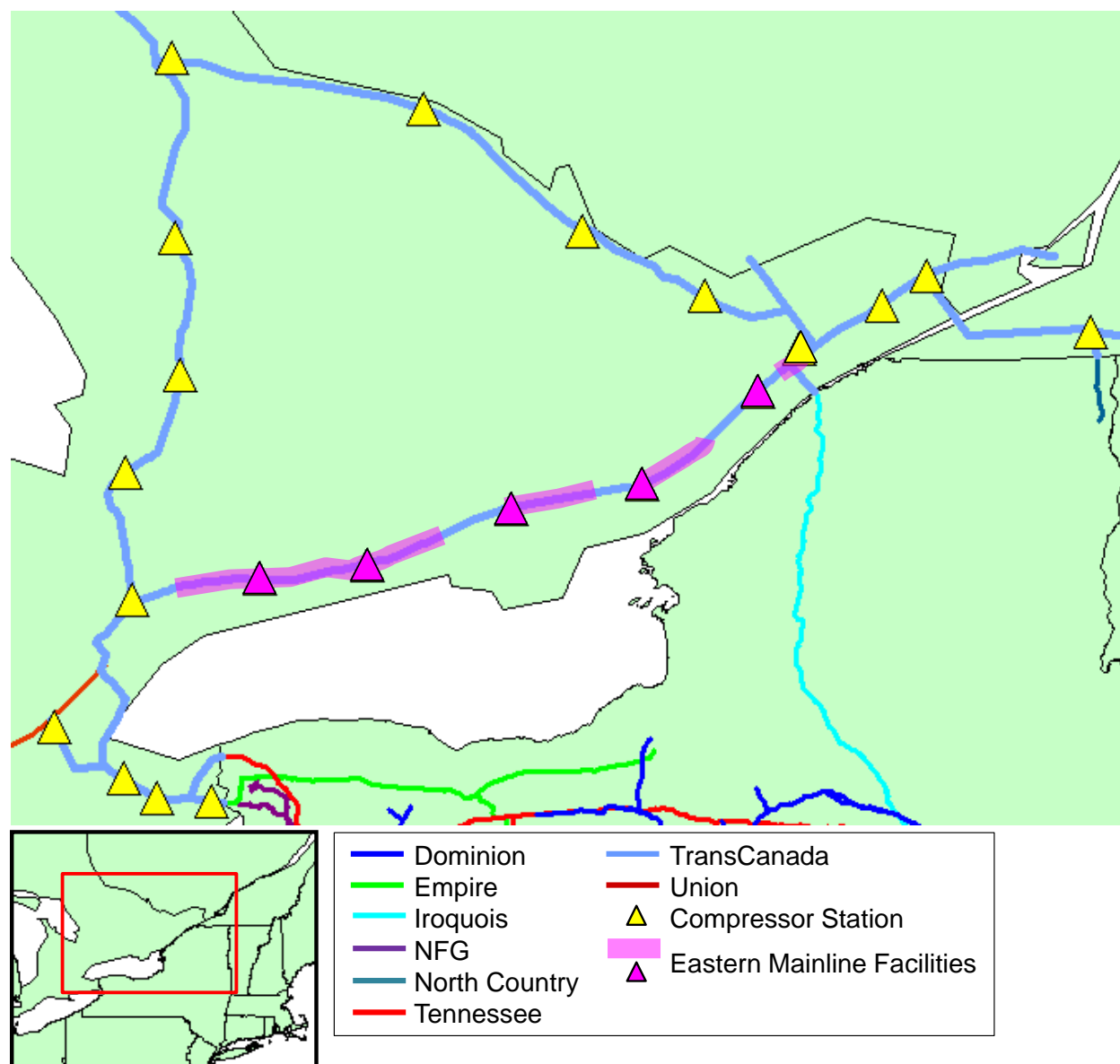


Figure A19-10. Eastern Mainline Project Facilities

Transco

One Transco expansion has been included in Sensitivity 13.²¹ The Gulf Trace Project is designed to expand its existing pipeline system to allow flow reversal in Louisiana to serve an

²¹ Since the Target 2 inputs were set, Transco has announced several new expansion projects. The Diamond East Project would consist of additional compression and pipeline looping along the Leidy Line into the Station 210 pool to add up to 1 Bcf/d of capacity to Transco’s existing system for a mid-2018 in-service date. The Western Marcellus Pipeline Project would consist of

expansion of the Sabine Pass LNG export terminal. In addition to modifications associated with the flow reversal, the preliminary project design also includes construction of a new compressor station and a compressor station expansion, along with an 8-mile lateral to the export terminal. The locations of these facilities are shown in Figure A19-11.

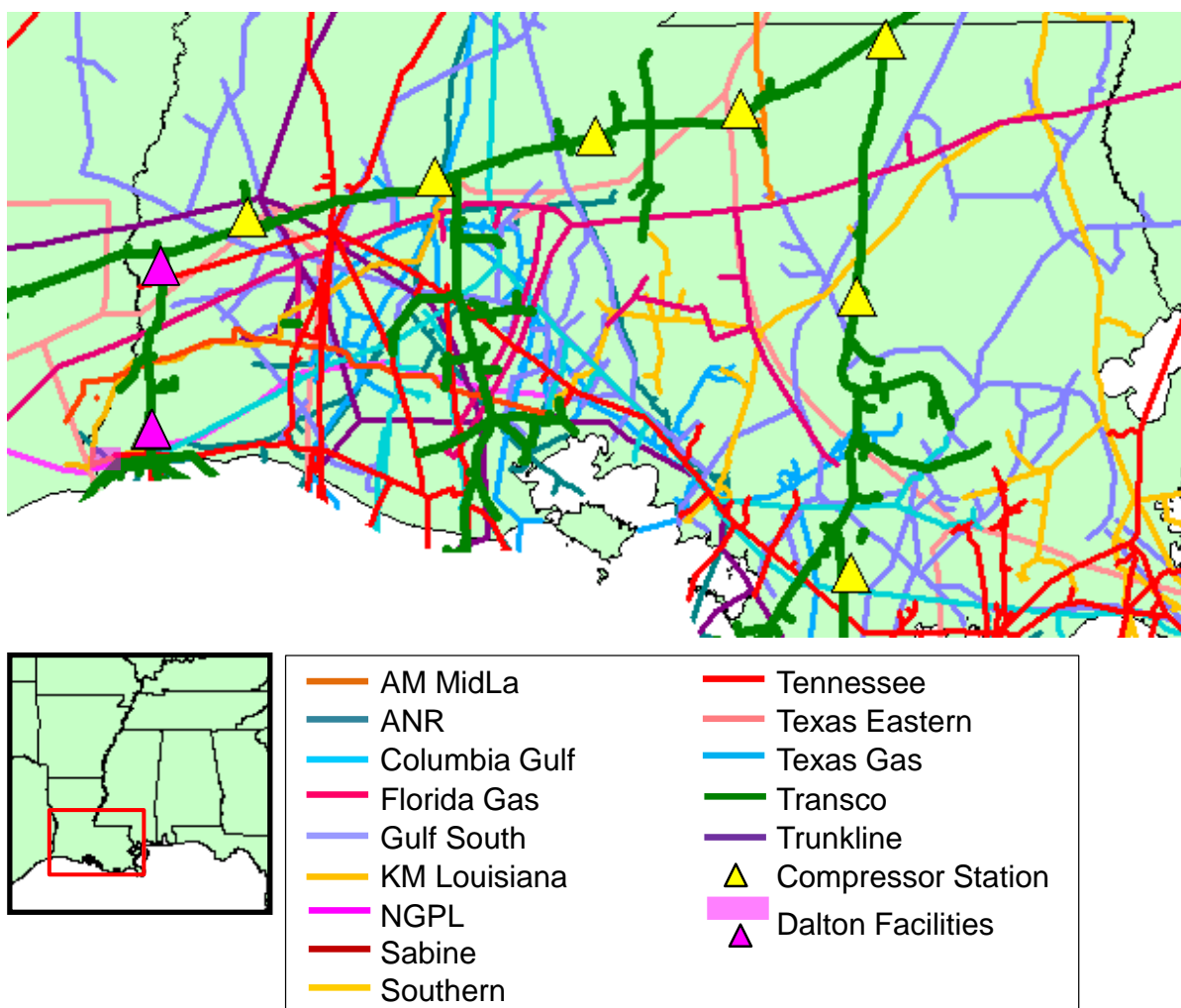


Figure A19-11. Gulf Trace Project Facilities

Union

Three Union expansion projects have been included in Sensitivity 13: the Lobo Compressor Station Expansion Project, the Parkway E Project, and the Hamilton-Milton Project. Each of these projects is designed to expand the capacity of Union's Dawn to Parkway system for a

a new greenfield pipeline from Clarrington, OH and Marshall County, WV to Station 165 in southern Virginia, along with mainline improvements to move the gas north to Pennsylvania and south to Louisiana. The project's preliminary design capacity is up to 2 Bcf/d, for a late 2018 in-service date. Finally, the Garden State Expansion Project, which has been fully contracted by a New Jersey LDC, is designed to add 180 MDth/d of capacity from the Station 210 pool to Burlington County, NJ; phased construction is planned for 2016 and 2017 in-service dates.

November 2016 in-service date. Project facilities are illustrated in Figure A19-12. The Lobo Compressor Station Expansion Project involves incremental compression at the existing Lobo station. The Hamilton to Milton Expansion Project, involves approximately 12 miles (20 km) of 48-inch loopline. Finally, the Parkway E Project involves incremental compression at the existing Parkway station. The total capacity increase associated with these projects is approximately 1,137 MDth/d (1.2 PJ/d).

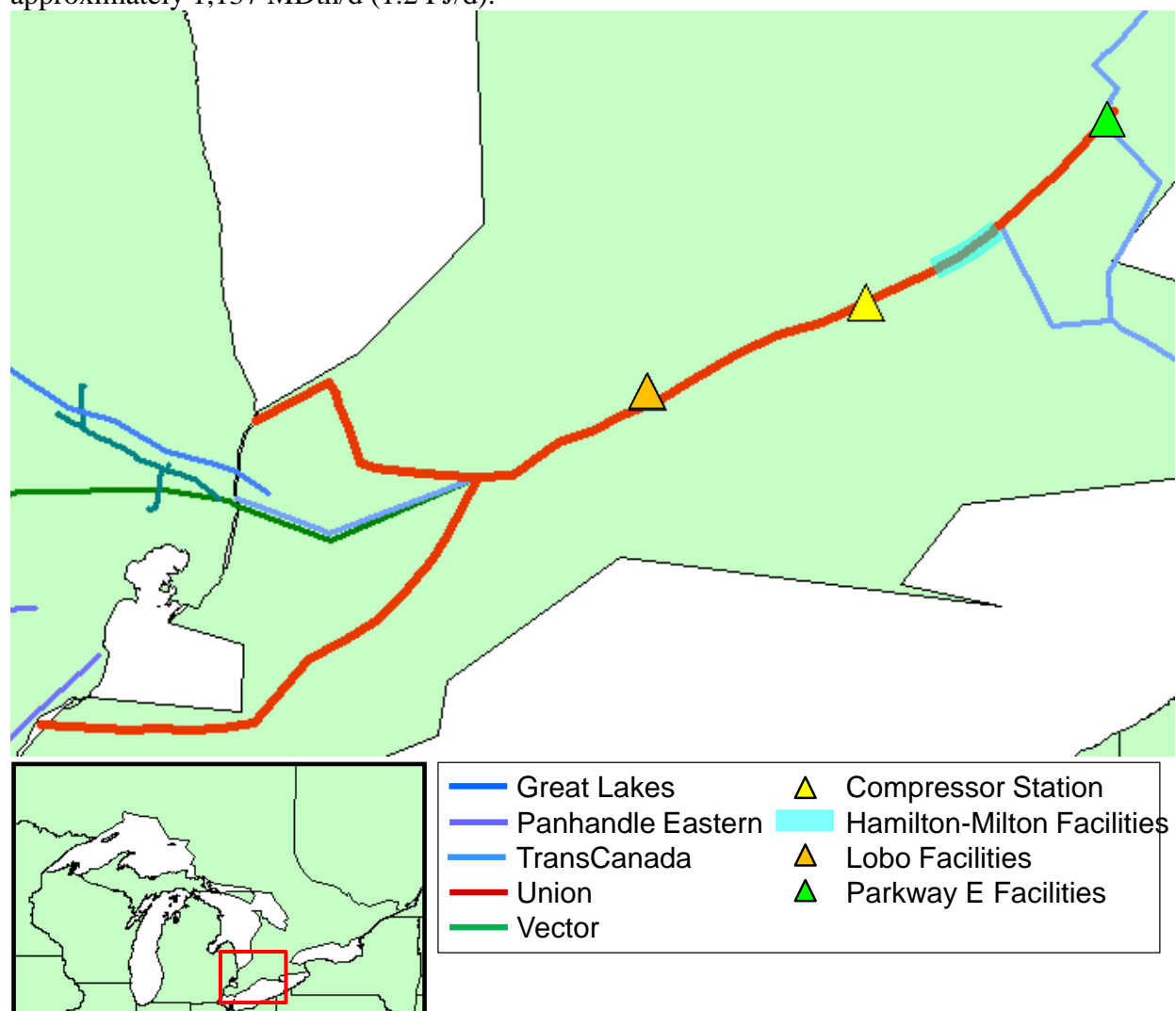


Figure A19-12. Union Expansion Project Facilities (Sensitivity 13)

WBI Energy

The Dakota Pipeline Project involves the construction of a new 375-mile 24-inch pipeline, with two compressor stations, connecting Bakken shale supplies to markets in the Great Lakes via an interconnection at Emerson with Great Lakes, Viking, and potentially TransCanada. The proposed route of the new pipeline is shown in Figure A19-13. The project open season, held in the first quarter of 2014, listed a proposed initial capacity of 400 MDth/d, with a potential increase to 500 MDth/d based on the results of the open season. The construction cost was estimated is \$650 million, with a November 2017 in-service date.

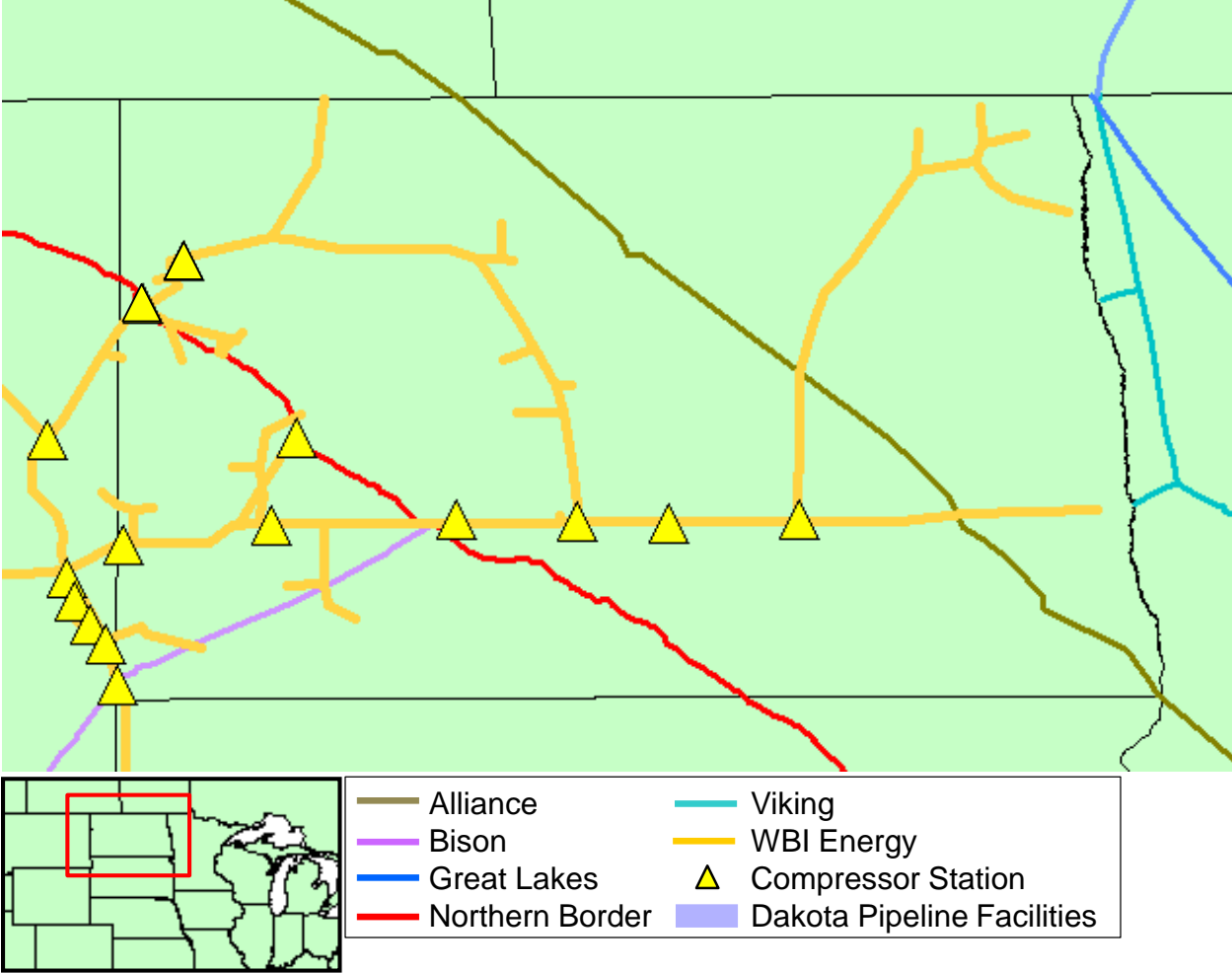


Figure A19-13. Dakota Pipeline Facilities

Appendix 20
Gas Price Sensitivities
S2 and S3

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S2: Apply RGDS Natural Gas Prices to Alternative Gas Demand Scenarios

HGDS S2 Winter 2018

Figure A20-1 summarizes the affected generation during the Winter 2018 peak hour by PPA.

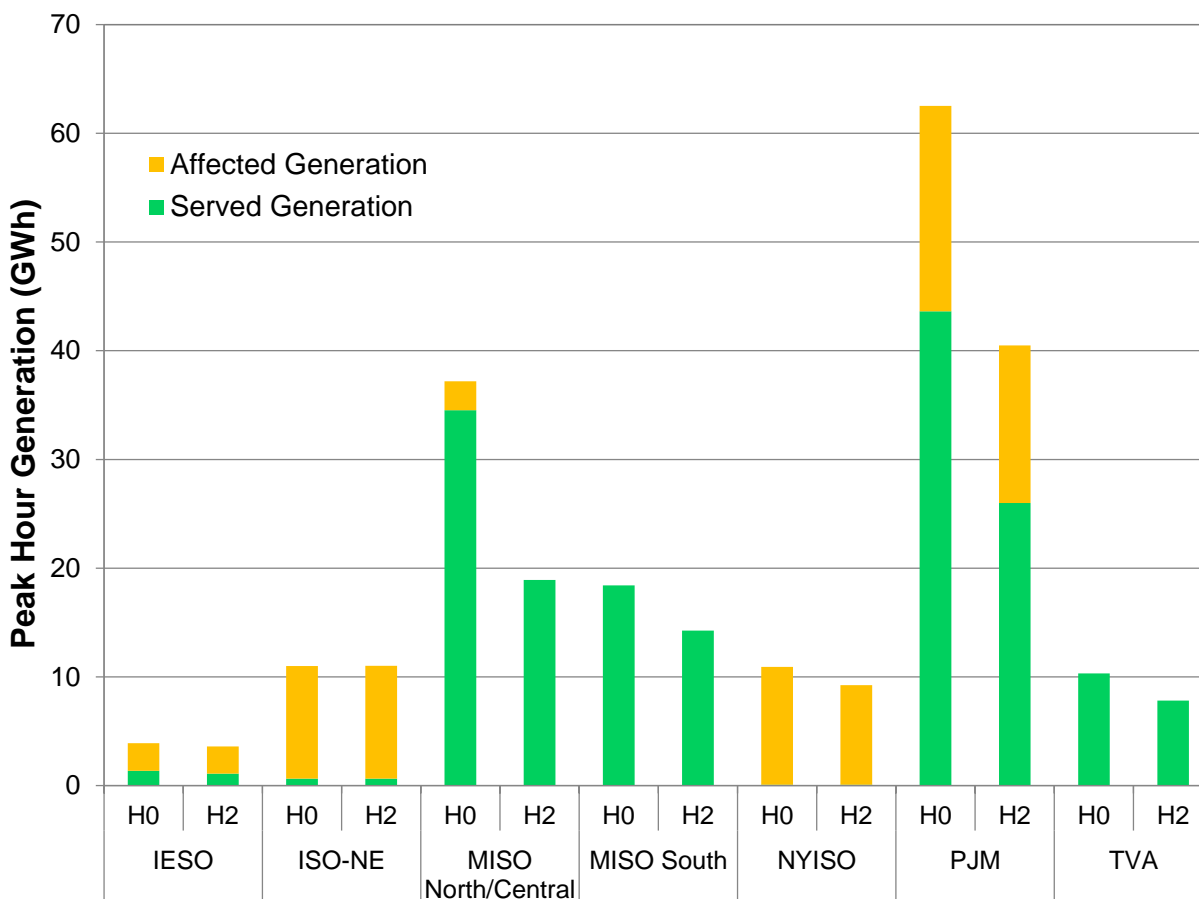


Figure A20-1. HGDS S2 Winter 2018: Peak Hour Affected Generation

Figure A20-2 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A20-1.

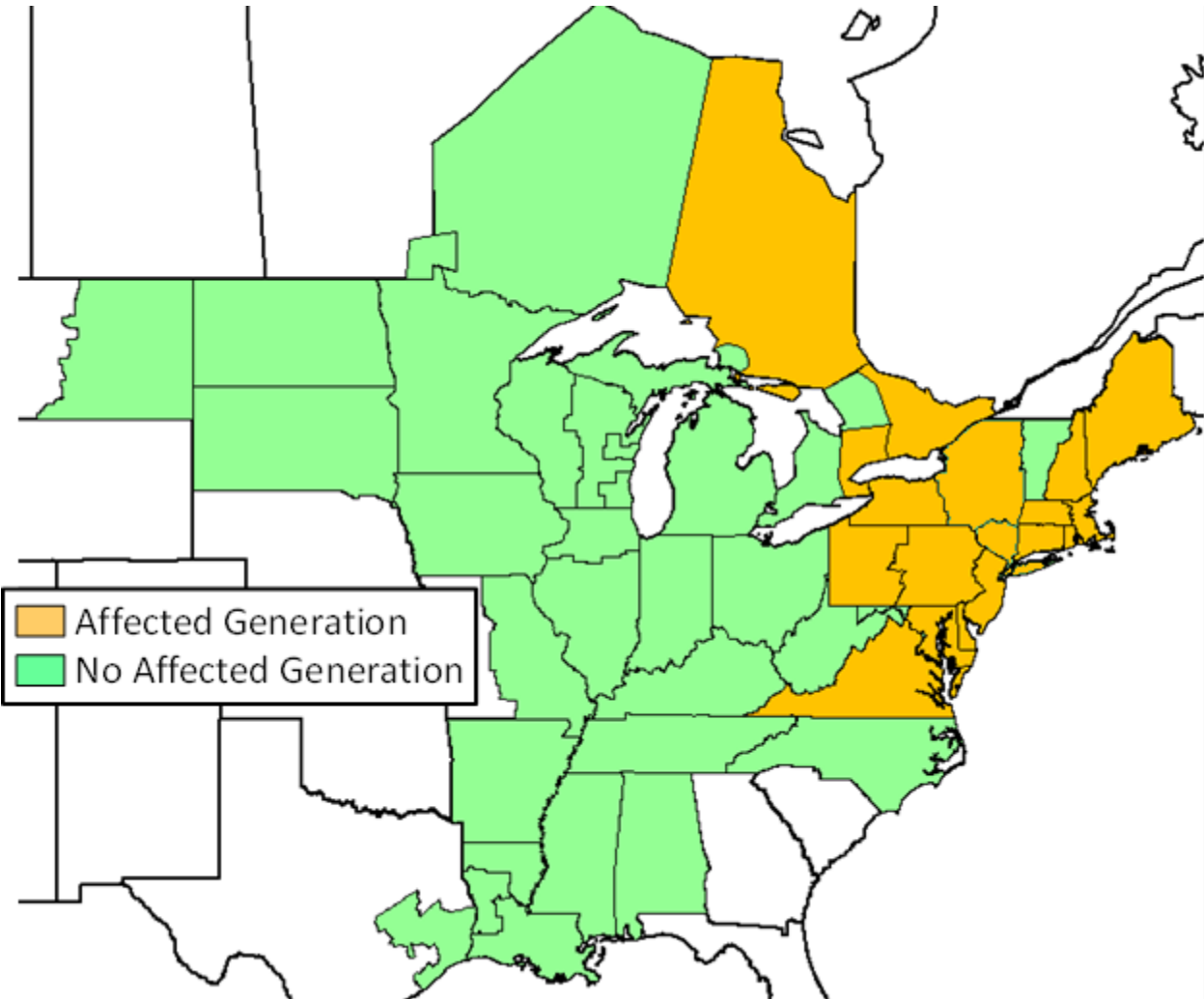


Figure A20-2. HGDS S2 Winter 2018: Locations with Peak Hour Affected Generation

Table A20-1. HGDS S2 Winter 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	24.1	3,216
Delaware	1.5	194
Maine	9.5	1,292
Maryland Eastern	5.0	539
Massachusetts Eastern	12.9	1,798
Massachusetts Western	7.8	1,059
New Hampshire	13.0	1,764
New Jersey	18.9	2,300
New York Central Northern	23.6	3,317
New York City	18.3	2,392
New York Long Island	9.4	1,039
New York Southern	10.9	1,312
New York Western	5.2	699
Ontario (CDA)	0.5	56
Ontario (EDA)	7.7	944
Ontario (NDA)	0.8	114
Pennsylvania Eastern	48.7	6,575
Pennsylvania Western	6.7	961
Rhode Island	9.6	1,243
Virginia	32.7	4,351

Figure A20-3 shows the constrained pipeline segments, in red, that result in the affected generation shown in Table A20-1 during the Winter 2018 peak hour.

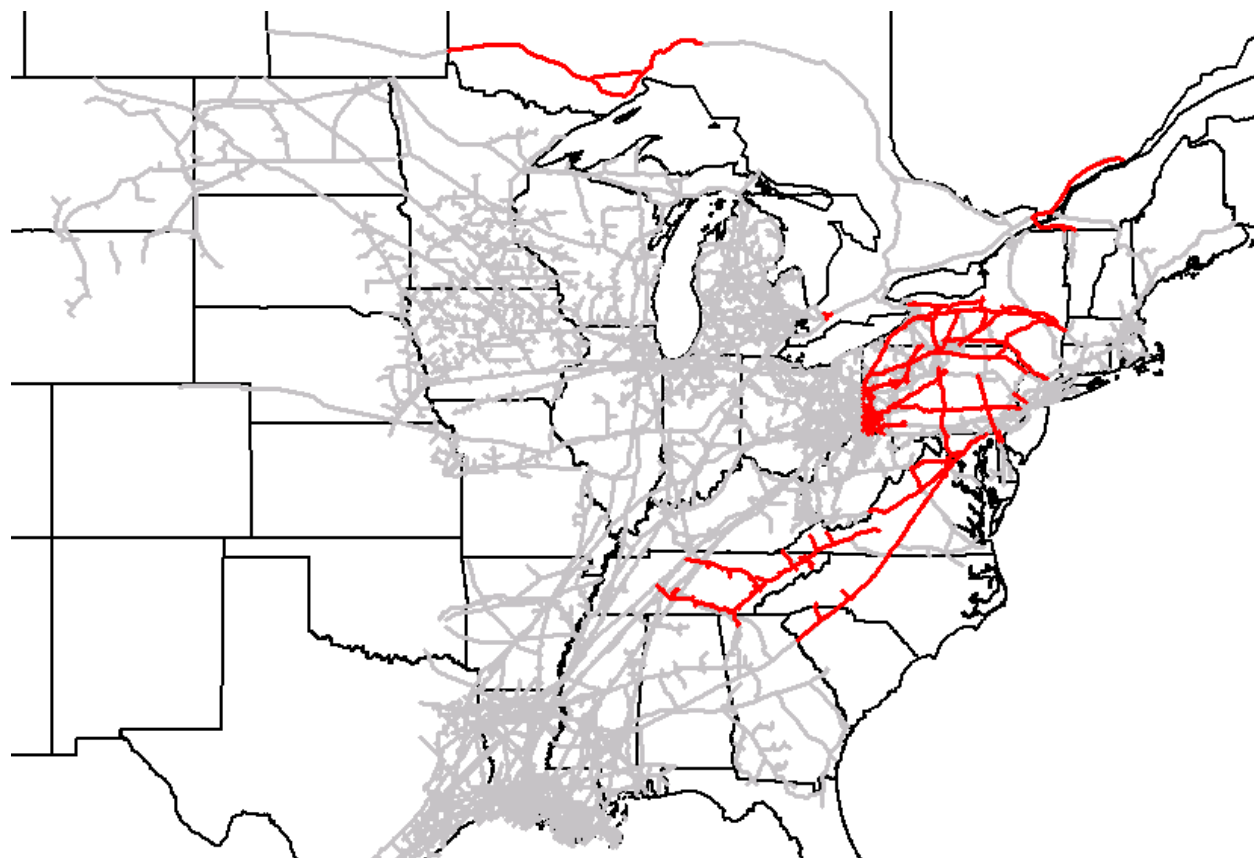


Figure A20-3. HGDS S2 Winter 2018: Peak Hour Constraints

Table A20-2 summarizes the results of the frequency and duration analysis.

Table A20-2. HGDS S2 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	11	1	6	27
Columbia Gas W PA/NY	15	1	5	29
Constitution	2	31	59	90
Dominion Eastern NY	1	4	4	4
Dominion Western NY	6	12	15	34
Dominion Southeast	7	1	16	29
East Tennessee Mainline	9	1	3	14
Eastern Shore	14	1	9	56
Empire Mainline	1	3	3	3
Millennium	8	1	32	65
NB/NS Supply	13	1	20	52
Tennessee Z4 PA	8	1	14	32
Tennessee Z5 NY	3	1	59	89
Texas Eastern M2 PA South	5	1	53	85
Texas Eastern M3 North	12	1	15	61
TransCanada Ontario West	3	1	5	7
TransCanada Quebec	7	1	14	30
Transco Leidy Atlantic	10	1	23	66
Transco Z5	4	1	2	5
Transco Z6 Leidy to 210	5	2	47	80
Union Gas Dawn	2	1	3	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-1 and Figure A21-2 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-3 and Figure A21-4 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-5 and Figure A21-6 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-7 and Figure A21-8 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-9 and Figure A21-10 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-11 and Figure A21-12 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East

Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-13 and Figure A21-14 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A21-15 and Figure A21-16 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-17 and Figure A21-18 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-19 and Figure A21-20 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A21-21 and Figure A21-22 relative to the total production

capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-23 and Figure A21-24 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-25 and Figure A21-26 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-27 and Figure A21-28 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A21-29 and Figure A21-30 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-31 and Figure A21-32 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A21-33 and Figure A21-34 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-35 and Figure A21-36 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-37 and Figure A21-38 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-39 and Figure A21-40 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A21-41 and Figure A21-42 relative to the capacity of the segment.

HGDS S2 Summer 2018

Figure A20-4 summarizes the affected generation during the Summer 2018 peak hour by PPA.

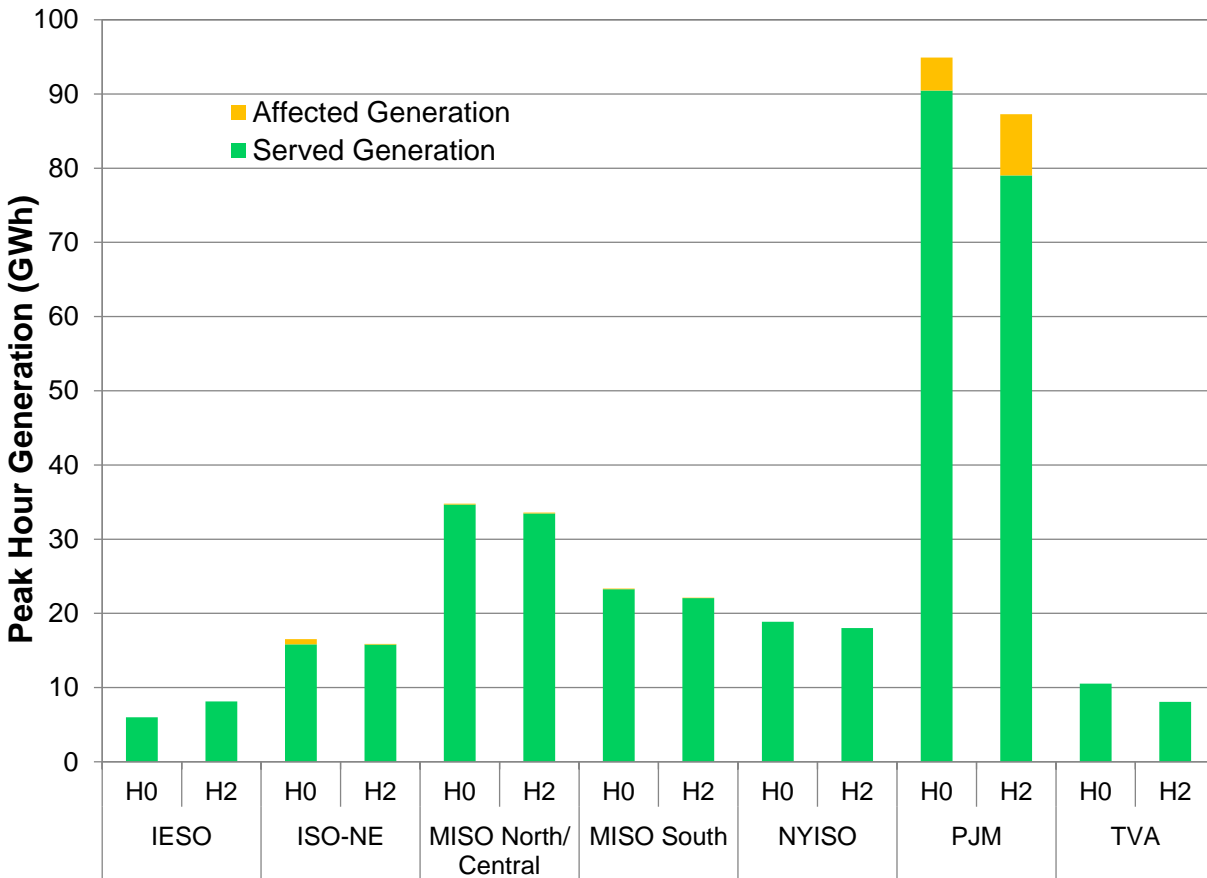


Figure A20-4. HGDS S2 Summer 2018: Peak Hour Affected Generation Figure A20-5 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A20-3.

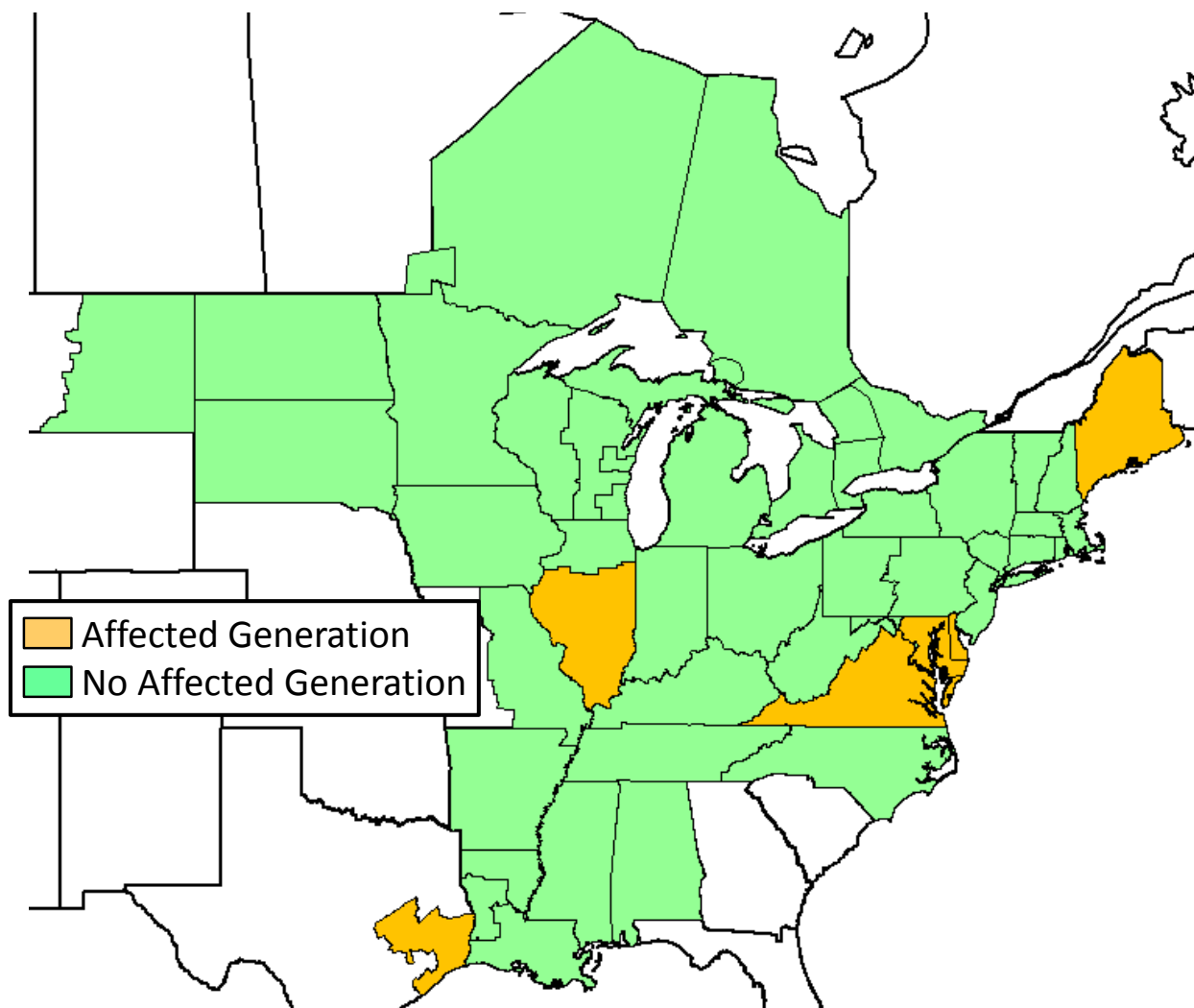


Figure A20-5. HGDS S2 Summer 2018: Locations with Peak Hour Affected Generation

Table A20-3. HGDS S2 Summer 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.4	1,162
Illinois Southern	1.0	112
Maine	0.6	67
Maryland Eastern	19.5	2,634
Texas East (SERC)	0.5	70
Virginia	33.7	4,453

Figure A20-6 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A20-4 during the Summer 2018 peak hour.

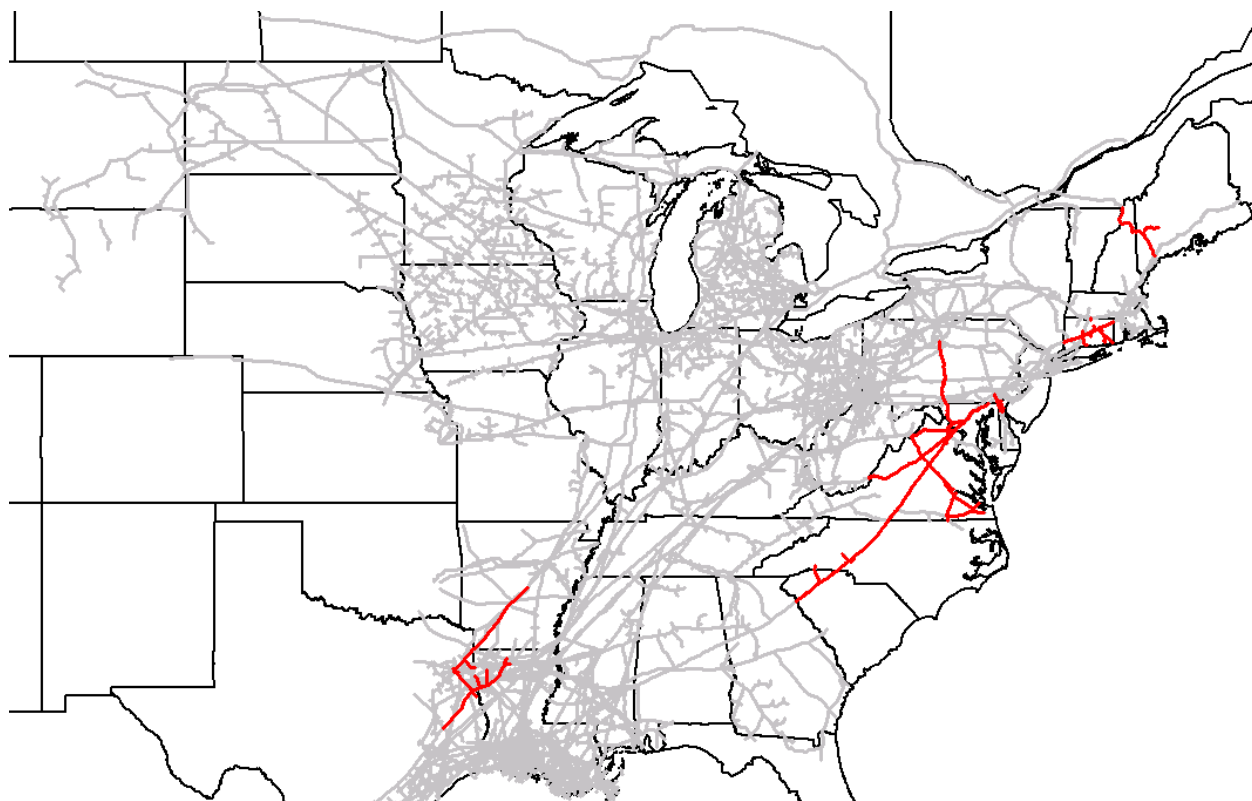


Figure A20-6. HGDS S2 Summer 2018: Peak Hour Constraints

Table A20-4 summarizes the results of the frequency and duration analysis.

Table A20-4. HGDS S2 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin CT	5	1	3	12
Columbia Gas VA/MD	2	1	1	2
Dominion Southeast	3	1	3	6
Eastern Shore	7	1	7	28
NB/NS Supply	3	1	39	72
PNGTS N of Westbrook	10	1	3	19
Texas Eastern ETX	8	1	6	18
Transco Z5	7	1	4	14

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-43 and Figure A21-44 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-45 and Figure A21-46 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-47 and Figure A21-48 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A21-49 and Figure A21-50 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A21-51 and Figure A21-52 relative to the total production capacity.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in

New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-53 and Figure A21-54 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-55 and Figure A21-56 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-57 and Figure A21-58 relative to the capacity of the segment.

HGDS S2 Winter 2023

Figure A20-7 summarizes the affected generation during the Winter 2023 peak hour by PPA.

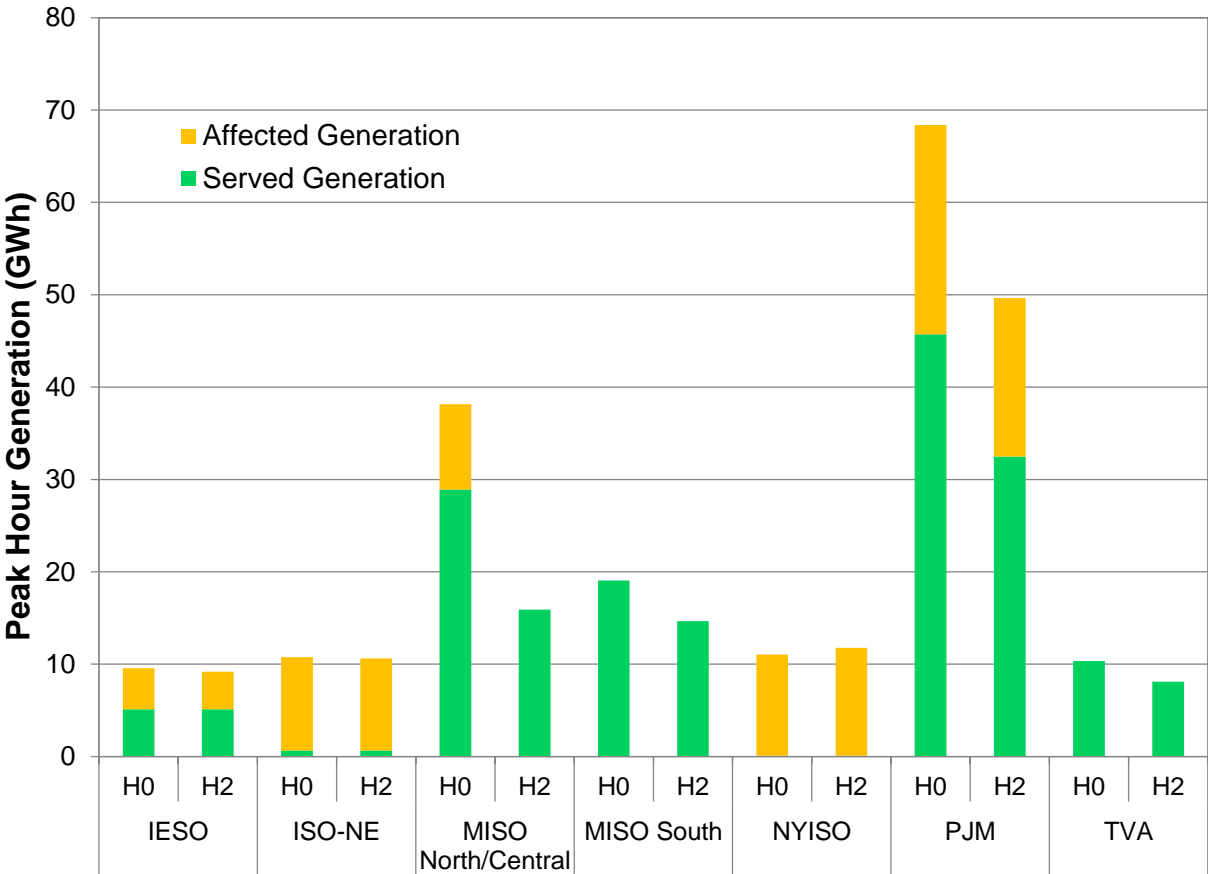


Figure A20-7. HGDS S2 Winter 2023: Peak Hour Affected Generation

Figure A20-8 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A20-5.

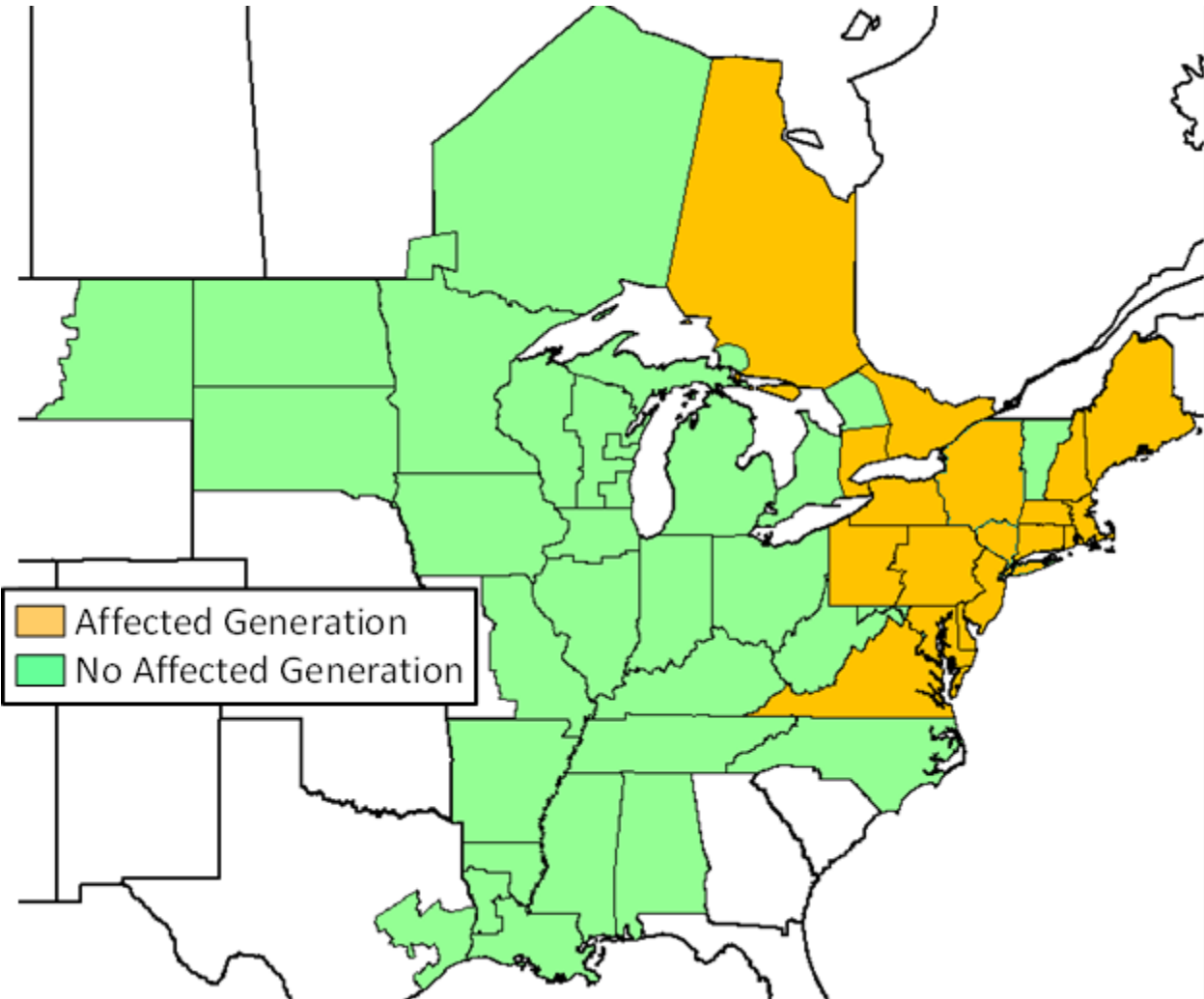


Figure A20-8. HGDS S2 Winter 2023: Locations with Peak Hour Affected Generation

Table A20-5. HGDS S2 Winter 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	17.1	2,385
Delaware	4.9	569
Maine	12.7	1,799
Maryland Eastern	5.0	539
Massachusetts Eastern	16.2	2,236
Massachusetts Western	7.8	1,059
New Hampshire	15.4	2,124
New Jersey	26.1	3,043
New York Central Northern	40.8	4,859
New York City	20.5	2,699
New York Long Island	12.5	1,355
New York Southern	15.1	1,629
New York Western	5.8	767
Ontario (CDA)	0.5	56
Ontario (EDA)	17.8	2,350
Ontario (NDA)	0.8	114
Pennsylvania Eastern	51.5	6,906
Pennsylvania Western	2.0	288
Rhode Island	2.7	361
Virginia	49.5	6,255

Figure A20-9 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A20-7 during the Winter 2023 peak hour.

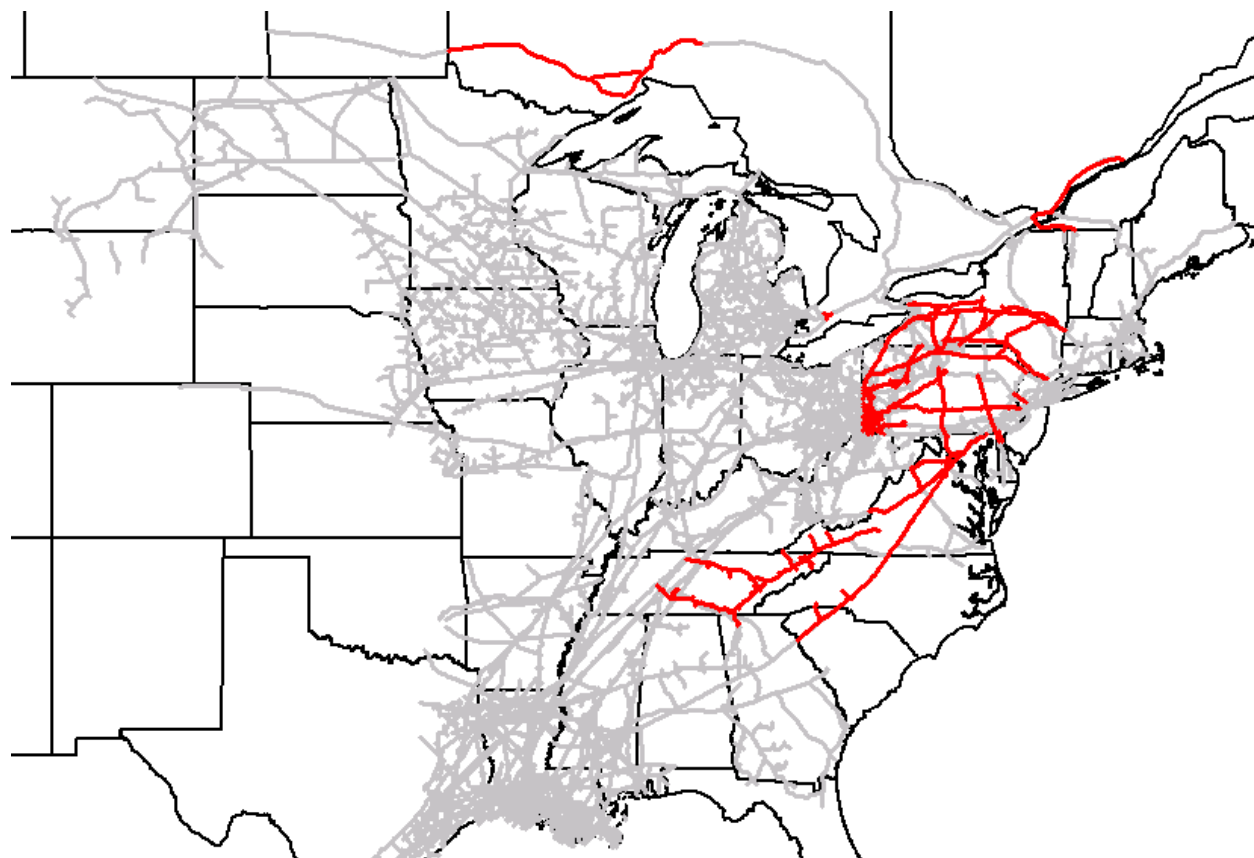


Figure A20-9. HGDS S2 Winter 2023: Peak Hour Constraints

Table A20-6 summarizes the results of the frequency and duration analysis.

Table A20-6. HGDS S2 Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	7	1	52	79
Columbia Gas W PA/NY	9	1	16	75
Constitution	2	31	59	90
Dominion Eastern NY	7	1	9	27
Dominion Western NY	6	1	15	36
Dominion Southeast	3	1	54	86
East Tennessee Mainline	6	1	8	22
Eastern Shore	9	1	32	80
Empire Mainline	4	1	13	25
Millennium	3	1	59	89
NB/NS Supply	7	1	5	13
Tennessee Z4 PA	7	1	14	34
Tennessee Z5 NY	3	1	59	89
Texas Eastern M2 PA South	5	1	55	86
Texas Eastern M3 North	10	1	10	41
TransCanada Ontario West	5	1	11	17
TransCanada Quebec to PNGTS	2	31	59	90
Transco Leidy Atlantic	10	1	27	63
Transco Z5	9	1	2	11
Transco Z6 Leidy to 210	5	1	55	86
Union Gas Dawn	5	1	5	12

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-59 and Figure A21-60 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-61 and Figure A21-62 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-63 and Figure A21-64 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-65 and Figure A21-66 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-67 and Figure A21-68 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-69 and Figure A21-70 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East

Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-71 and Figure A21-72 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A21-73 and Figure A21-74 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-75 and Figure A21-76 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-77 and Figure A21-78 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A21-79 and Figure A21-80 relative to the total production

capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-81 and Figure A21-82 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-83 and Figure A21-84 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-85 and Figure A21-86 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A21-87 and Figure A21-88 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-89 and Figure A21-90 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A21-91 and Figure A21-92 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-93 and Figure A21-94 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-95 and Figure A21-96 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-97 and Figure A21-98 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A21-99 and Figure A21-100 relative to the capacity of the segment.

HGDS S2 Summer 2023

Figure A20-10 summarizes the affected generation during the Summer 2023 peak hour by PPA.

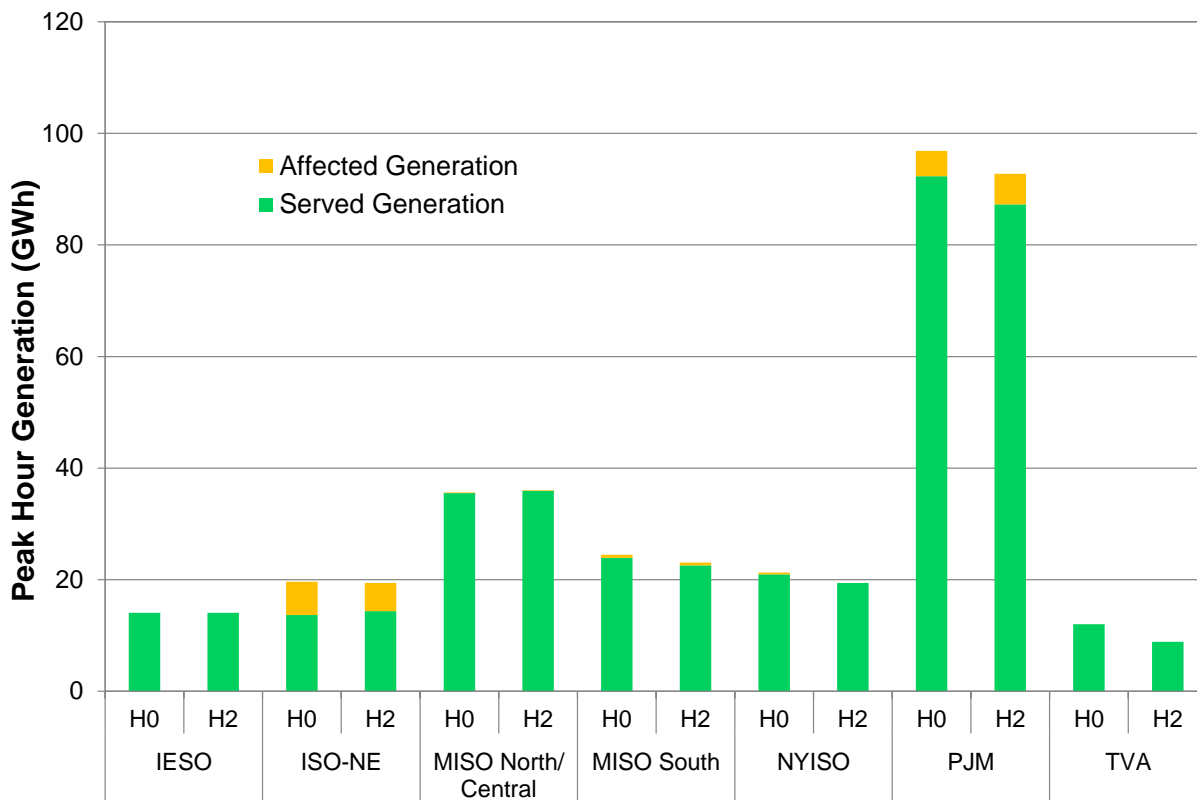


Figure A20-10. HGDS S2 Summer 2023: Peak Hour Affected Generation

Figure A20-11 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A20-7.

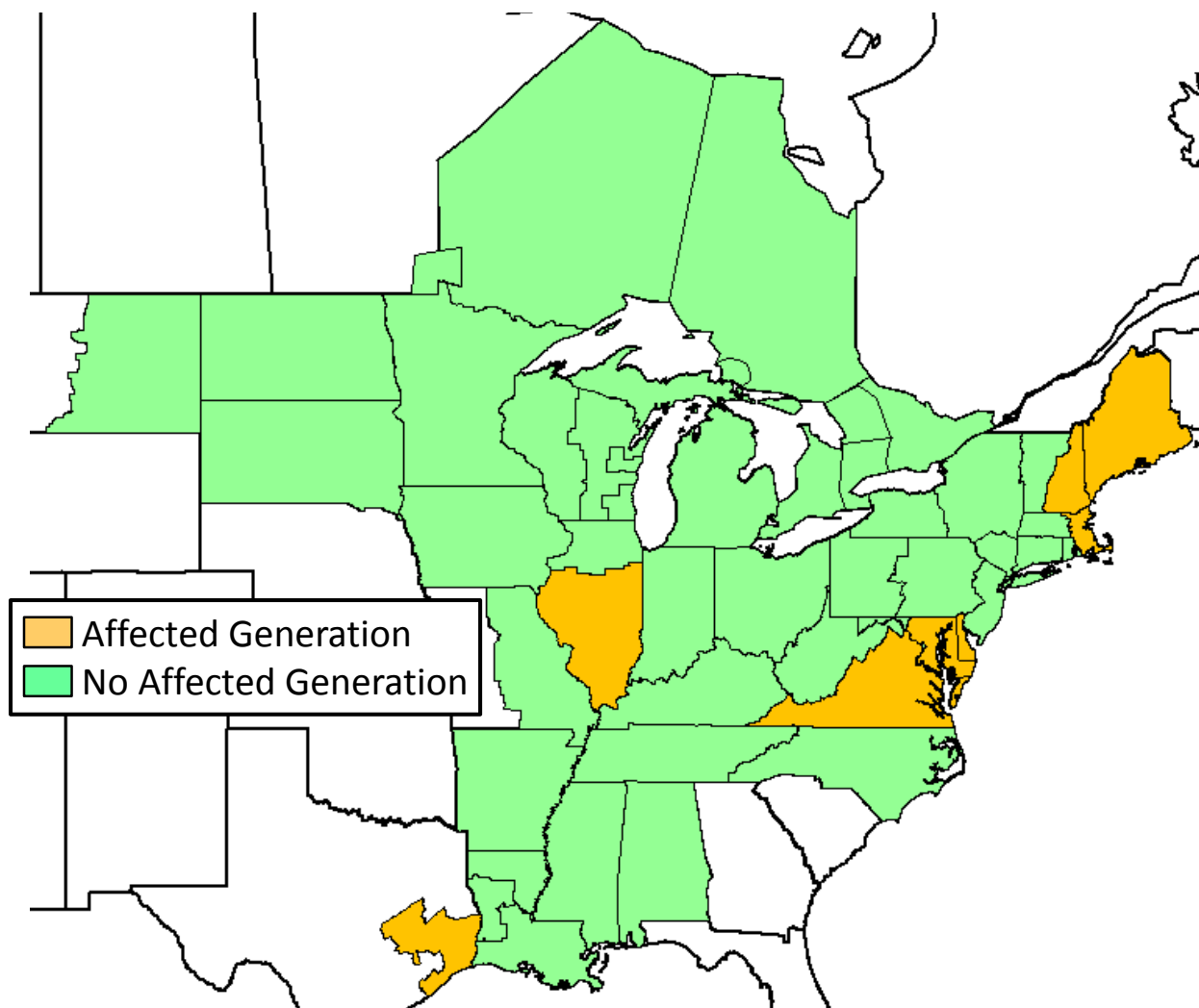


Figure A20-11. HGDS S2 Summer 2023: Locations with Peak Hour Affected Generation

Table A20-7. HGDS S2 Summer 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.6	1,188
Illinois Southern	1.0	112
Maine	17.2	2,318
Maryland Eastern	23.6	3,353
Massachusetts Eastern	8.1	1,108
New Hampshire	11.5	1,600
Texas East (SERC)	3.6	511
Virginia	8.4	936

Figure A20-12 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A20-10 during the Summer 2018 peak hour.



Figure A20-12. HGDS S2 Summer 2023: Peak Hour Constraints

Table A20-8 summarizes the results of the frequency and duration analysis.

Table A20-8. HGDS S2 Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin CT	6	1	8	33
Columbia Gas VA/MD	2	1	4	5
Dominion Southeast	8	1	11	39
Eastern Shore	2	1	9	35
NB/NS Supply	7	1	33	74
PNGTS N of Westbrook	9	1	23	73
Tennessee Z5 NY	1	92	92	92
Texas Eastern ETX	8	1	10	25
Transco Z5	7	1	6	23

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine

and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-101 and Figure A21-102 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-103 and Figure A21-104 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-105 and Figure A21-106 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A21-107 and Figure A21-108 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A21-109 and Figure A21-110 relative to the total production capacity.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-111 and Figure A21-112 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-113 and Figure A21-114 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-115 and Figure A21-116 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-117 and Figure A21-118 relative to the capacity of the segment.

LGDS S2 Winter 2018

Figure A20-13 summarizes the affected generation during the Winter 2018 peak hour by PPA.

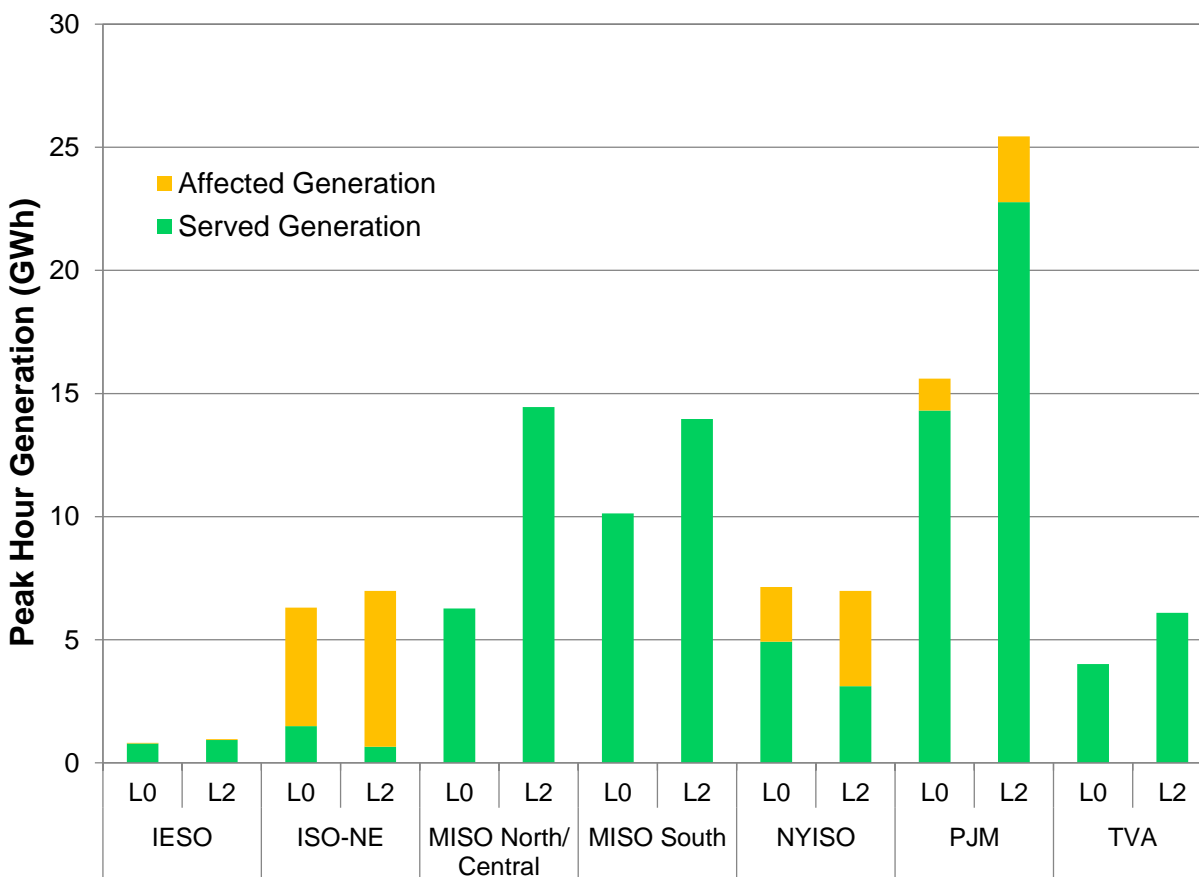


Figure A20-13. LGDS S2 Winter 2018: Peak Hour Affected Generation

Figure A20-14 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A20-9.

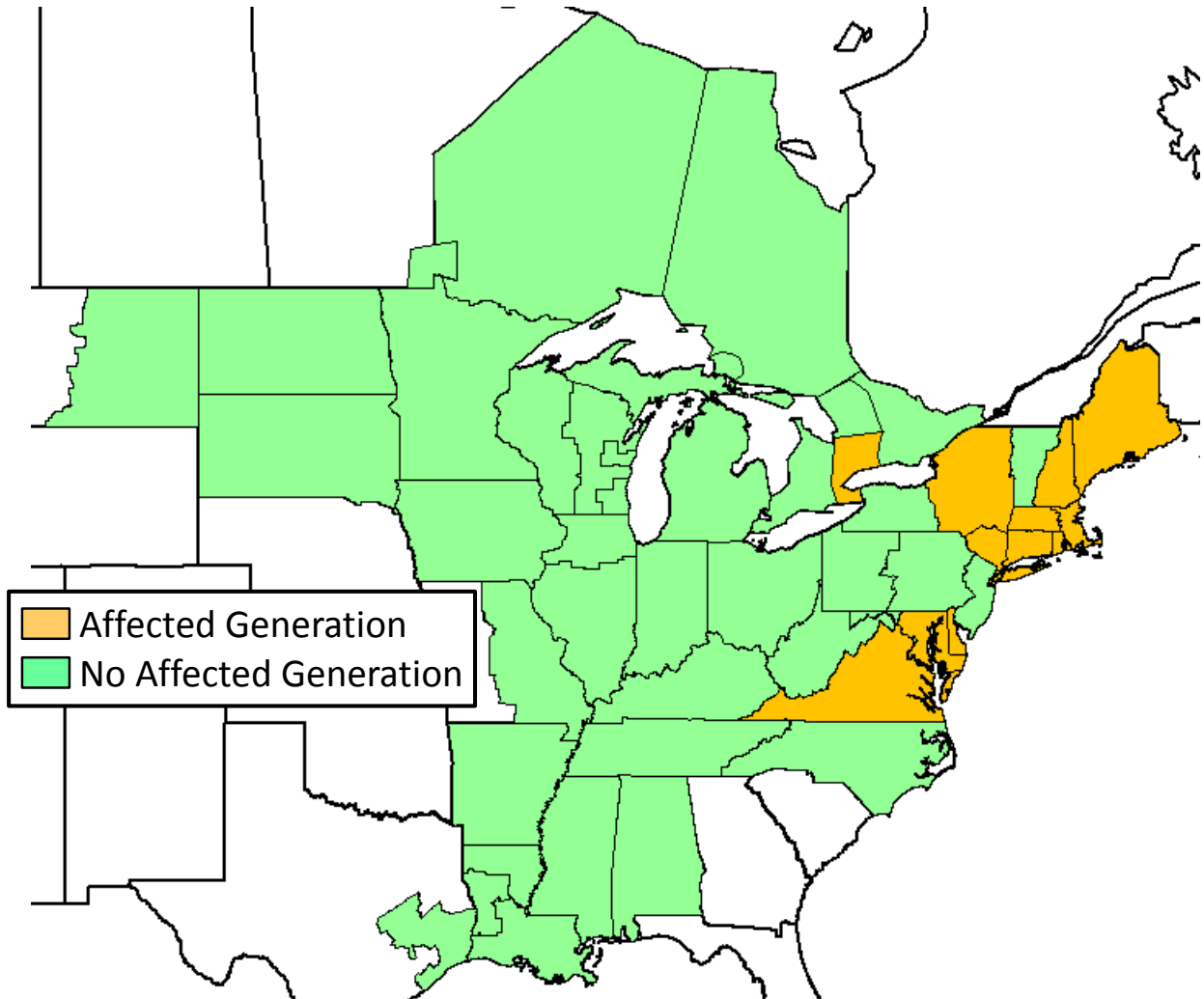


Figure A20-14. LGDS S2 Winter 2018: Locations with Peak Hour Affected Generation

Table A20-9. LGDS S2 Winter 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	11.4	1,431
Delaware	1.6	199
Maine	7.6	1,045
Maryland Eastern	3.6	346
Massachusetts Eastern	12.1	1,673
Massachusetts Western	6.6	893
New Hampshire	4.9	658
New York Central Northern	3.3	461
New York City	14.7	1,752
New York Long Island	10.1	890
New York Southern	5.4	767
Ontario (CDA)	0.2	28
Rhode Island	4.8	631
Virginia	15.5	2,131

Figure A20-15 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A20-13 during the Winter 2018 peak hour.

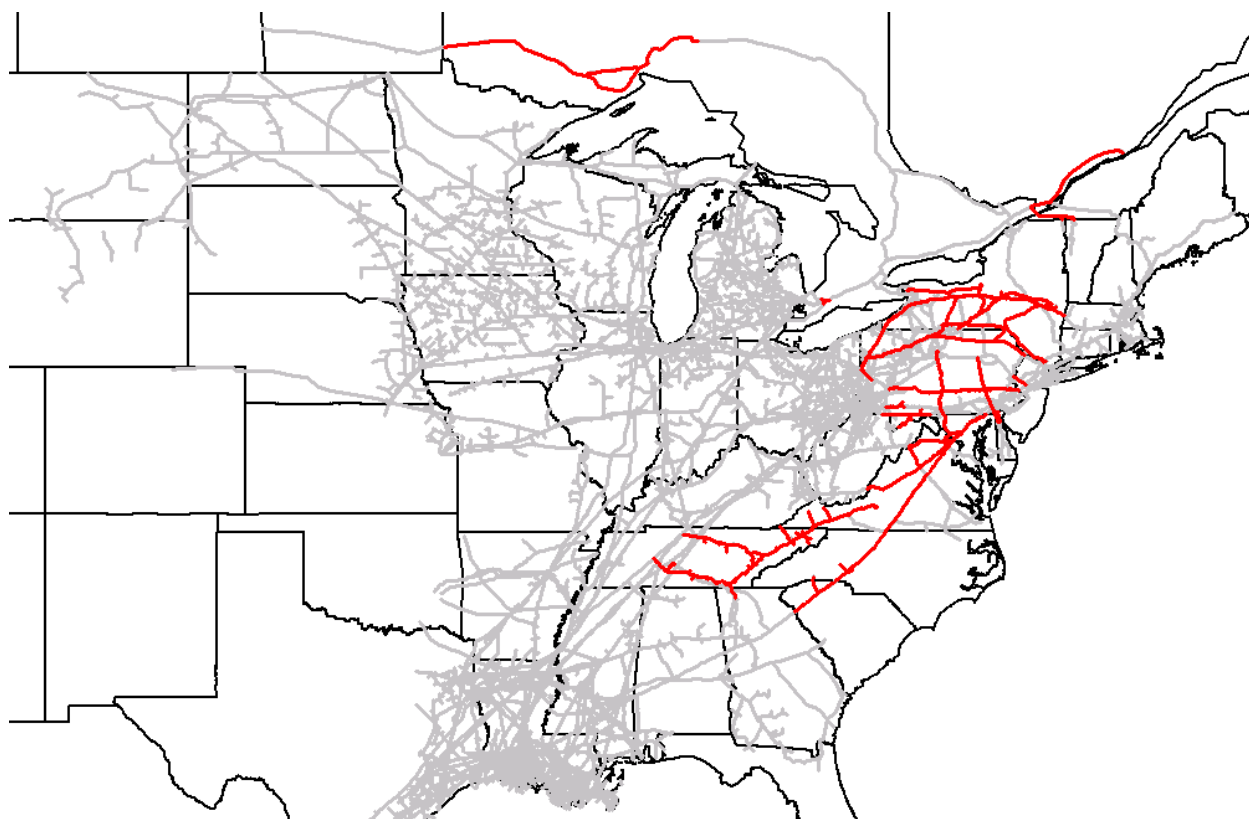


Figure A20-15. LGDS S2 Winter 2018: Peak Hour Constraints

Table A20-10 summarizes the results of the frequency and duration analysis.

Table A20-10. LGDS S2 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	12	1	5	23
Constitution	3	11	47	89
Dominion Eastern NY	2	1	5	6
Dominion Southeast	3	1	2	4
East Tennessee Mainline	2	1	1	2
Eastern Shore	11	1	8	33
Empire Mainline	1	4	4	4
Millennium	7	1	4	12
NB/NS Supply	15	1	18	52
Tennessee Z4 PA	1	2	2	2
Tennessee Z5 NY	11	1	16	50
Texas Eastern M2 PA South	10	1	13	46
Texas Eastern M3 North	7	2	13	43
TransCanada Ontario West	2	1	2	3
TransCanada Quebec	7	1	13	22
Transco Z5	2	1	2	3
Transco Z6 Leidy to 210	12	1	18	59
Union Gas Dawn	2	1	2	3

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-119 and Figure A21-120 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-121 and Figure A21-122 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-123 and Figure A21-124 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-125 and Figure A21-126 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-127 and Figure A21-128 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A21-129 and Figure A21-130 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-131 and Figure A21-132 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-133 and Figure A21-134 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A21-135 and Figure A21-136 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-137 and Figure A21-138 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-139 and Figure A21-140 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-141 and Figure A21-142 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A21-143 and Figure A21-144 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-145 and Figure A21-146 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A21-147 and Figure A21-148 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-149 and Figure A21-150 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-151 and Figure A21-152 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators

directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A21-153 and Figure A21-154 relative to the capacity of the segment.

LGDS S2 Summer 2018

Figure A20-16 summarizes the affected generation during the Summer 2018 peak hour by PPA.

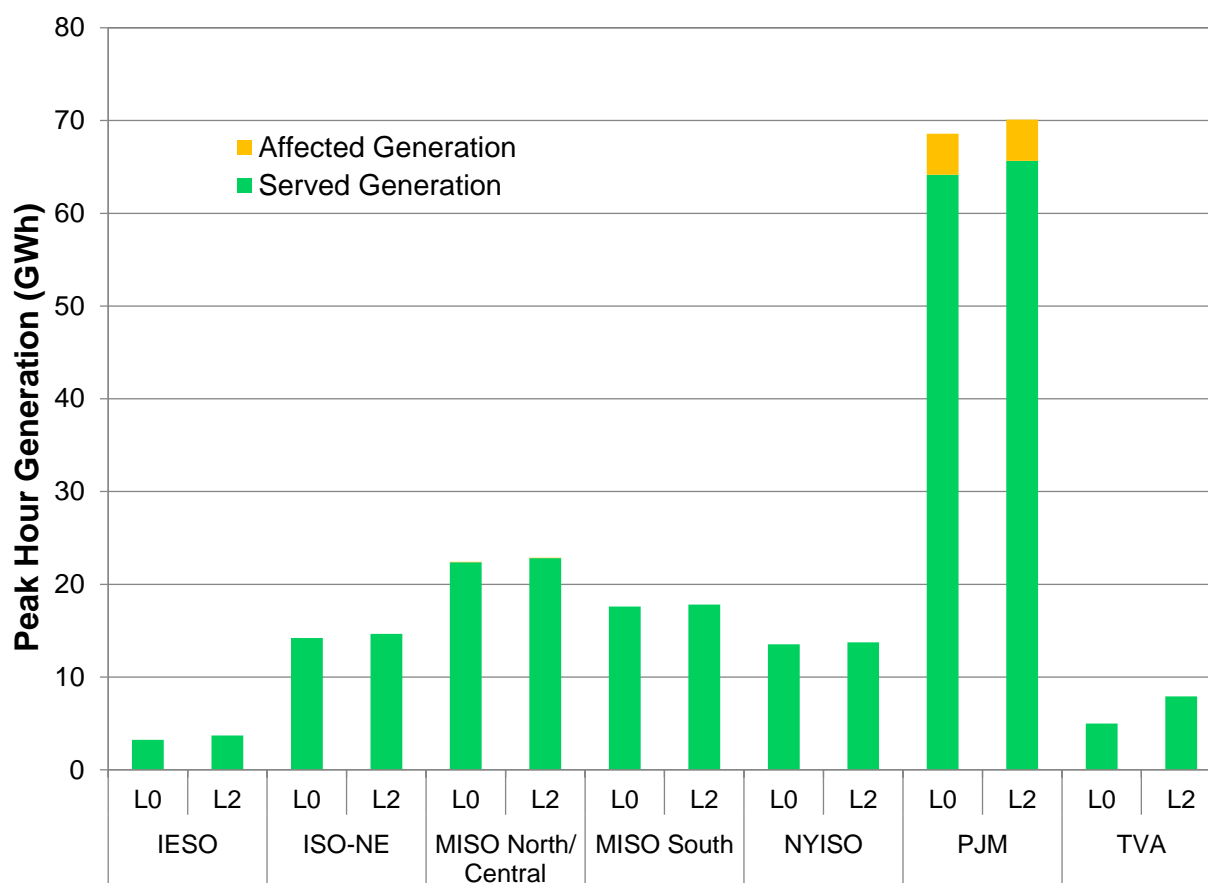


Figure A20-17 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A20-11.

Figure A20-16. LGDS S2 Summer 2018: Peak Hour Affected Generation

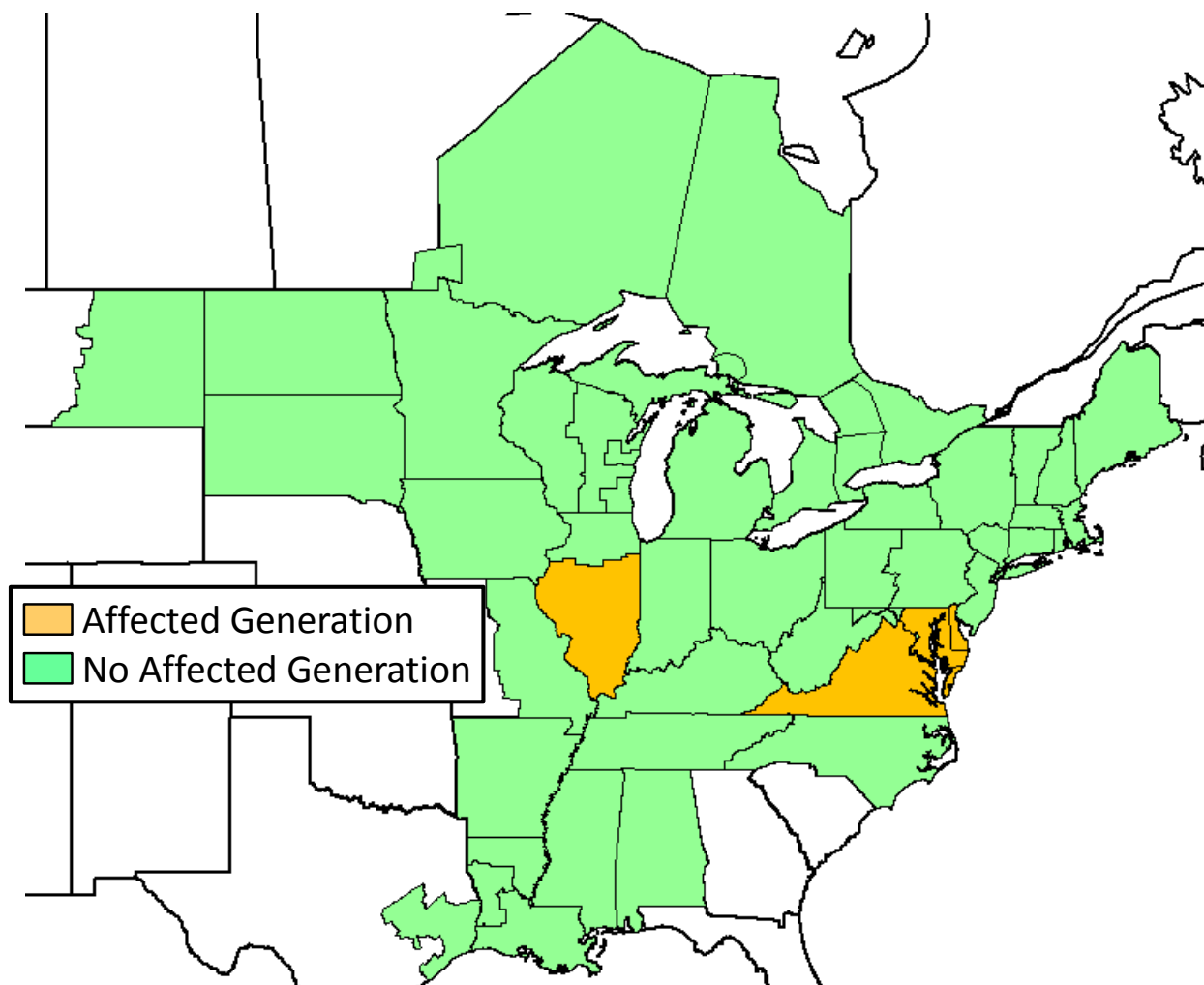


Figure A20-17. LGDS S2 Summer 2018: Locations with Peak Hour Affected Generation

Table A20-11. LGDS S2 Summer 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.3	1,149
Illinois Southern	0.5	50
Maryland Eastern	16.7	2,361
Virginia	8.4	936

Figure A20-18 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A20-16 during the Summer 2018 peak hour.

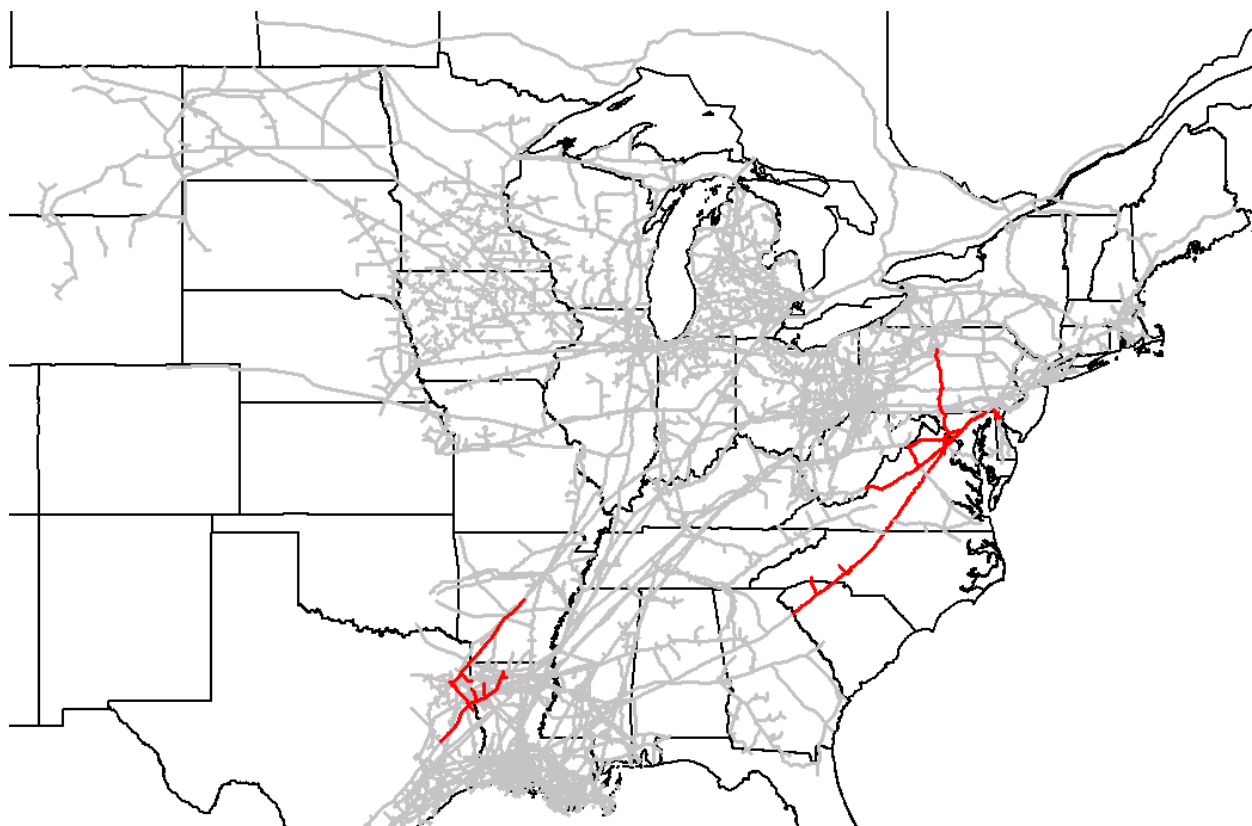


Figure A20-18. LGDS S2 Summer 2018: Peak Hour Constraints

Table A20-12 summarizes the results of the frequency and duration analysis.

Table A20-12. LGDS S2 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	3	1	1	3
Dominion Southeast	1	1	1	1
Eastern Shore	8	1	7	21
Texas Eastern Zone ETX	7	1	6	15
Transco Z5	4	1	3	7

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia, generators behind LDCs served by Columbia Gas in Maryland and Virginia, and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-155 and Figure A21-156 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-157 and Figure A21-158 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A21-159 and Figure A21-160 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-161 and Figure A21-162 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-163 and Figure A21-164 relative to the capacity of the segment.

LGDS S2 Winter 2023

Figure A20-19 summarizes the affected generation during the Winter 2023 peak hour by PPA.

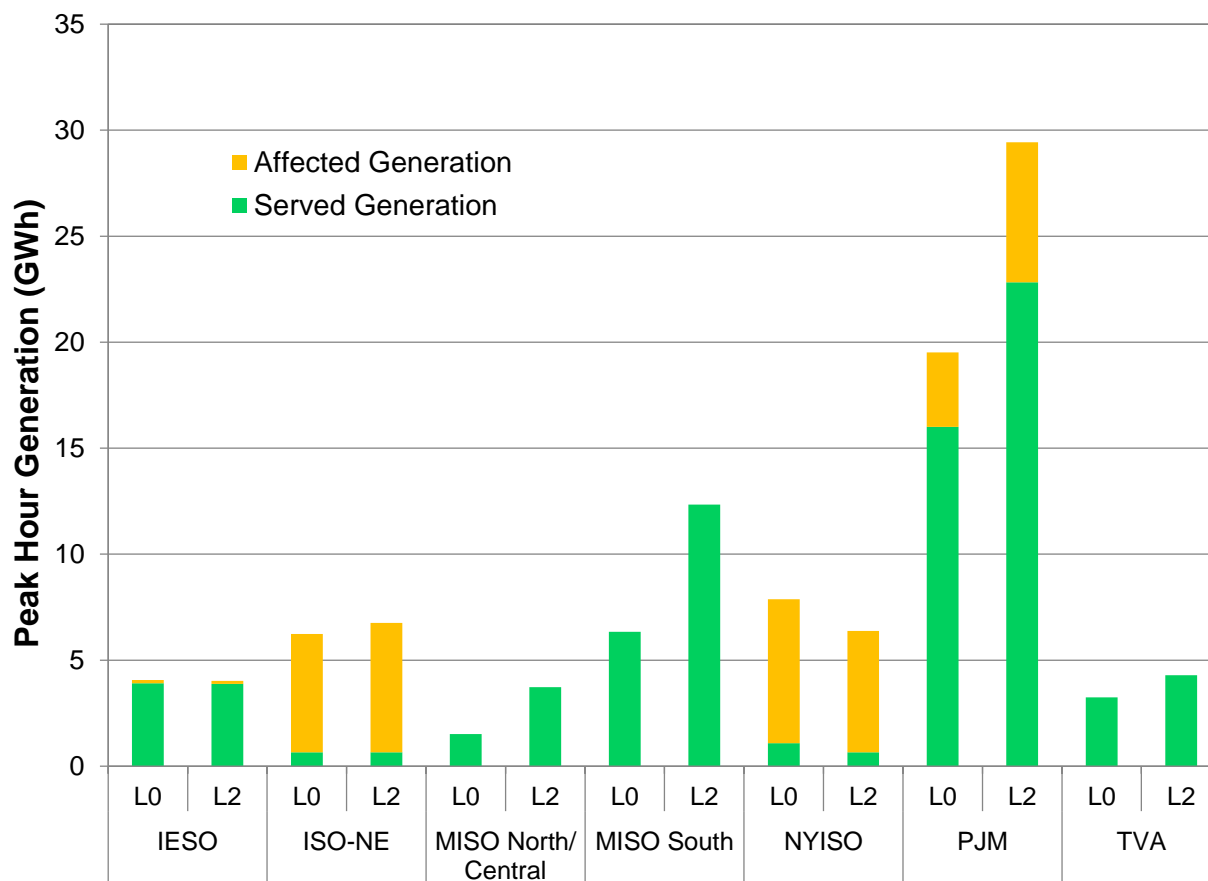


Figure A20-19. LGDS S2 Winter 2023: Peak Hour Affected Generation

Figure A20-20 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A20-13.

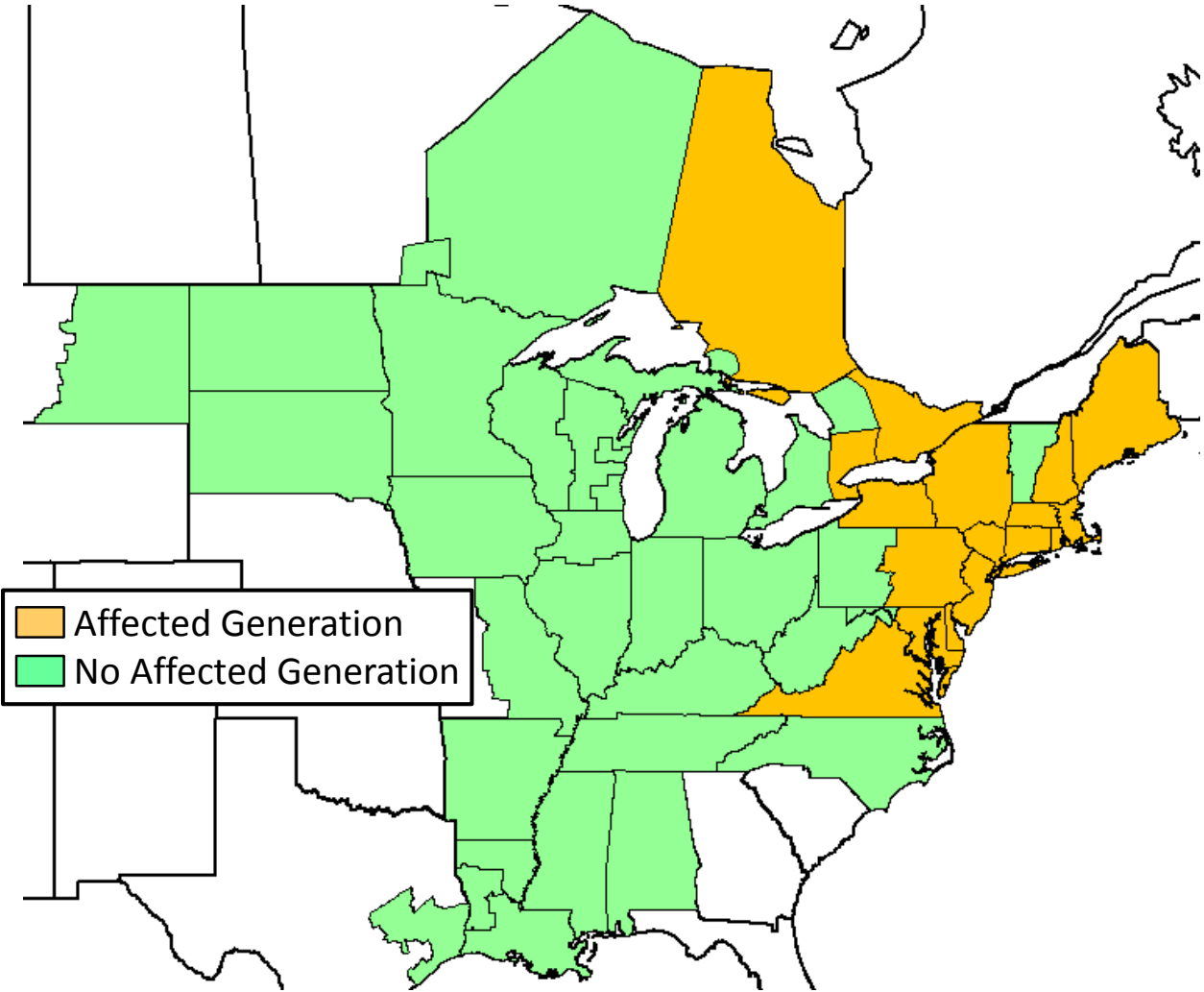


Figure A20-20. LGDS S2 Winter 2023: Locations with Peak Hour Affected Generation

Table A20-13. LGDS S2 Winter 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	9.8	1,345
Delaware	1.3	173
Maine	5.5	759
Maryland Eastern	5.0	539
Massachusetts Eastern	10.9	1,525
Massachusetts Western	7.6	1,008
New Hampshire	9.1	1,207
New Jersey	9.2	1,162
New York Central Northern	24.7	2,798
New York City	8.5	947
New York Long Island	3.3	358
New York Southern	13.8	1,503
New York Western	1.1	126
Ontario (CDA)	0.2	28
Ontario (EDA)	0.1	7
Ontario (NDA)	0.8	114
Pennsylvania Eastern	3.5	494
Rhode Island	1.9	262
Virginia	35.4	4,237

Figure A20-21 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A20-19 during the Winter 2023 peak hour.

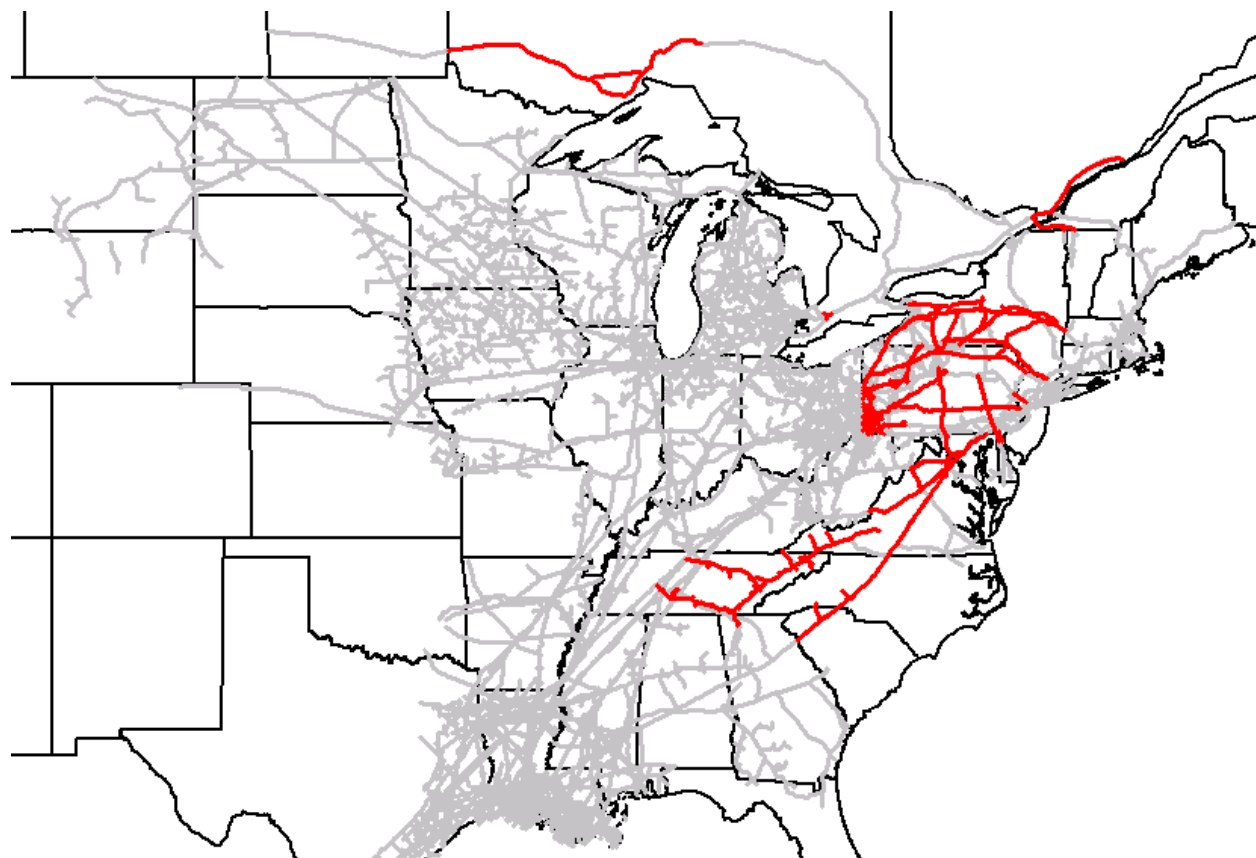


Figure A20-21. LGDS S2 Winter 2023: Peak Hour Constraints

Table A20-14 summarizes the results of the frequency and duration analysis.

Table A20-14. LGDS S2 Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	4	2	58	83
Columbia Gas W PA/NY	4	1	6	2
Constitution	2	31	59	90
Dominion Eastern NY	3	2	9	13
Dominion Western NY	1	4	4	4
Dominion Southeast	8	1	32	69
East Tennessee Mainline	3	1	2	5
Eastern Shore	13	1	12	49
Empire Mainline	8	1	13	32
Millennium	2	31	59	90
NB/NS Supply	2	31	59	90
Tennessee Z4 PA	6	1	4	15
Tennessee Z5 NY	5	1	55	86
Texas Eastern M2 PA South	10	1	6	25
Texas Eastern M3 North	8	1	4	22
TransCanada Ontario West	5	1	11	17
TransCanada Quebec	6	1	8	20
Transco Leidy Atlantic				
Transco Z5	5	1	2	6
Transco Z6 Leidy to 210	14	1	4	28
Union Gas Dawn	3	1	2	3

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d over the 2018 capacity. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-165 and Figure A21-166 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-167 and Figure A21-168 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-169 and Figure A21-170 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-171 and Figure A21-172 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-173 and Figure A21-174 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase of 15 MDth/d over 2018. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-175 and Figure A21-176 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-177 and Figure A21-178 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A21-179 and Figure A21-180 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-181 and Figure A21-182 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-183 and Figure A21-184 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects

generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A21-185 and Figure A21-186 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-187 and Figure A21-188 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-189 and Figure A21-190 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-191 and Figure A21-192 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A21-193 and Figure A21-194 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-195 and Figure A21-196 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A21-197 and Figure A21-198 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-199 and Figure A21-200 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-201 and Figure A21-202 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-203 and Figure A21-204 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A21-205 and Figure A21-206 relative to the capacity of the segment.

LGDS S2 Summer 2023

Figure A20-22 summarizes the affected generation during the Summer 2023 peak hour by PPA.

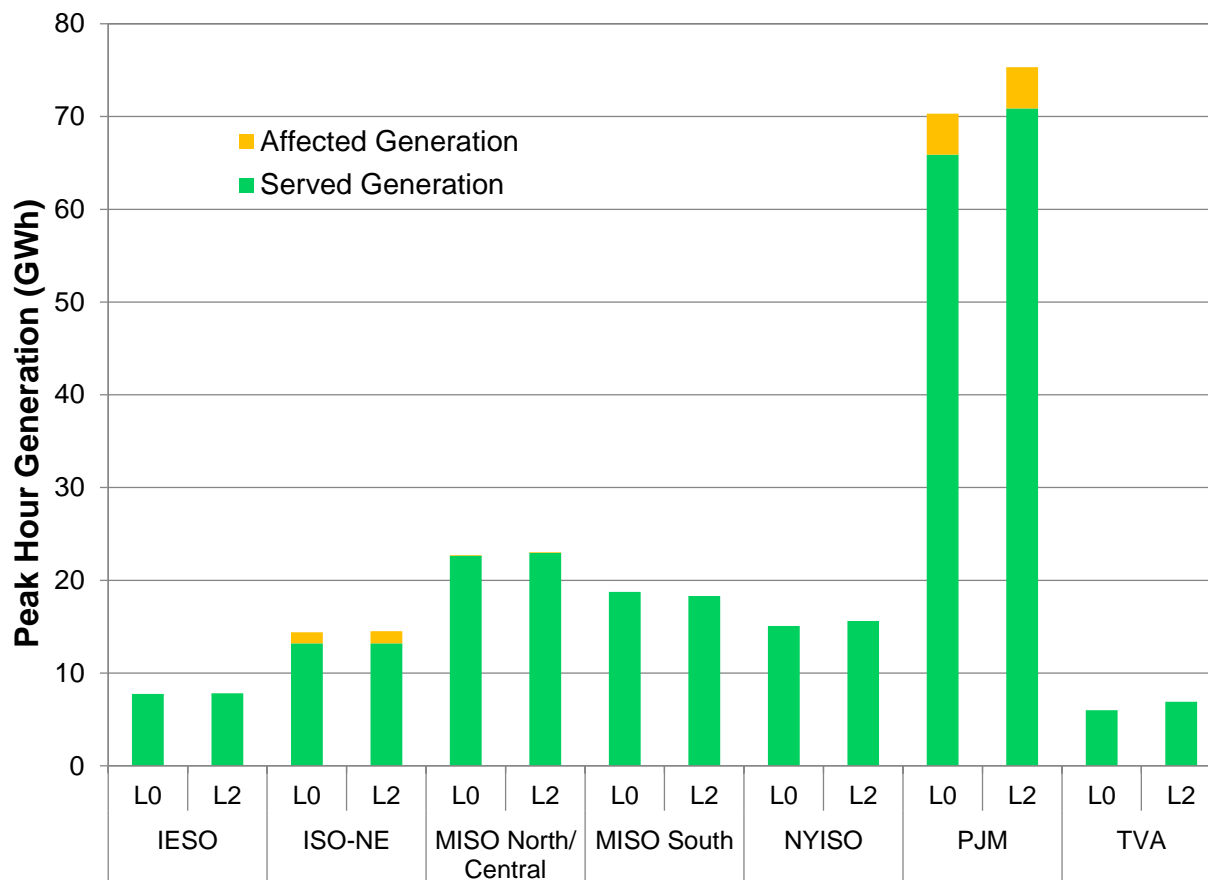


Figure A20-22. LGDS S2 Summer 2023: Peak Hour Affected Generation

Figure A20-23 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A20-15.

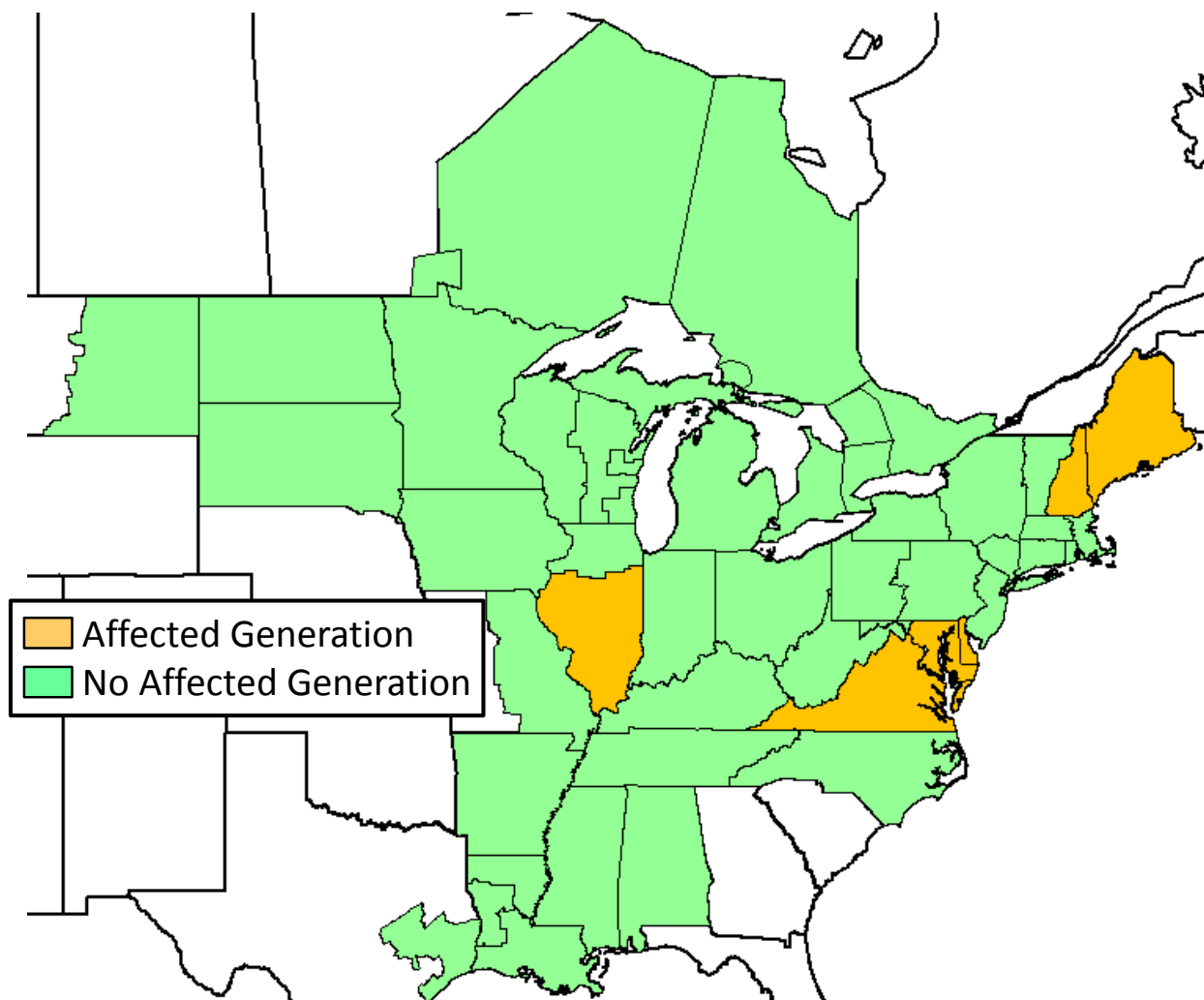


Figure A20-23. LGDS S2 Summer 2023: Locations with Peak Hour Affected Generation

Table A20-15. LGDS S2 Summer 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.3	1,149
Illinois Southern	0.6	67
Maine	4.0	540
Maryland Eastern	16.7	2,361
New Hampshire	6.9	780
Virginia	8.4	936

Figure A20-24 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A20-22 during the Summer 2018 peak hour.

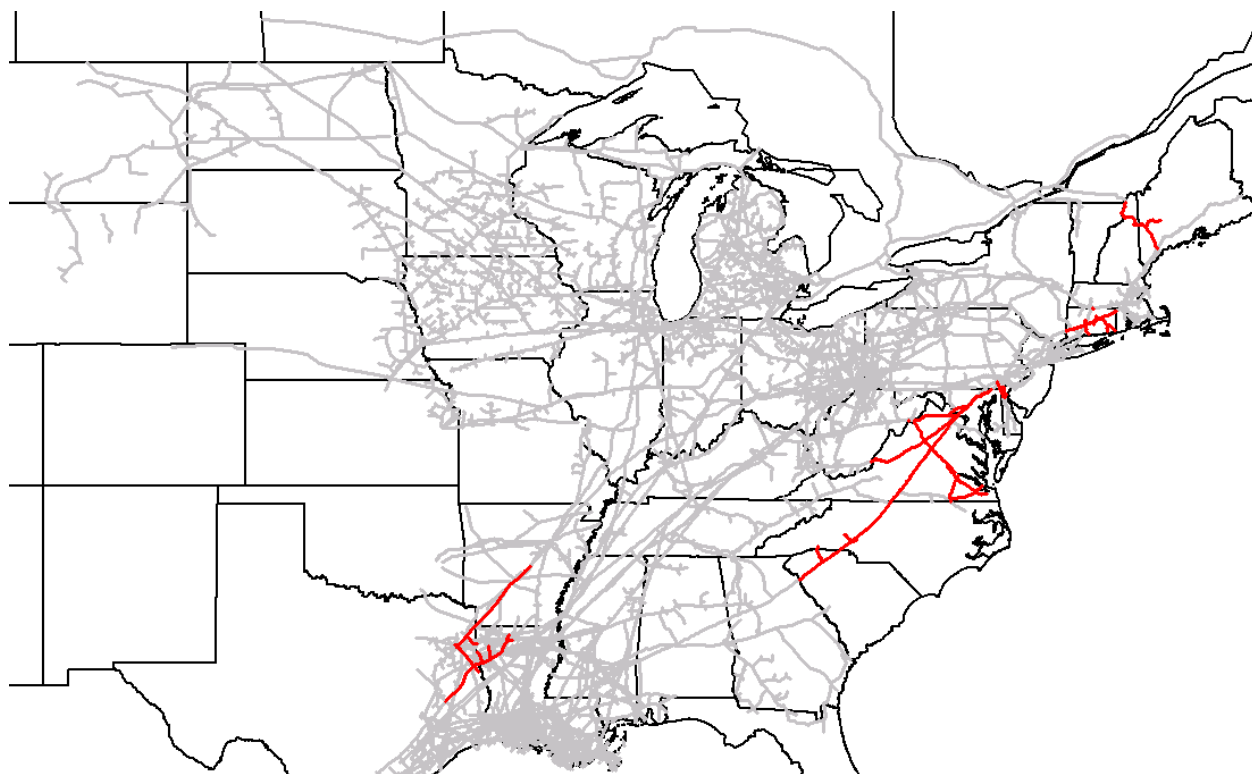


Figure A20-24. LGDS S2 Summer 2023: Peak Hour Constraints

Table A20-16 summarizes the results of the frequency and duration analysis.

Table A20-16. LGDS S2 Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	4	1	3	9
Columbia Gas VA/MD	3	1	3	5
Dominion Southeast	6	1	8	16
Eastern Shore	7	1	3	15
NB/NS Supply	12	2	8	40
PNGTS N of Westbrook	9	1	3	15
Texas Eastern Zone ETX	5	1	6	13
Transco Z5	7	1	3	15

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-207 and Figure A21-208 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-209 and Figure A21-210 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-211 and Figure A21-212 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A21-213 and Figure A21-214 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A21-215 and Figure A21-216 relative to the total production capacity.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-217 and Figure A21-218 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-219 and Figure A21-220 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-221 and Figure A21-222 relative to the capacity of the segment.

S3: Significantly Lower Gas Prices

RGDS S3 Winter 2018

Figure A20-25 summarizes the affected generation during the Winter 2018 peak hour by PPA.

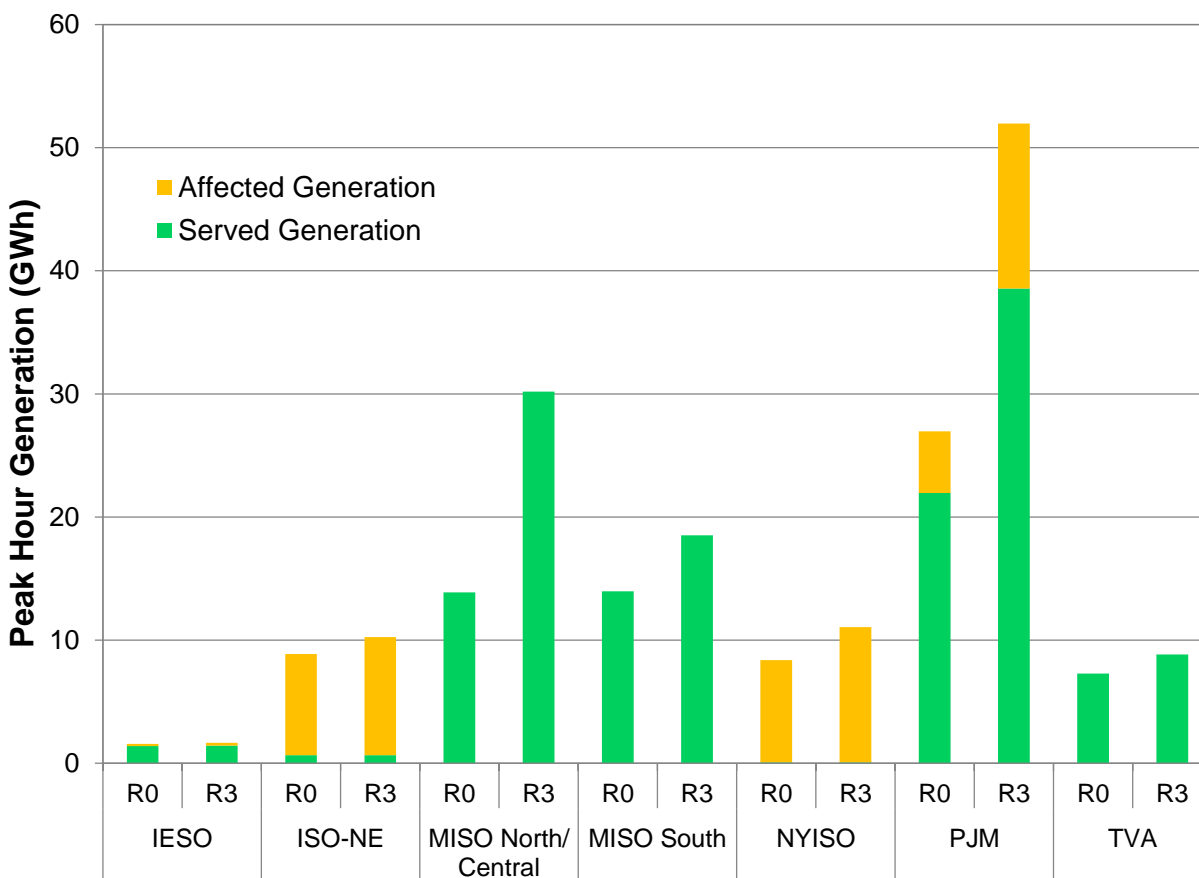


Figure A20-25. RGDS S3 Winter 2018: Peak Hour Affected Generation

Figure A20-26 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A20-17.

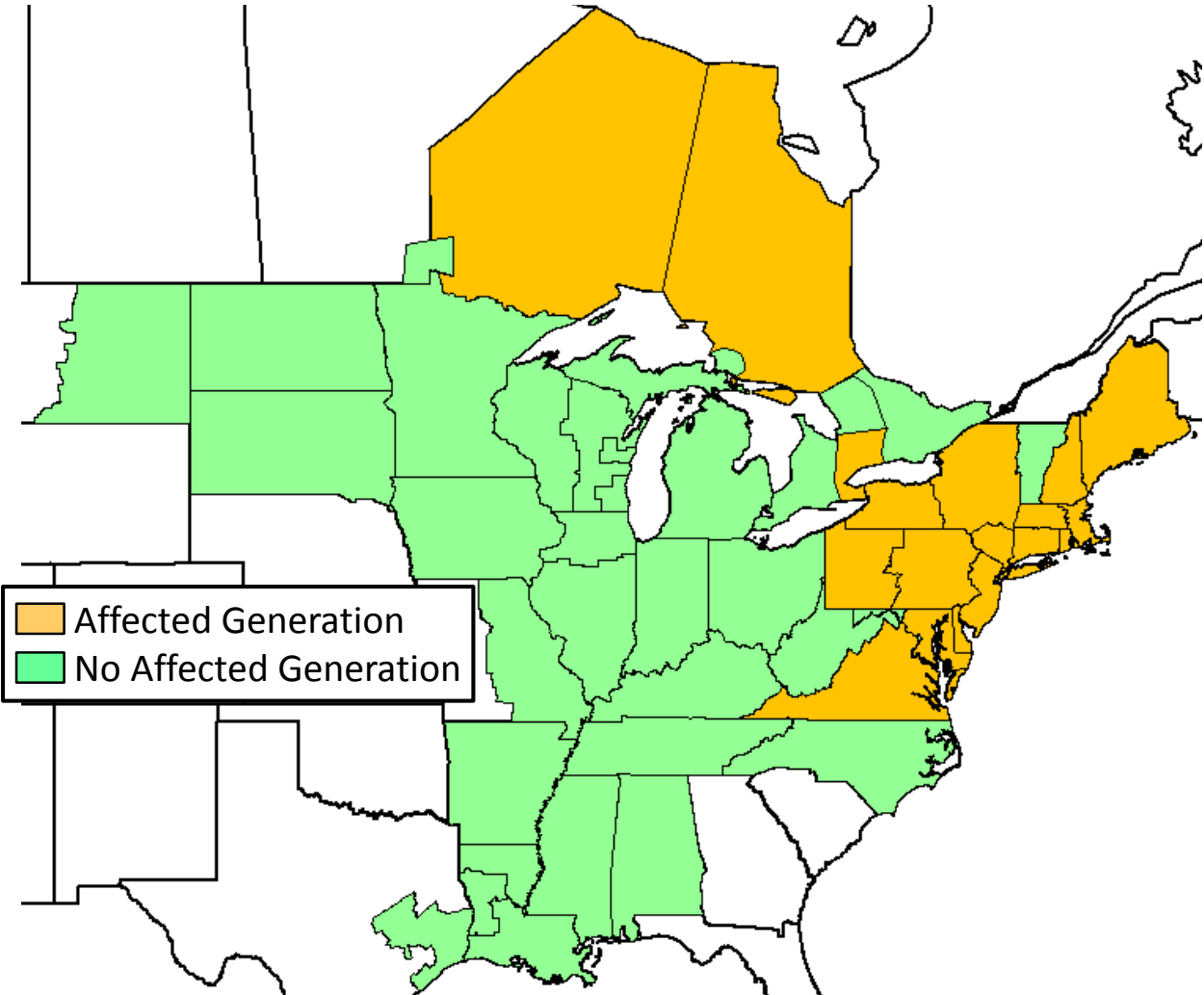


Figure A20-26. RGDS S3 Winter 2018: Locations with Peak Hour Affected Generation

Table A20-17. RGDS S3 Winter 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	19.8	2,633
Delaware	1.3	173
Maine	9.5	1,292
Maryland Eastern	1.7	228
Massachusetts Eastern	16.4	2,279
Massachusetts Western	7.8	1,059
New Hampshire	9.4	1,245
New Jersey	18.6	2,548
New York Central Northern	48.2	5,871
New York City	16.0	2,098
New York Long Island	9.3	1,063
New York Southern	10.9	1,312
New York Western	1.7	196
Ontario (CDA)	1.4	150
Ontario (NDA)	0.4	41
Ontario (WDA)	0.4	38
Pennsylvania Eastern	33.3	4,673
Pennsylvania Western	11.0	1,574
Rhode Island	8.4	1,083
Virginia	36.7	4,622
Connecticut	19.8	2,633
Delaware	1.3	173

Figure A20-27 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A20-25 during the Winter 2018 peak hour.

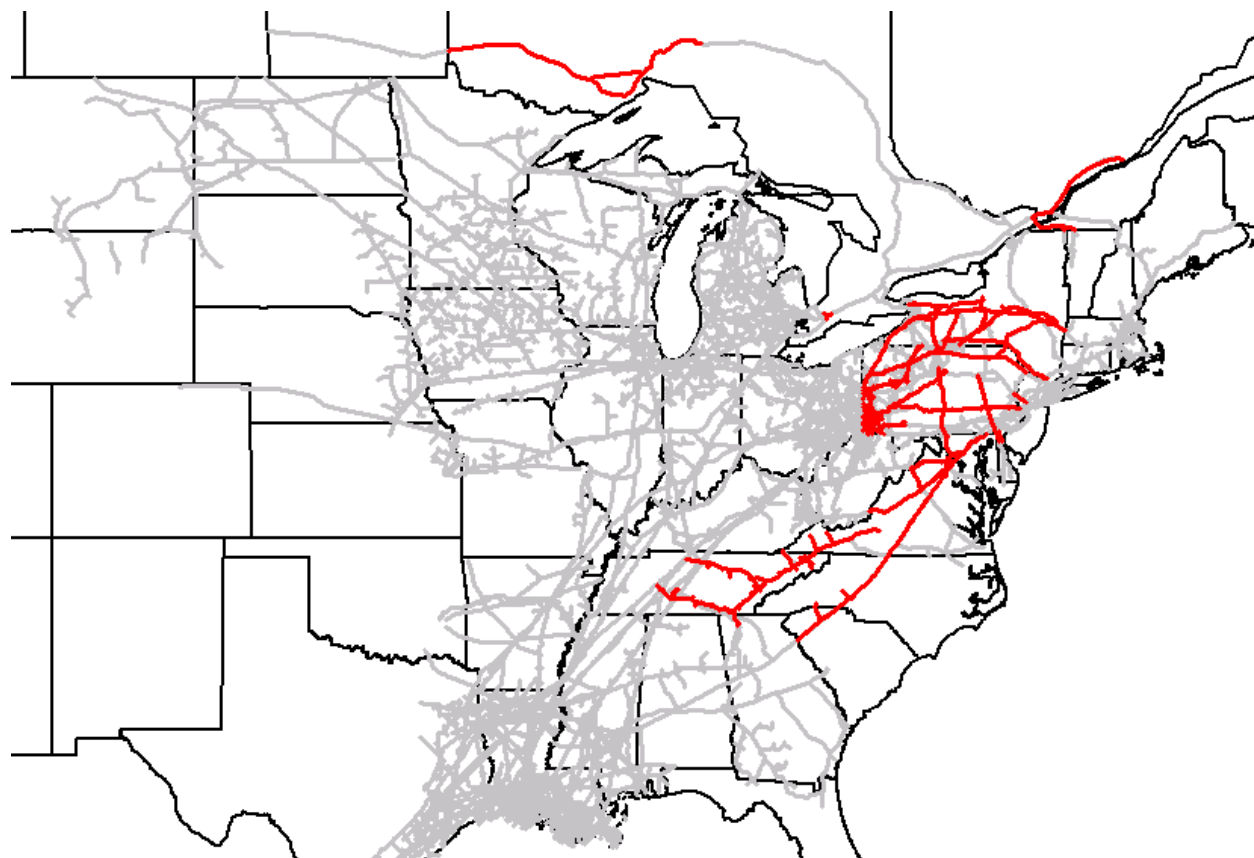


Figure A20-27. RGDS S3 Winter 2018: Peak Hour Constraints

Table A20- summarizes the results of the frequency and duration analysis.

Table A20-18. RGDS S3 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	14	1	12	50
Columbia Gas W PA/NY	6	1	2	8
Constitution	2	31	59	90
Dominion Eastern NY	13	1	13	41
Dominion Western NY	1	4	4	4
Dominion Southeast	5	1	4	13
East Tennessee Mainline	7	1	5	21
Eastern Shore	10	1	4	20
Empire Mainline	12	1	15	48
Millennium	7	1	38	69
NB/NS Supply	14	1	21	63
Tennessee Z4 PA	5	1	47	78
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	4	1	59	84
Texas Eastern M3 North	6	1	50	78
TransCanada Ontario West	5	1	8	15
TransCanada Quebec	6	1	22	30
Transco Leidy Atlantic	2	31	59	90
Transco Z5	8	1	12	26
Transco Z6 Leidy to 210	9	1	15	55
Union Gas Dawn	2	1	3	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-223 and Figure A21-224 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-225 and Figure A21-226 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-227 and Figure A21-228 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-229 and Figure A21-230 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-231 and Figure A21-232 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-233 and Figure A21-234 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-235 and Figure A21-236 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A21-237 and Figure A21-238 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-239 and Figure A21-240 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-241 and Figure A21-242 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects

generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A21-243 and Figure A21-244 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-245 and Figure A21-246 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-247 and Figure A21-248 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-249 and Figure A21-250 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A21-251 and Figure A21-252 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-253 and Figure A21-254 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A21-255 and Figure A21-256 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-257 and Figure A21-258 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-259 and Figure A21-260 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-261 and Figure A21-262 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A21-263 and Figure A21-264 relative to the capacity of the segment.

RGDS S3 Summer 2018

Figure A20-28 summarizes the affected generation during the Summer 2018 peak hour by PPA.

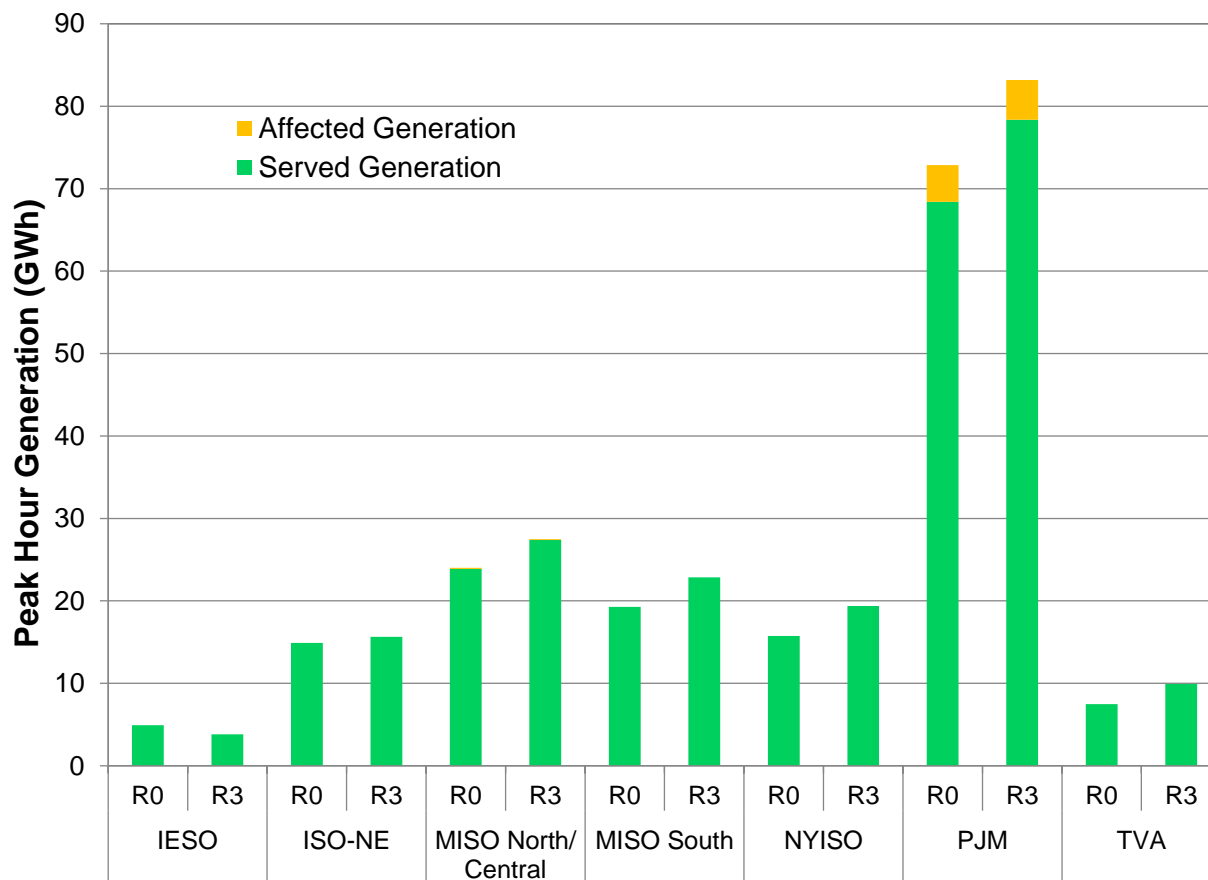


Figure A20-28. RGDS S3 Summer 2018: Peak Hour Affected Generation

Figure A20-29 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A20-19.

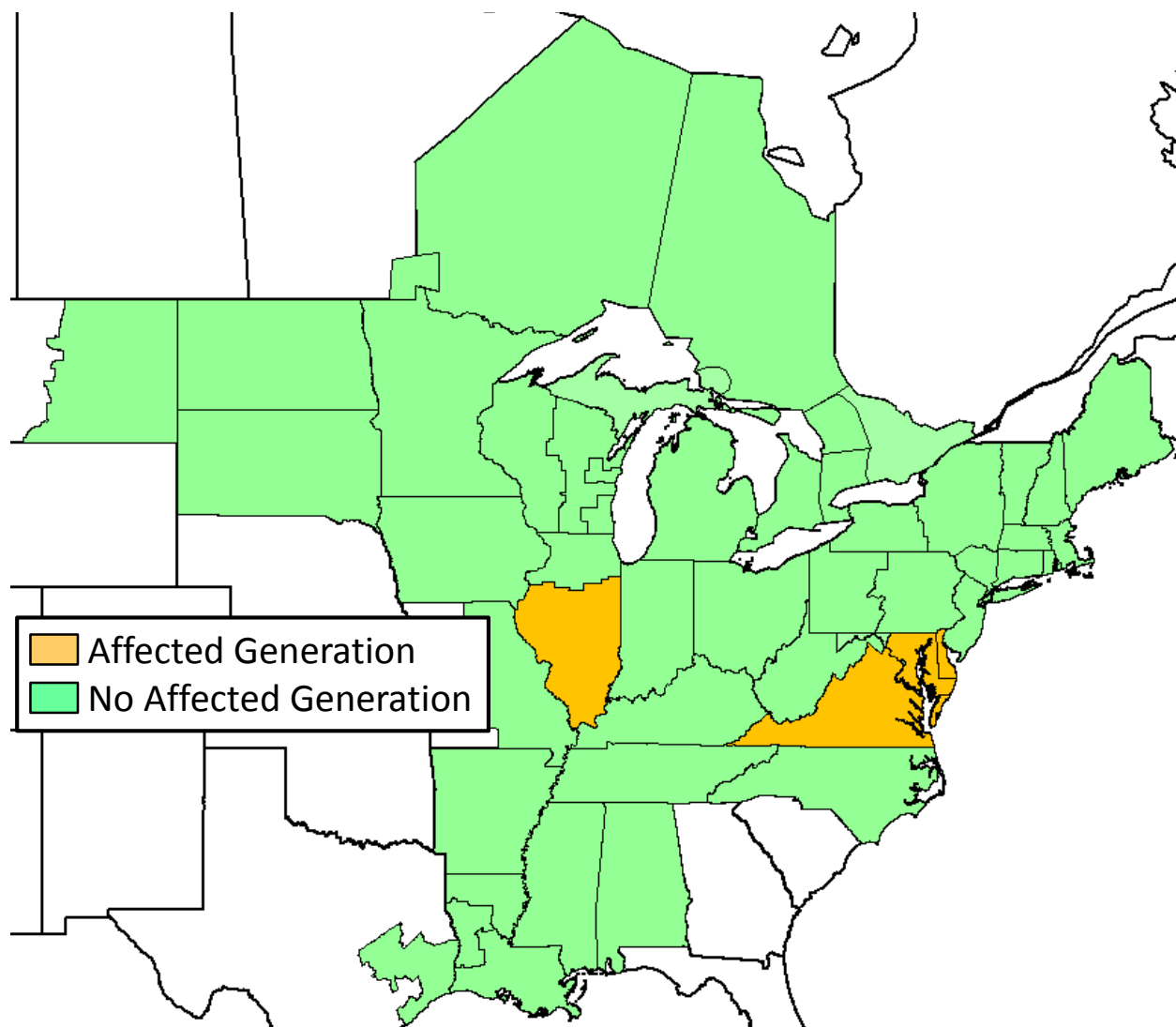


Figure A20-29. RGDS S3 Summer 2018: Locations with Peak Hour Affected Generation

Table A20-19. RGDS S3 Summer 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.9	1,210
Illinois Southern	1.0	113
Maryland Eastern	18.9	2,679
Virginia	8.4	936

Figure A20-30 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A20-28 during the Summer 2018 peak hour.

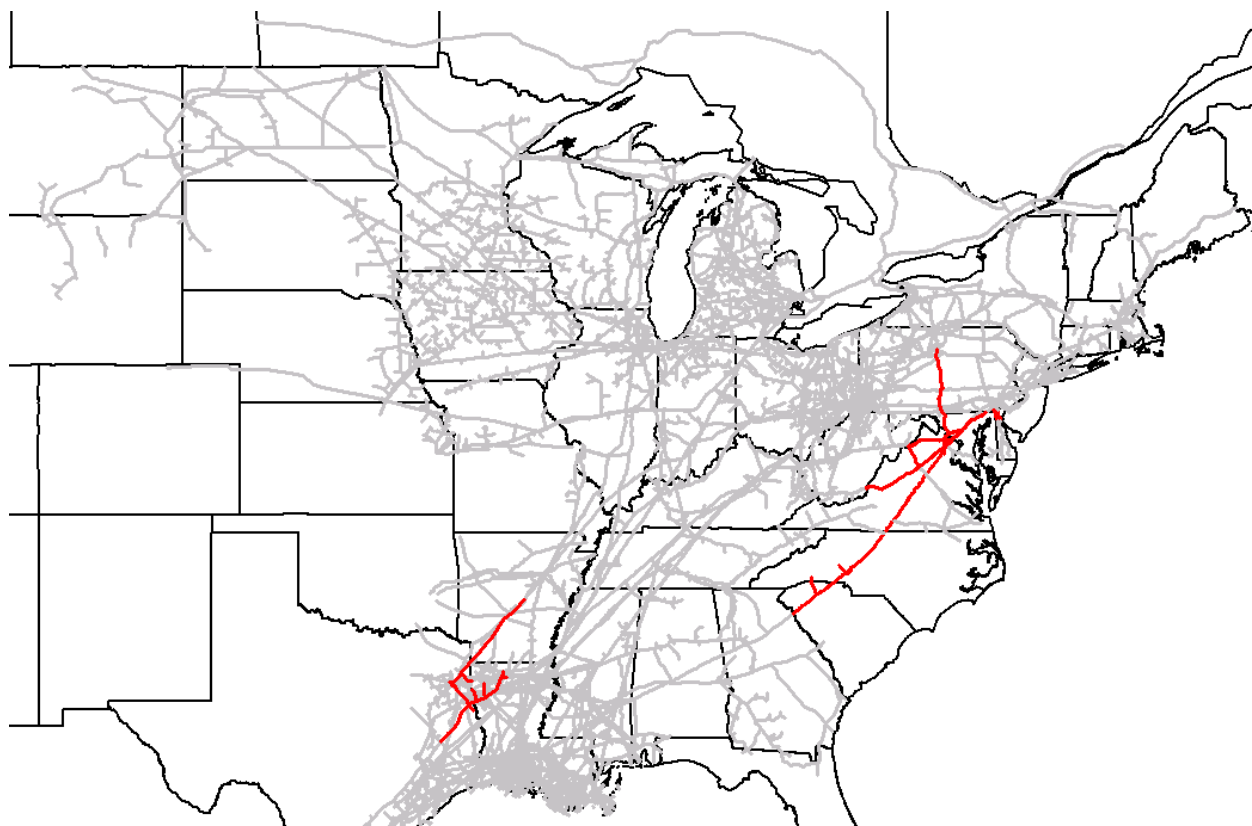


Figure A20-30. RGDS S3 Summer 2018: Peak Hour Constraints

Table A20-20 summarizes the results of the frequency and duration analysis.

Table A20-20. RGDS S3 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	5	1	1	5
Dominion Southeast	15	1	8	41
Eastern Shore	9	1	16	48
Texas Eastern ETX	10	1	6	22
Transco Z5	7	1	16	42

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas’s Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia, generators behind LDCs served by Columbia Gas in Maryland and Virginia, and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-265 and Figure A21-266 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-267 and Figure A21-268 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A21-269 and Figure A21-270 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-271 and Figure A21-272 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-273 and Figure A21-274 relative to the capacity of the segment.

RGDS S3 Winter 2023

Figure A20-31 summarizes the affected generation during the Winter 2023 peak hour by PPA.

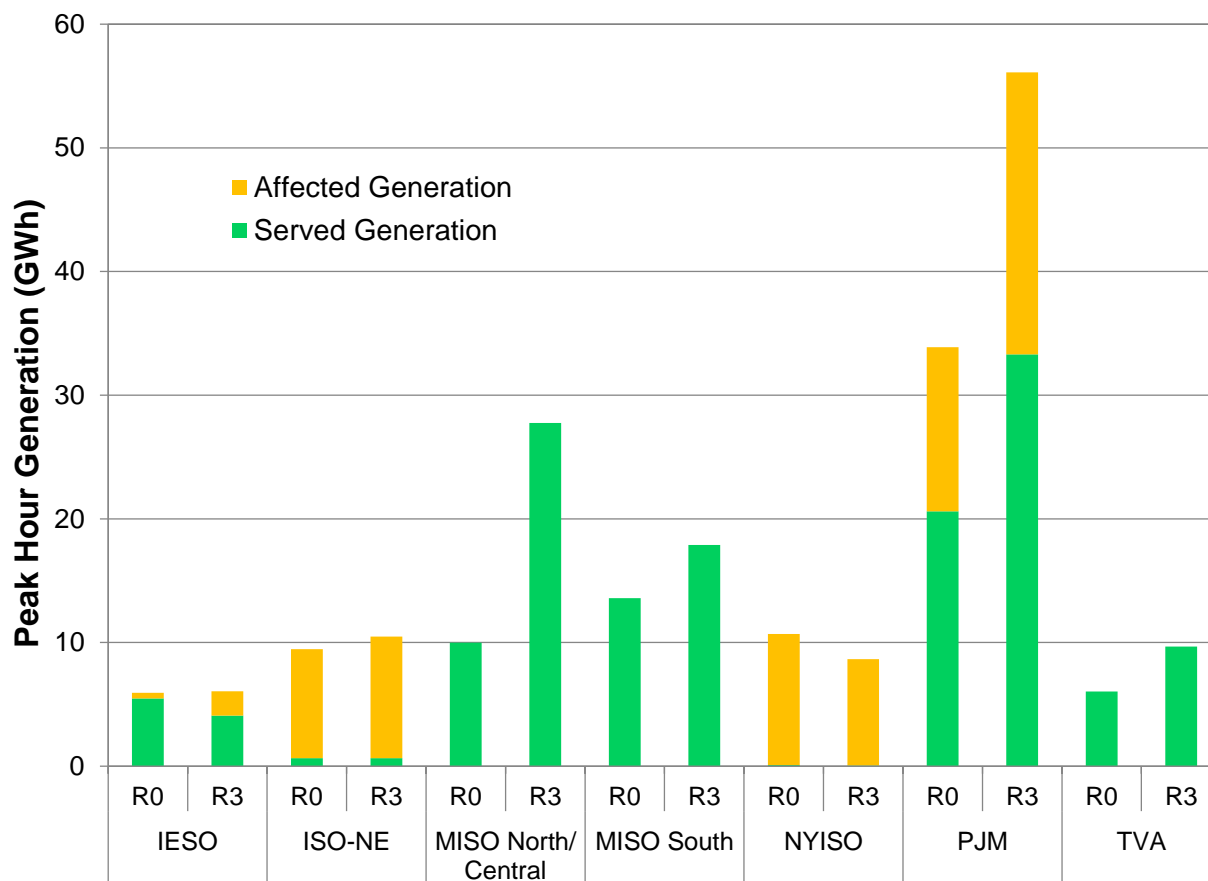


Figure A20-31. RGDS S3 Winter 2023: Peak Hour Affected Generation

Figure A20-32 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A20-21.

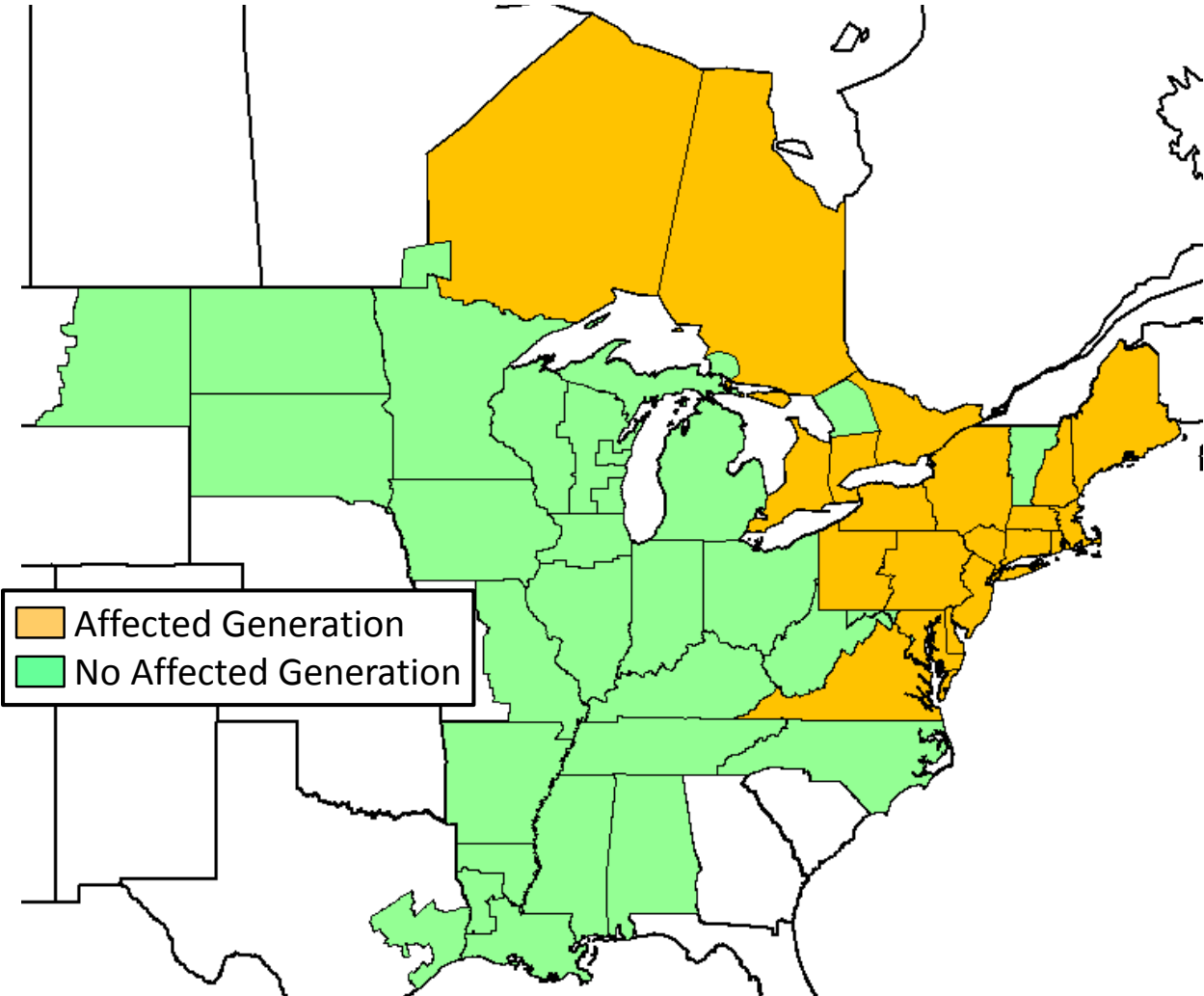


Figure A20-32. RGDS S3 Winter 2023: Locations with Peak Hour Affected Generation

Table A20-21. RGDS S3 Winter 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	18.8	2,530
Delaware	0.3	30
Maine	9.5	1,292
Maryland Eastern	12.5	1,217
Massachusetts Eastern	16.4	2,279
Massachusetts Western	9.1	1,219
New Hampshire	9.4	1,245
New Jersey	15.4	2,182
New York Central Northern	45.7	5,459
New York City	7.5	848
New York Long Island	5.2	540
New York Southern	13.8	1,503
New York Western	2.3	255
Ontario (CDA)	1.6	181
Ontario (EDA)	2.1	249
Ontario (NDA)	1.2	155
Ontario (StClair)	9.7	1,347
Ontario (WDA)	0.4	38
Pennsylvania Eastern	78.6	10,926
Pennsylvania Western	11.0	1,574
Rhode Island	9.6	1,255
Virginia	54.1	6,866

Figure A20-33 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A20-31 during the Winter 2023 peak hour.

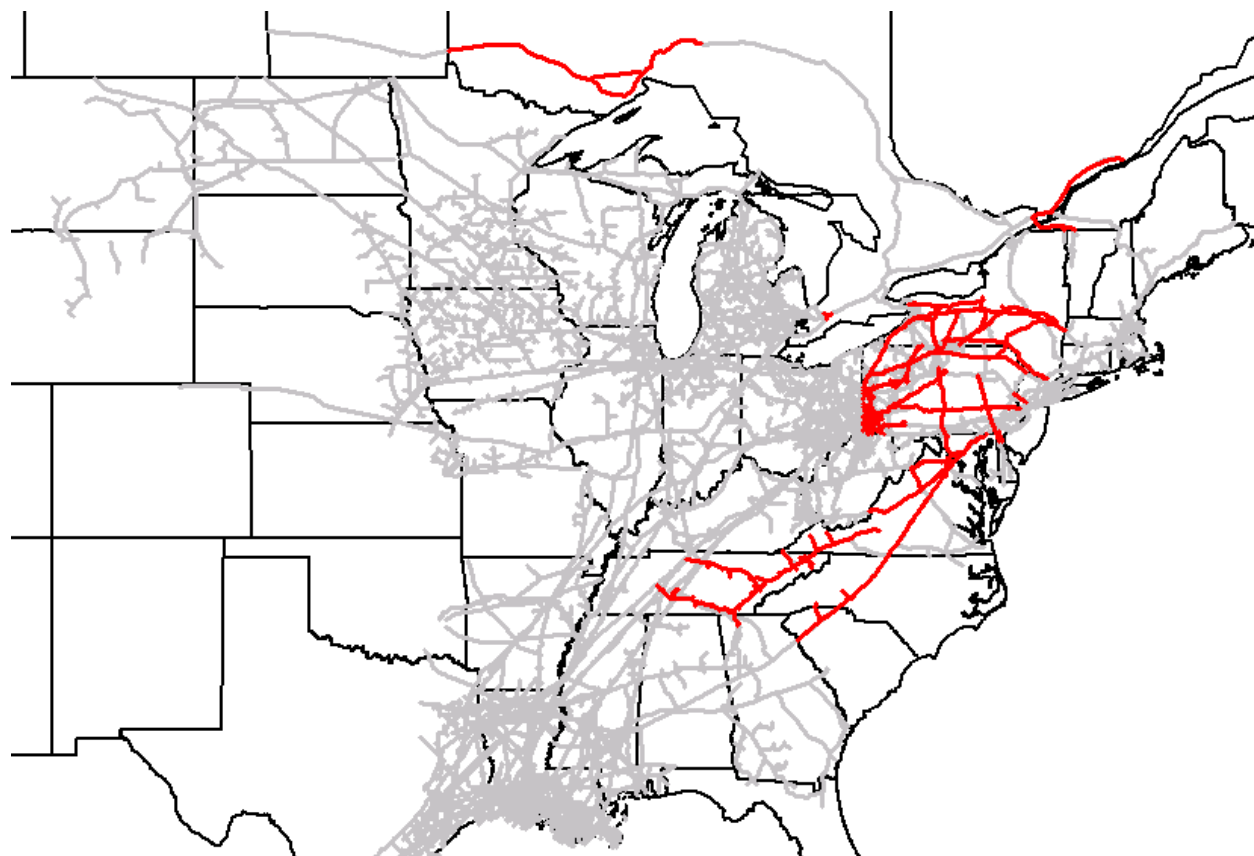


Figure A20-33. RGDS S3 Winter 2023: Peak Hour Constraints

Table A20-22 summarizes the results of the frequency and duration analysis.

Table A20-22. RGDS S3 Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	5	2	52	82
Columbia Gas W PA/NY	11	1	3	16
Constitution	2	31	59	90
Dominion Eastern NY	6	1	35	65
Dominion Western NY	1	5	5	5
Dominion Southeast	5	4	32	70
East Tennessee Mainline	7	1	5	19
Eastern Shore	5	1	3	7
Empire Mainline	5	1	54	63
Great Lakes East	11	1	12	45
Millennium	7	1	38	69
NB/NS Supply	2	31	59	90
Tennessee Z4 PA	6	1	48	81
Tennessee Z5 NY	3	1	59	89
Texas Eastern M2 PA South	2	31	59	90
Texas Eastern M3 North	3	2	59	88
TransCanada Ontario West	7	1	12	24
TransCanada Quebec to PNGTS	5	2	15	37
Transco Leidy Atlantic	2	31	59	90
Transco Z5	9	1	12	27
Transco Z6 Leidy to 210	2	31	59	90
Union Gas Dawn	3	1	2	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d over the 2018 capacity. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-275 and Figure A21-276 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-277 and Figure A21-278 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-279 and Figure A21-280 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-281 and Figure A21-282 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-283 and Figure A21-284 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase of 15 MDth/d over 2018. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-285 and Figure A21-286 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-287 and Figure A21-288 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A21-289 and Figure A21-290 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-291 and Figure A21-292 relative to the capacity of the segment.

Great Lakes East

The 100% peak hour utilization on Great Lakes Gas's East segment, which is modeled with a capacity of 1,164 MDth/d, potentially affects generators directly connected to Great Lakes in Michigan, generators behind LDCs served by Great Lakes in Michigan, generators directly connected to Vector, and generators behind Union Gas. The locations of these generators are shown in Figure A17-3.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-293 and Figure A21-294 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium,

generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-295 and Figure A21-296 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A21-297 and Figure A21-298 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-299 and Figure A21-300 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-301 and Figure A21-302 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-303 and Figure A21-304 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A21-305 and Figure A21-306 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-307 and Figure A21-308 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A21-309 and Figure A21-310 relative to the capacity of

the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-311 and Figure A21-312 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-313 and Figure A21-314 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-315 and Figure A21-316 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A21-317 and Figure A21-318 relative to the capacity of the segment.

RGDS S3 Summer 2023

Figure A20-34 summarizes the affected generation during the Summer 2023 peak hour by PPA.

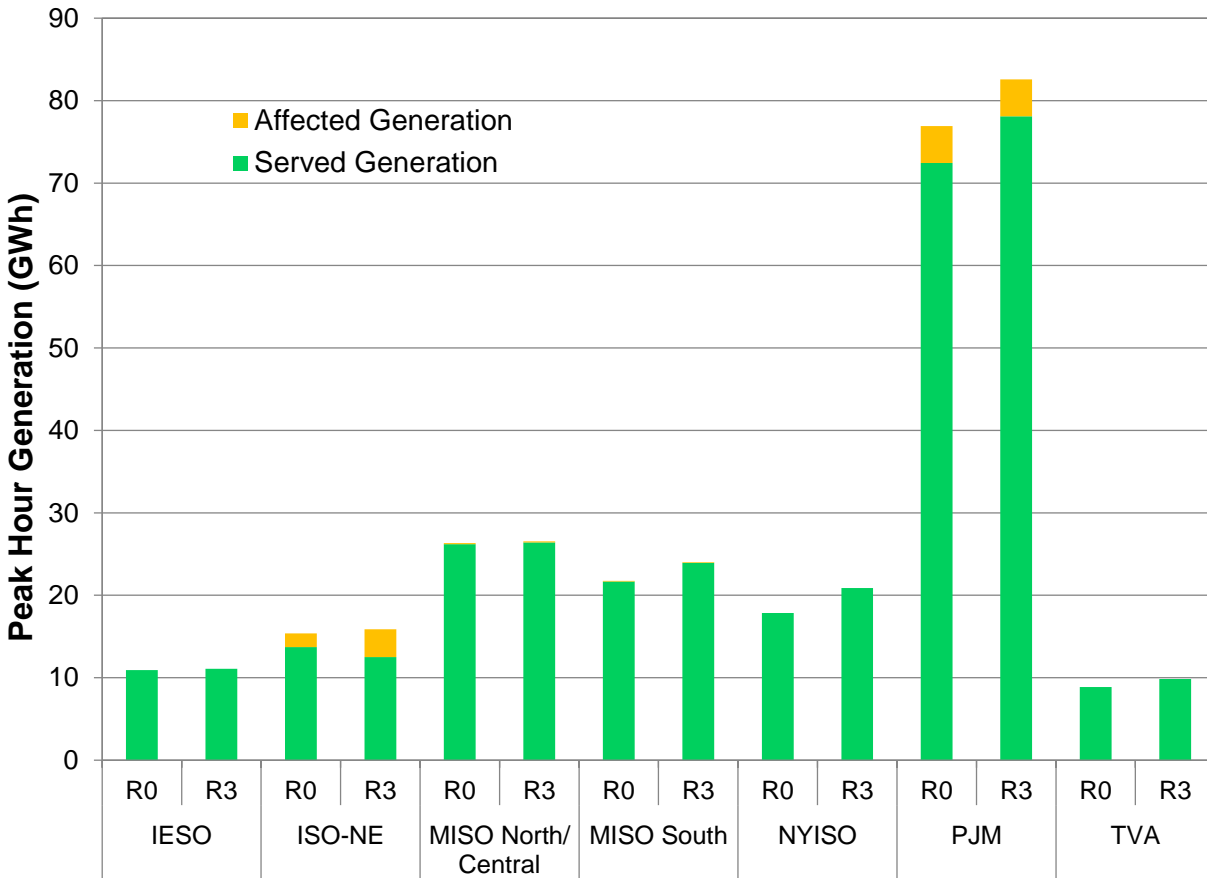


Figure A20-34. RGDS S3 Summer 2023: Peak Hour Affected Generation

Figure A20-35 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A20-23.

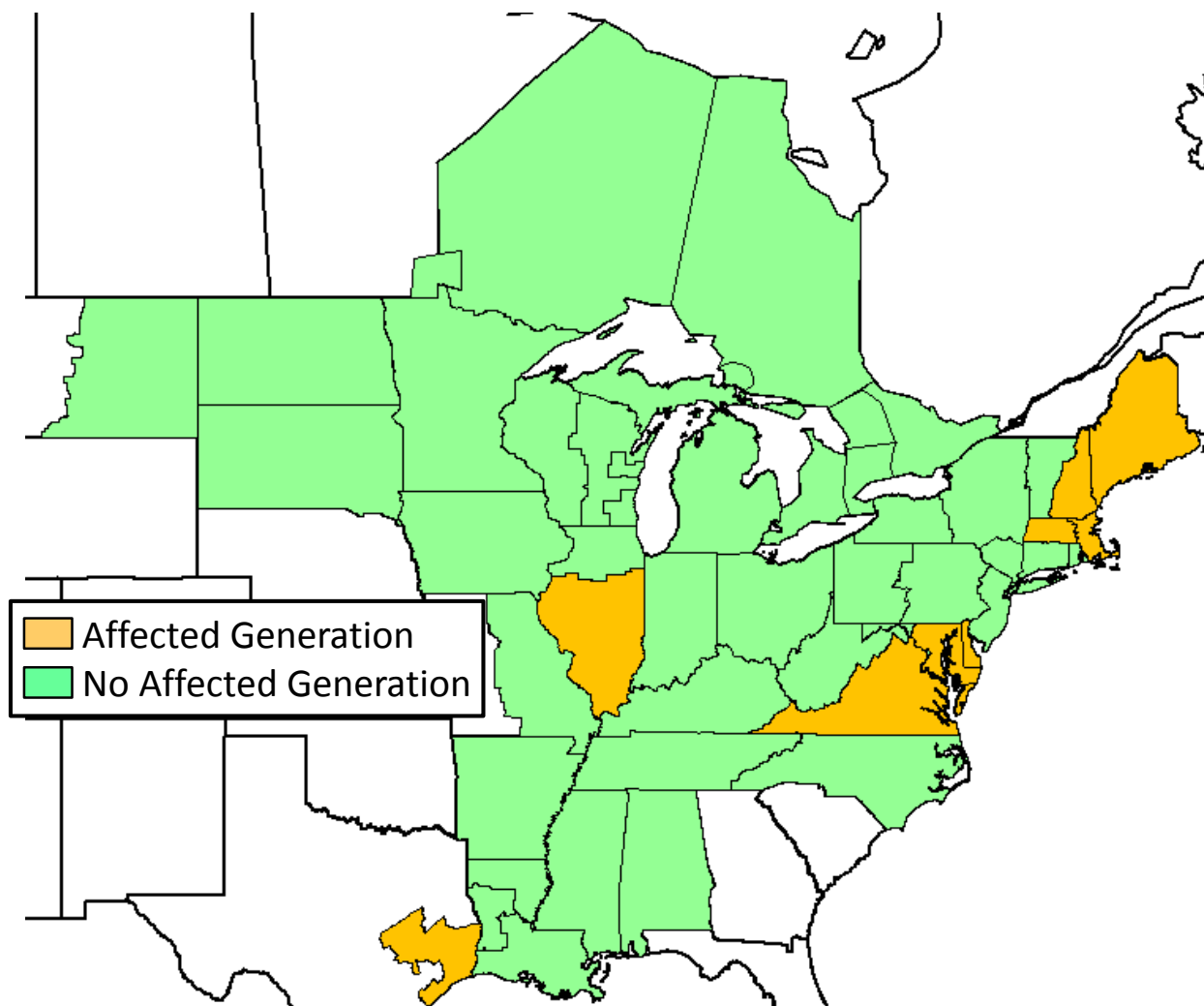


Figure A20-35. RGDS S3 Summer 2023: Locations with Peak Hour Affected Generation

Table A20-23. RGDS S3 Summer 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.5	1,175
Illinois Southern	1.0	112
Maine	10.5	1,357
Maryland Eastern	16.7	2,361
Massachusetts Eastern	3.2	383
Massachusetts Western	1.2	139
New Hampshire	12.3	1,480
Texas East (SERC)	0.6	81
Virginia	8.4	936

Figure A20-36 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A20-34 during the Summer 2023 peak hour.

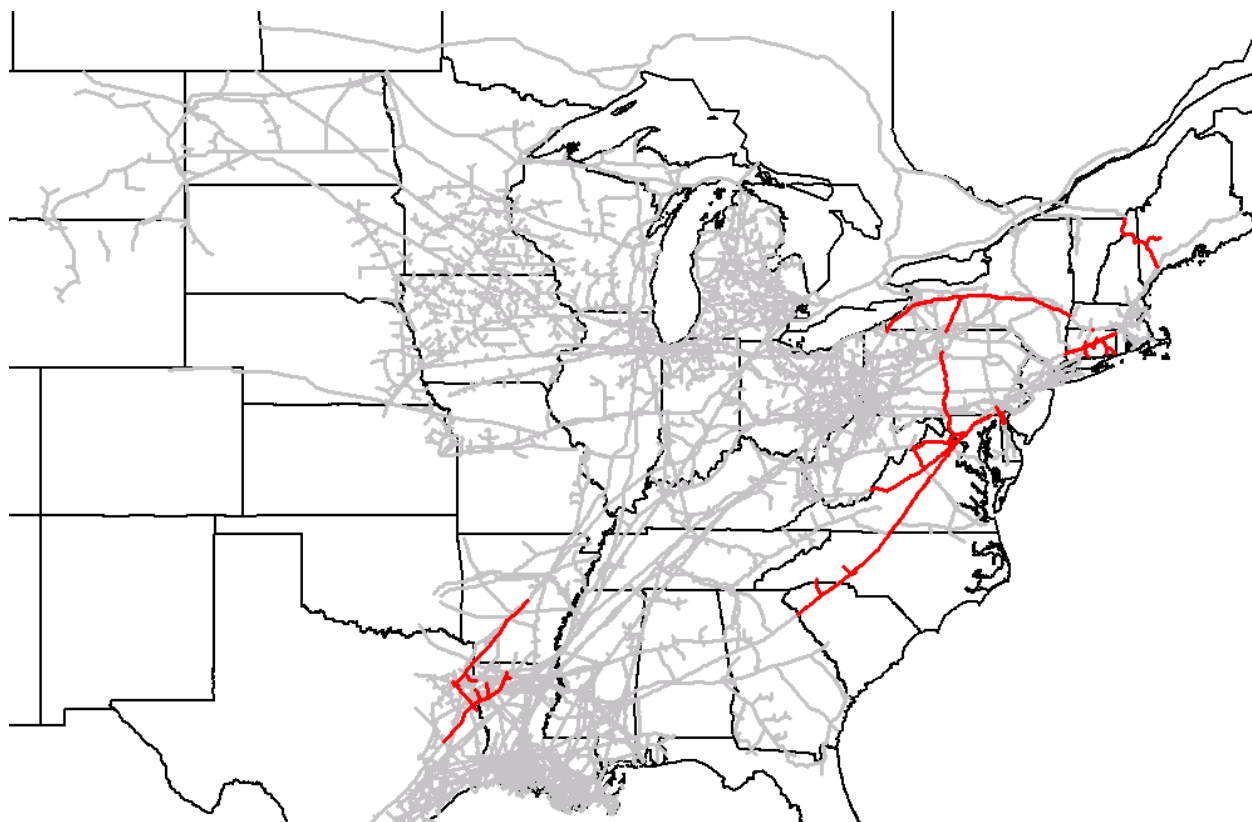


Figure A20-36. RGDS S3 Summer 2023: Peak Hour Constraints

Table A20-24 summarizes the results of the frequency and duration analysis.

Table A20-24. RGDS S3 Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin CT	10	1	9	27
Columbia Gas VA/MD	8	1	6	17
Dominion Southeast	10	1	20	69
Eastern Shore	7	1	16	43
NB/NS Supply	4	2	69	78
PNGTS N of Westbrook	11	1	19	62
Tennessee Z5 NY	1	92	92	92
Texas Eastern ETX	10	1	10	32
Transco Z5	8	1	13	35

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine

and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-319 and Figure A21-320 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-321 and Figure A21-322 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-323 and Figure A21-324 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A21-325 and Figure A21-326 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A21-327 and Figure A21-328 relative to the total production capacity.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-329 and Figure A21-330 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-331 and Figure A21-332 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-333 and Figure A21-334 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A21-335 and Figure A21-336 relative to the capacity of the segment.

Appendix 21

S2 and S3 Chronological and Descending Demand Figures

(Contains CEII – Not included in this Volume)

Appendix 22

Coal and Nuclear Deactivation Sensitivities

S5a, S5b, S5c and S9

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S5a: Additional Coal and Nuclear Deactivation with Wind Replacement

RGDS S5a Winter 2018

Figure A22-1 summarizes the affected generation during the Winter 2018 peak hour by PPA.

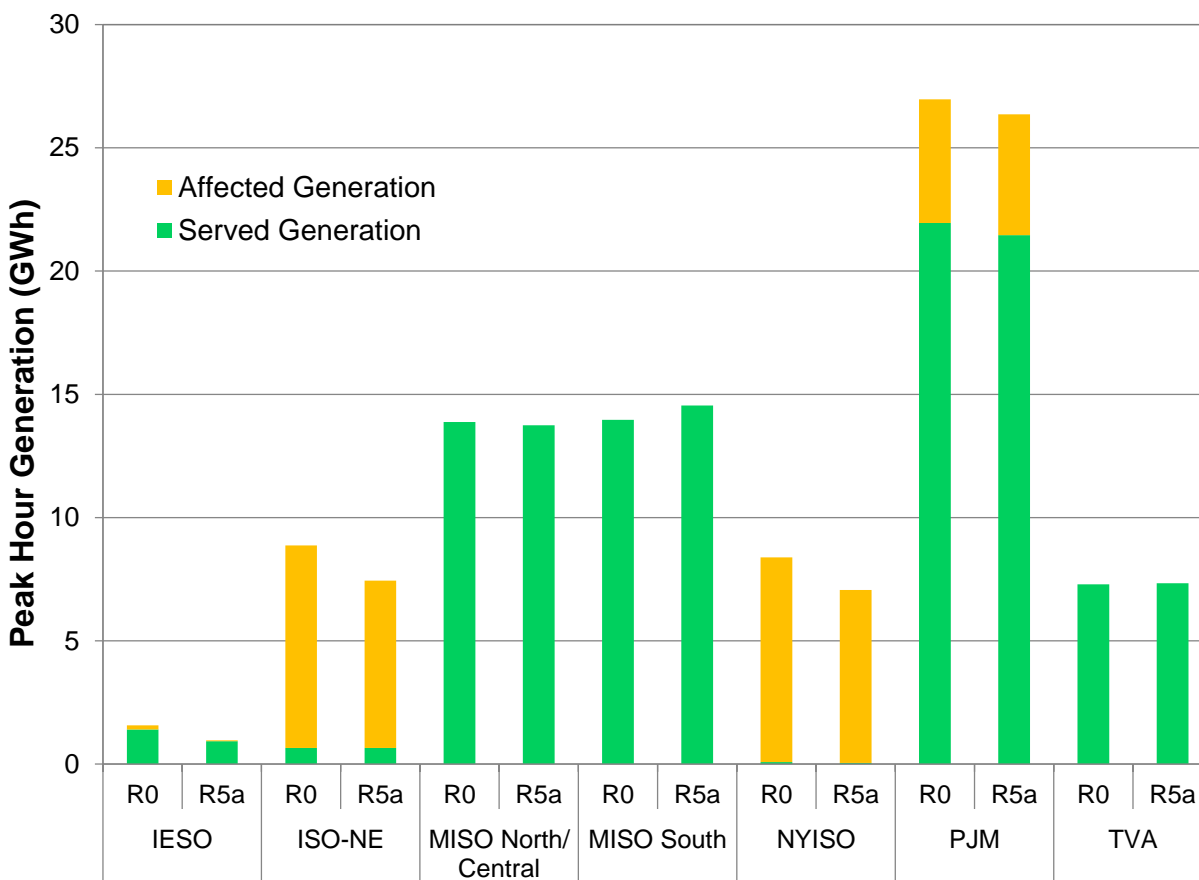


Figure A22-1. RGDS S5a Winter 2018: Peak Hour Affected Generation

Figure A22-2 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-1.

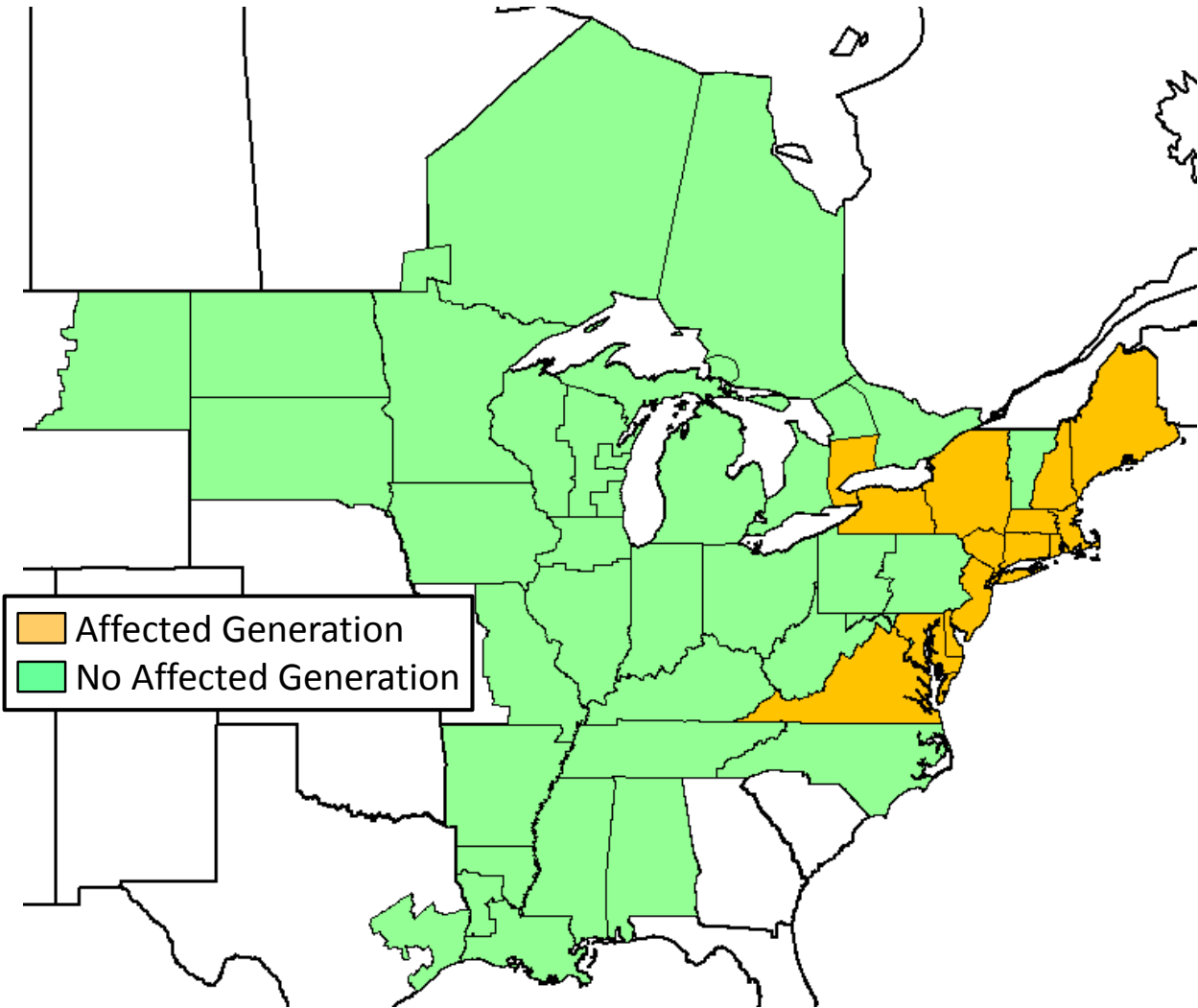


Figure A22-2. RGDS S5a Winter 2018: Locations with Peak Hour Affected Generation

Table A22-1. RGDS S5a Winter 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	9.8	1,345
Delaware	1.4	176
Maine	5.5	759
Maryland Eastern	5.0	539
Massachusetts Eastern	10.9	1,525
Massachusetts Western	7.8	1,059
New Hampshire	8.4	1,120
New Jersey	12.4	1,551
New York Central Northern	20.5	2,887
New York City	14.2	1,729
New York Long Island	9.1	955
New York Southern	10.9	1,312
New York Western	1.2	132
Ontario (CDA)	0.2	28
Rhode Island	7.5	985
Virginia	20.0	2,635

Figure A22-3 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-1 during the Winter 2018 peak hour.

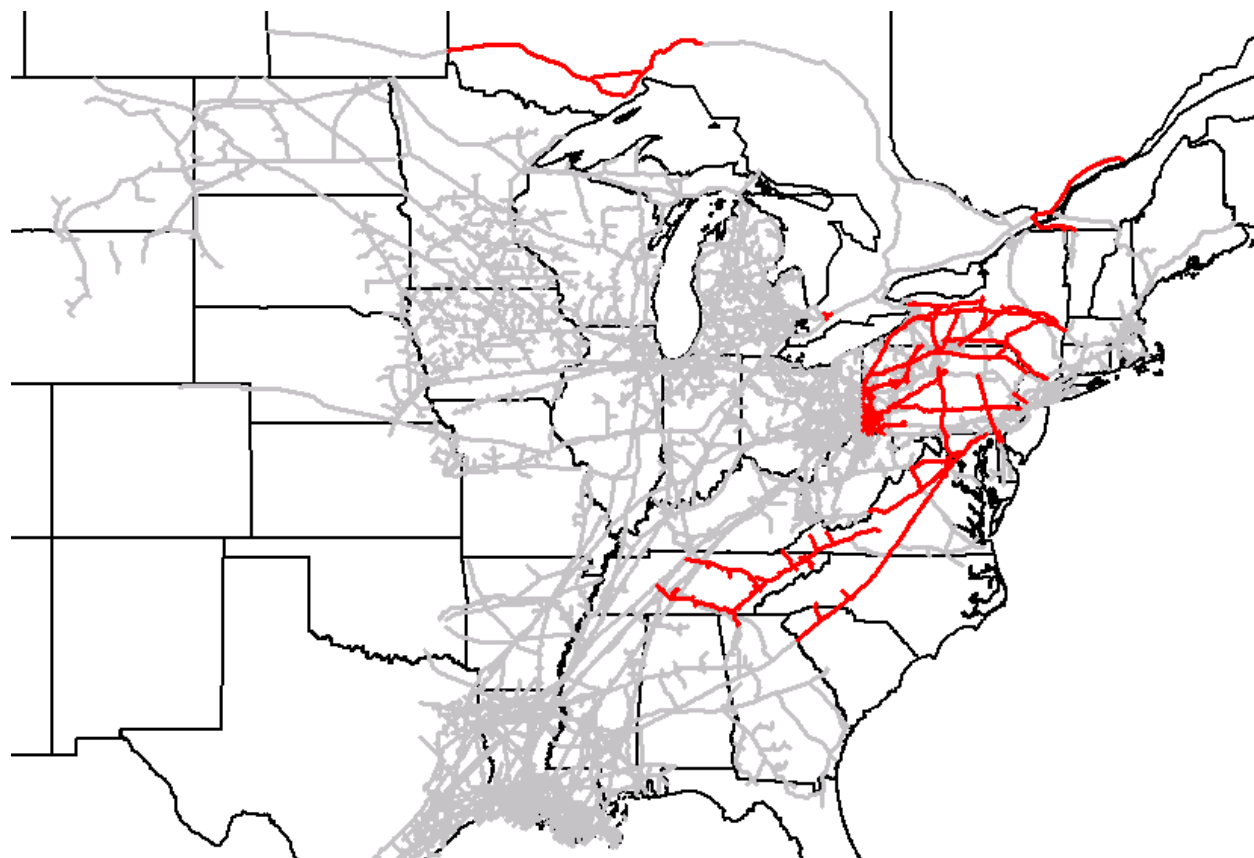


Figure A22-3. RGDS S5a Winter 2018: Peak Hour Constraints

Table A22-2 summarizes the results of the frequency and duration analysis.

Table A22-2. RGDS S5a Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	12	1	5	21
Columbia Gas W PA/NY	9	1	3	14
Constitution	2	31	59	90
Dominion Eastern NY	3	1	6	9
Dominion Western NY	1	3	3	3
Dominion Southeast	3	1	2	4
East Tennessee Mainline	6	1	1	6
Eastern Shore	14	1	10	53
Empire Mainline	2	1	12	13
Millennium	7	1	38	69
NB/NS Supply	15	1	19	52
Tennessee Z4 PA	9	1	13	25
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	9	1	15	50
Texas Eastern M3 North	12	1	9	36
TransCanada Ontario West	5	1	4	10
TransCanada Quebec	7	1	7	21
Transco Leidy Atlantic	9	1	17	57
Transco Z5	5	1	2	7
Transco Z6 Leidy to 210	5	1	3	8
Union Gas Dawn	2	1	3	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-1 and Figure A23-2 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-3 and Figure A23-4 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-5 and Figure A23-6 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-7 and Figure A23-8 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-9 and Figure A23-10 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-11 and Figure A23-12 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East

Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-13 and Figure A23-14 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-15 and Figure A23-16 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-17 and Figure A23-18 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-19 and Figure A23-20 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A23-21 and Figure A23-22 relative to the total production

capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-23 and Figure A23-24 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-25 and Figure A23-26 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-27 and Figure A23-28 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A23-29 and Figure A23-30 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-31 and Figure A23-32 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A23-33 and Figure A23-34 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-35 and Figure A23-36 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-37 and Figure A23-38 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-39 and Figure A23-40 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A23-41 and Figure A23-42 relative to the capacity of the segment.

RGDS S5a Summer 2018

Figure A22-4 summarizes the affected generation during the Summer 2018 peak hour by PPA.

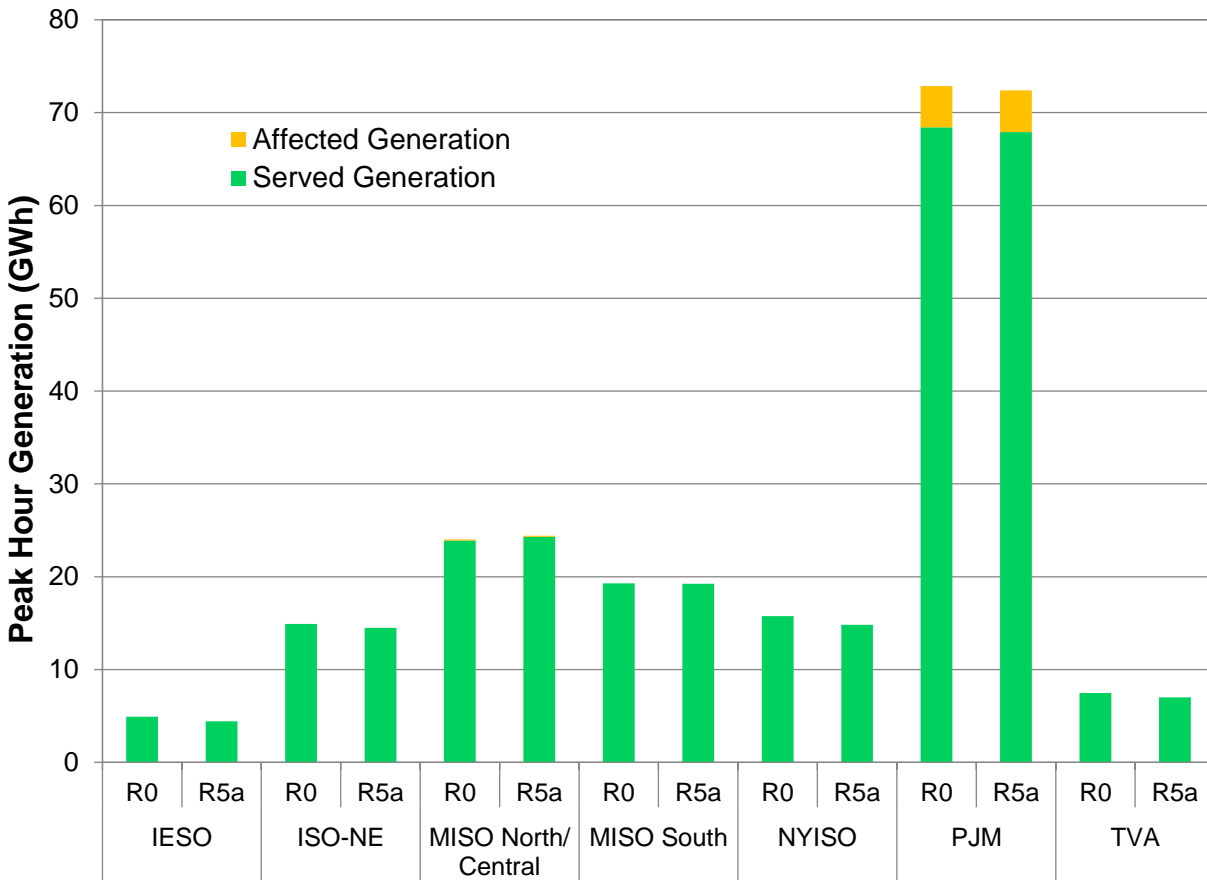


Figure A22-4. RGDS S5a Summer 2018: Peak Hour Affected Generation

Figure A22-5 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-3.

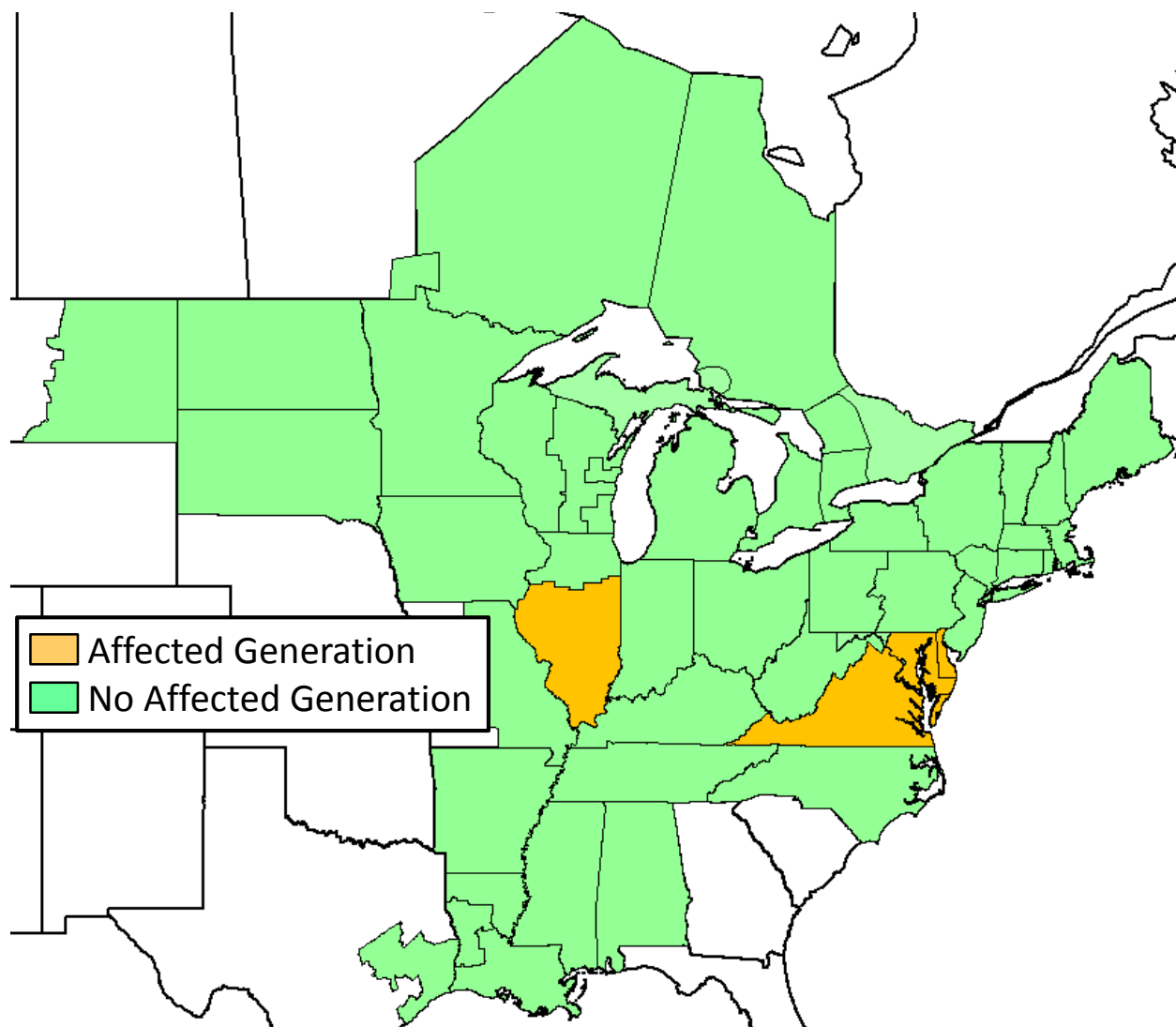


Figure A22-5. RGDS S5a Summer 2018: Locations with Peak Hour Affected Generation

Table A22-3. RGDS S5a Summer 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.3	1,149
Illinois Southern	1.0	110
Maryland Eastern	16.7	2,361
Virginia	9.1	1,001

Figure A22-6 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-4 during the Summer 2018 peak hour.

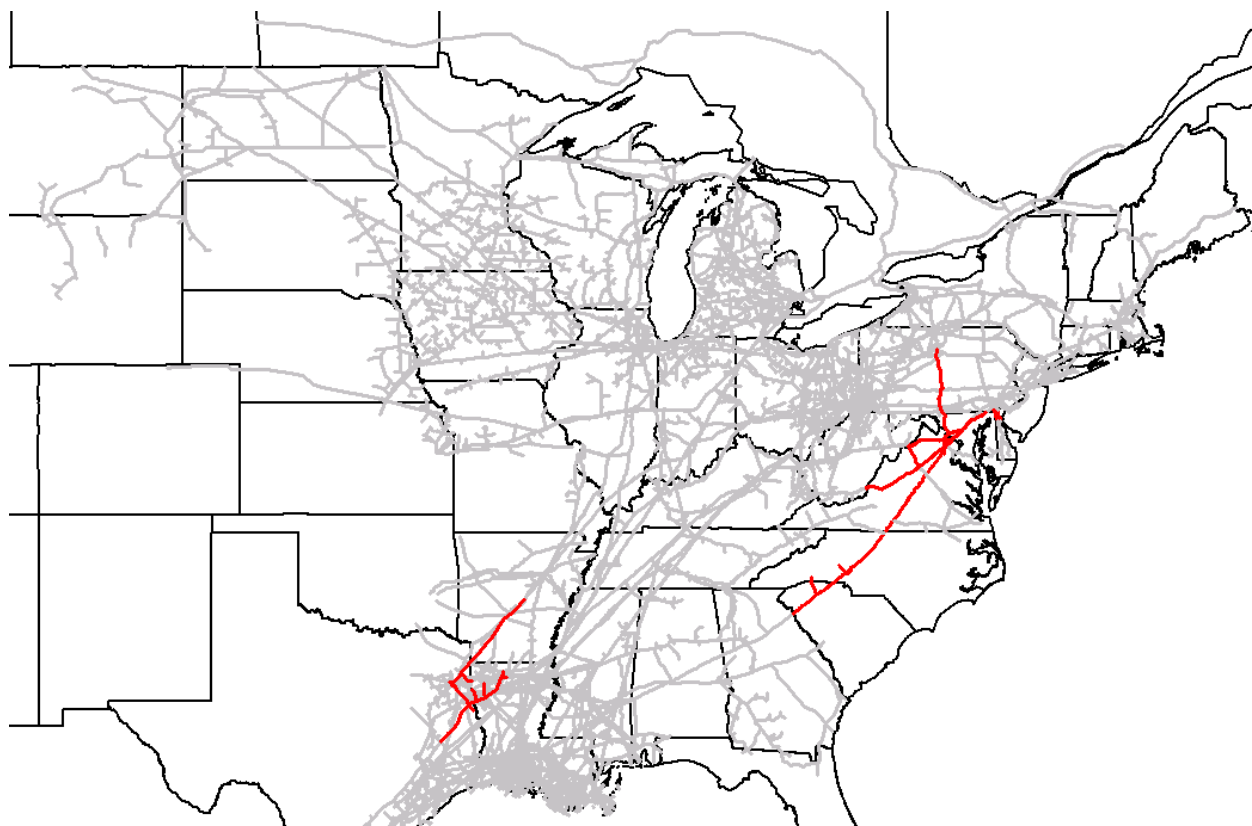


Figure A22-6. RGDS S5a Summer 2018: Peak Hour Constraints

Table A22-4 summarizes the results of the frequency and duration analysis.

Table A22-4. RGDS S5a Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	1	1	1	1
Dominion Southeast	3	1	2	5
Eastern Shore	12	1	6	25
Texas Eastern Zone ETX	6	1	6	14
Transco Z5	7	1	6	18

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-43 and Figure A23-44 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-45 and Figure A23-46 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-47 and Figure A23-48 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-49 and Figure A23-50 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-51 and Figure A23-52 relative to the capacity of the segment.

RGDS S5a Winter 2023

Figure A22-7 summarizes the affected generation during the Winter 2023 peak hour by PPA.

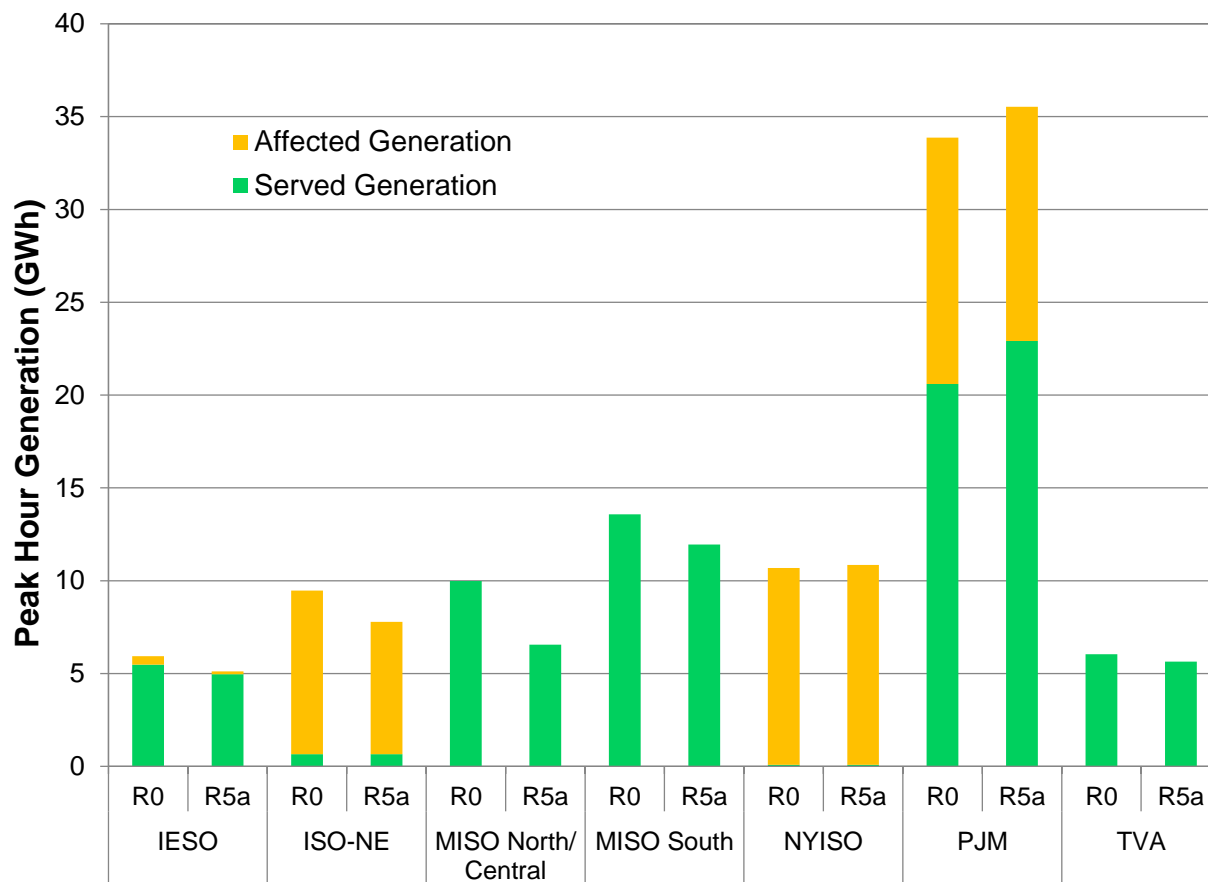


Figure A22-7. RGDS S5a Winter 2023: Peak Hour Affected Generation

Figure A22-8 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-5.

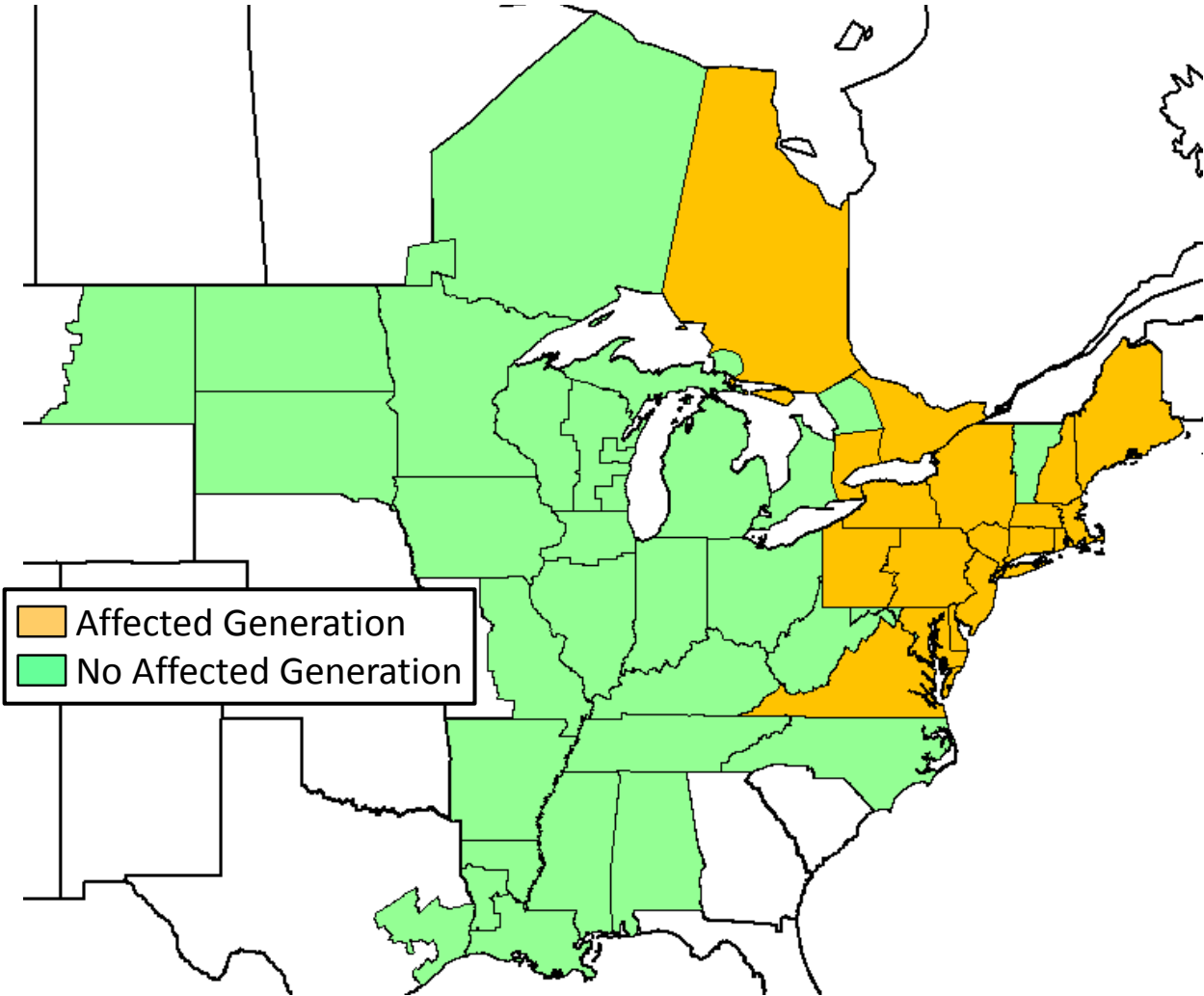


Figure A22-8. RGDS S5a Winter 2023: Locations with Peak Hour Affected Generation

Table A22-5. RGDS S5a Winter 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	10.1	1,345
Delaware	5.8	664
Maine	7.6	1,045
Maryland Eastern	8.5	869
Massachusetts Eastern	10.2	1,416
Massachusetts Western	10.7	1,399
New Hampshire	7.5	1,003
New Jersey	30.9	3,504
New York Central Northern	39.9	4,734
New York City	20.0	2,504
New York Long Island	12.4	1,187
New York Southern	13.8	1,503
New York Western	1.7	196
Ontario (CDA)	0.2	28
Ontario (EDA)	0.1	7
Ontario (NDA)	0.8	114
Pennsylvania Eastern	26.4	3,357
Pennsylvania Western	2.0	288
Rhode Island	7.1	921
Virginia	37.7	4,581

Figure A22-9 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-7 during the Winter 2023 peak hour.

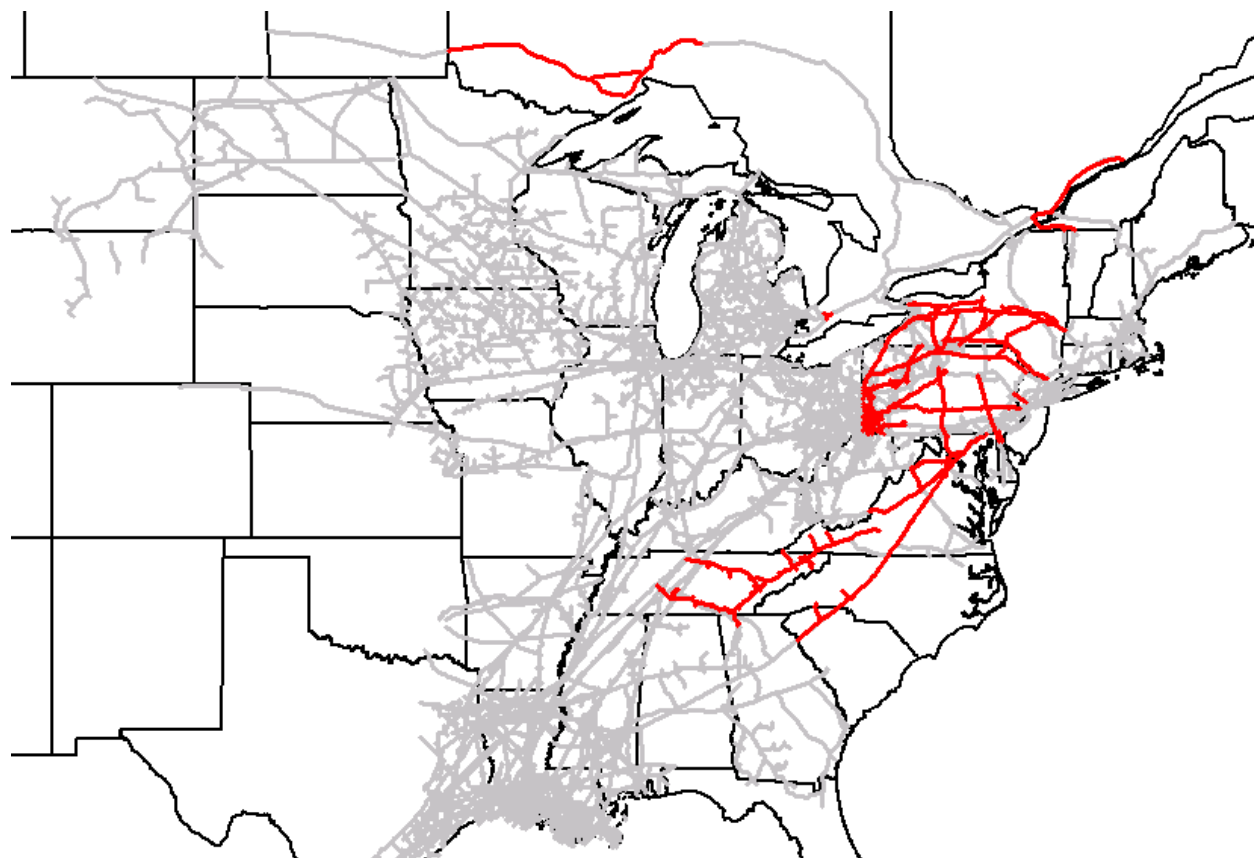


Figure A22-9. RGDS S5a Winter 2023: Peak Hour Constraints

Table A22-6 summarizes the results of the frequency and duration analysis.

Table A22-6. RGDS S5a Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	7	1	59	79
Columbia Gas W PA/NY	16	1	6	32
Constitution	2	31	59	90
Dominion Eastern NY	9	1	16	52
Dominion Western NY	1	5	5	5
Dominion Southeast	6	1	31	64
East Tennessee Mainline	4	1	4	8
Eastern Shore	9	1	26	74
Empire Mainline	5	1	42	55
Millennium	7	1	38	69
NB/NS Supply	2	31	59	90
Tennessee Z4 PA	11	1	13	35
Tennessee Z5 NY	4	1	48	88
Texas Eastern M2 PA South	8	1	17	62
Texas Eastern M3 North	12	1	10	50
TransCanada Ontario West	4	1	5	9
TransCanada Quebec	6	1	14	29
Transco Leidy Atlantic	10	1	28	69
Transco Z5	8	1	2	9
Transco Z6 Leidy to 210	3	3	55	89
Union Gas Dawn	2	1	2	3

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-53 and Figure A23-54 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-55 and Figure A23-56 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-57 and Figure A23-58 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-59 and Figure A23-60 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-61 and Figure A23-62 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-63 and Figure A23-64 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East

Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-65 and Figure A23-66 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-67 and Figure A23-68 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-69 and Figure A23-70 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-71 and Figure A23-72 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A23-73 and Figure A23-74 relative to the total production

capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-75 and Figure A23-76 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-77 and Figure A23-78 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-79 and Figure A23-80 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A23-81 and Figure A23-82 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-83 and Figure A23-84 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A23-85 and Figure A23-86 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-87 and Figure A23-88 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-89 and Figure A23-90 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-91 and Figure A23-92 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A23-93 and Figure A23-94 relative to the capacity of the segment.

RGDS S5a Summer 2023

Figure A22-10 summarizes the affected generation during the Summer 2023 peak hour by PPA.

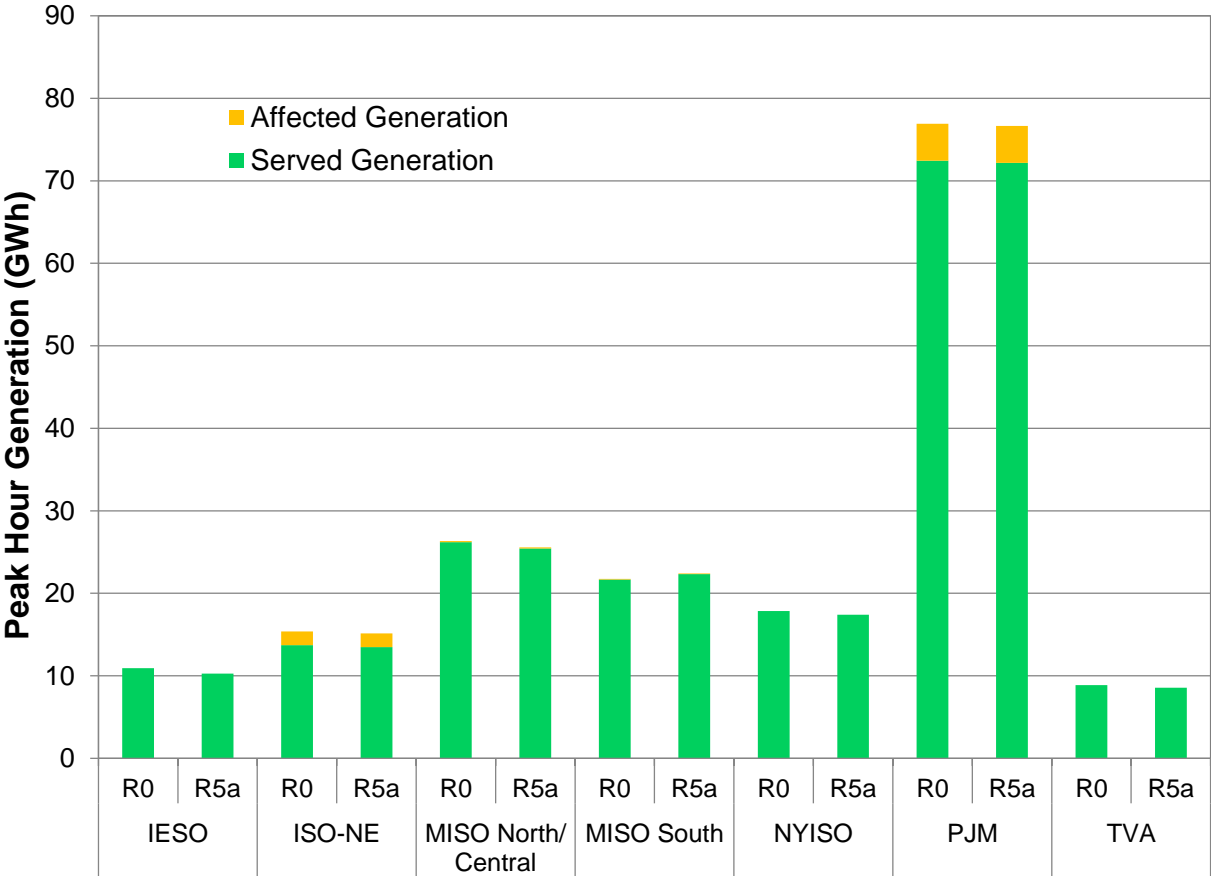


Figure A22-10. RGDS S5a Summer 2023: Peak Hour Affected Generation

Figure A22-11 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-7.

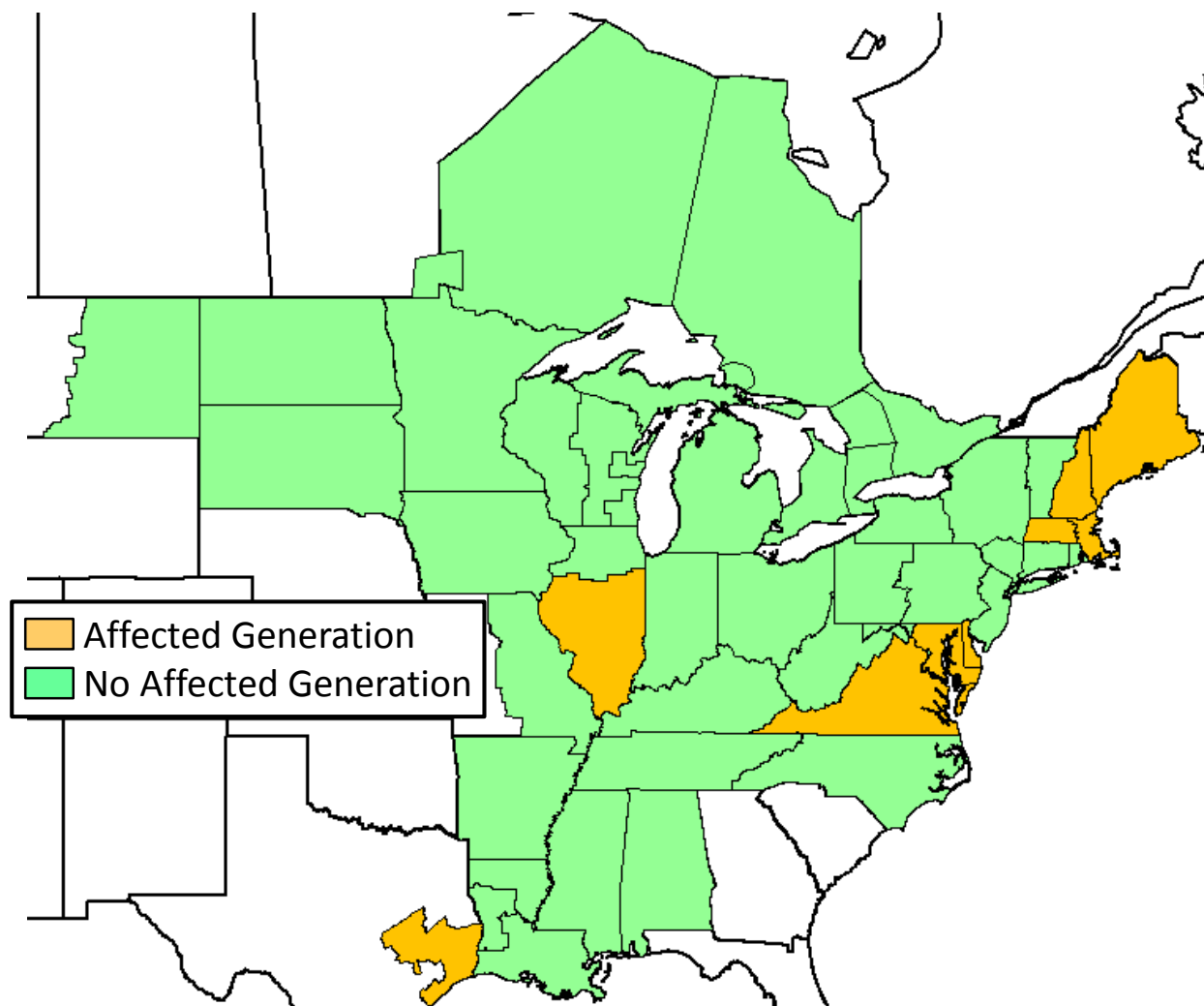


Figure A22-11. RGDS S5a Summer 2023: Locations with Peak Hour Affected Generation

Table A22-7. RGDS S5a Summer 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.5	1,175
Illinois Southern	1.0	112
Maine	5.8	785
Maryland Eastern	16.7	2,361
New Hampshire	7.7	863
Texas East (SERC)	0.6	81
Virginia	8.4	936

Figure A22-12 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-10 during the Summer 2023 peak hour.

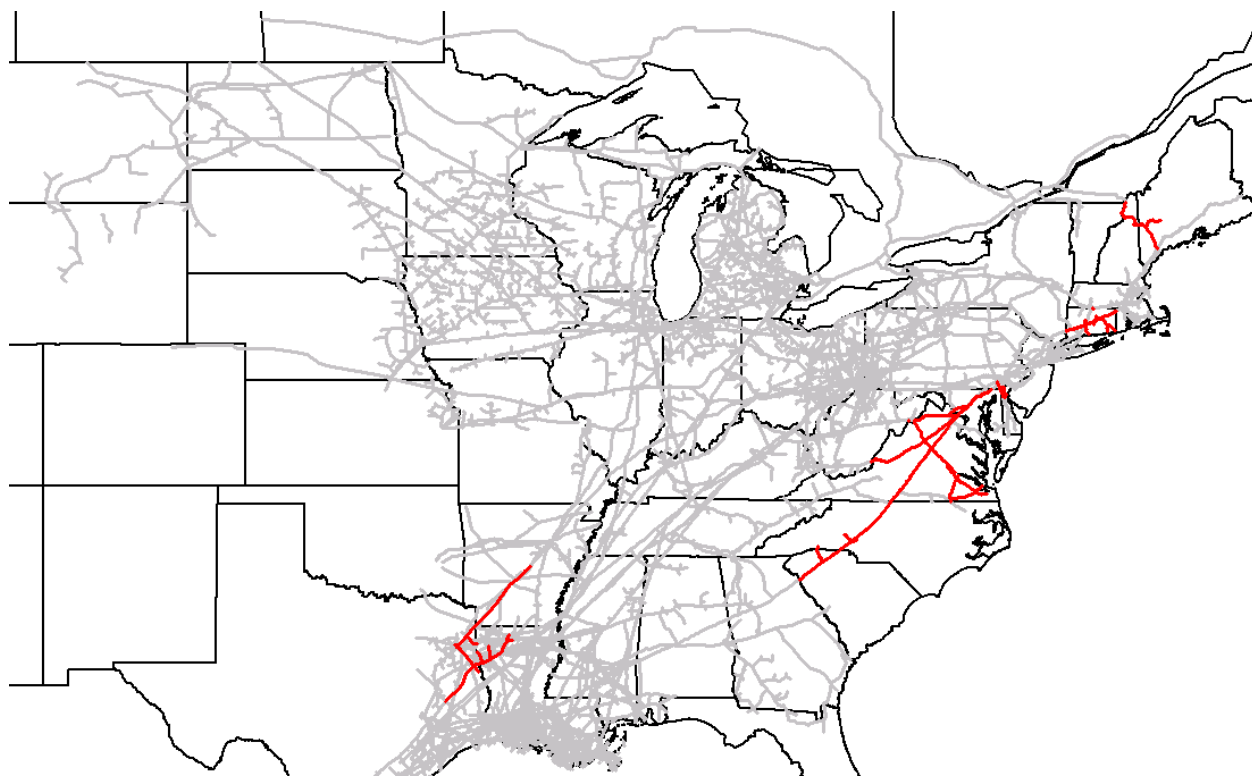


Figure A22-12. RGDS S5a Summer 2023: Peak Hour Constraints

Table A22-8 summarizes the results of the frequency and duration analysis.

Table A22-8. RGDS S5a Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	5	1	3	11
Columbia Gas VA/MD	2	1	3	4
Dominion Southeast	12	1	7	30
Eastern Shore	9	1	7	30
NB/NS Supply	4	2	34	70
PNGTS N of Westbrook	11	1	8	38
Texas Eastern Zone ETX	8	1	6	19
Transco Z5	7	1	6	17

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-95 and Figure A23-96 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-97 and Figure A23-98 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-99 and Figure A23-100 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-101 and Figure A23-102 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A23-103 and Figure A23-104 relative to the total production capacity.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in

New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-105 and Figure A23-106 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-107 and Figure A23-108 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-109 and Figure A23-110 relative to the capacity of the segment.

S5b: Additional Coal and Nuclear Deactivation with Quebec Imports

RGDS S5b Winter 2023

Figure A22-13 summarizes the affected generation during the Winter 2023 peak hour by PPA.

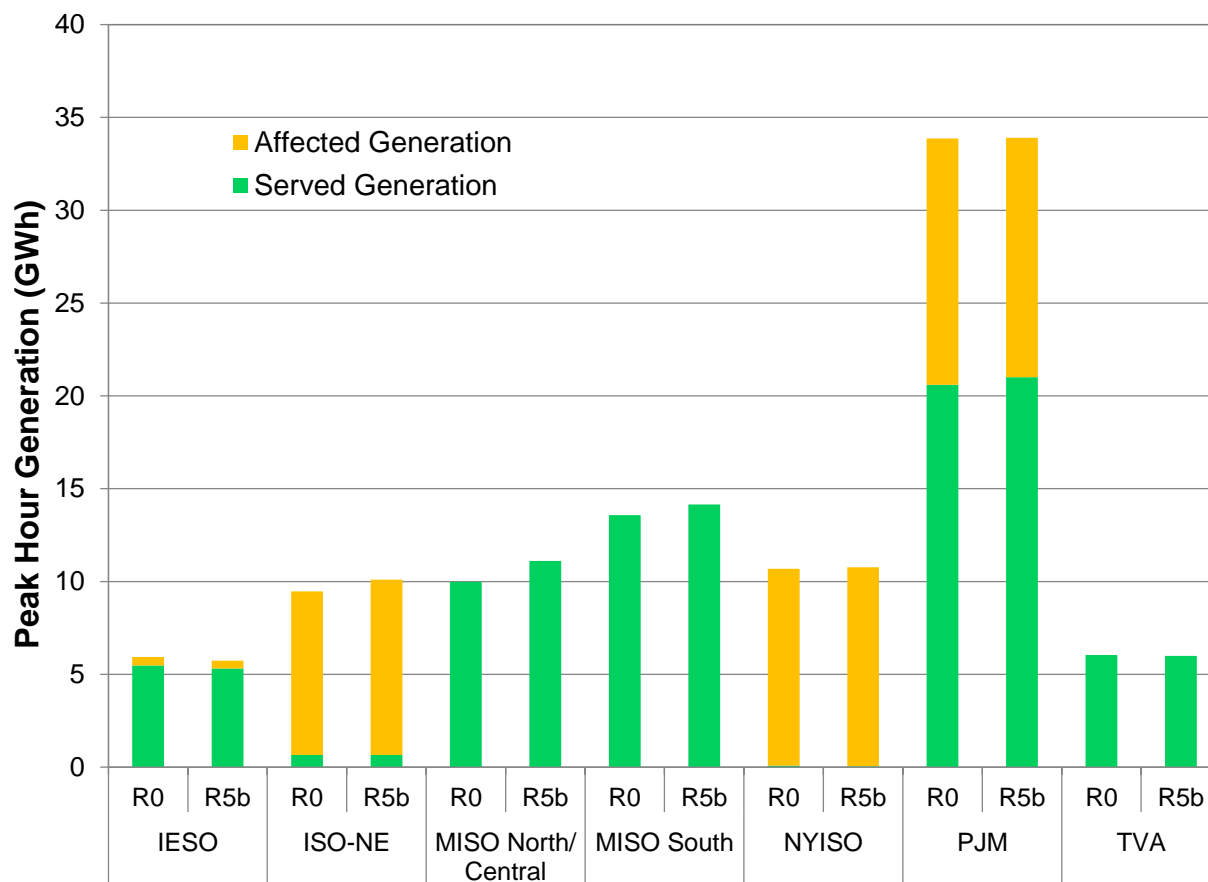


Figure A22-13. RGDS S5b Winter 2023: Peak Hour Affected Generation

Figure A22-14 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-9.

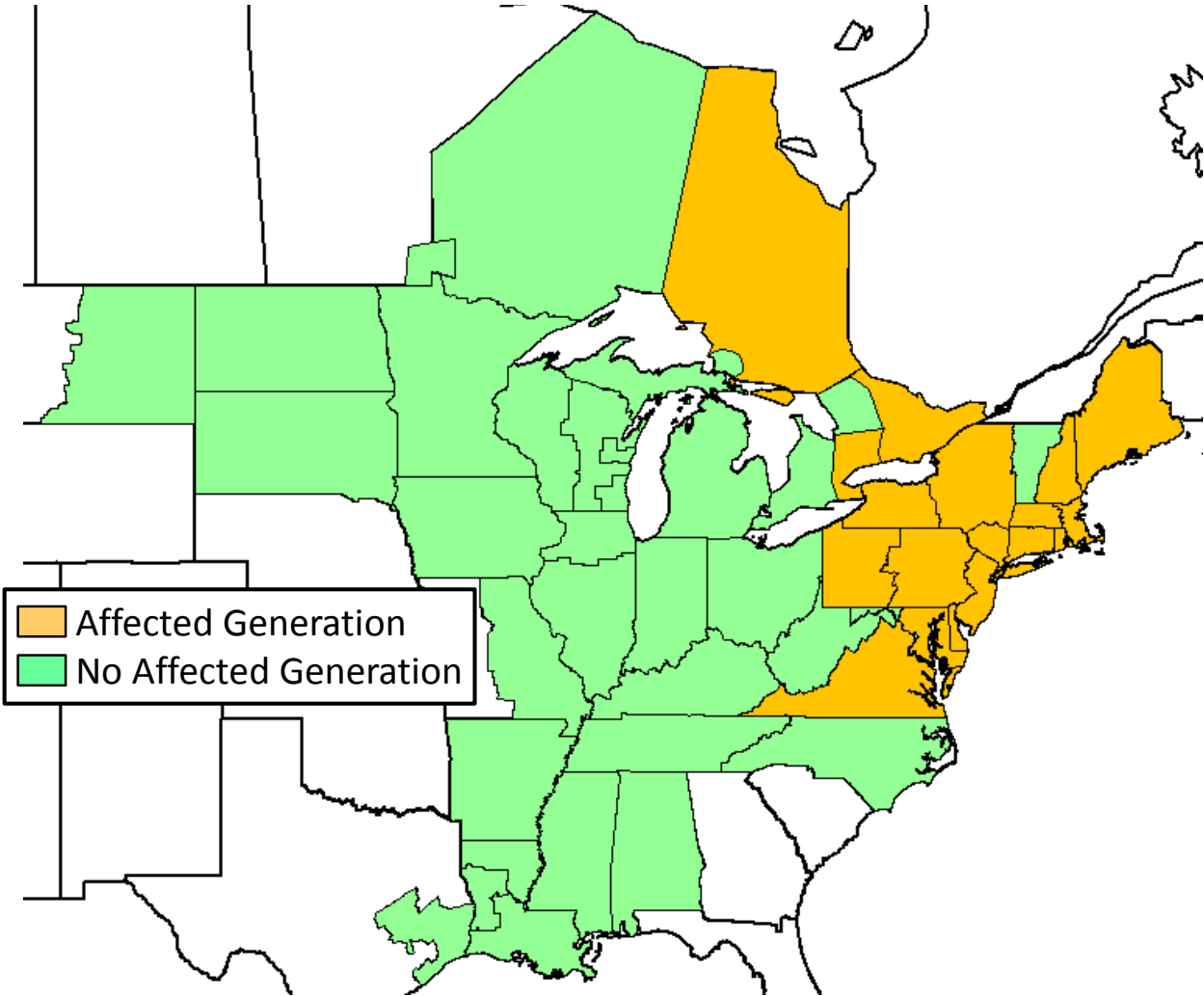


Figure A22-14. RGDS S5b Winter 2023: Locations with Peak Hour Affected Generation

Table A22-9. RGDS S5b Winter 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	17.5	2,408
Delaware	1.3	173
Maine	9.5	1,292
Maryland Eastern	5.0	543
Massachusetts Eastern	16.4	2,279
Massachusetts Western	9.3	1,239
New Hampshire	9.4	1,245
New Jersey	7.8	1,044
New York Central Northern	44.9	5,462
New York City	16.8	2,225
New York Long Island	11.4	1,166
New York Southern	15.1	1,629
New York Western	2.1	235
Ontario (CDA)	0.5	55
Ontario (EDA)	2.1	249
Ontario (NDA)	0.8	114
Pennsylvania Eastern	43.0	5,938
Pennsylvania Western	6.7	961
Rhode Island	7.5	984
Virginia	35.4	4,237

Figure A22-15 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-13 during the Winter 2023 peak hour.

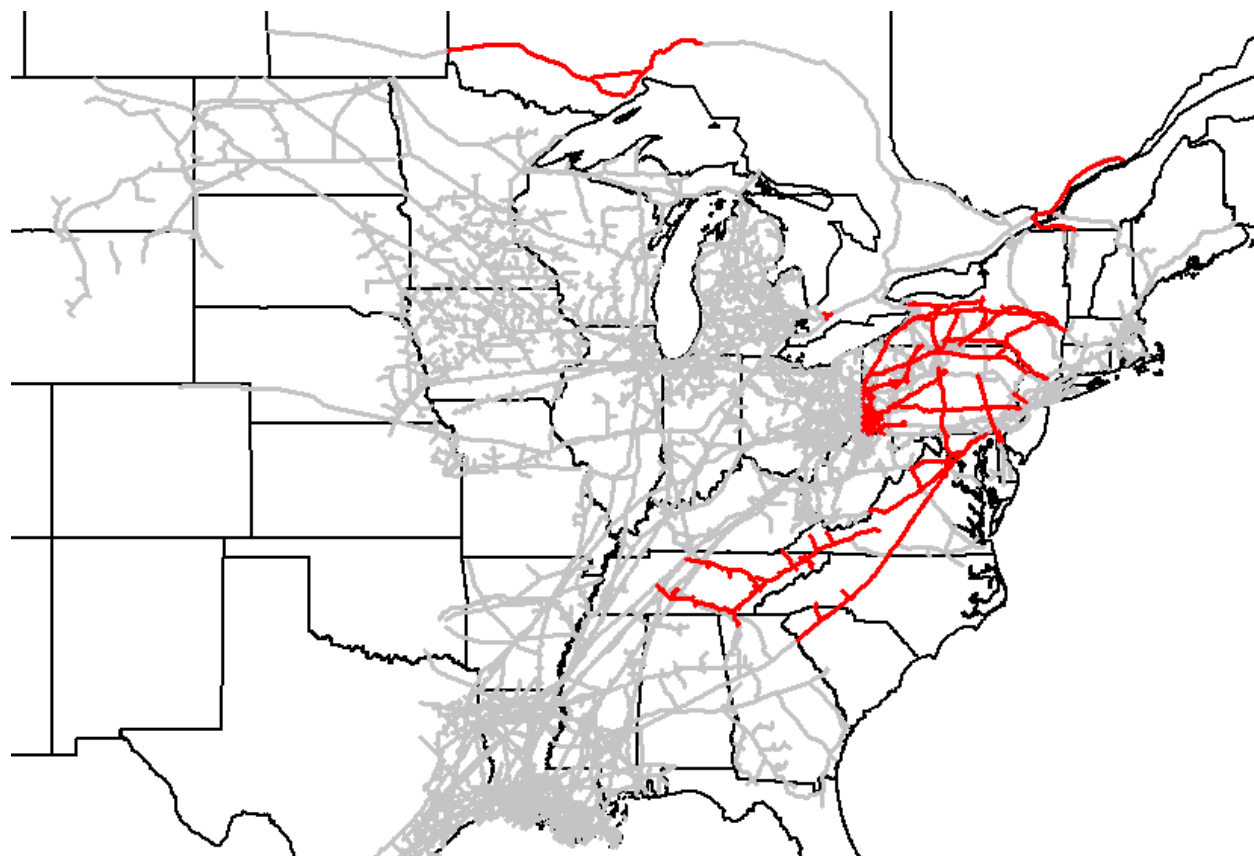


Figure A22-15. RGDS S5b Winter 2023: Peak Hour Constraints

Table A22-10 summarizes the results of the frequency and duration analysis.

Table A22-10. RGDS S5b Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	6	1	52	81
Columbia Gas W PA/NY	12	1	3	18
Constitution	2	31	59	90
Dominion Eastern NY	8	3	19	62
Dominion Western NY	5	1	1	5
Dominion Southeast	5	4	31	69
East Tennessee Mainline	4	1	4	4
Eastern Shore	12	1	16	64
Empire Mainline	6	1	54	65
Millennium	7	1	38	69
NB/NS Supply	2	31	59	90
Tennessee Z4 PA	7	1	26	48
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	6	1	27	64
Texas Eastern M3 North	12	1	12	47
TransCanada Ontario West	5	1	6	12
TransCanada Quebec	7	1	14	33
Transco Leidy Atlantic	8	1	27	60
Transco Z5	7	1	2	8
Transco Z6 Leidy to 210	5	1	55	86
Union Gas Dawn	3	1	2	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d over the 2018 capacity. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-111 and Figure A23-112 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-113 and Figure A23-114 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-115 and Figure A23-116 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-117 and Figure A23-118 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-119 and Figure A23-120 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase of 15 MDth/d over 2018. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-121 and Figure A23-122 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-123 and Figure A23-124 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-125 and Figure A23-126 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-127 and Figure A23-128 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-129 and Figure A23-130 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects

generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A23-131 and Figure A23-132 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-133 and Figure A23-134 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-135 and Figure A23-136 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-137 and Figure A23-138 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A23-139 and Figure A23-140 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-141 and Figure A23-142 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A23-143 and Figure A23-144 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-145 and Figure A23-146 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-147 and Figure A23-148 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-149 and Figure A23-150 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A23-151 and Figure A23-152 relative to the capacity of the segment.

RGDS S5b Summer 2023

Figure A22-16 summarizes the affected generation during the Summer 2023 peak hour by PPA.

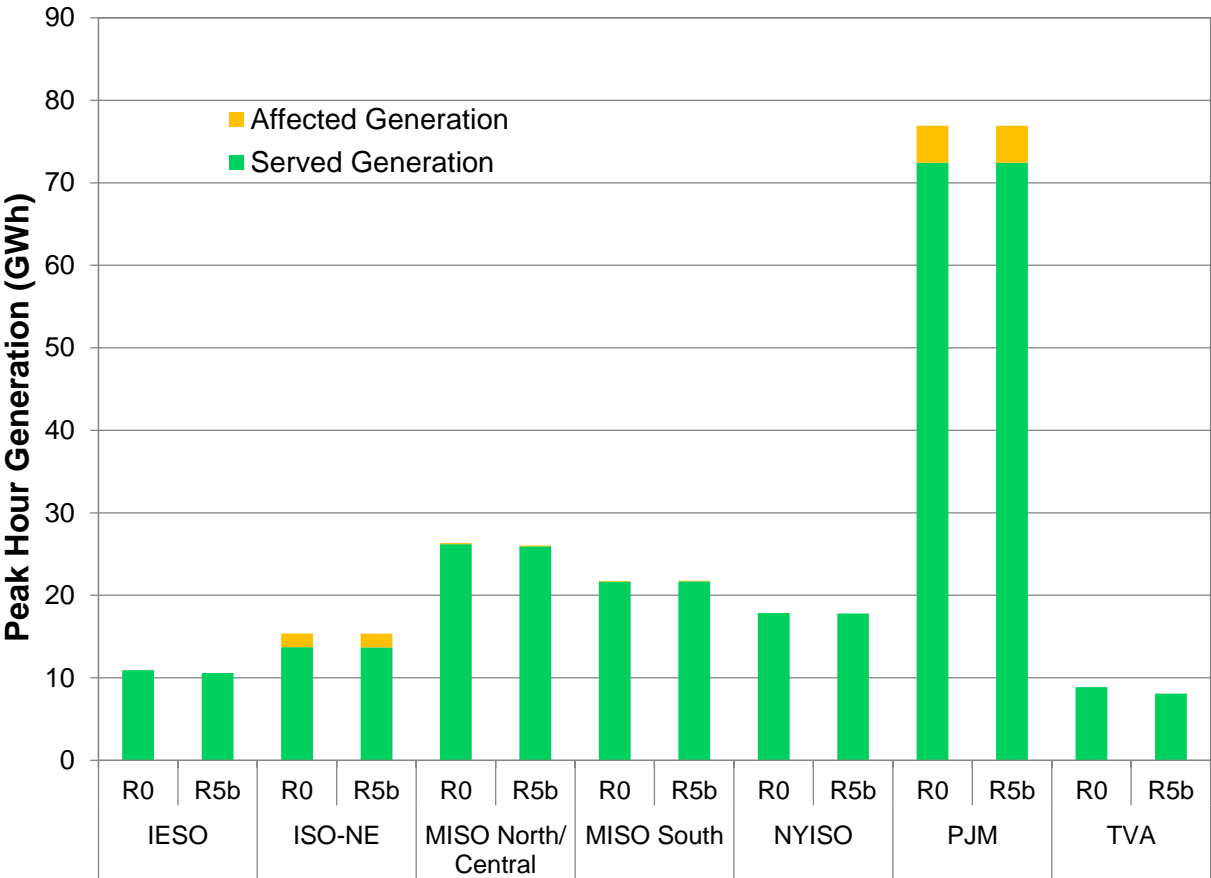


Figure A22-16. RGDS S5b Summer 2023: Peak Hour Affected Generation

Figure A22-17 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-11.

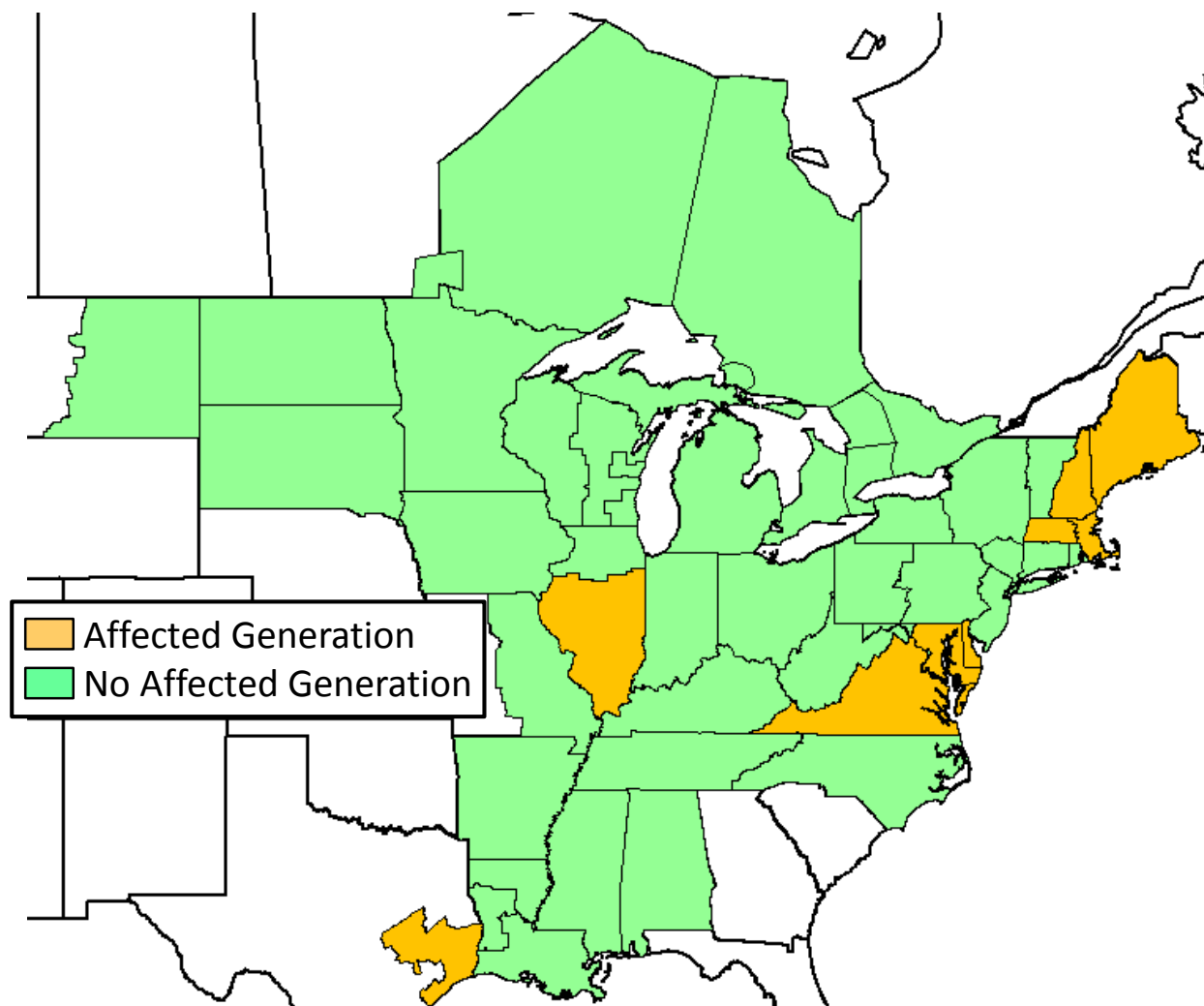


Figure A22-17. RGDS S5b Summer 2023: Locations with Peak Hour Affected Generation

Table A22-11. RGDS S5b Summer 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.5	1,175
Illinois Southern	1.0	111.5
Maine	6.0	804
Maryland Eastern	16.7	2,361
New Hampshire	7.6	857
Texas East (SERC)	0.6	81
Virginia	8.4	936

Figure A22-18 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-16 during the Summer 2023 peak hour.

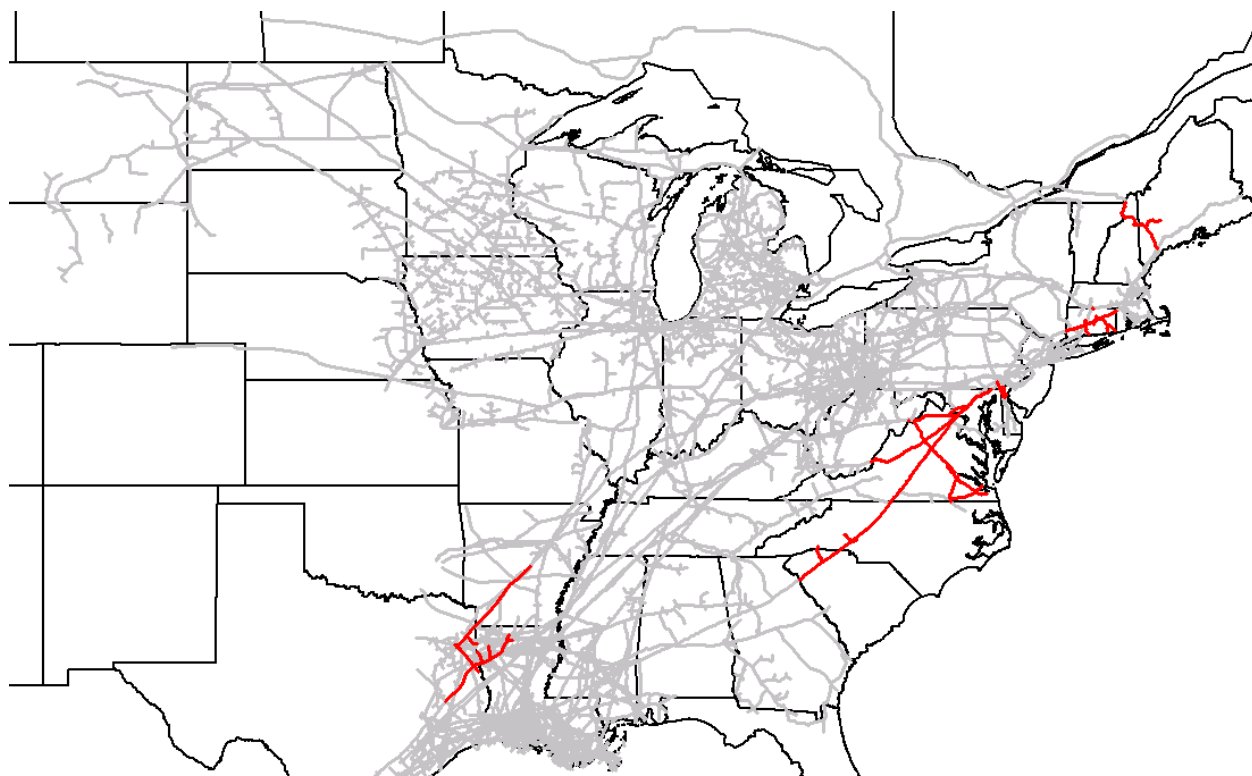


Figure A22-18. RGDS S5b Summer 2023: Peak Hour Constraints

Table A22-12 summarizes the results of the frequency and duration analysis.

Table A22-12. RGDS S5b Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	6	2	3	15
Columbia Gas VA/MD	2	1	3	4
Dominion Southeast	8	1	7	26
Eastern Shore	10	1	7	29
NB/NS Supply	5	3	33	72
PNGTS N of Westbrook	10	1	9	44
Texas Eastern Zone ETX	7	1	10	20
Transco Z5	6	1	6	16

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-153 and Figure A23-154 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-155 and Figure A23-156 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-157 and Figure A23-158 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-159 and Figure A23-160 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A23-161 and Figure A23-162 relative to the total production capacity.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-163 and Figure A23-164 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-165 and Figure A23-166 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-167 and Figure A23-168 relative to the capacity of the segment.

S5c: Additional Coal and Nuclear Deactivation with EE/DR

RGDS S5c Winter 2018

Figure A22-19 summarizes the affected generation during the Winter 2018 peak hour by PPA.

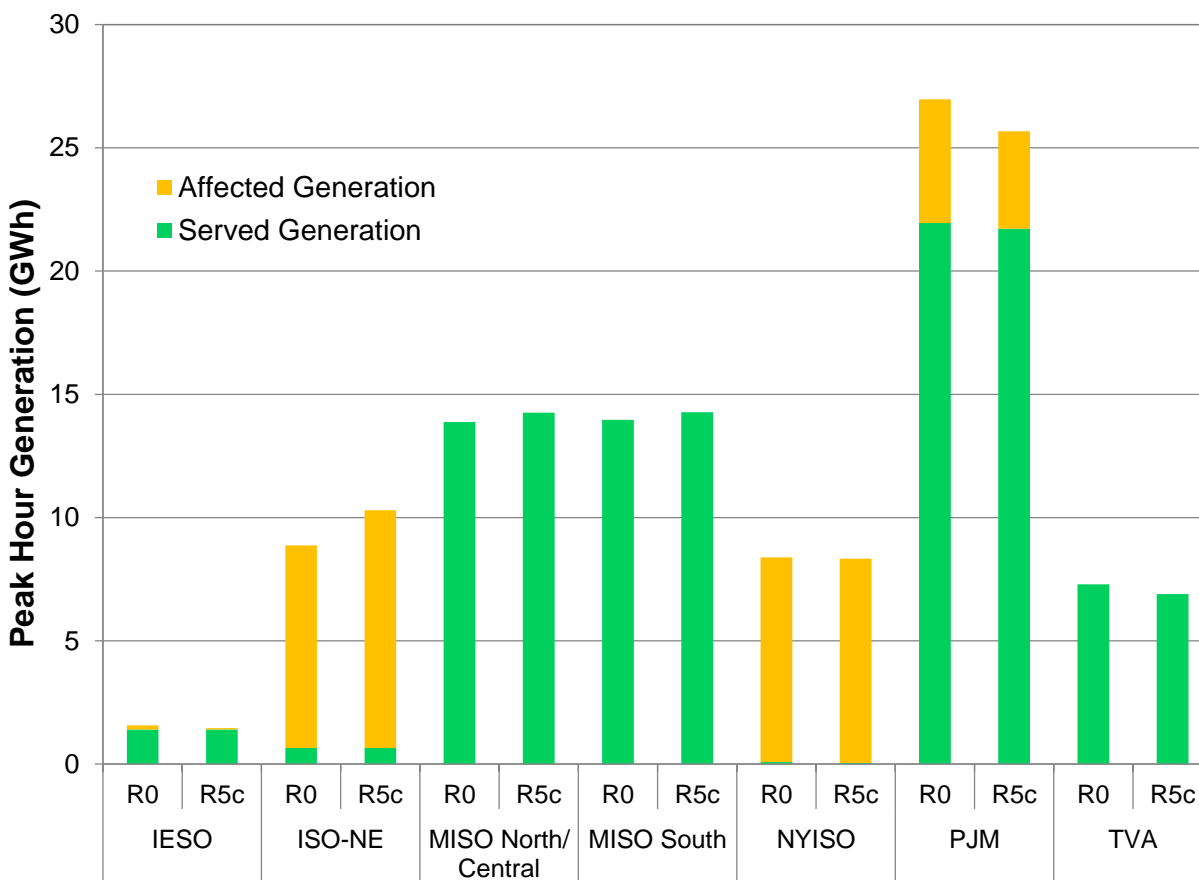


Figure A22-19. RGDS S5c Winter 2018: Peak Hour Affected Generation

Figure A22-20 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-13.

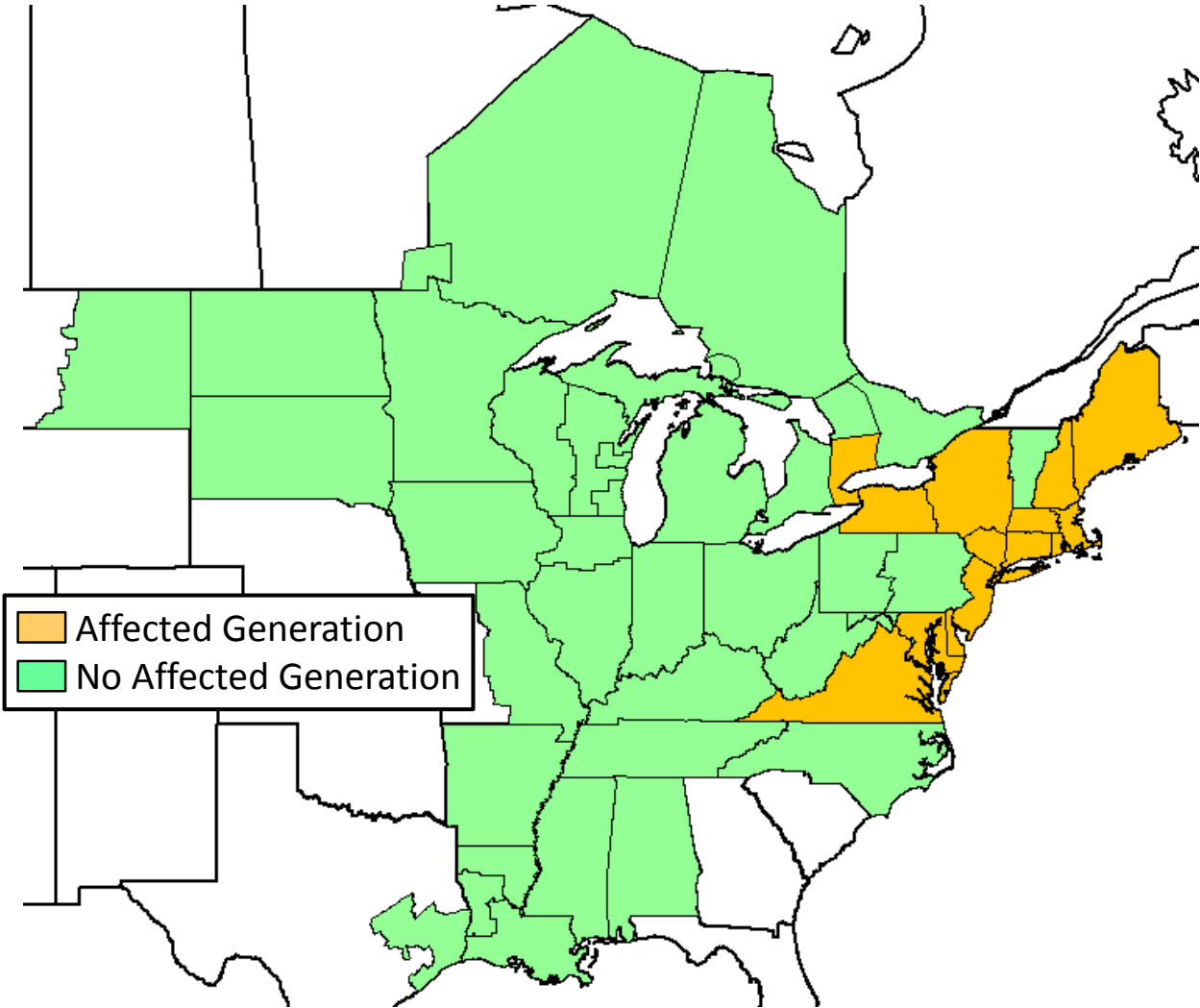


Figure A22-20. RGDS S5c Winter 2018: Locations with Peak Hour Affected Generation

Table A22-13. RGDS S5c Winter 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	21.1	2,756
Delaware	1.3	173
Maine	9.5	1,292
Maryland Eastern	2.4	295
Massachusetts Eastern	14.3	1,989
Massachusetts Western	9.1	1,219
New Hampshire	9.4	1,245
New Jersey	9.2	1,162
New York Central Northern	23.1	3,242
New York City	16.0	2,094
New York Long Island	9.2	1,030
New York Southern	10.9	1,312
New York Western	1.6	179
Ontario (CDA)	0.5	55
Rhode Island	8.8	1,145
Virginia	21.0	2,748

Figure A22-21 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-19 during the Winter 2018 peak hour.

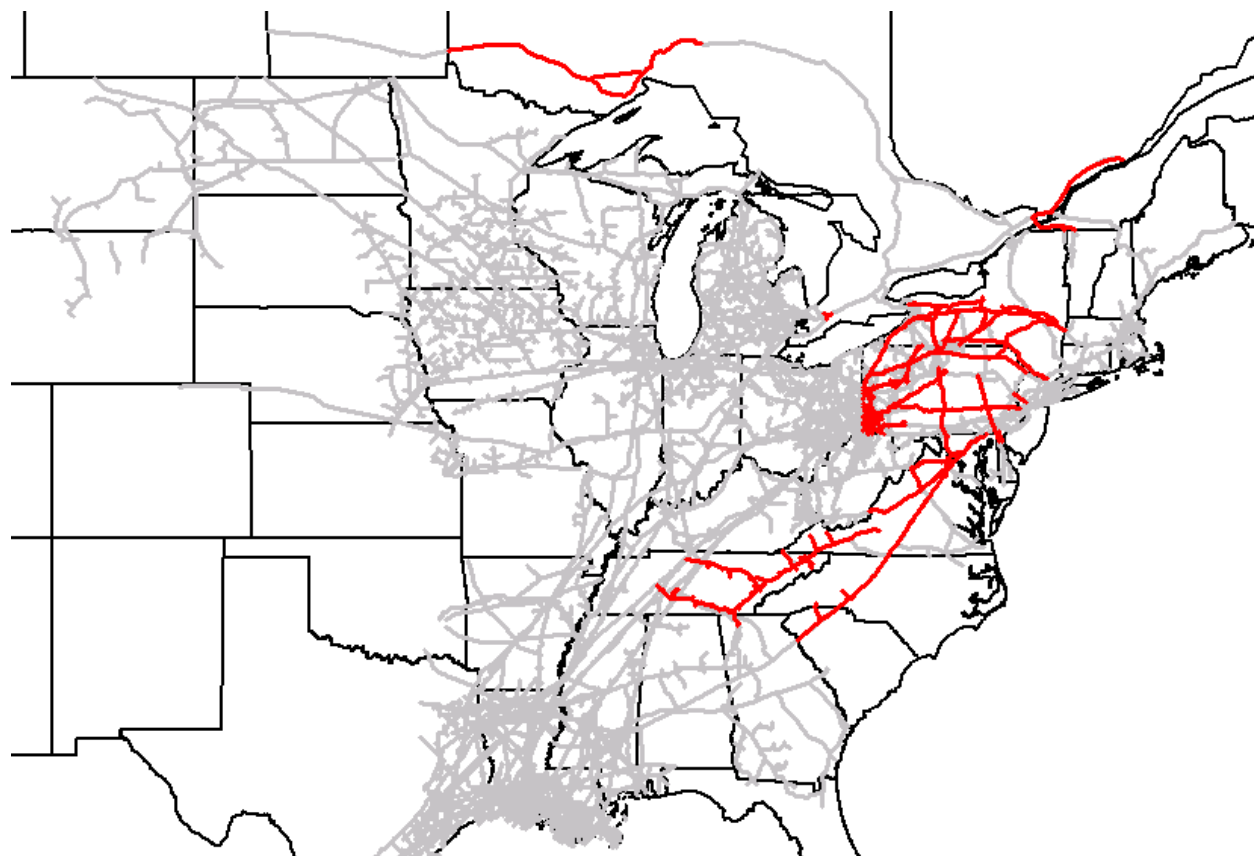


Figure A22-21. RGDS S5c Winter 2018: Peak Hour Constraints

Table A22-14 summarizes the results of the frequency and duration analysis.

Table A22-14. RGDS S5c Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	13	1	5	23
Columbia Gas W PA/NY	9	1	3	14
Constitution	2	31	59	90
Dominion Eastern NY	5	1	9	15
Dominion Western NY	1	4	4	4
Dominion Southeast	2	1	2	3
East Tennessee Mainline	5	1	2	6
Eastern Shore	12	1	9	49
Empire Mainline	5	1	12	19
Millennium	7	1	38	69
NB/NS Supply	10	1	20	57
Tennessee Z4 PA	9	1	14	34
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	9	1	15	51
Texas Eastern M3 North	12	1	12	42
TransCanada Ontario West	6	1	5	10
TransCanada Quebec	9	1	16	31
Transco Leidy Atlantic	10	1	17	58
Transco Z5	3	1	5	7
Transco Z6 Leidy to 210	5	1	3	9
Union Gas Dawn	2	1	2	3

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-169 and Figure A23-170 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-171 and Figure A23-172 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-173 and Figure A23-174 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-175 and Figure A23-176 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-177 and Figure A23-178 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-179 and Figure A23-180 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-181 and Figure A23-182 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-183 and Figure A23-184 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-185 and Figure A23-186 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-187 and Figure A23-188 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects

generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A23-189 and Figure A23-190 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-191 and Figure A23-192 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-193 and Figure A23-194 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-195 and Figure A23-196 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A23-197 and Figure A23-198 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-199 and Figure A23-200 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A23-201 and Figure A23-202 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-203 and Figure A23-204 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-205 and Figure A23-206 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-207 and Figure A23-208 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A23-209 and Figure A23-210 relative to the capacity of the segment.

RGDS S5c Summer 2018

Figure A22-22 summarizes the affected generation during the Summer 2018 peak hour by PPA.

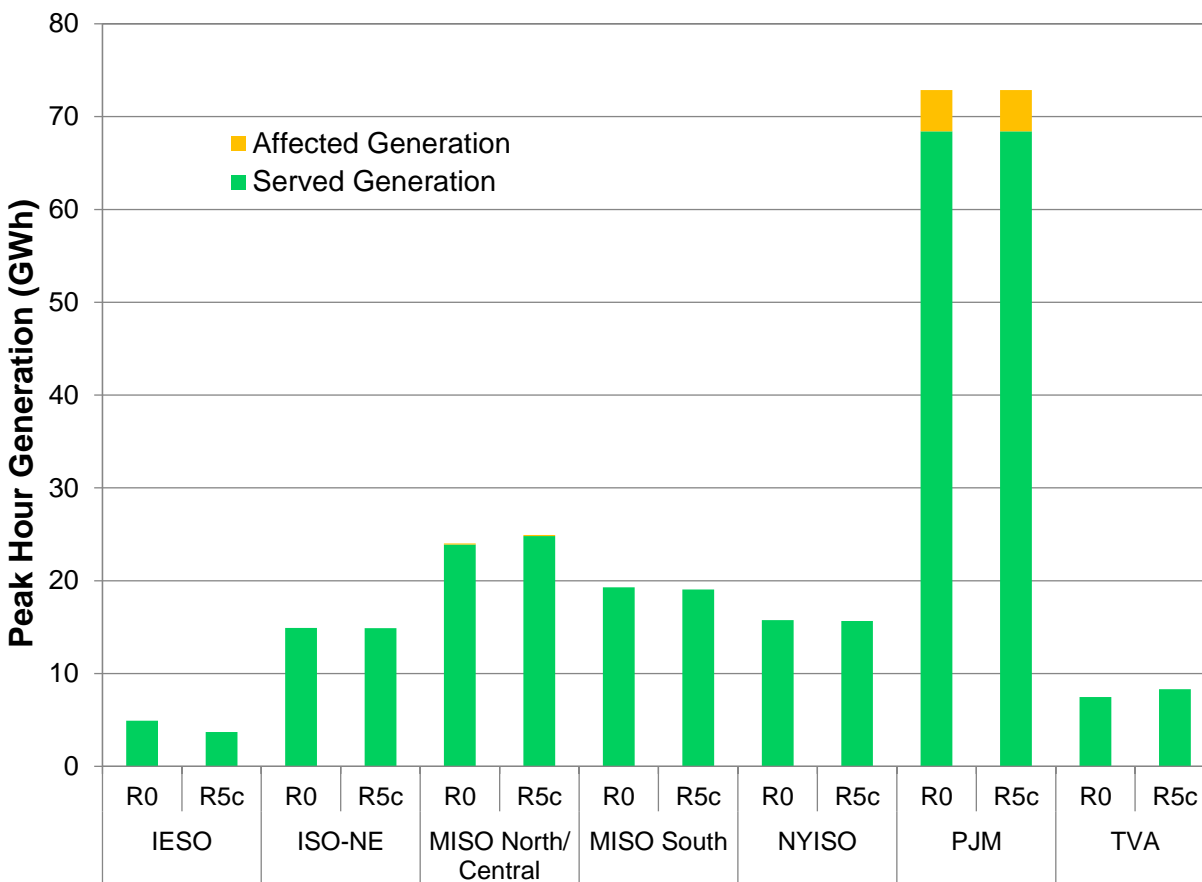


Figure A22-22. RGDS S5c Summer 2018: Peak Hour Affected Generation

Figure A22-23 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-15.

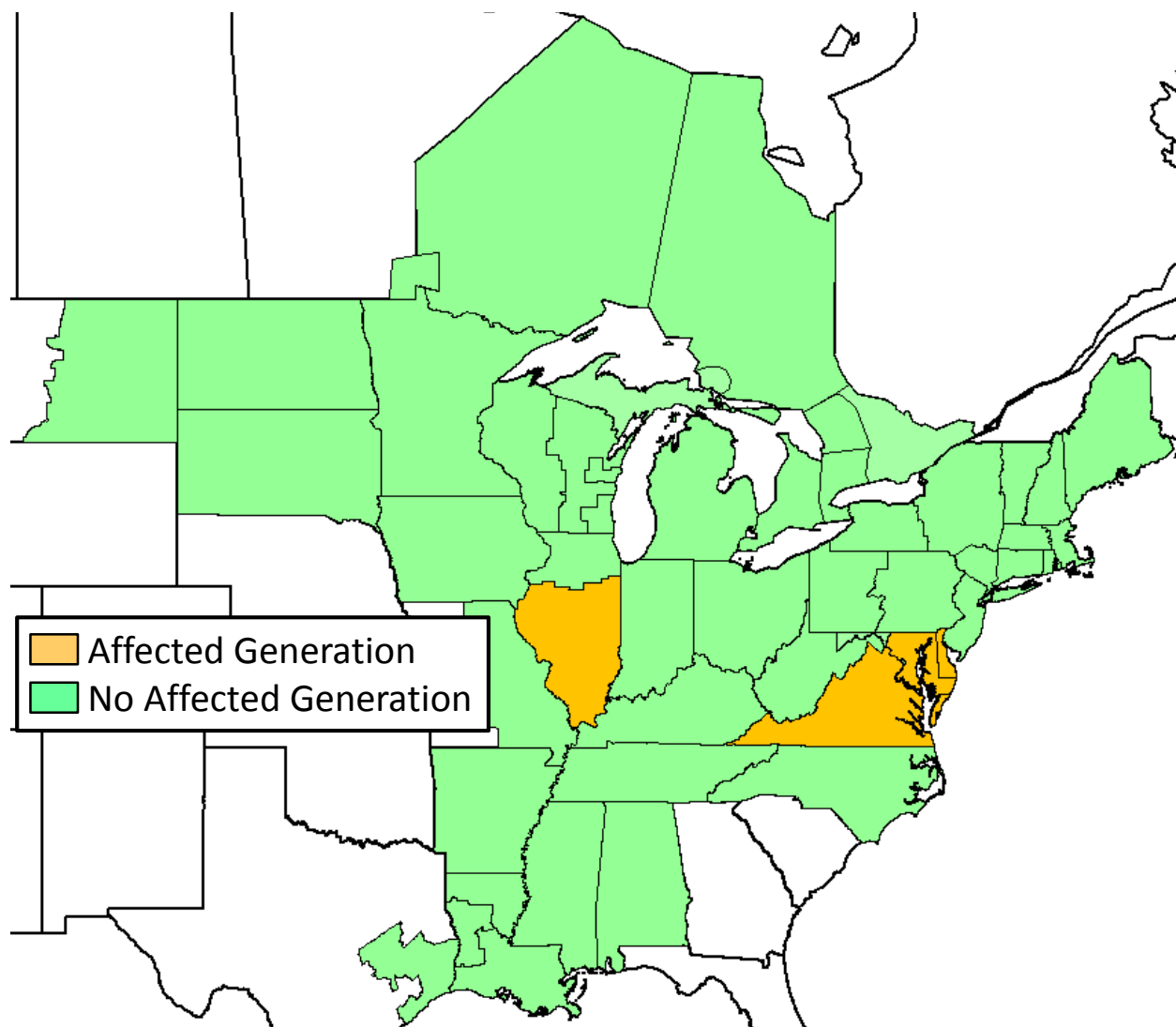


Figure A22-23. RGDS S5c Summer 2018: Locations with Peak Hour Affected Generation

Table A22-15. RGDS S5c Summer 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.3	1,149
Illinois Southern	1.0	110
Maryland Eastern	16.7	2,361
Virginia	8.4	936

Figure A22-24 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-22 during the Summer 2018 peak hour.

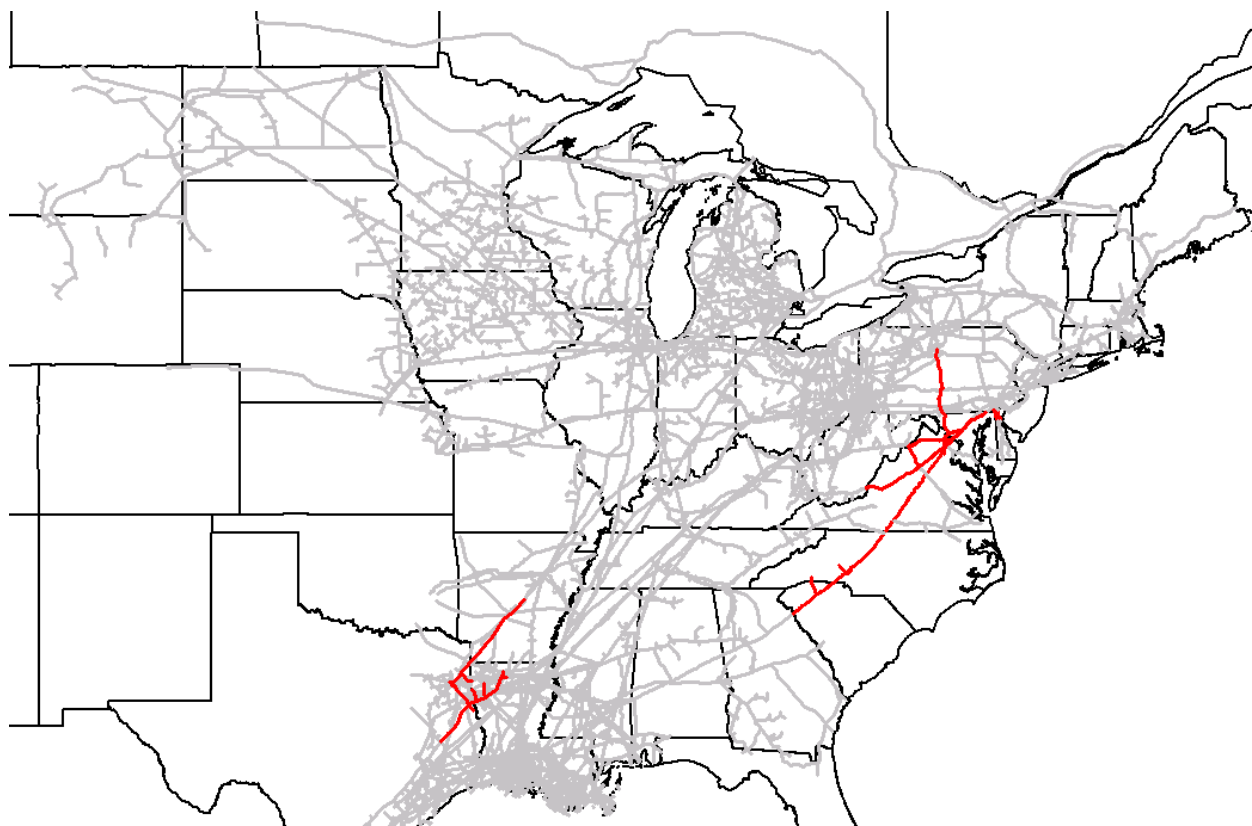


Figure A22-24. RGDS S5c Summer 2018: Peak Hour Constraints

Table A22-16 summarizes the results of the frequency and duration analysis.

Table A22-16. RGDS S5c Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	1	1	1	1
Dominion Southeast	4	1	3	7
Eastern Shore	10	1	6	23
Texas Eastern Zone ETX	6	1	6	14
Transco Z5	8	2	6	20

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia, generators behind LDCs served by Columbia Gas in Maryland and Virginia, and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-211 and Figure A23-212 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-213 and Figure A23-214 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-215 and Figure A23-216 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-217 and Figure A23-218 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-219 and Figure A23-220 relative to the capacity of the segment.

RGDS S5c Winter 2023

Figure A22-25 summarizes the affected generation during the Winter 2023 peak hour by PPA.

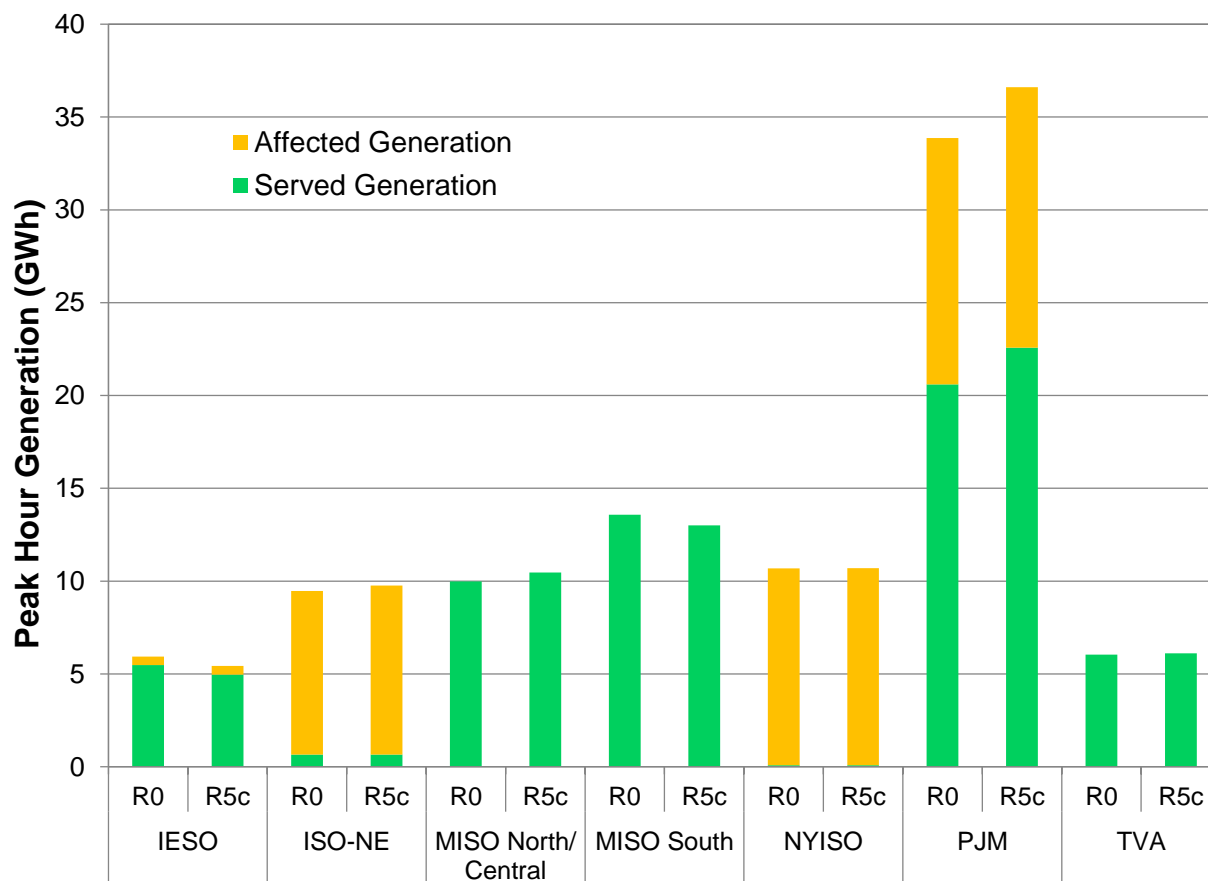


Figure A22-25. RGDS S5c Winter 2023: Peak Hour Affected Generation

Figure A22-26 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-17.

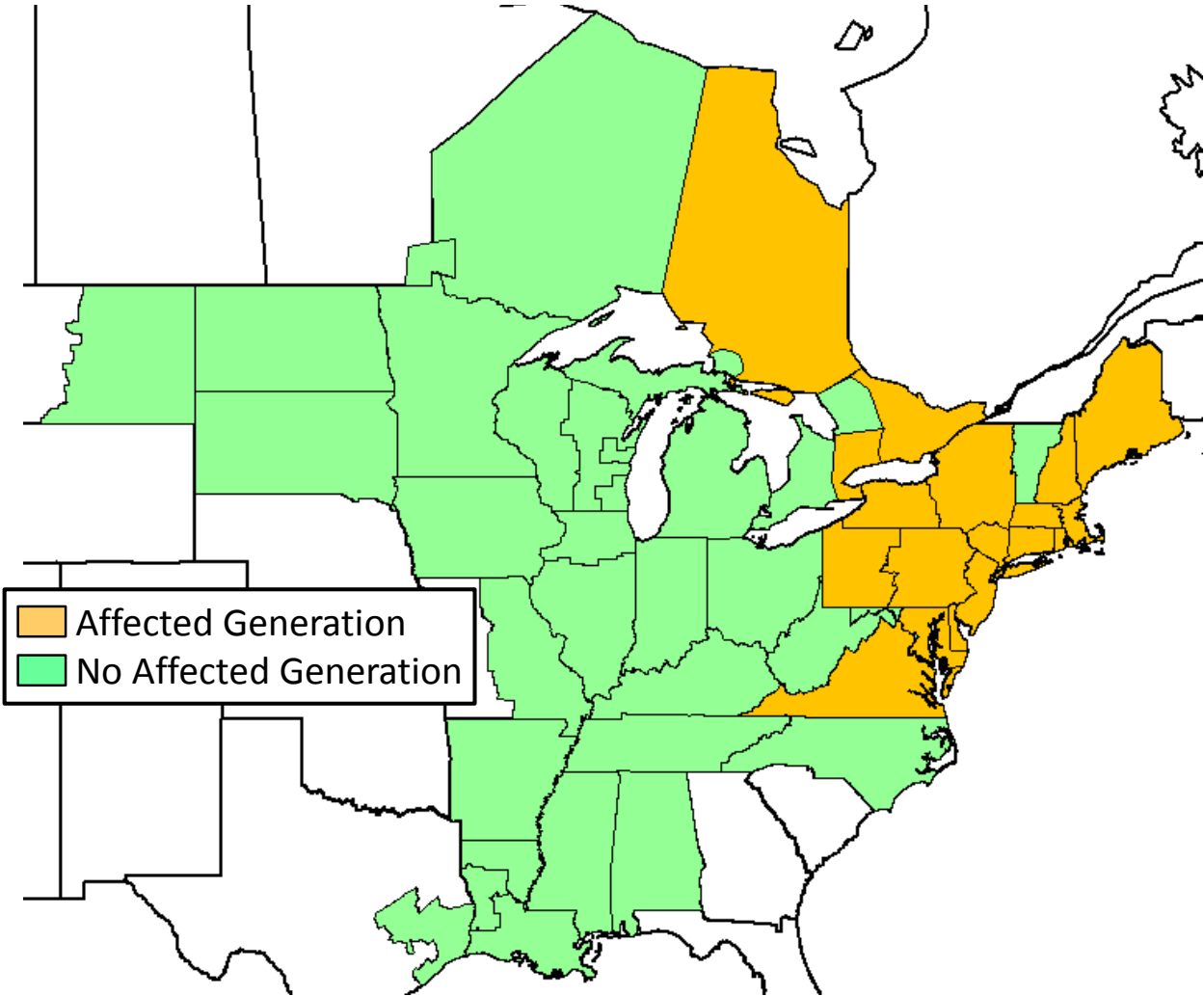


Figure A22-26. RGDS S5c Winter 2023: Locations with Peak Hour Affected Generation

Table A22-17. RGDS S5c Winter 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	17.2	2,371
Delaware	1.3	173
Maine	9.5	1,292
Maryland Eastern	5.0	539
Massachusetts Eastern	14.6	2,025
Massachusetts Western	9.3	1,239
New Hampshire	9.4	1,245
New Jersey	25.7	3,261
New York Central Northern	41.0	4,875
New York City	18.1	2,317
New York Long Island	12.1	1,241
New York Southern	13.8	1,503
New York Western	2.2	247
Ontario (CDA)	0.5	55
Ontario (EDA)	2.1	249
Ontario (NDA)	1.2	155
Pennsylvania Eastern	39.9	5,296
Pennsylvania Western	6.7	961
Rhode Island	7.1	936
Virginia	35.4	4,237

Figure A22-27 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-25 during the Winter 2023 peak hour.

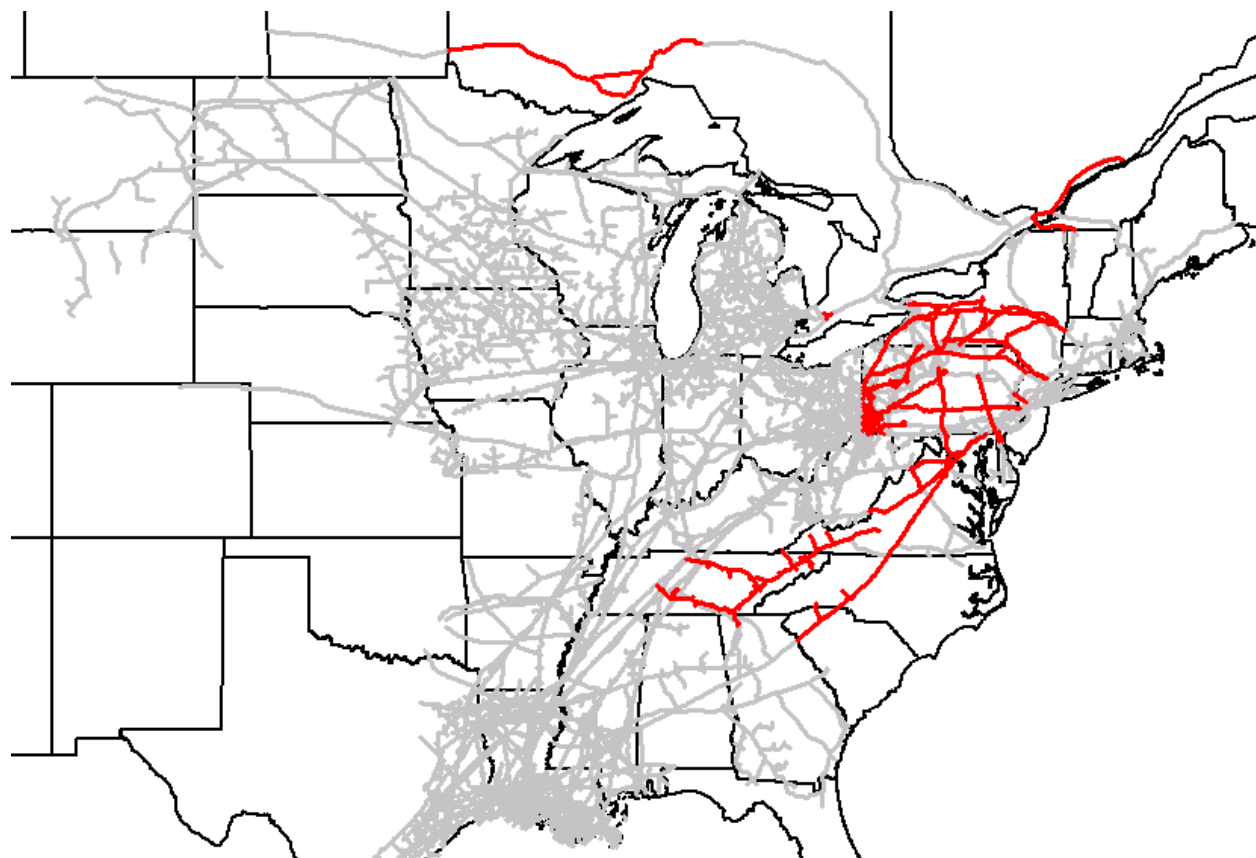


Figure A22-27. RGDS S5c Winter 2023: Peak Hour Constraints

Table A22-18 summarizes the results of the frequency and duration analysis.

Table A22-18. RGDS S5c Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	6	1	52	81
Columbia Gas W PA/NY	9	1	3	16
Constitution	2	31	59	90
Dominion Eastern NY	8	1	16	58
Dominion Western NY	1	5	5	5
Dominion Southeast	5	3	31	68
East Tennessee Mainline	6	1	4	11
Eastern Shore	10	1	14	66
Empire Mainline	8	1	44	64
Millennium	7	3	38	69
NB/NS Supply	1	31	59	90
Tennessee Z4 PA	9	1	9	47
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	9	1	27	67
Texas Eastern M3 North	8	1	26	56
TransCanada Ontario West	5	1	3	8
TransCanada Quebec	7	1	14	33
Transco Leidy Atlantic	8	1	28	65
Transco Z5	10	1	4	14
Transco Z6 Leidy to 210	4	1	55	88
Union Gas Dawn	2	1	2	3

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d over the 2018 capacity. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-221 and Figure A23-222 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-223 and Figure A23-224 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-225 and Figure A23-226 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-227 and Figure A23-228 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-229 and Figure A23-230 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase of 15 MDth/d over 2018. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-231 and Figure A23-232 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-233 and Figure A23-234 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-235 and Figure A23-236 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-237 and Figure A23-238 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-239 and Figure A23-240 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects

generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A23-241 and Figure A23-242 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-243 and Figure A23-244 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-245 and Figure A23-246 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-247 and Figure A23-248 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A23-249 and Figure A23-250 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-251 and Figure A23-252 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A23-253 and Figure A23-254 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-255 and Figure A23-256 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-257 and Figure A23-258 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-259 and Figure A23-260 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A23-261 and Figure A23-262 relative to the capacity of the segment.

RGDS S5c Summer 2023

Figure A22-28 summarizes the affected generation during the Summer 2023 peak hour by PPA.

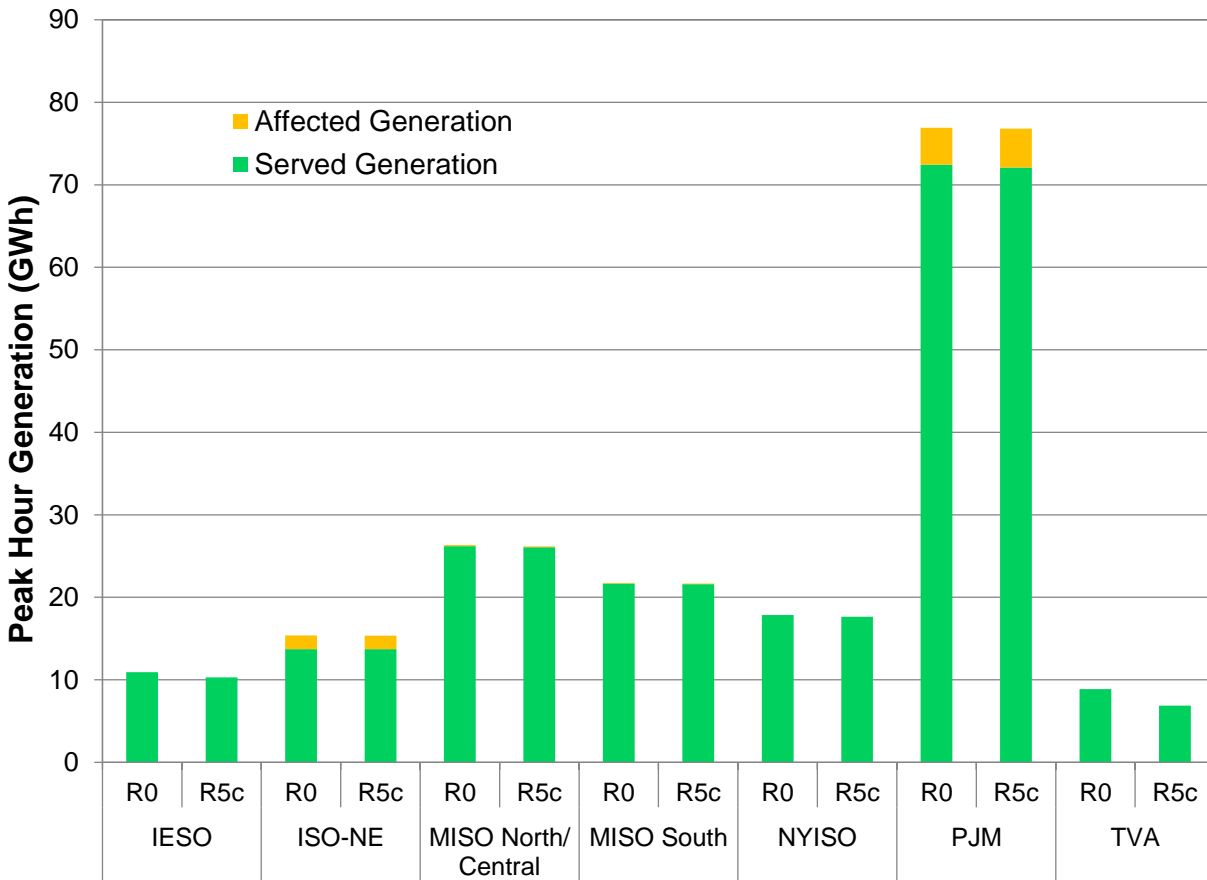


Figure A22-28. RGDS S5c Summer 2023: Peak Hour Affected Generation

Figure A22-29 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-19.

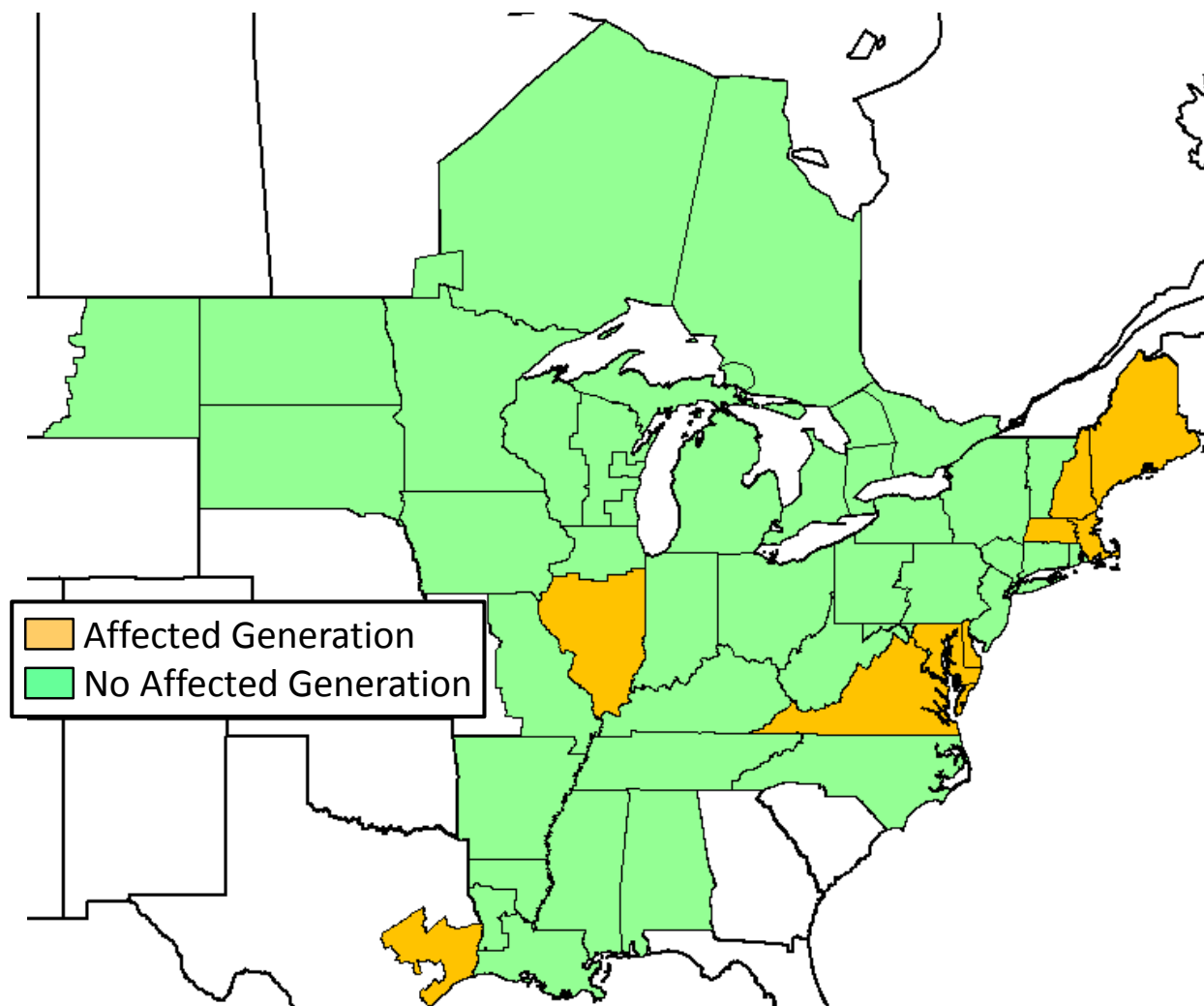


Figure A22-29. RGDS S5c Summer 2023: Locations with Peak Hour Affected Generation

Table A22-19. RGDS S5c Summer 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.5	1,175
Illinois Southern	1.0	112
Maine	5.8	776
Maryland Eastern	16.7	2,361
New Hampshire	7.6	857
Texas East (SERC)	0.6	81
Virginia	10.9	1,181

Figure A22-30 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-28 during the Summer 2023 peak hour.

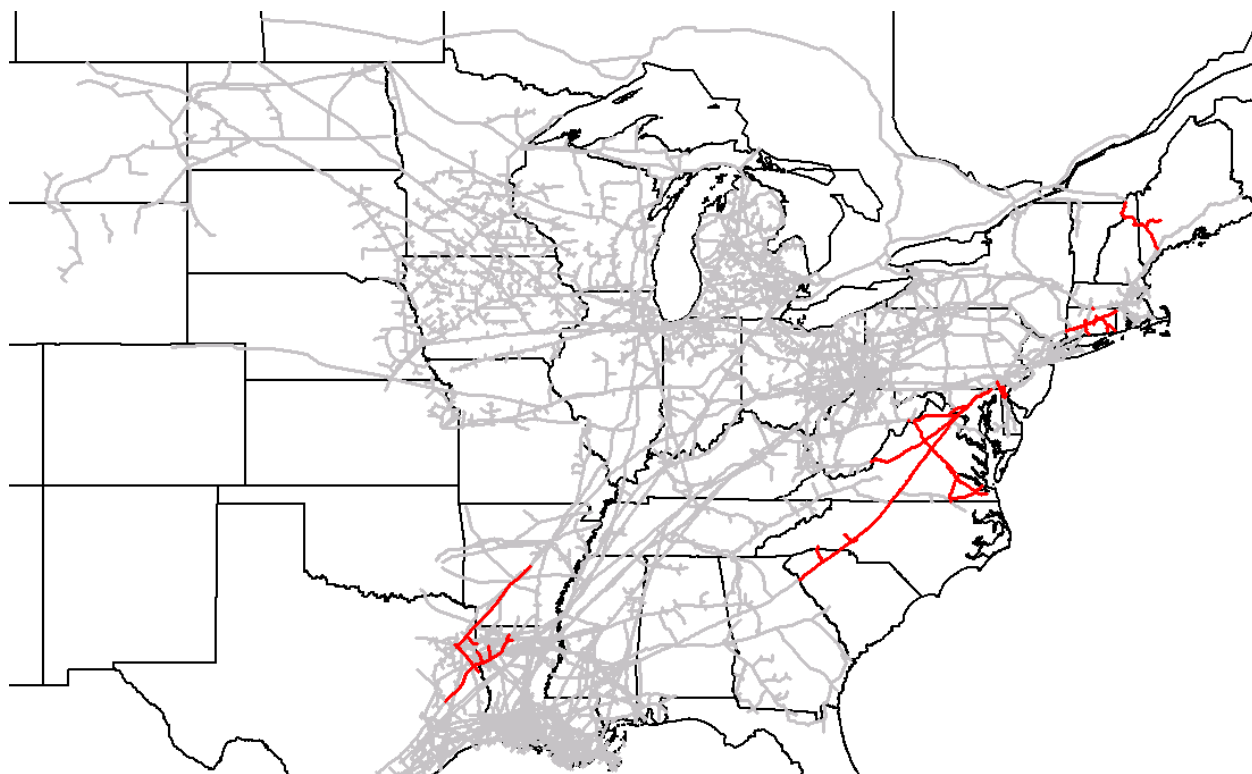


Figure A22-30. RGDS S5c Summer 2023: Peak Hour Constraints

Table A22-20 summarizes the results of the frequency and duration analysis.

Table A22-20. RGDS S5c Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	6	1	3	12
Columbia Gas VA/MD	2	1	4	5
Dominion Southeast	10	1	9	29
Eastern Shore	11	1	9	33
NB/NS Supply	5	2	27	69
PNGTS N of Westbrook	10	1	12	41
Texas Eastern Zone ETX	8	1	6	20
Transco Z5	9	1	6	20

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-263 and Figure A23-264 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-265 and Figure A23-266 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-267 and Figure A23-268 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-269 and Figure A23-270 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A23-271 and Figure A23-272 relative to the total production capacity.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-273 and Figure A23-274 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-275 and Figure A23-276 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-277 and Figure A23-278 relative to the capacity of the segment.

S9: Retirement of IESO and NYISO Nuclear Units

HGDS S9 Winter 2018

Figure A22-31 summarizes the affected generation during the Winter 2018 peak hour by PPA.

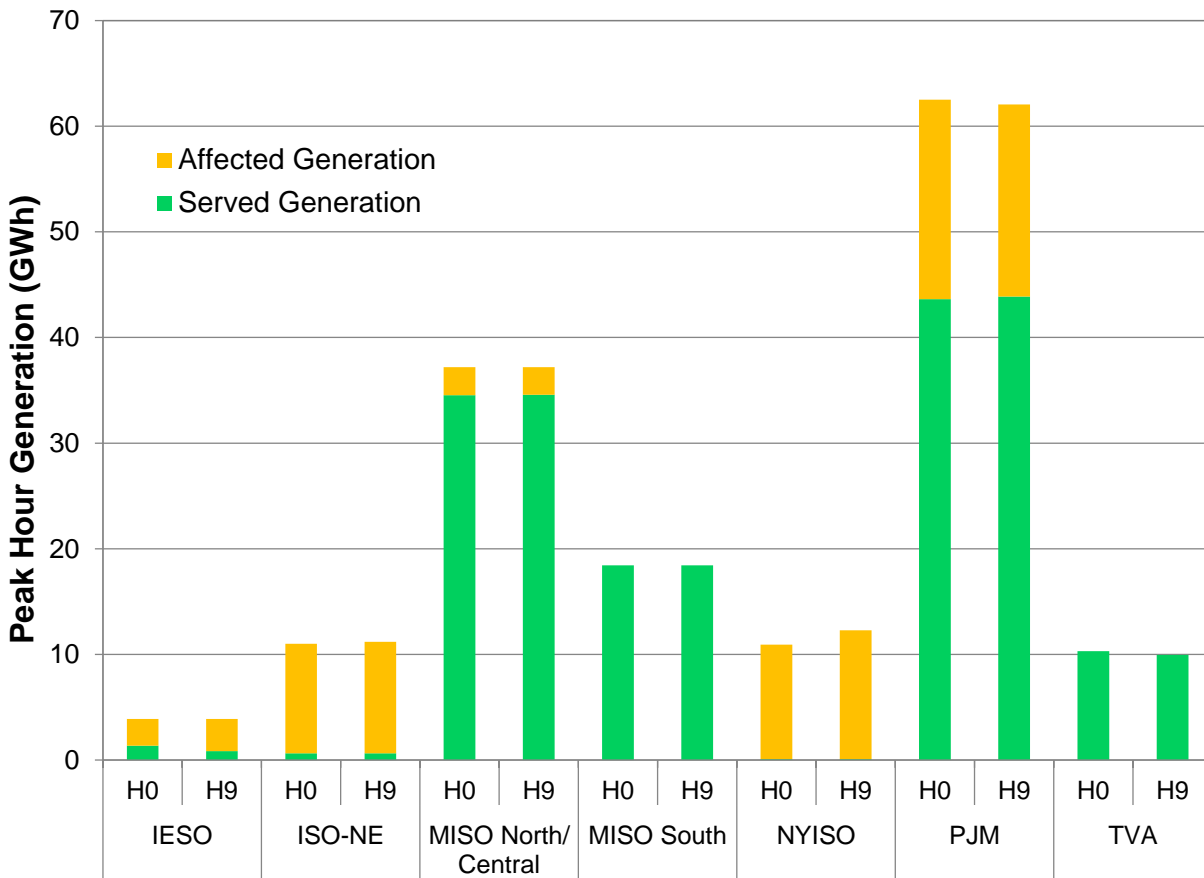


Figure A22-31. HGDS S9 Winter 2018: Peak Hour Affected Generation

Figure A22-32 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-21.

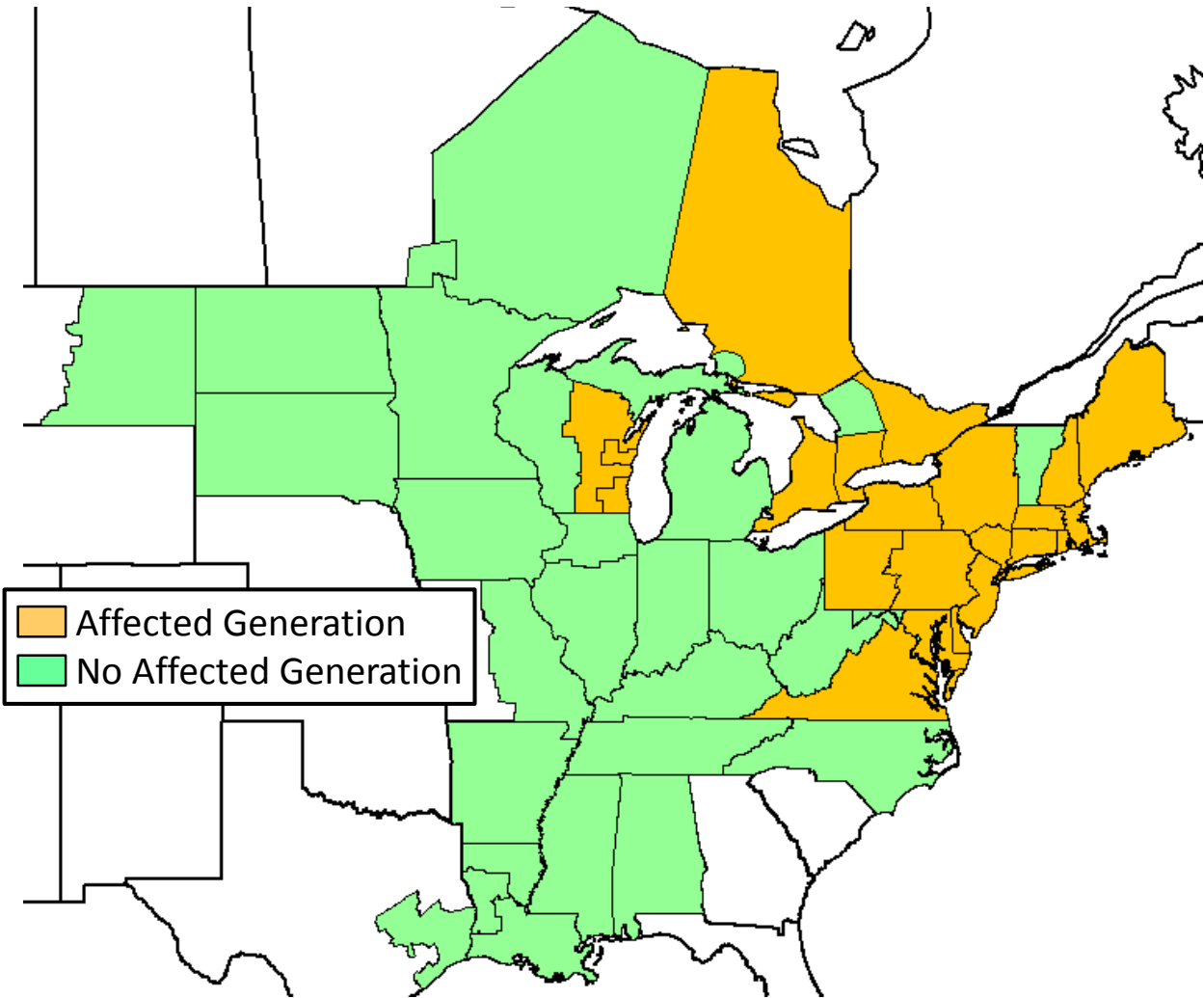


Figure A22-32. HGDS S9 Winter 2018: Locations with Peak Hour Affected Generation

Table A22-21. HGDS S9 Winter 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	24.1	3,216
Delaware	1.3	173
Maine	9.5	1,292
Maryland Eastern	5.0	539
Massachusetts Eastern	14.5	2,023
Massachusetts Western	7.8	1,059
New Hampshire	13.0	1,764
New Jersey	26.8	3,459
New York Central Northern	38.8	4,933
New York City	21.2	2,813
New York Long Island	8.9	1,048
New York Southern	17.5	2,257
New York Western	5.3	716
Ontario (CDA)	1.6	181
Ontario (EDA)	15.8	1,766
Ontario (NDA)	1.2	155
Ontario (StClair)	7.0	950
Pennsylvania Eastern	67.3	9,117
Pennsylvania Western	11.0	1,574
Rhode Island	9.2	1,194
Virginia	28.9	3,743
Wisconsin Eastern (RFC)	19.0	2,362
Wisconsin Western (MROE)	2.2	254

Figure A22-33 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-31 during the Winter 2018 peak hour.

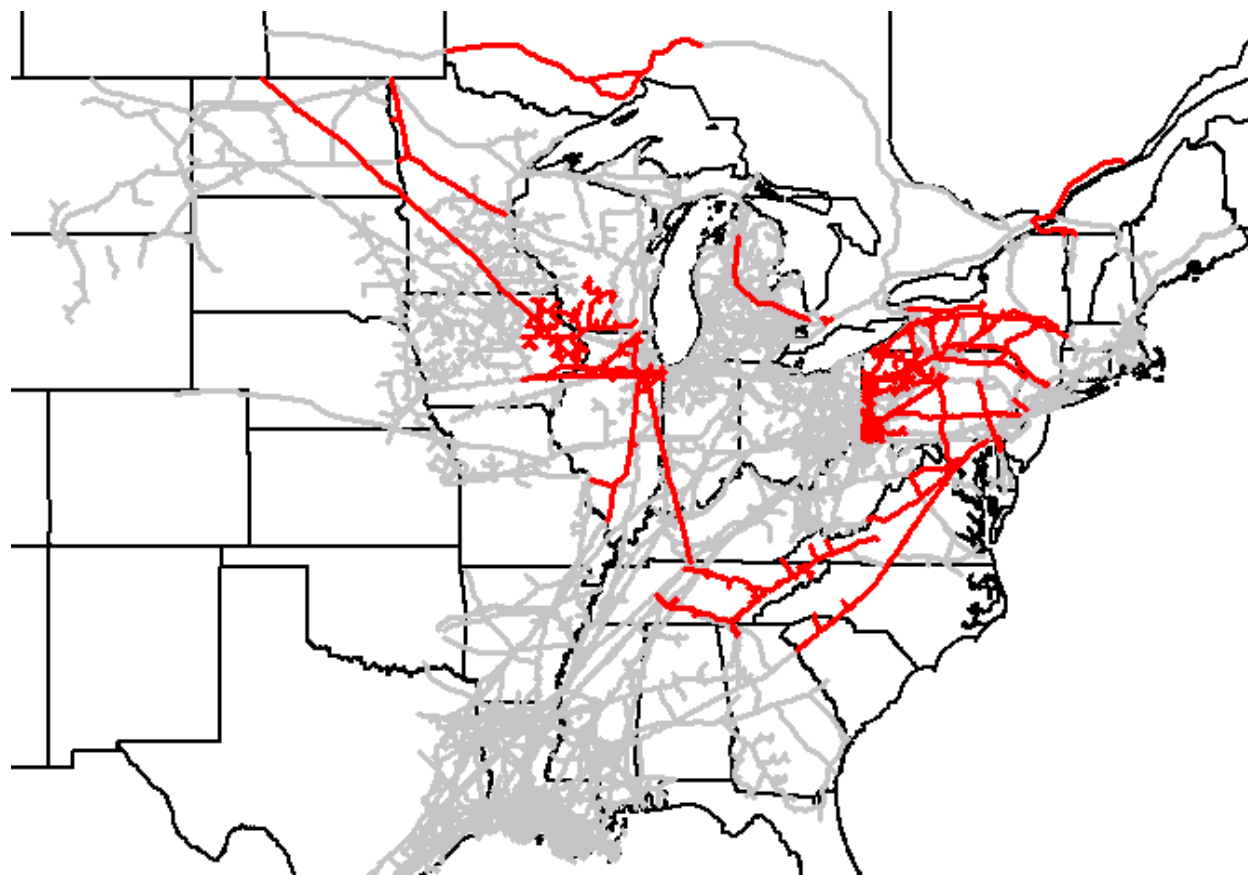


Figure A22-33. HGDS S9 Winter 2018: Peak Hour Constraints

Table A22-22 summarizes the results of the frequency and duration analysis.

Table A22-22. HGDS S9 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Alliance	4	1	6	10
ANR Northern Illinois	10	1	35	59
Columbia Gas VA/MD	12	1	13	57
Columbia Gas W PA/NY	7	1	3	11
Constitution	2	31	59	90
Dominion Eastern NY	10	1	10	24
Dominion Western NY	6	1	12	34
Dominion Southeast	5	1	14	23
East Tennessee Mainline	6	2	8	26
Eastern Shore	13	1	31	61
Empire Mainline	8	1	13	33
Great Lakes East	12	1	30	66
Midwestern	17	1	12	58
Millennium	8	1	37	67
NB/NS Supply	15	1	19	56
NGPL IA/IL North	12	1	13	55
NGPL IA/IL South	11	1	11	48
Northern Border Chicago	14	1	10	45
Northern Natural D	1	4	1	8
Tennessee Z4 PA	7	1	47	72
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	2	31	59	90
Texas Eastern M3 North	4	1	57	83
TransCanada Ontario West	3	1	5	8
TransCanada Quebec	7	1	14	29
Transco Leidy Atlantic	3	3	55	89
Transco Z5	8	1	11	20
Transco Z6 Leidy to 210	2	31	59	90
Union Gas Dawn	4	1	3	6
Viking Z1	11	1	10	24

Alliance

The 100% peak hour utilization on Alliance's mainline, which is modeled with a capacity of 1,800 MDth/d, potentially affects generators behind LDCs served by Alliance and generators behind LDCs served by Guardian. The locations of these generators are shown in Figure A17-1.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-279 and Figure A23-280 relative to the capacity of the segment.

ANR Northern Illinois

The 100% peak hour utilization on ANR's Northern Illinois segment, which is modeled with a capacity of 1,337 MDth/d, potentially affects generators directly connected to ANR in Illinois and Wisconsin and generators behind LDCs served by ANR in Illinois and Wisconsin. The locations of these generators are shown in Figure A17-2.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-281 and Figure A23-282 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-283 and Figure A23-284 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-285 and Figure A23-286 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-287 and Figure A23-288 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-289 and Figure A23-290 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-291 and Figure A23-292 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-293 and Figure A23-294 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-295 and Figure A23-296 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-297 and Figure A23-298 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-299 and Figure A23-300 relative to the capacity of the segment.

Great Lakes East

The 100% peak hour utilization on Great Lakes Gas's East segment, which is modeled with a capacity of 1,164 MDth/d, potentially affects generators directly connected to Great Lakes in Michigan, generators behind LDCs served by Great Lakes in Michigan, generators directly connected to Vector, and generators behind Union Gas. The locations of these generators are shown in Figure A17-3.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-301 and Figure A23-302 relative to the capacity of the segment.

Midwestern

The 100% peak hour utilization on Midwestern's mainline segment, which is modeled with a capacity of 635 MDth/d, potentially affects generators that are directly connected to Midwestern in Indiana and Indiana, generators behind LDCs served by Midwestern in Indiana and Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-4.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-303 and Figure A23-304 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-305 and Figure A23-306 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A23-307 and Figure A23-308 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

NGPL Iowa/Illinois North

The 100% peak hour utilization on NGPL's Iowa/Illinois North segment, which is modeled with a capacity of 1,677 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Iowa, Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-5.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-309 and Figure A23-310 relative to the capacity of the segment.

NGPL Iowa/Illinois South

The 100% peak hour utilization on NGPL's Iowa/Illinois South segment, which is modeled with a capacity of 1,624 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-6.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-311 and Figure A23-312 relative to the capacity of the segment.

Northern Border Chicago

The 100% peak hour utilization on Northern Border's Chicago segment, which is modeled with a capacity of 987 MDth/d, potentially affects generators directly connected to Northern Border in Illinois, generators behind LDCs served by Northern Border in Illinois and Indiana, and generators behind LDCs served by Guardian. The locations of these generators are shown in Figure A17-7.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-313 and Figure A23-314 relative to the capacity of the segment.

Northern Natural Zone D

The 100% peak hour utilization on Northern Natural's Zone D segment, which is modeled with a capacity of 800 MDth/d, potentially affects generators directly connected to Northern Natural in Wisconsin, generators behind LDCs served by Northern Natural in Illinois and Wisconsin, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-8.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-315 and Figure A23-316 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-317 and Figure A23-318 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut

and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-319 and Figure A23-320 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-321 and Figure A23-322 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A23-323 and Figure A23-324 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-325 and Figure A23-326 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A23-327 and Figure A23-328 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-329 and Figure A23-330 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-331 and Figure A23-332 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-333 and Figure A23-334 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A23-335 and Figure A23-336 relative to the capacity of the segment.

Viking Zone 1

The 100% peak hour utilization on Viking's Zone 1 segment, which is modeled with a capacity of 543 MDth/d, potentially affects generators directly connected to Viking, generators behind LDCs served by Viking, generators directly connected to ANR, and generators behind LDCs served by ANR. The locations of these generators are shown in Figure A17-9.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-337 and Figure A23-338 relative to the capacity of the segment.

HGDS S9 Summer 2018

Figure A22-34 summarizes the affected generation during the Winter 2018 peak hour by PPA.

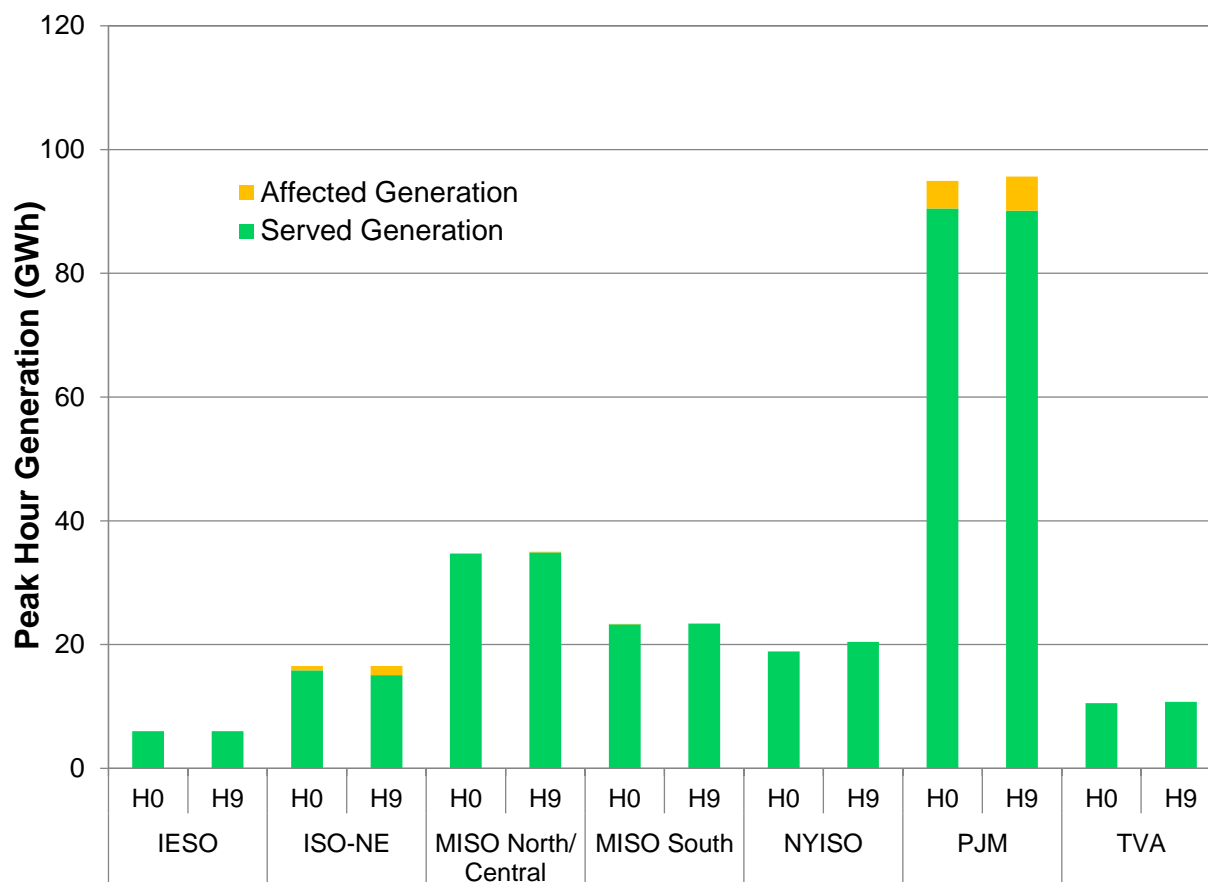


Figure A22-34. HGDS S9 Summer 2018: Peak Hour Affected Generation

Figure A22-35 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-23.

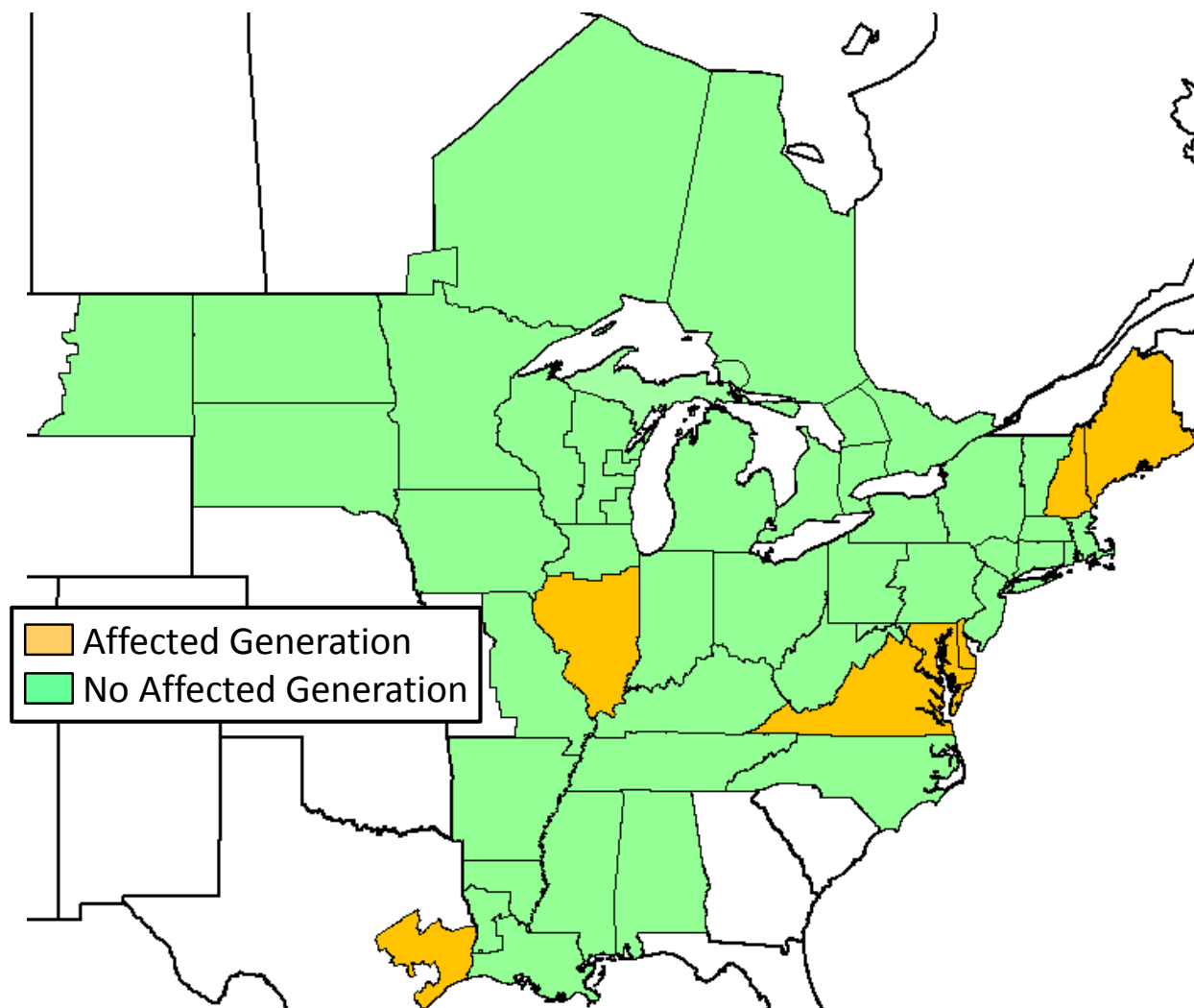


Figure A22-35. HGDS S9 Summer 2018: Locations with Peak Hour Affected Generation

Table A22-23. HGDS S9 Summer 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	9.0	1,223
Illinois Southern	1.0	112
Maine	4.0	540
Maryland Eastern	21.6	3,065
New Hampshire	7.2	933
Texas East (SERC)	0.5	70
Virginia	11.1	1,208

Figure A22-36 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-34 during the Summer 2018 peak hour.

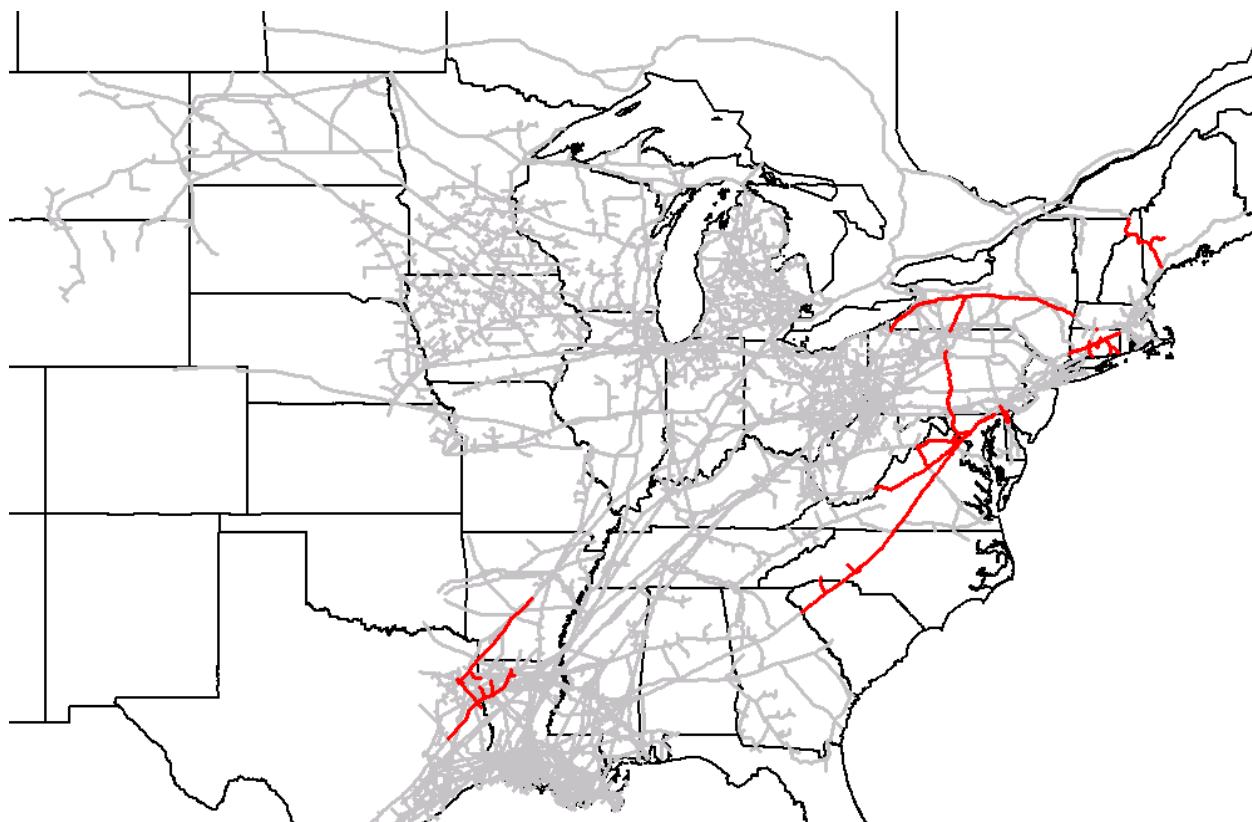


Figure A22-36. HGDS S9 Summer 2018: Peak Hour Constraints

Table A22-24 summarizes the results of the frequency and duration analysis.

Table A22-24. HGDS S9 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	3	2	3	8
Columbia Gas VA/MD	8	1	16	42
Dominion Southeast	8	1	24	72
Eastern Shore	8	1	16	43
NB/NS Supply	2	5	74	79
PNGTS N of Westbrook	3	3	77	86
Texas Eastern Zone ETX	9	1	9	24
Transco Z5	7	1	40	70

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report..

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-339 and Figure A23-340 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-341 and Figure A23-342 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-343 and Figure A23-344 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-345 and Figure A23-346 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 623 MDth/d in 2018. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A23-347 and Figure A23-348 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-349 and Figure A23-350 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-351 and Figure A23-352 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-353 and Figure A23-354 relative to the capacity of the segment.

HGDS S9 Winter 2023

Figure A22-37 summarizes the affected generation during the Winter 2023 peak hour by PPA.

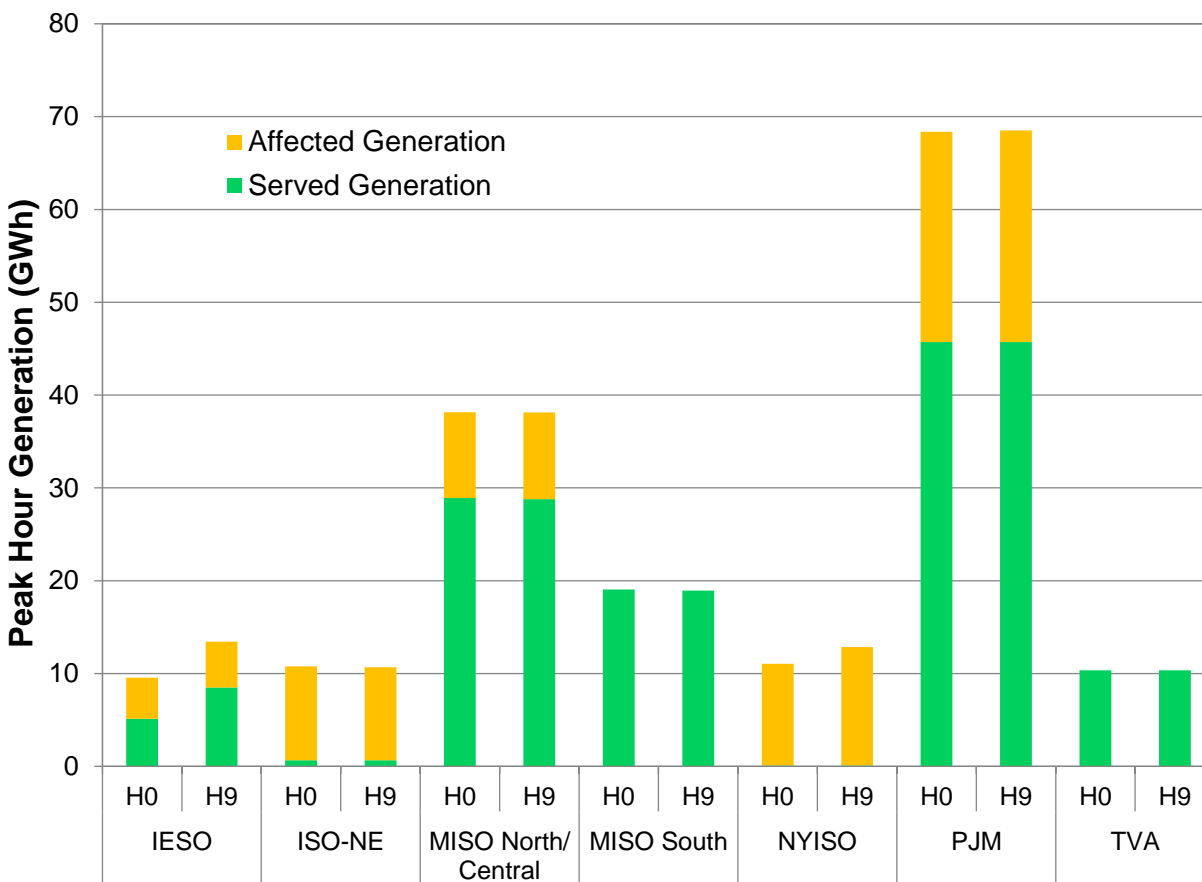


Figure A22-37. HGDS S9 Winter 2023: Peak Hour Affected Generation

Figure A22-38 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-25.

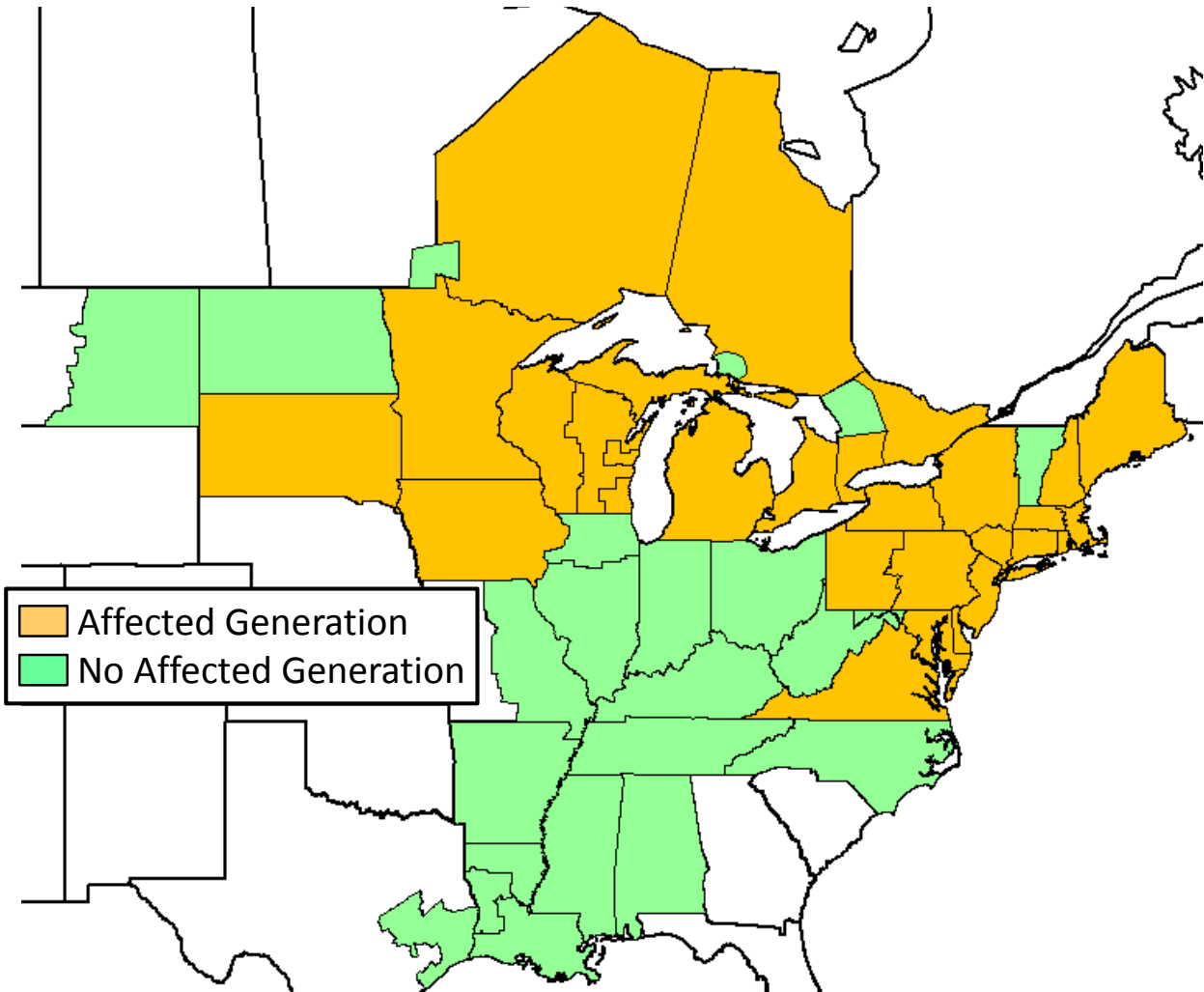


Figure A22-38. HGDS S9 Winter 2023: Locations with Peak Hour Affected Generation

Table A22-25. HGDS S9 Winter 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	17.1	2,385
Delaware	0.9	118
Iowa	12.6	1,716
Maine	12.7	1,799
Maryland Eastern	6.3	667
Massachusetts Eastern	13.8	1,927
Massachusetts Western	10.4	1,369
Michigan Lower Peninsula	0.1	11
Michigan Upper Peninsula	3.6	520
Minnesota	2.9	361
New Hampshire	16.7	2,284
New Jersey	17.2	2,387
New York Central Northern	42.4	4,958
New York City	19.8	2,628
New York Long Island	12.2	1,251
New York Southern	25.4	3,156
New York Western	5.9	774.9
Ontario (CDA)	1.6	181
Ontario (EDA)	15.8	2,172
Ontario (NDA)	1.2	155
Ontario (StClair)	17.2	2,410
Ontario (WDA)	0.4	38
Pennsylvania Eastern	93.3	12,864
Pennsylvania Western	11.0	1,574
Rhode Island	1.9	262
South Dakota	1.0	136
Virginia	42.3	5,181
Wisconsin Eastern (RFC)	30.3	3,921
Wisconsin Western (MROE)	20.2	2,467
Wisconsin Western (MROW)	2.0	204

Figure A22-39 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-37 during the Winter 2023 peak hour.

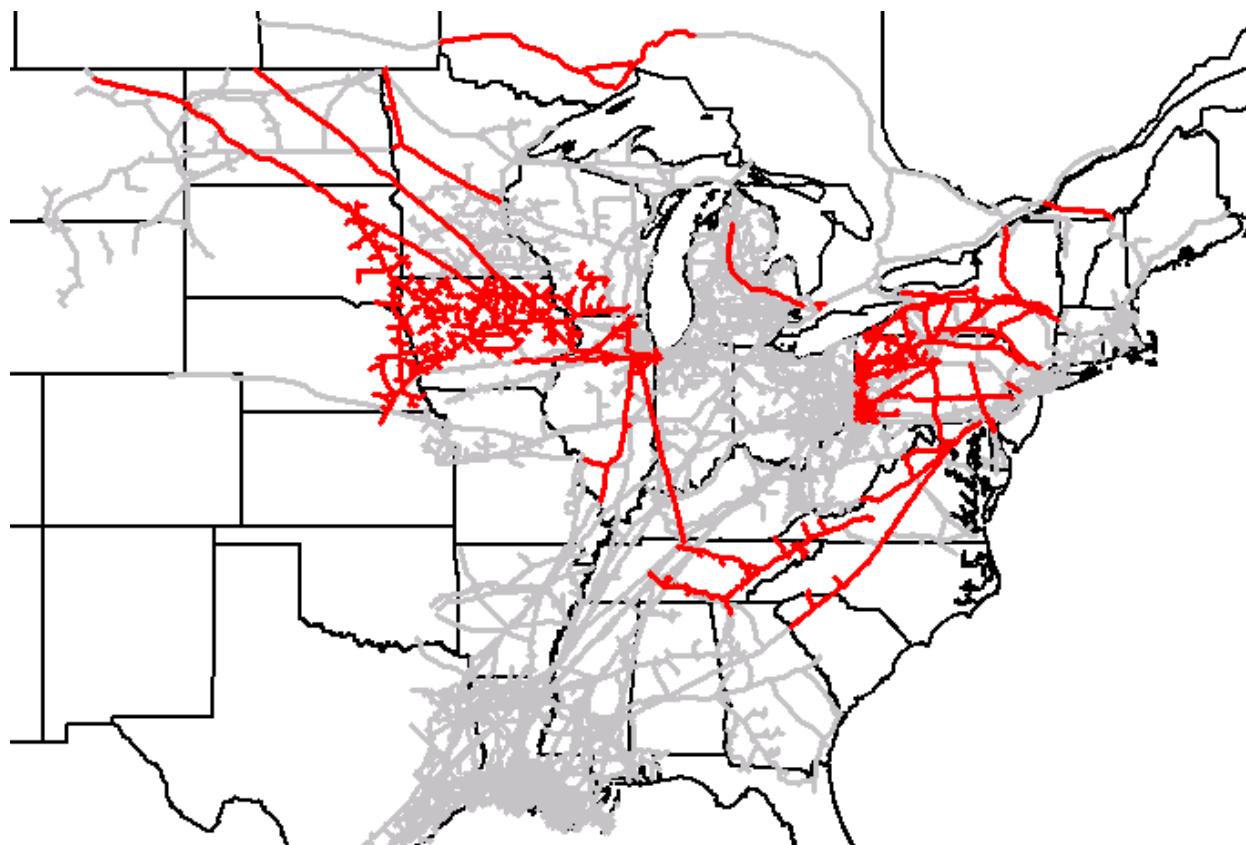


Figure A22-39. HGDS S9 Winter 2023: Peak Hour Constraints

Table A22-26 summarizes the results of the frequency and duration analysis.

Table A22-26. HGDS S9 Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Alliance	4	1	7	10
ANR Northern Illinois	11	1	17	55
Columbia Gas VA/MD	6	1	52	80
Columbia Gas W PA/NY	9	2	23	68
Constitution	2	31	59	90
Dominion Eastern NY	6	2	14	42
Dominion Western NY	7	1	15	37
Dominion Southeast	3	1	54	86
East Tennessee Mainline	6	2	8	26
Eastern Shore	5	1	3	9
Empire Mainline	7	1	16	41
Great Lakes East	3	13	59	89
Iroquois Zone 1	2	31	59	90
Midwestern	20	1	9	55
Millennium	2	31	59	90
NB/NS Supply	2	31	59	90
NGPL IA/IL North	11	1	19	54
NGPL IA/IL South	9	1	11	40
Northern Border Mainline	3	1	2	2
Northern Natural ABC	6	1	33	43
Northern Natural D	9	1	10	29
Tennessee Z4 PA	4	9	48	77
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	2	31	59	90
Texas Eastern M3 North	4	1	54	84
TransCanada Ontario West	5	2	11	22
TransCanada Quebec to PNGTS	2	31	59	90
Transco Leidy Atlantic	7	3	27	83
Transco Z5	7	1	14	28
Transco Z6 Leidy to 210	2	31	59	90
Union Gas Dawn	7	1	5	15
Vector Z1	4	1	8	12
Viking Z1	12	1	17	59

Alliance

The 100% peak hour utilization on Alliance's mainline, which is modeled with a capacity of 1,800 MDth/d, potentially affects generators behind LDCs served by Alliance and generators behind LDCs served by Guardian. The locations of these generators are shown in Figure A17-1.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-355 and Figure A23-356 relative to the capacity of the segment.

ANR Northern Illinois

The 100% peak hour utilization on ANR's Northern Illinois segment, which is modeled with a capacity of 1,337 MDth/d, potentially affects generators directly connected to ANR, generators behind LDCs served by ANR. The locations of these generators are shown in Figure A17-2.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-357 and Figure A23-358 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,867 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-359 and Figure A23-360 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-361 and Figure A23-362 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-363 and Figure A23-364 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-365 and Figure A23-366 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-367 and Figure A23-368 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-369 and Figure A23-370 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-371 and Figure A23-372 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-373 and Figure A23-374 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-375 and Figure A23-376 relative to the capacity of the segment.

Great Lakes East

The 100% peak hour utilization on Great Lakes Gas's East segment, which is modeled with a capacity of 1,164 MDth/d, potentially affects generators directly connected to Great Lakes in Michigan, generators behind LDCs served by Great Lakes in Michigan, generators directly connected to Vector, and generators behind Union Gas. The locations of these generators are shown in Figure A17-3.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-377 and Figure A23-378 relative to the capacity of the segment.

Iroquois Zone 1

The 100% peak hour utilization on Iroquois's Zone 1, which is modeled with a capacity of 1,195 MDth/d, potentially affects generators directly connected to Iroquois and generators behind LDCs served by Iroquois. The locations of these generators are shown in Figure A17-10.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-379 and Figure A23-380 relative to the capacity of the segment.

Midwestern

The 100% peak hour utilization on Midwestern's mainline segment, which is modeled with a capacity of 635 MDth/d, potentially affects generators behind LDCs served by Midwestern and

behind LDCs served by Guardian downstream of the Joliet Hub. The locations of these generators are shown in Figure A17-4.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-381 and Figure A23-382 relative to the capacity of the segment

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, in particular, in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-383 and Figure A23-384 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 283 MDth/d in 2023. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A23-385 and Figure A23-386 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

NGPL Iowa/Illinois North

The 100% peak hour utilization on NGPL's Iowa/Illinois North segment, which is modeled with a capacity of 1,677 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Iowa, Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-5.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-387 and Figure A23-388 relative to the capacity of the segment.

NGPL Iowa/Illinois South

The 100% peak hour utilization on NGPL's Iowa/Illinois South segment, which is modeled with a capacity of 1,624 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-6.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-389 and Figure A23-390 relative to the capacity of the segment.

Northern Border Mainline

The 100% peak hour utilization on Northern Border's mainline, which is modeled with a capacity of 2,311 MDth/d, potentially affects generators directly connected to Northern Border in Minnesota and Illinois, generators behind LDCs served by Northern Border in Minnesota, Iowa, Illinois and Indiana, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-11.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-391 and Figure A23-392 relative to the capacity of the segment.

Northern Natural Zone ABC

The 100% peak hour utilization on Northern Natural's Zone ABC segment, which is modeled with a capacity of 2,138 MDth/d, potentially affects generators directly connected to Northern Natural in Iowa, South Dakota, Wisconsin and Minnesota, generators behind LDCs served by Northern Natural in Iowa, Wisconsin and Minnesota, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-12.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-393 and Figure A23-394 relative to the capacity of the segment.

Northern Natural Zone D

The 100% peak hour utilization on Northern Natural's Zone D segment, which is modeled with a capacity of 800 MDth/d, potentially affects generators directly connected to Northern Natural in Wisconsin, generators behind LDCs served by Northern Natural in Illinois and Wisconsin, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-8.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-395 and Figure A23-396 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC. The locations of these generators are shown in Figure 9-91 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-397 and Figure A23-398 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,404 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-399 and Figure A23-400 relative to the capacity of the segment.

Texas Eastern M2 Pennsylvania – Southern Branch

The Texas Eastern M2 Pennsylvania – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York that are served by Texas Eastern, and generators that are served by Algonquin and Eastern Shore, either directly or behind an LDC. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-401 and Figure A23-402 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 3,357 MDth/d. The 100% peak hour utilization on Texas Eastern's Zone M3 northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, and generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-403 and Figure A23-404 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,508 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-405 and Figure A23-406 relative to the capacity of the segment.

TransCanada Quebec to PNGTS

TransCanada's Quebec to PNGTS segment is modeled with a capacity of 270 MDth/d. The 100% peak hour utilization on this segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure A17-13.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-407 and Figure A23-408 relative to the capacity of the segment.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-409 and Figure A23-410 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 4,117 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-411 and Figure A23-412 relative to the capacity of the segment. The electric demand data set in these figures includes only gas demand at generators in the Study Region.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station segment is modeled with a capacity of 3,430 MDth/d. The 100% peak hour utilization on Transco's Leidy Line to Station 210 segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania and both New York City and Long Island. Locations of these generators are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-413 and Figure A23-414 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-415 and Figure A23-416 relative to the capacity of the segment.

Vector Zone 1

The 100% peak hour utilization on Vector's Zone 1 segment, which is modeled with a capacity of 1,600 MDth/d, potentially affects generators directly connected to Vector in Illinois, Indiana, Michigan and Ontario and generators behind LDCs served by Vector in Indiana and Michigan. The locations of these generators are shown in Figure A17-14.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-417 and Figure A23-418 relative to the capacity of the segment.

Viking Zone 1

The 100% peak hour utilization on Viking's Zone 1 segment, which is modeled with a capacity of 543 MDth/d, potentially affects generators directly connected to Viking, generators behind LDCs served by Viking, generators directly connected to ANR, and generators behind LDCs served by ANR. The locations of these generators are shown in Figure A17-9.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-419 and Figure A23-420 relative to the capacity of the segment.

HGDS S9 Summer 2023

Figure A22-40 summarizes the affected generation during the Summer 2023 peak hour by PPA.

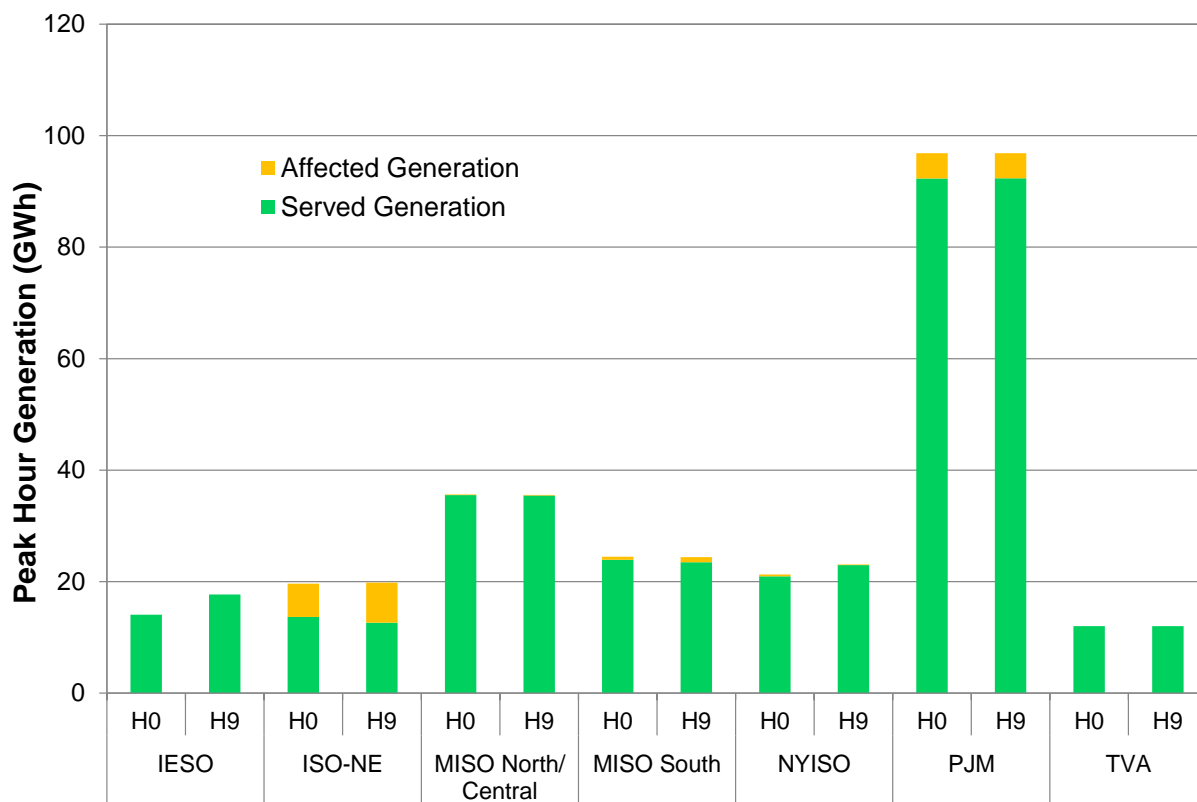


Figure A22-40. HGDS S9 Summer 2023: Peak Hour Affected Generation

Figure A22-41 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A22-27.

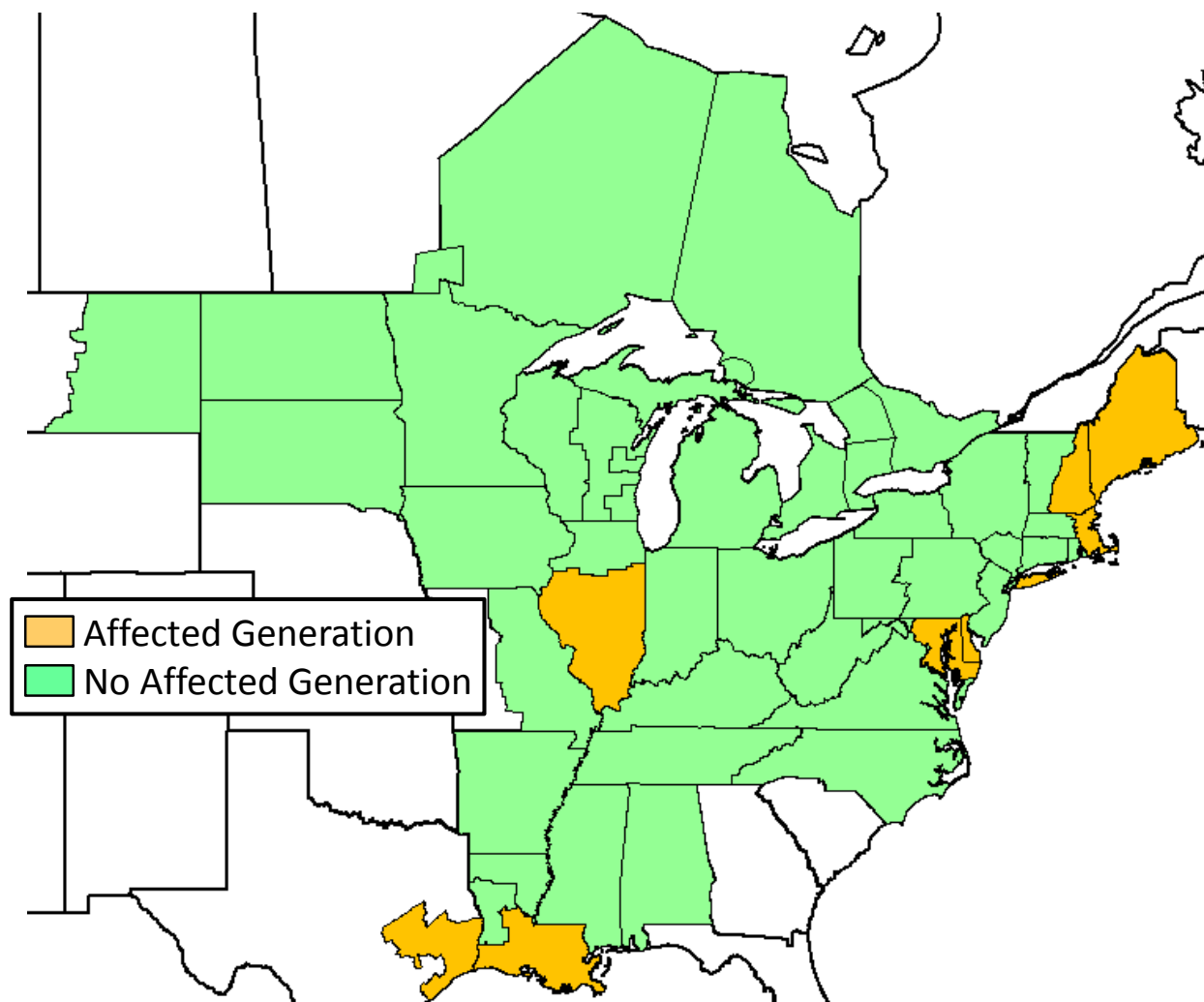


Figure A22-41. HGDS S9 Summer 2023: Locations with Peak Hour Affected Generation

Table A22-27. HGDS S9 Summer 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.6	1,188
Illinois Southern	1.0	112
Louisiana Southern	3.2	416
Maine	17.3	2,335
Maryland Eastern	16.7	2,361
Massachusetts Eastern	20.7	2,780
New Hampshire	15.2	2,085
New York Long Island	0.8	81
Texas East (SERC)	3.6	511
Virginia	8.4	936

Figure A22-42 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A22-40 during the Summer 2018 peak hour.



Figure A22-42. HGDS S9 Summer 2023: Peak Hour Constraints

Table A22-28 summarizes the results of the frequency and duration analysis.

Table A22-28. HGDS S9 Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	10	1	23	59
Columbia Gas VA/MD	5	1	6	12
Dominion Southeast	9	2	19	67
Eastern Shore	9	1	15	40
Gulf South Zone 2 HH	7	2	6	29
Iroquois Z1 → Z2	8	1	8	34
NB/NS Supply	6	2	23	69
PNGTS N of Westbrook	6	2	23	69
Tennessee Z5 NY	1	92	92	92
Texas Eastern Zone ETX	10	1	17	42
Transco Z5	7	1	16	43

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-421 and Figure A23-422 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,867 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-423 and Figure A23-424 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-425 and Figure A23-426 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A23-427 and Figure A23-428 relative to the capacity of the segments.

Gulf South Zone 2 Henry Hub

The 100% peak hour utilization on the Henry Hub segment of Gulf South Zone 2, which is modeled with a capacity of 700 MDth/d, potentially affects generators directly connected to Gulf South in Louisiana, and generators behind LDCs served by Gulf South in Louisiana. The locations of these generators are shown in Figure A17-15.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-429 and Figure A23-430 relative to the capacity of the segment.

Iroquois Zone 1 to Zone 2

The 100% peak hour utilization of the link between Iroquois Zone 1 and Iroquois Zone 1, which is modeled with a capacity of 855 MDth/d, potentially affects generators directly connected to Iroquois in New York and Connecticut, and generators behind LDCs served by Iroquois in New York and Connecticut. The locations of these generators are shown in Figure A17-16.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-431 and Figure A23-432 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 283 MDth/d in 2023. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A23-433 and Figure A23-434 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-435 and Figure A23-436 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-437 and Figure A23-438 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-439 and Figure A23-440 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A23-441 and Figure A23-442 relative to the capacity of the segment.

Appendix 23

S5a, S5b, S5c and S9 Chronological and Descending Demand Figures

(Contains CEII – Not included in this Volume)

Appendix 24
Gas Infrastructure Sensitivities
S13, S14 and S16

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S13: Increased Infrastructure to Enable Additional Marcellus/Utica Flows to Neighboring PPAs

RGDS S13 Winter 2018

Figure A24-1 summarizes the affected generation during the Winter 2018 peak hour by PPA.

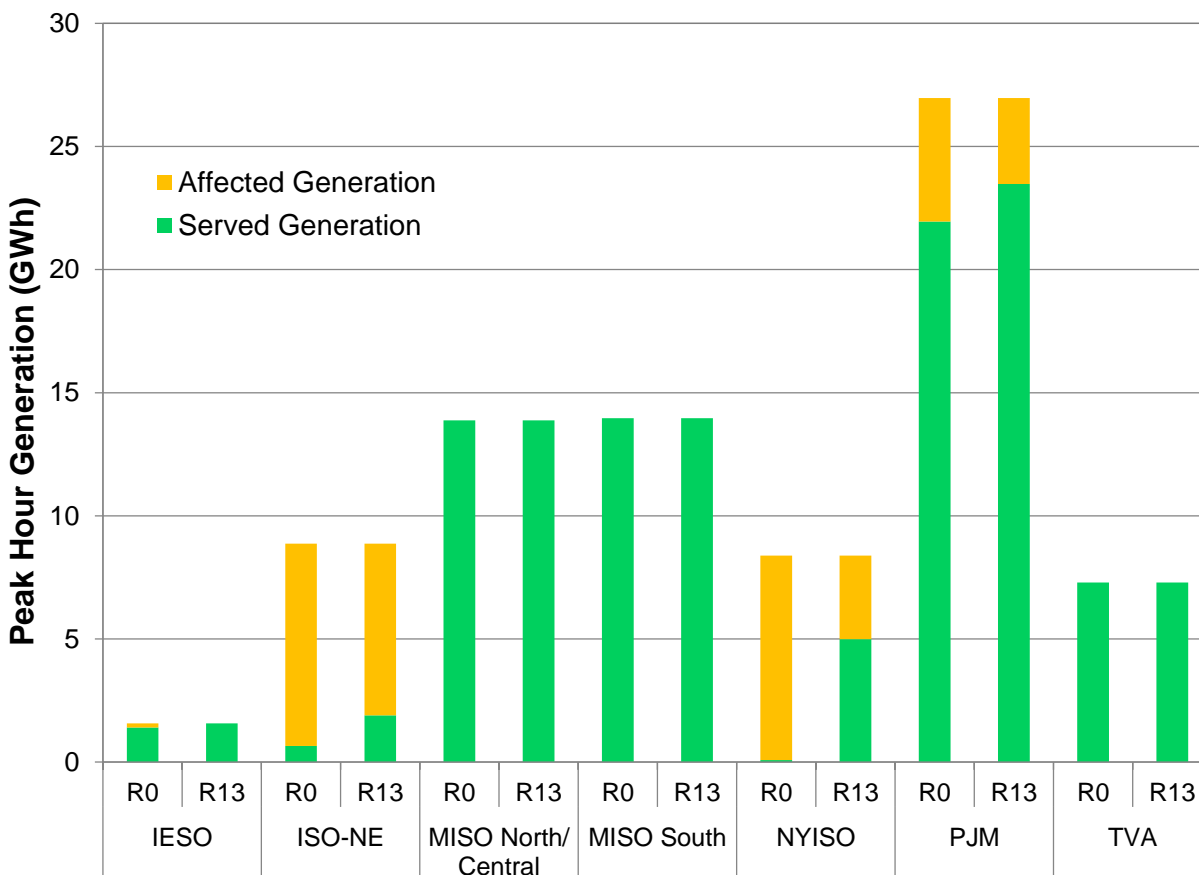


Figure A24-1. RGDS S13 Winter 2018: Peak Hour Affected Generation

Figure A24-2 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A24-1.

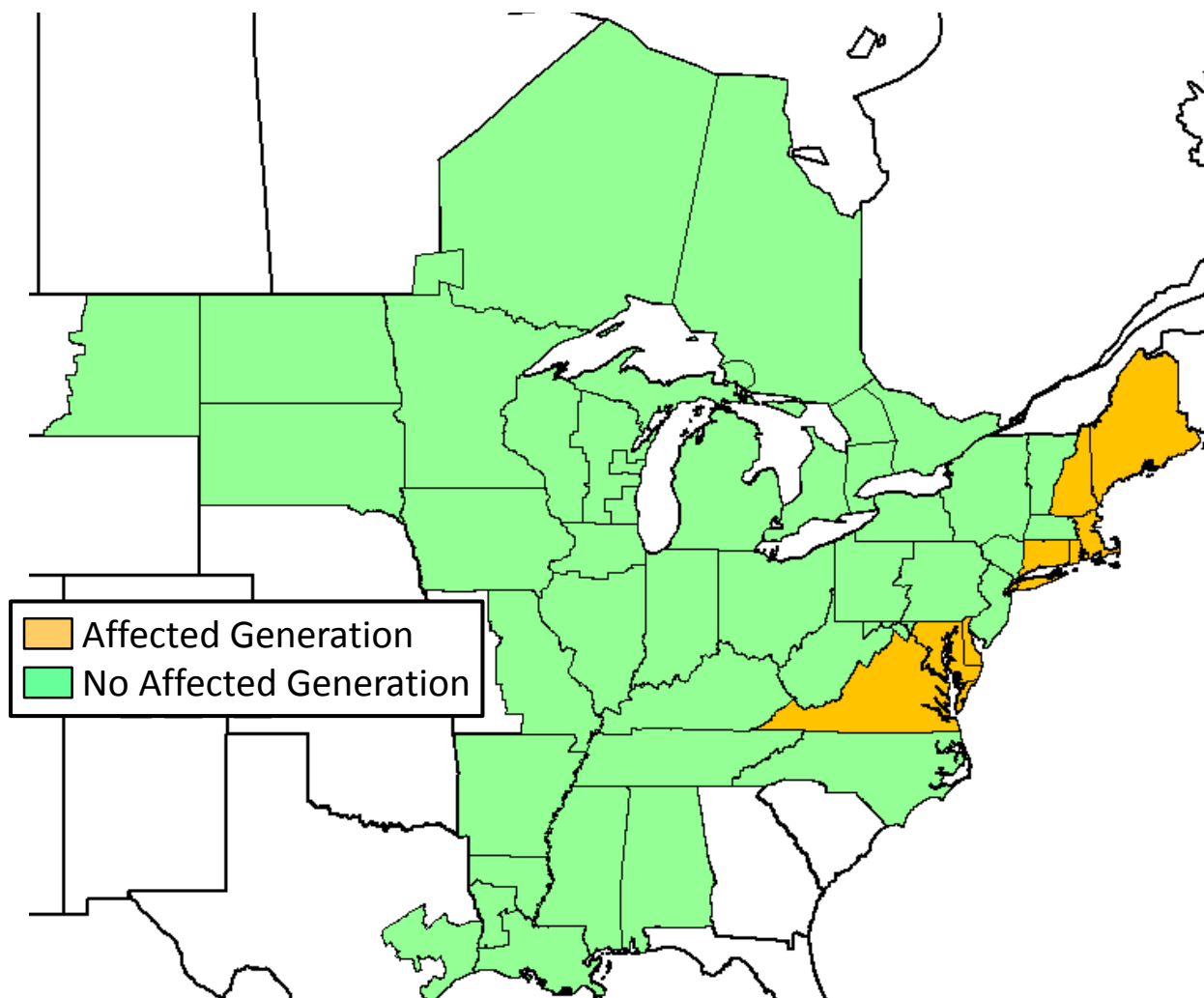


Figure A24-2. RGDS S13 Winter 2018: Locations with Peak Hour Affected Generation

Table A24-1. RGDS S13 Winter 2018: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	16.0	2,200
Delaware	1.6	199
Maine	7.6	1,045
Maryland Eastern	5.0	539
Massachusetts Eastern	12.8	1,781
New Hampshire	8.7	1,159
New York City	17.7	2,336
New York Long Island	9.4	1,054
Rhode Island	5.9	783
Virginia	21.0	2,755

Figure A24-3 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A24-1 during the Winter 2018 peak hour.

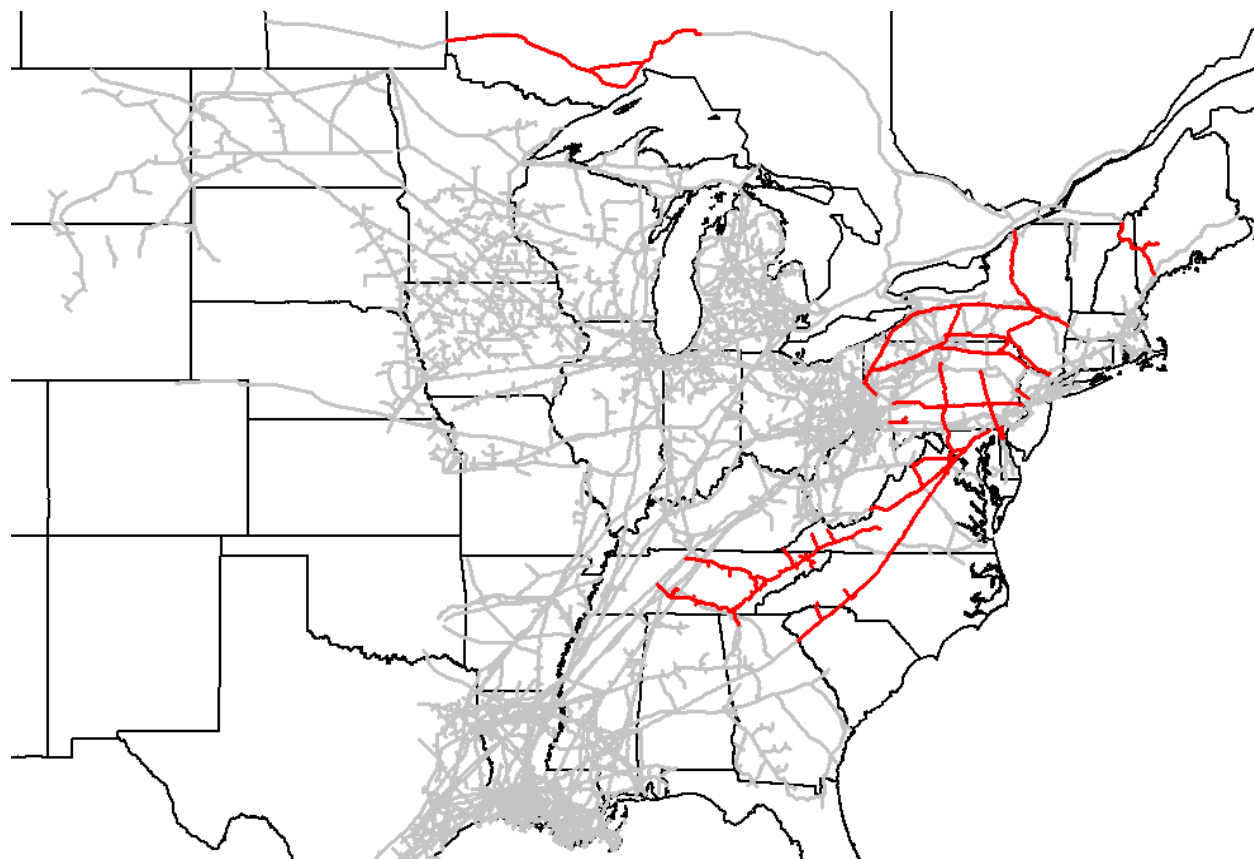


Figure A24-3. RGDS S0 Winter 2018: Peak Hour Constraints

Table A24-2 summarizes the results of the frequency and duration analysis.

Table A24-2. RGDS S13 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	12	1	5	23
Constitution	5	1	12	25
Dominion Southeast	7	1	12	22
East Tennessee	7	1	2	9
Eastern Shore	11	1	10	51
Iroquois Z1	10	1	15	54
Millennium	4	1	59	83
NB/NS Offshore	13	1	20	58
PNGTS N of Westbrook	10	1	26	71
Tennessee Z4 PA	10	1	7	30
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	10	1	15	50
Texas Eastern M3 North	10	2	7	39
Transco Leidy Atlantic	8	2	23	59
Transco Z5	3	1	7	9
Transco Z6 Leidy to 210	5	1	3	8

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-1 and Figure A25-2 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-3 and Figure A25-4 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-5 and Figure A25-6 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-7 and Figure A25-8 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A25-9 and Figure A25-10 relative to the capacity of the segments.

Iroquois Zone 1

The 100% peak hour utilization on Iroquois's Zone 1, which is modeled with a capacity of 1,195 MDth/d, potentially affects generators directly connected to Iroquois and generators behind LDCs served by Iroquois. The locations of these generators are shown in Figure A17-10.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-11 and Figure A25-12 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-13 and Figure A25-14 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A25-15 and Figure A25-16 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 300 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A25-17 and Figure A25-18 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-19 and Figure A25-20 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut

and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-21 and Figure A25-22 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-23 and Figure A25-24 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A25-25 and Figure A25-26 relative to the capacity of the segment.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-27 and Figure A25-28 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study

Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-29 and Figure A25-30 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-31 and Figure A25-32 relative to the capacity of the segment.

RGDS S13 Summer 2018

Figure A24-4 summarizes the affected generation during the Summer 2018 peak hour by PPA.

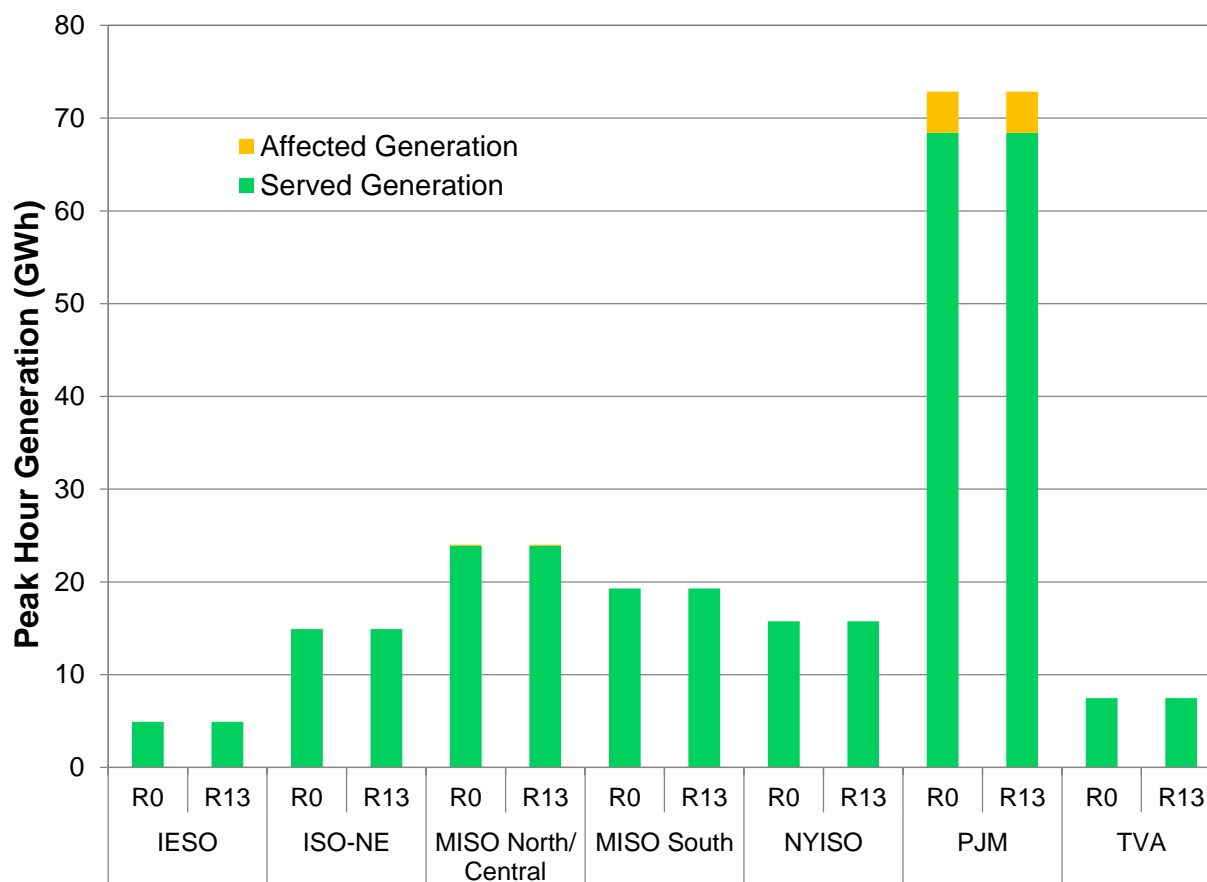


Figure A24-4. RGDS S13 Summer 2018: Peak Hour Affected Generation

Figure A24-5 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A24-3.

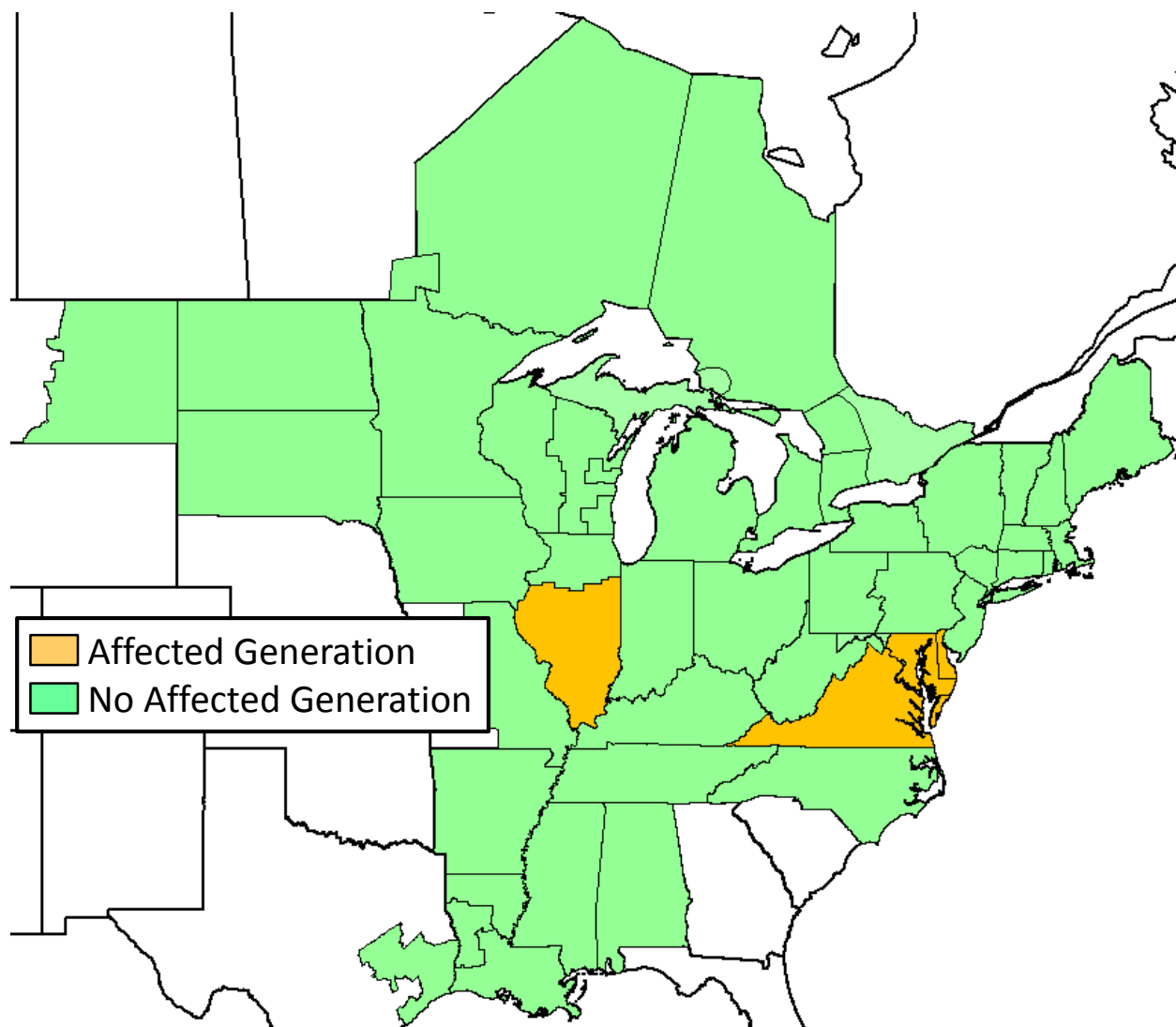


Figure A24-5. RGDS S13 Summer 2018: Locations with Peak Hour Affected Generation

Table A24-3. RGDS S13 Summer 2018 Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.3	1,149
Illinois Southern	1.0	110
Maryland Eastern	16.7	2,361
Virginia	8.4	936

Figure A24-6 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A24-4 during the Summer 2018 peak hour.

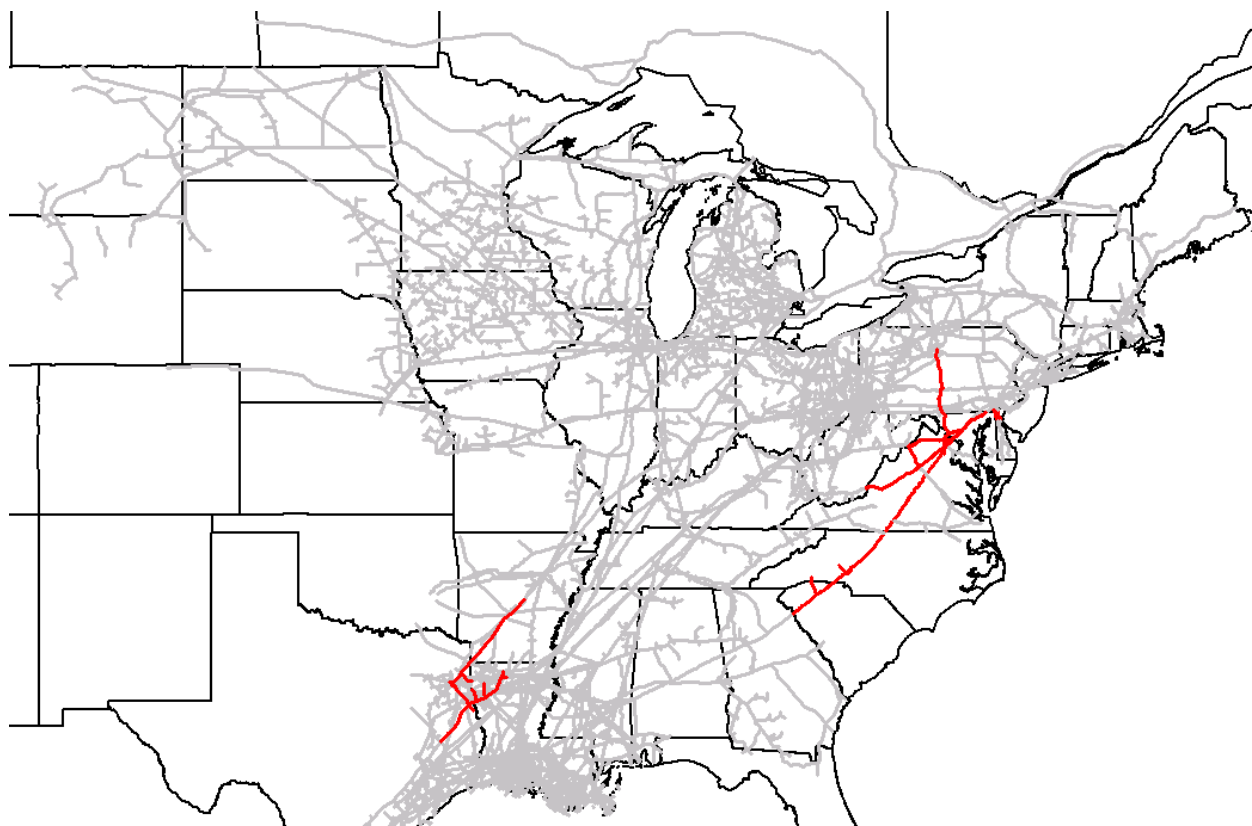


Figure A24-6. RGDS S13 Summer 2018: Peak Hour Constraints

Table A24-4 summarizes the results of the frequency and duration analysis.

Table A24-4. RGDS S13 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	1	1	1	1
Dominion Southeast	3	1	2	5
Eastern Shore	7	1	6	19
Texas Eastern Zone ETX	4	1	6	12
Transco Z5	7	2	6	18

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-33 and Figure A25-34 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-35 and Figure A25-36 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A25-37 and Figure A25-38 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-39 and Figure A25-40 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-41 and Figure A25-42 relative to the capacity of the segment.

RGDS S13 Winter 2023

Figure A24-7 summarizes the affected generation during the Winter 2023 peak hour by PPA.

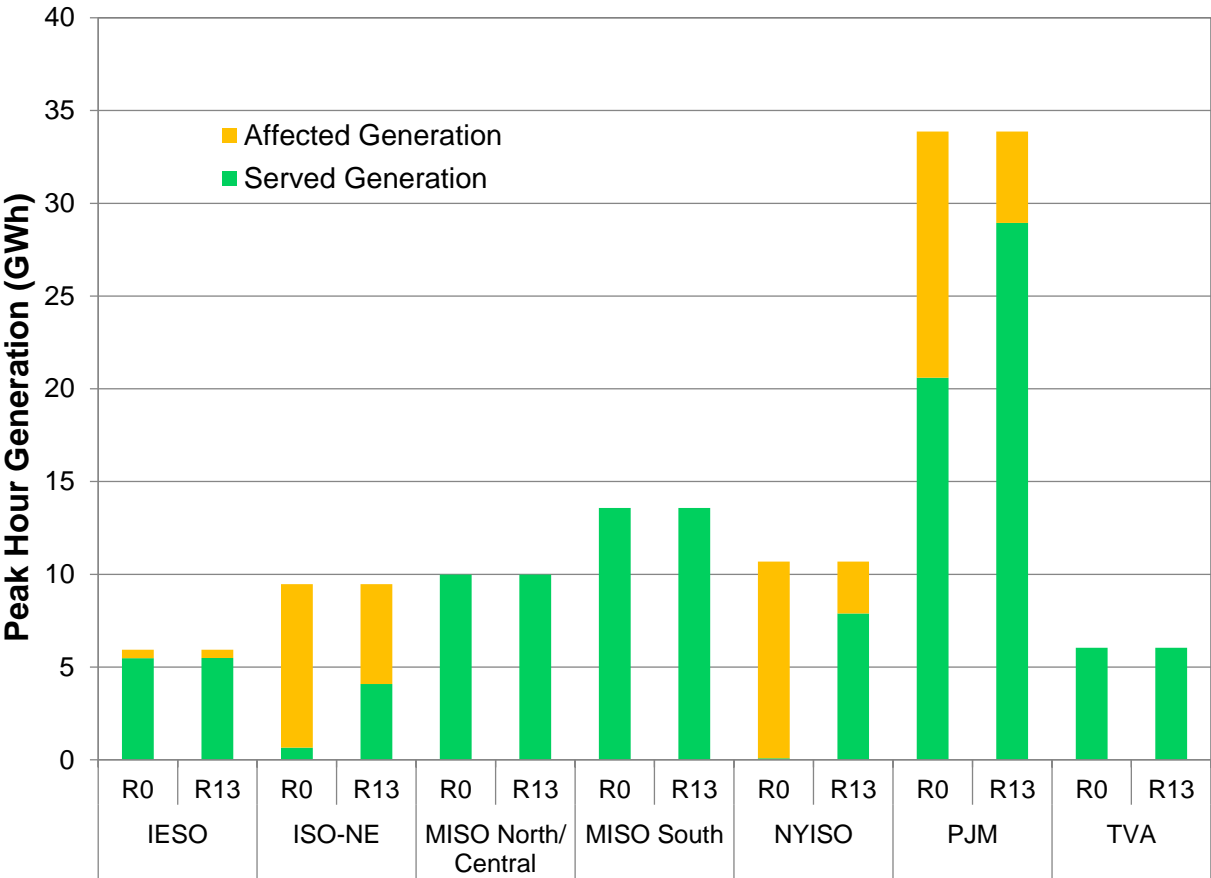


Figure A24-7. RGDS S13 Winter 2023: Peak Hour Affected Generation

Figure A24-8 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A24-5.

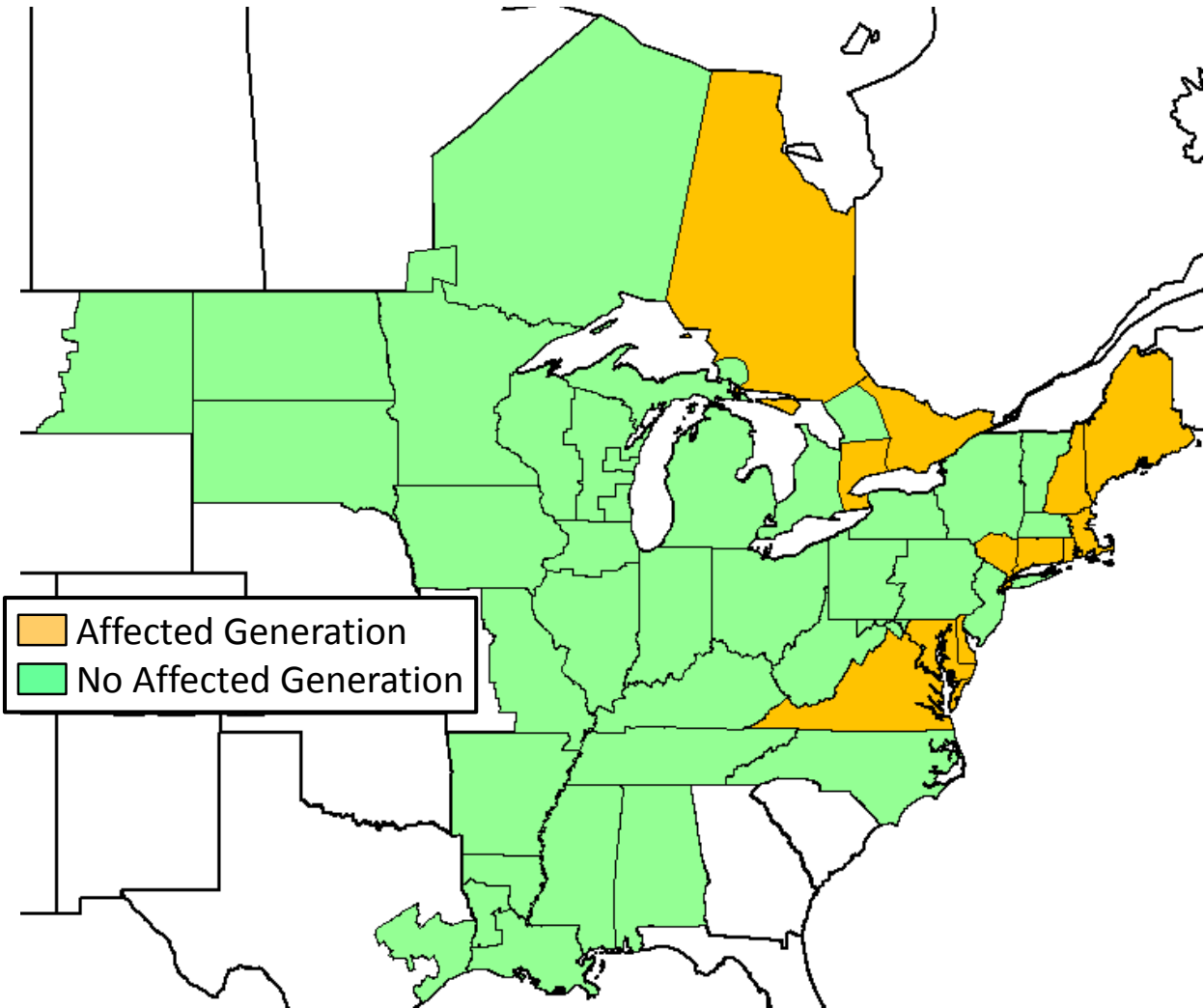


Figure A24-8. RGDS S13 Winter 2023: Locations with Peak Hour Affected Generation

Table A24-5. RGDS S13 Winter 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	15.4	2,122
Delaware	1.1	151
Maine	3.6	506
Maryland Eastern	5.0	539
Massachusetts Eastern	14.6	2,025
New Hampshire	3.5	467
New York City	19.8	2,665
New York Southern	1.3	126
Ontario (CDA)	0.5	55
Ontario (EDA)	2.1	249
Ontario (NDA)	1.1	147
Rhode Island	1.9	262
Virginia	35.4	4,237

Figure A24-9 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A24-7 during the Winter 2023 peak hour.

**Figure A24-9. RGDS S13 Winter 2023: Peak Hour Constraints**

Table A24-6 summarizes the results of the frequency and duration analysis.

Table A24-6. RGDS S13 Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	6	1	52	80
Constitution	2	31	59	90
Dominion Southeast	4	1	52	85
East Tennessee	5	1	5	11
Eastern Shore	12	1	15	63
Iroquois Z1 → Z2	2	31	59	90
Millennium	7	1	37	68
NB/NS Offshore	2	31	59	90
Tennessee Z4 PA	7	1	8	25
Texas Eastern M2 PA South	7	1	46	81
Texas Eastern M3 North	6	1	17	47
TransCanada Ontario West	4	1	6	11
Transco Leidy Atlantic	3	4	59	89
Transco Z5	8	1	2	9
Transco Z6 Leidy to 210	5	1	55	86
Union Gas Dawn	2	1	2	3

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-43 and Figure A25-44 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-45 and Figure A25-46 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-47 and Figure A25-48 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-49 and Figure A25-50 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A25-51 and Figure A25-52 relative to the capacity of the segments.

Iroquois Zone 1 to Zone 2

The 100% peak hour utilization of the link between Iroquois Zone 1 and Iroquois Zone 1, which is modeled with a capacity of 855 MDth/d, potentially affects generators directly connected to Iroquois in New York and Connecticut, and generators behind LDCs served by Iroquois in New York and Connecticut. The locations of these generators are shown in Figure A17-16.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-53 and Figure A25-54 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly

in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-55 and Figure A25-56 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A25-57 and Figure A25-58 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-59 and Figure A25-60 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-61 and Figure A25-62 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A25-63 and Figure A25-64 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-65 and Figure A25-66 relative to the capacity of the segment.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-67 and Figure A25-68 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-69 and Figure A25-70 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-71 and Figure A25-72 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 6,612 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A25-73 and Figure A25-74 relative to the capacity of the segment.

RGDS S13 Summer 2023

Figure A24-10 summarizes the affected generation during the Summer 2023 peak hour by PPA.

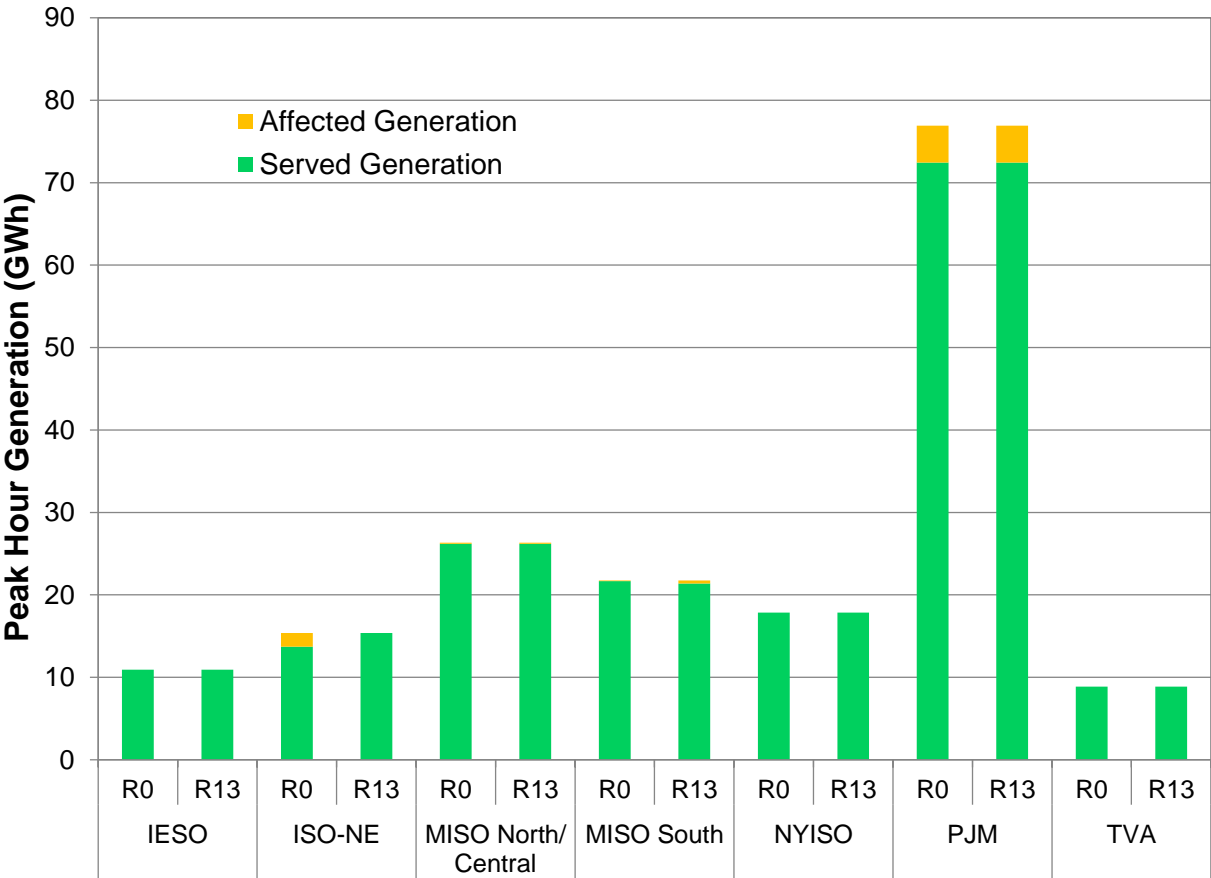


Figure A24-10. RGDS S13 Summer 2023: Peak Hour Affected Generation

Figure A24-11 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A24-7.

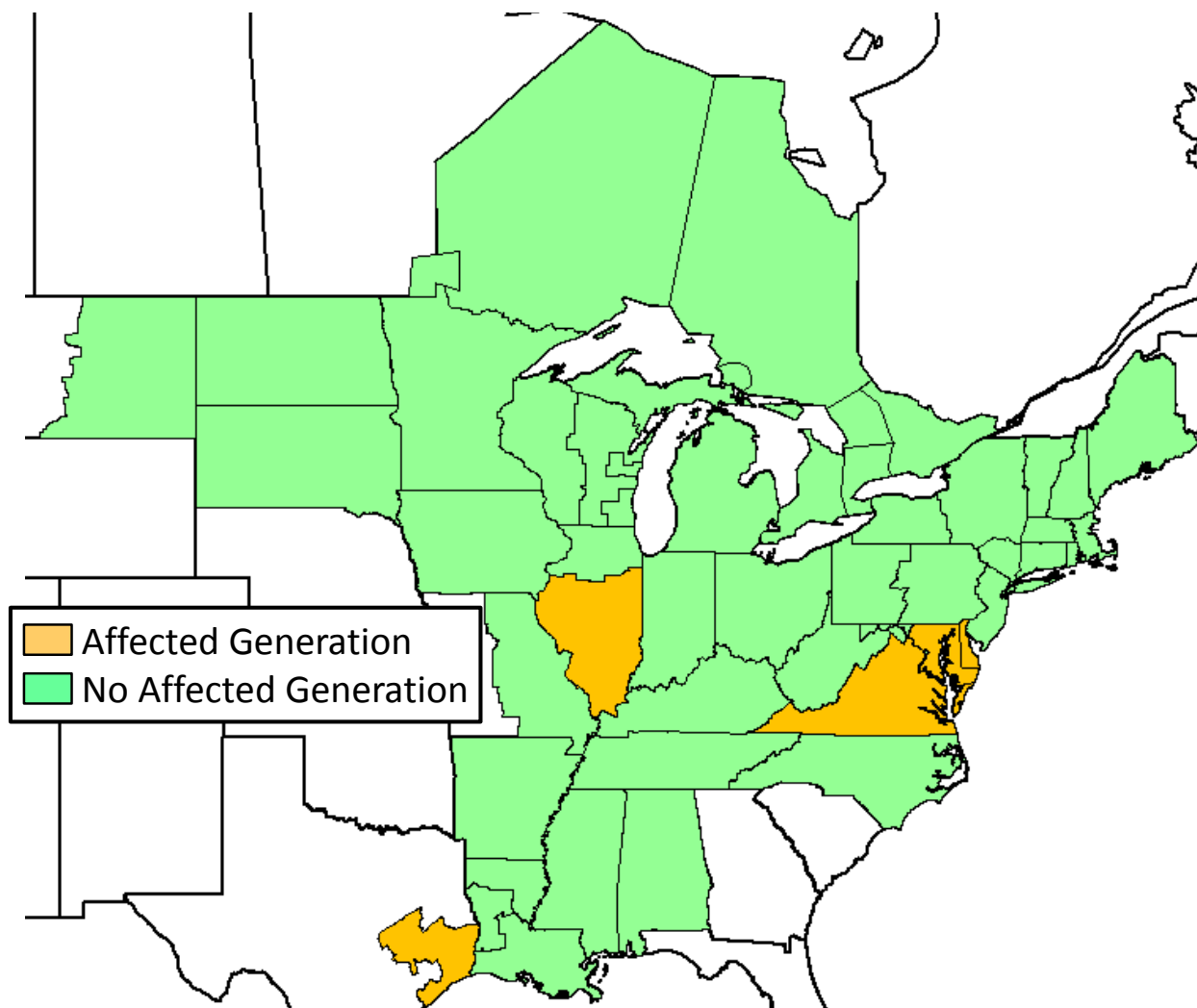


Figure A24-11. RGDS S13 Summer 2023: Locations with Peak Hour Affected Generation

Table A24-7. RGDS S13 Summer 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.5	1,175
Illinois Southern	1.0	112
Maryland Eastern	16.7	2,361
Texas East (SERC)	2.7	383
Virginia	8.4	936

Figure A24-12 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A24-10 during the Summer 2023 peak hour.

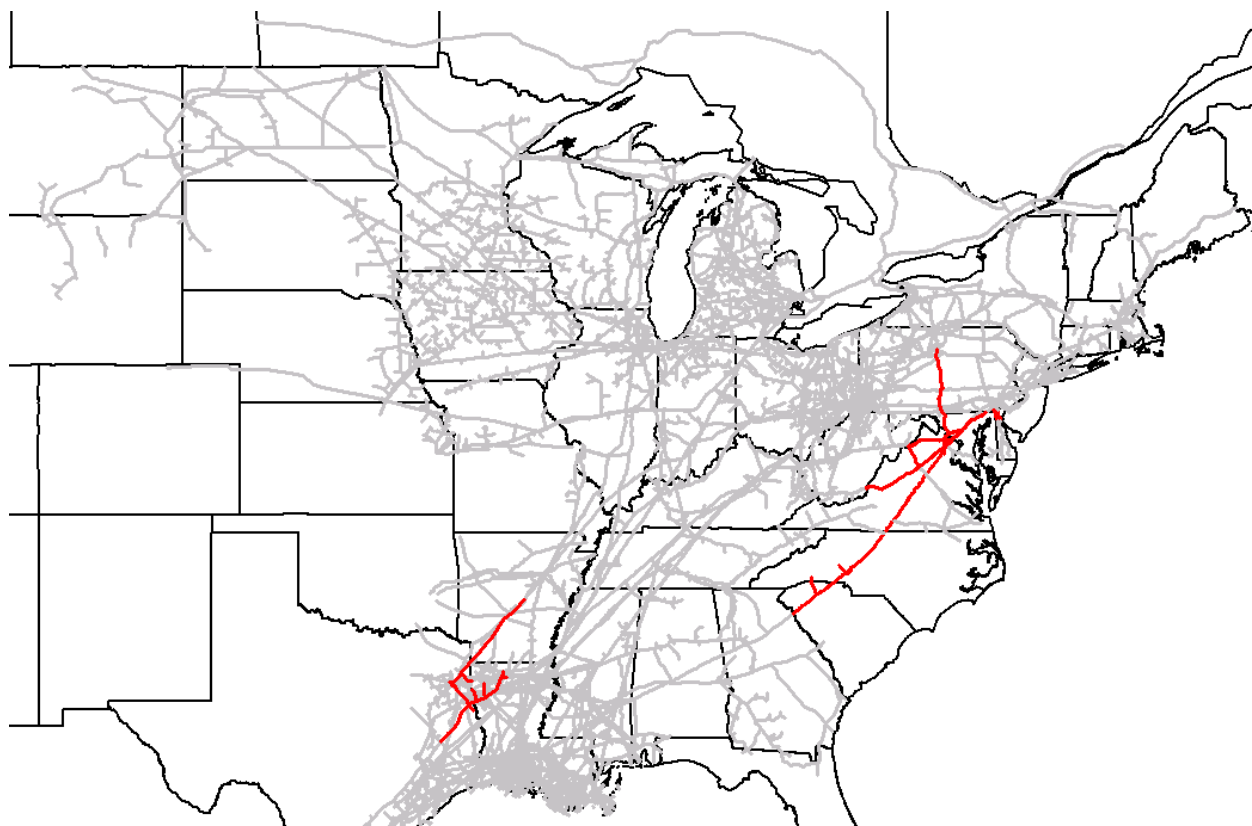


Figure A24-12. RGDS S13 Summer 2023: Peak Hour Constraints

Table A24-8 summarizes the results of the frequency and duration analysis.

Table A24-8. RGDS S13 Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	2	1	3	4
Dominion Southeast	9	1	7	27
Eastern Shore	9	1	7	27
Texas Eastern Zone ETX	7	1	6	17
Transco Z5	6	1	6	16

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia, generators behind LDCs served by Columbia Gas in Maryland and Virginia, and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-75 and Figure A25-76 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-77 and Figure A25-78 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A25-79 and Figure A25-80 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-81 and Figure A25-82 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-83 and Figure A25-84 relative to the capacity of the segment.

S14: Increased Gas Storage Availability

RGDS S14 Winter 2018

Figure A24-13 summarizes the affected generation during the Winter 2018 peak hour by PPA.

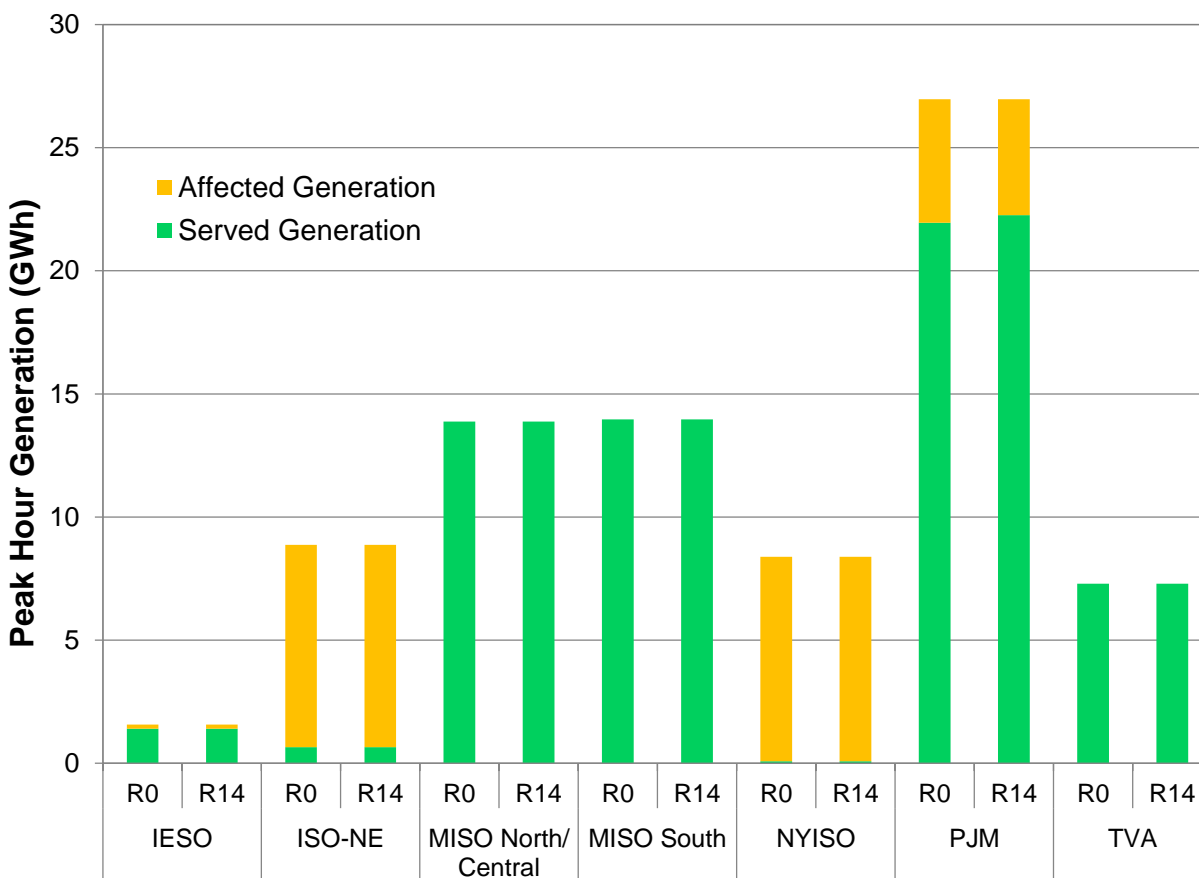


Figure A24-13. RGDS S14 Winter 2018: Peak Hour Affected Generation

Figure A24-14 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A24-9.

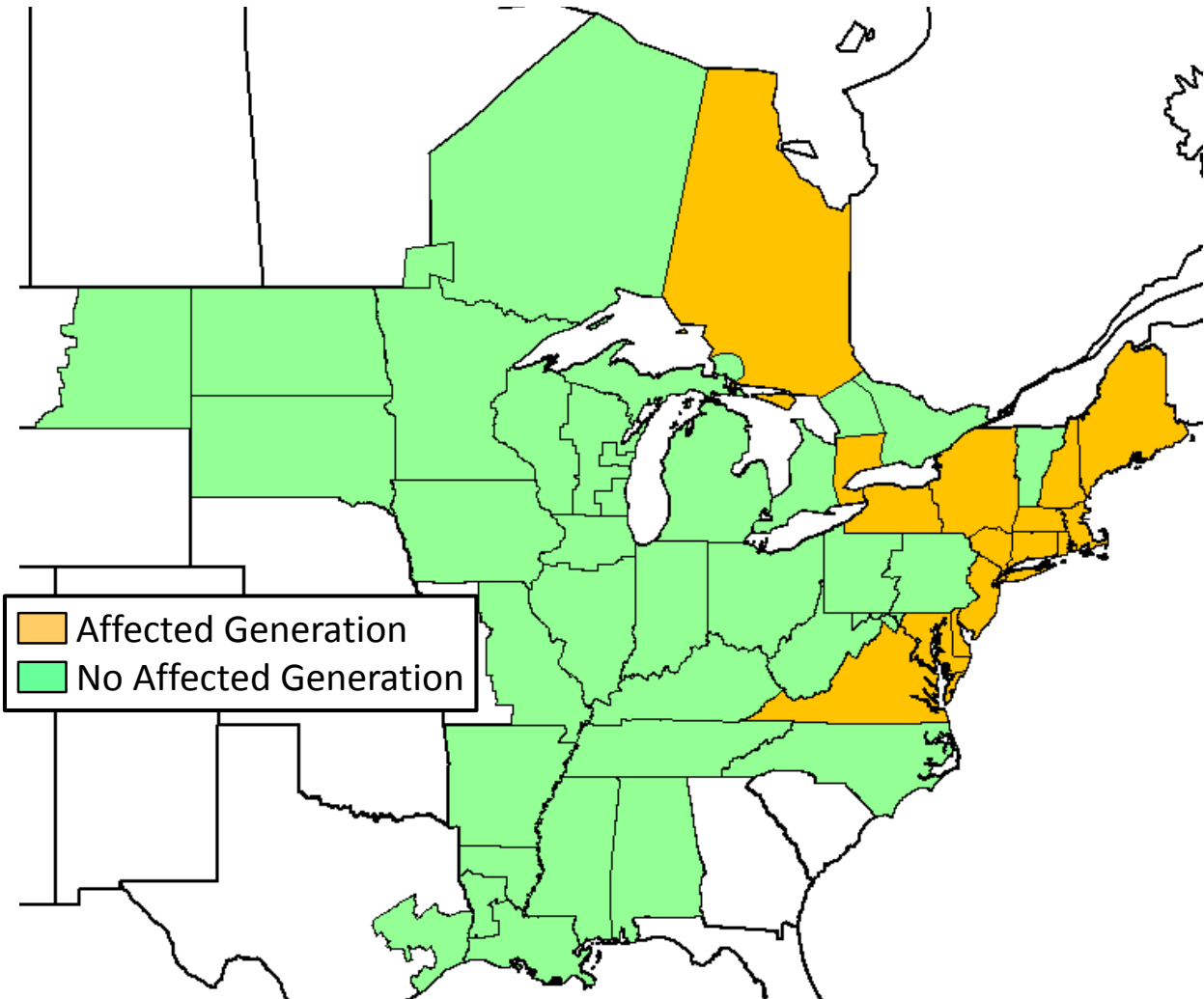


Figure A24-14. RGDS S14 Winter 2018: Locations with Peak Hour Affected Generation

Table A24-9. RGDS S14 Winter 2018: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	16.0	2,200
Delaware	1.6	199
Maine	7.6	1,045
Maryland Eastern	5.0	539
Massachusetts Eastern	12.8	1,781
Massachusetts Western	7.8	1,059
New Hampshire	9.4	1,245
New Jersey	9.8	1,214
New York Central Northern	24.4	3,419
New York City	17.7	2,336
New York Long Island	9.4	1,054
New York Southern	10.9	1,312
New York Western	1.6	179
Ontario (CDA)	0.5	55
Ontario (NDA)	0.8	114
Rhode Island	6.7	887
Virginia	21.0	2,755

Figure A24-15 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A24-13 during the Winter 2018 peak hour.

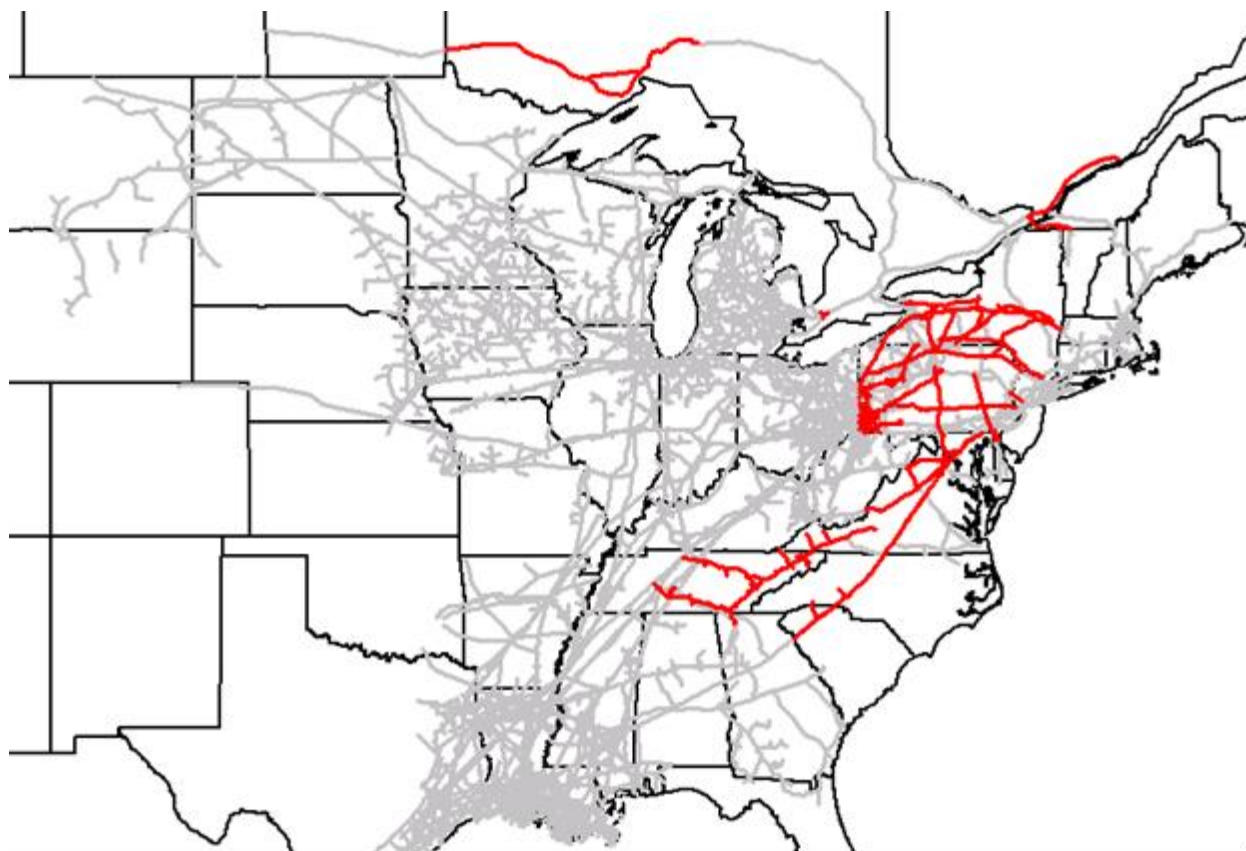


Figure A24-15. RGDS S14 Winter 2018: Peak Hour Constraints

Table A24-10 summarizes the results of the frequency and duration analysis.

Table A24-10. RGDS S14 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	12	1	5	23
Columbia Gas W PA/NY	11	1	5	21
Constitution	5	1	12	25
Dominion Eastern NY	6	1	6	15
Dominion Western NY	1	4	4	4
Dominion Southeast	7	1	12	22
East Tennessee Mainline	7	1	2	9
Eastern Shore	11	1	10	51
Empire Mainline	5	1	12	21
Millennium	4	1	59	83
NB/NS Supply	13	1	20	58
Tennessee Z4 PA	10	1	7	30
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	10	1	15	50
Texas Eastern M3 North	10	2	7	39
TransCanada Ontario West	5	1	5	12
TransCanada Quebec	9	1	14	30
Transco Leidy Atlantic	8	2	23	59
Transco Z5	3	1	7	9
Transco Z6 Leidy to 210	5	1	3	8
Union Gas Dawn	2	1	3	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-85 and Figure A25-86 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-87 and Figure A25-88 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-89 and Figure A25-90 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-91 and Figure A25-92 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-93 and Figure A25-94 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-95 and Figure A25-96 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East

Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-97 and Figure A25-98 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A25-99 and Figure A25-100 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-101 and Figure A25-102 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-103 and Figure A25-104 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A25-105 and Figure A25-106 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-107 and Figure A25-108 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-109 and Figure A25-110 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-111 and Figure A25-112 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators

directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A25-113 and Figure A25-114 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-115 and Figure A25-116 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A25-117 and Figure A25-118 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-119 and Figure A25-120 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-121 and Figure A25-122 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-123 and Figure A25-124 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A25-125 and Figure A25-126 relative to the capacity of the segment.

RGDS S14 Summer 2018

Figure A24-16 summarizes the affected generation during the Summer 2018 peak hour by PPA.

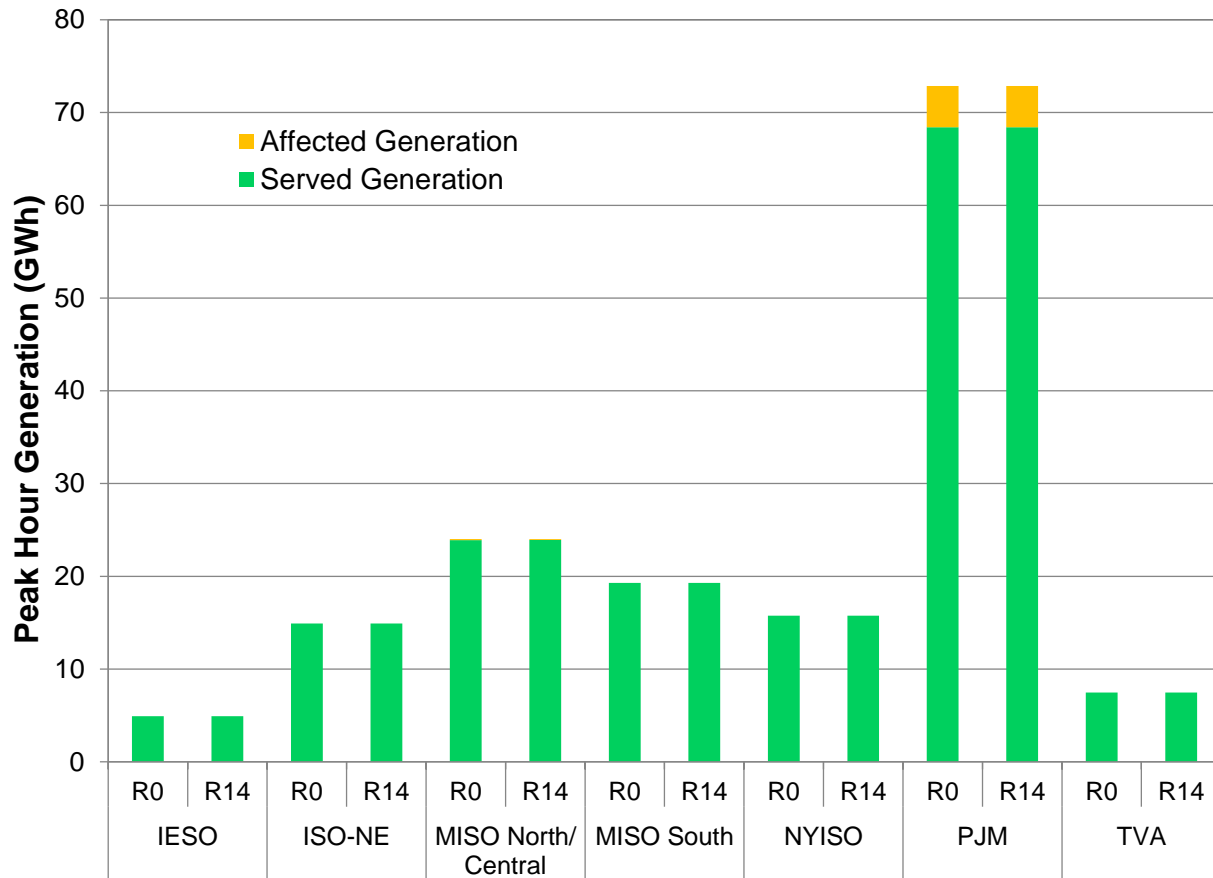


Figure A24-16. RGDS S14 Summer 2018: Peak Hour Affected Generation

Figure A24-17 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A24-11.

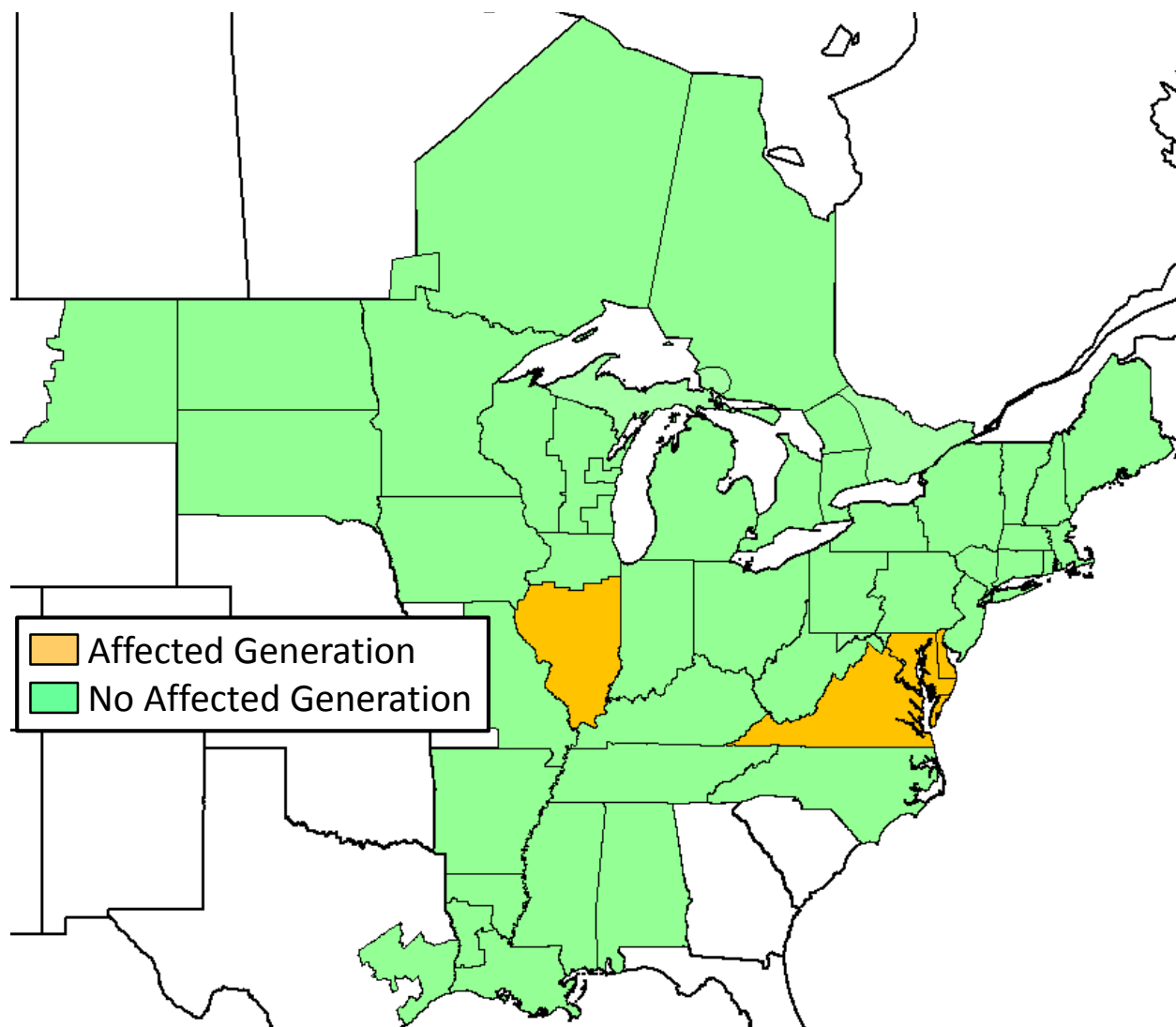


Figure A24-17. RGDS S14 Summer 2018: Locations with Peak Hour Affected Generation

Table A24-11. RGDS S14 Summer 2018 Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.3	1,149
Illinois Southern	0.8	91
Maryland Eastern	16.7	2,361
Virginia	8.4	936

Figure A24-18 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A24-16 during the Summer 2018 peak hour.

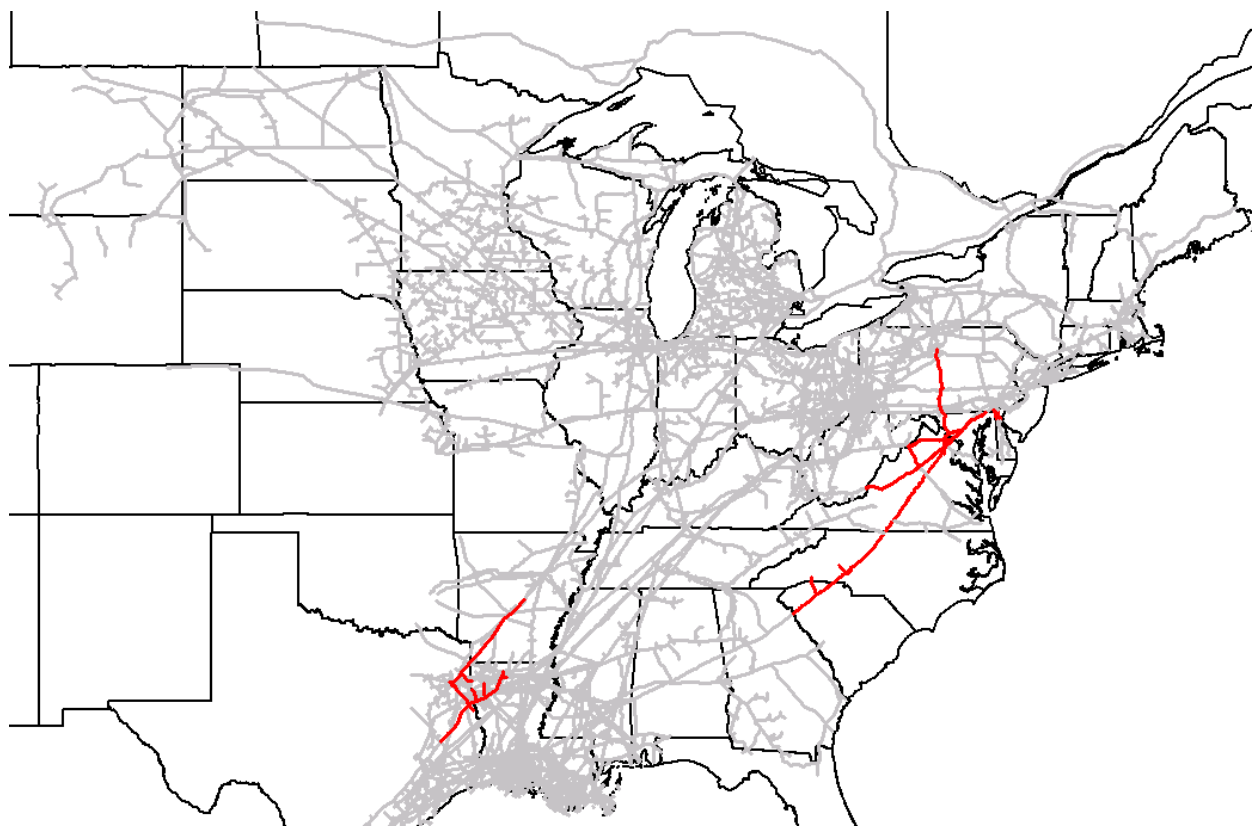


Figure A24-18. RGDS S14 Summer 2018: Peak Hour Constraints

Table A24-12 summarizes the results of the frequency and duration analysis.

Table A24-12. RGDS S14 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	1	1	1	1
Dominion Southeast	3	1	2	5
Eastern Shore	7	1	6	19
Texas Eastern Zone ETX	4	1	6	12
Transco Z5	7	2	6	18

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia, generators behind LDCs served by Columbia Gas in Maryland and Virginia, and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-127 and Figure A25-128 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-129 and Figure A25-130 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A25-131 and Figure A25-132 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-133 and Figure A25-134 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-135 and Figure A25-136 relative to the capacity of the segment.

RGDS S14 Winter 2023

Figure A24-19 summarizes the affected generation during the Winter 2023 peak hour by PPA.

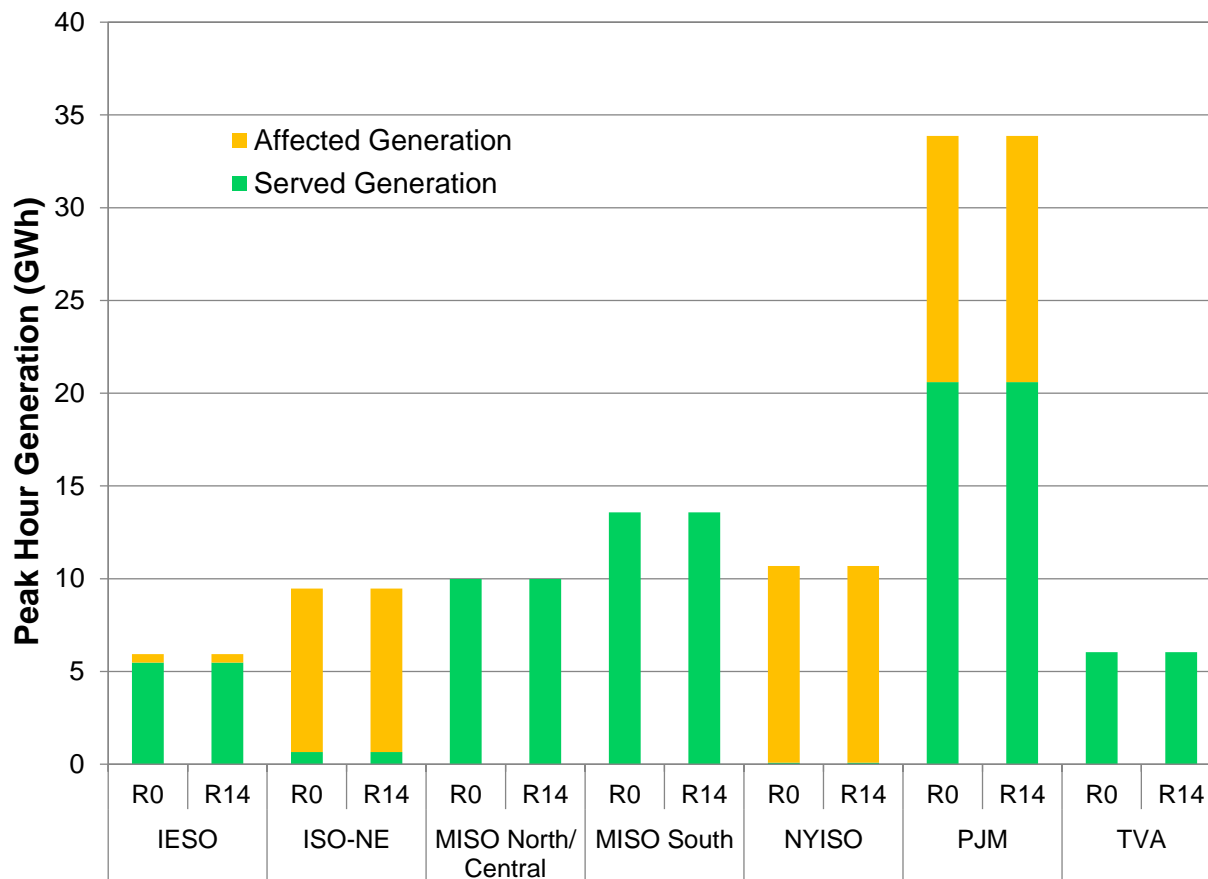


Figure A24-19. RGDS S14 Winter 2023: Peak Hour Affected Generation

Figure A24-20 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A24-13.

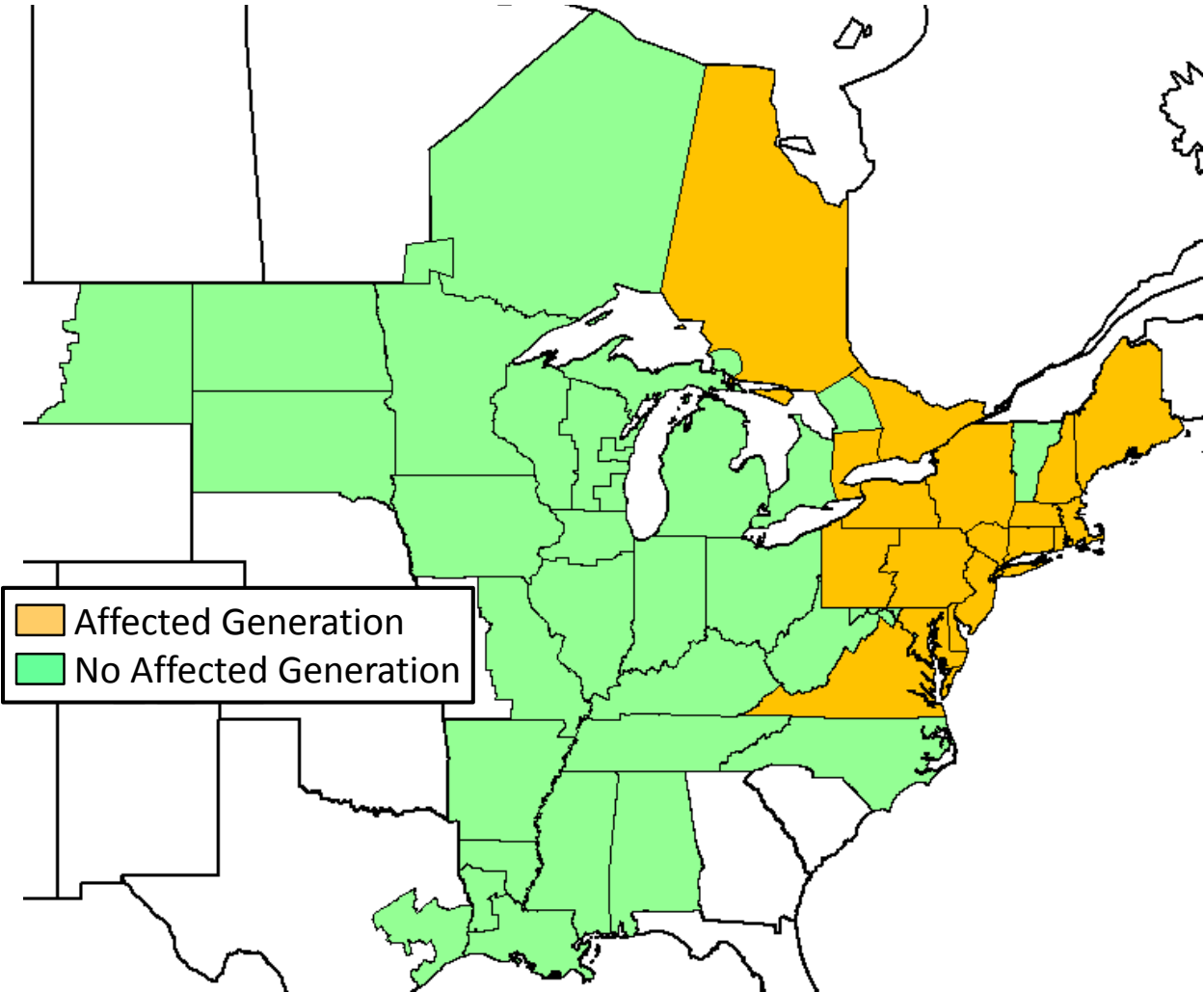


Figure A24-20. RGDS S14 Winter 2023: Locations with Peak Hour Affected Generation

Table A24-13. RGDS S14 Winter 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	15.6	2,140
Delaware	1.3	173
Maine	9.1	1,232
Maryland Eastern	5.0	539
Massachusetts Eastern	14.6	2,025
Massachusetts Western	9.3	1,239
New Hampshire	9.4	1,245
New Jersey	10.7	1,372
New York Central Northern	40.1	4,764
New York City	19.8	2,665
New York Long Island	12.8	1,292
New York Southern	15.1	1,629
New York Western	2.2	247
Ontario (CDA)	0.5	55
Ontario (EDA)	2.1	249
Ontario (NDA)	1.2	155
Pennsylvania Eastern	43.5	5,990
Pennsylvania Western	6.7	961
Rhode Island	7.1	936
Virginia	35.4	4,237

Figure A24-21 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A24-19 during the Winter 2023 peak hour.

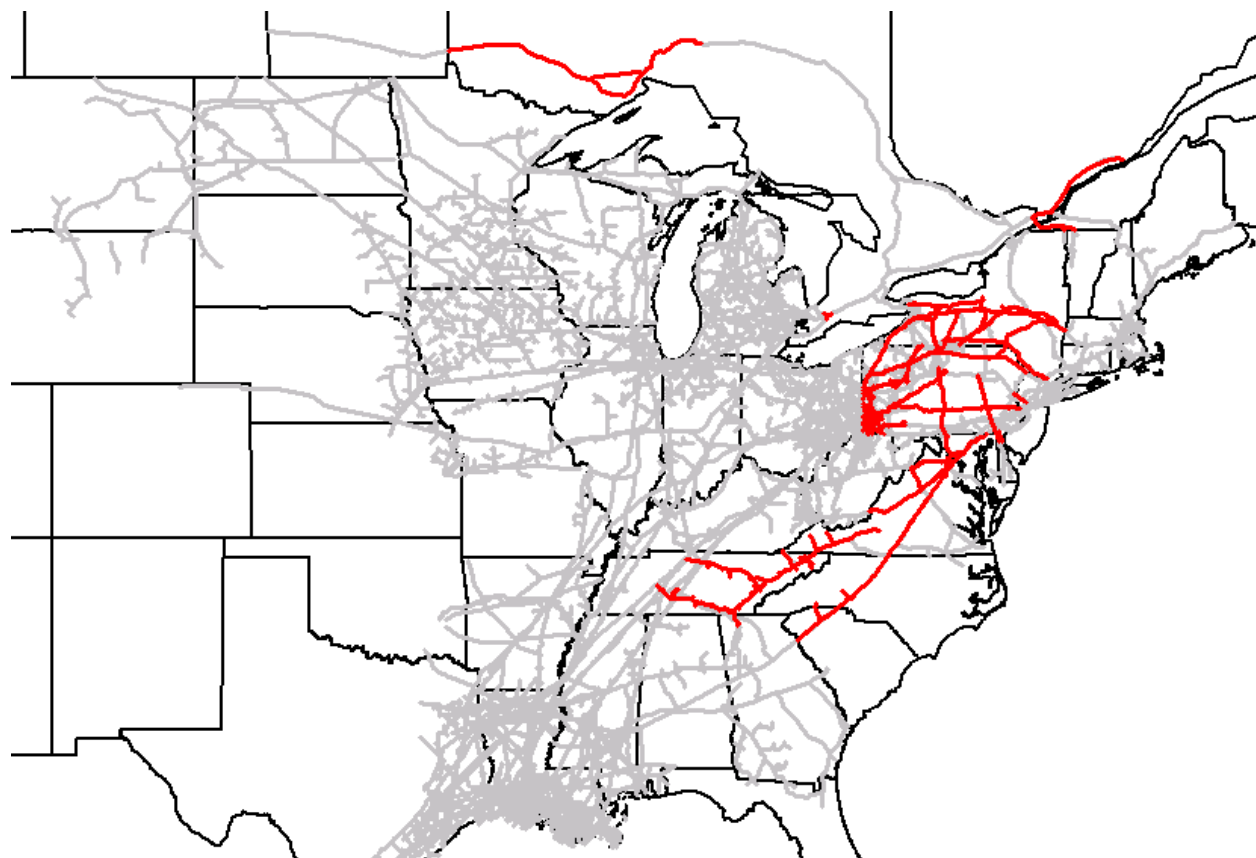


Figure A24-21. RGDS S14 Winter 2023: Peak Hour Constraints

Table A24-14 summarizes the results of the frequency and duration analysis.

Table A24-14. RGDS S14 Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	6	1	52	80
Columbia Gas W PA/NY	15	1	5	28
Constitution	2	31	59	90
Dominion Eastern NY	9	1	16	58
Dominion Western NY	1	5	5	5
Dominion Southeast	4	1	52	85
East Tennessee Mainline	5	1	5	11
Eastern Shore	12	1	15	63
Empire Mainline	8	1	44	61
Millennium	7	1	37	68
NB/NS Supply	2	31	59	90
Tennessee Z4 PA	7	1	8	25
Tennessee Z5 NY	3	1	59	89
Texas Eastern M2 PA South	7	1	46	81
Texas Eastern M3 North	6	1	17	47
TransCanada Ontario West	4	1	6	11
TransCanada Quebec	6	1	14	34
Transco Leidy Atlantic	3	4	59	89
Transco Z5	8	1	2	9
Transco Z6 Leidy to 210	5	1	55	86
Union Gas Dawn	3	1	2	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d over the 2018 capacity. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-137 and Figure A25-138 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-139 and Figure A25-140 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-141 and Figure A25-142 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-143 and Figure A25-144 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-145 and Figure A25-146 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase of 15 MDth/d over 2018. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-147 and Figure A25-148 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-149 and Figure A25-150 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A25-151 and Figure A25-152 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-153 and Figure A25-154 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-155 and Figure A25-156 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects

generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A25-157 and Figure A25-158 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-159 and Figure A25-160 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-161 and Figure A25-162 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-163 and Figure A25-164 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A25-165 and Figure A25-166 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-167 and Figure A25-168 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A25-169 and Figure A25-170 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-171 and Figure A25-172 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-173 and Figure A25-174 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-175 and Figure A25-176 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A25-177 and Figure A25-178 relative to the capacity of the segment.

RGDS S14 Summer 2023

Figure A24-22 summarizes the affected generation during the Summer 2023 peak hour by PPA.

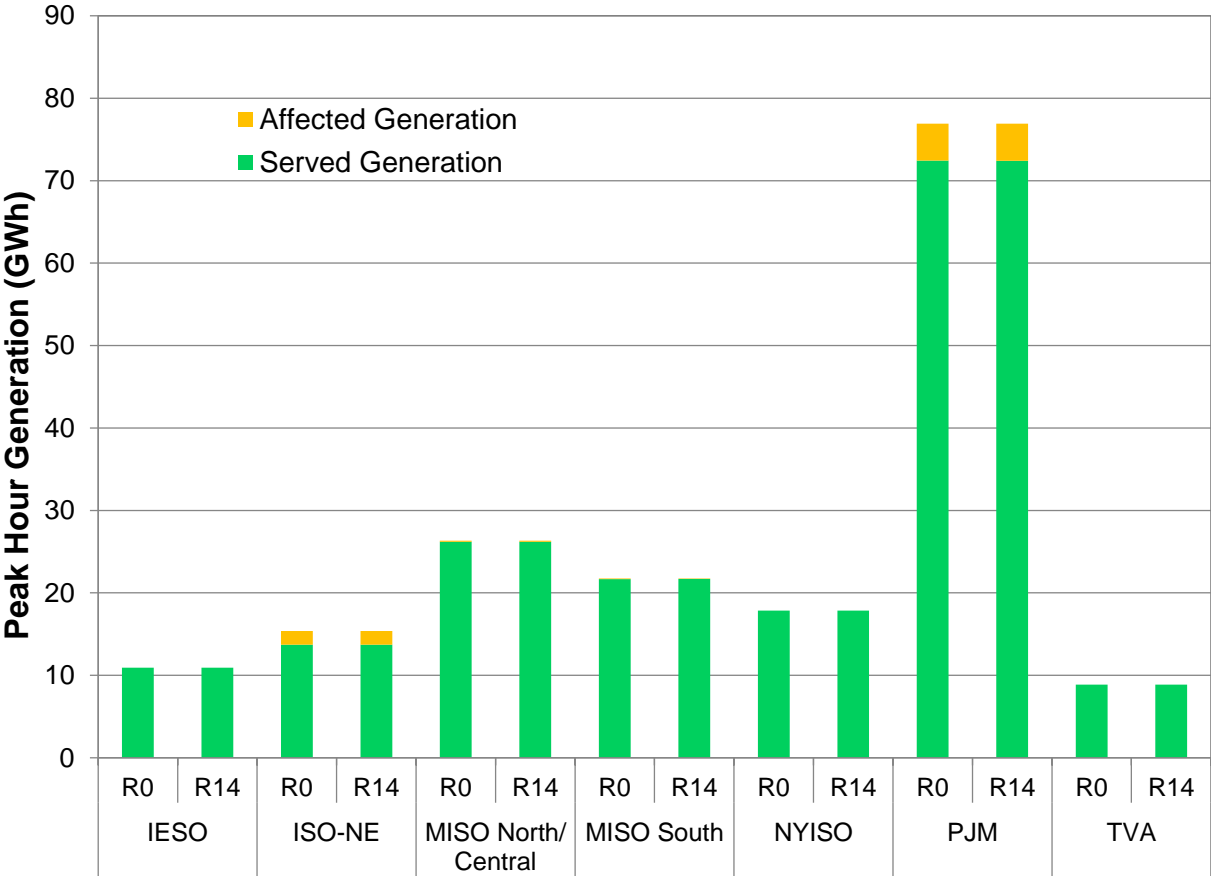


Figure A24-22. RGDS S14 Summer 2023: Peak Hour Affected Generation

Figure A24-23 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A24-15.

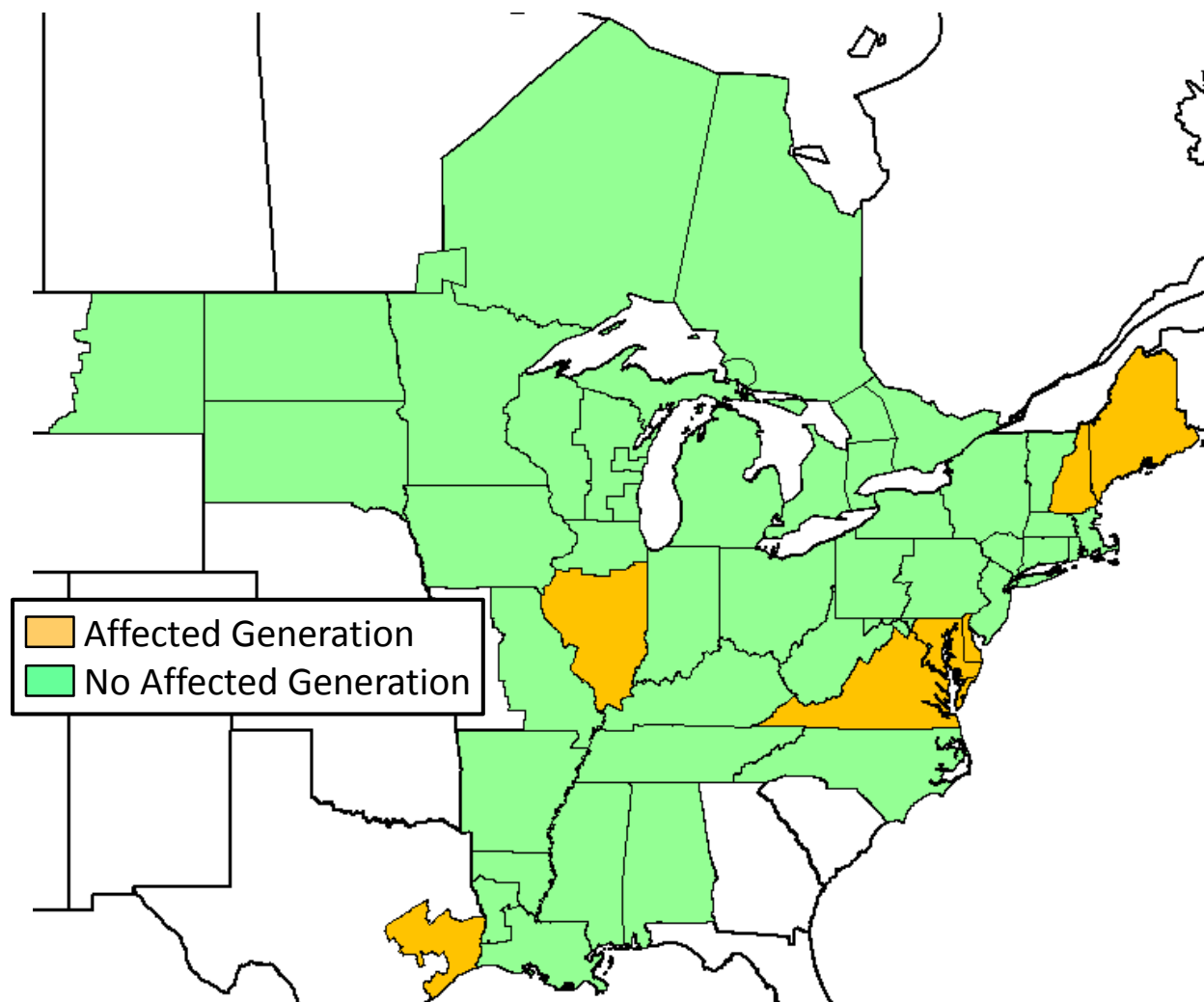


Figure A24-23. RGDS S14 Summer 2023: Locations with Peak Hour Affected Generation

Table A24-15. RGDS S14 Summer 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.5	1,175
Illinois Southern	1.0	112
Maine	6.0	809
Maryland Eastern	16.7	2,361
New Hampshire	7.6	857
Texas East (SERC)	0.4	58
Virginia	8.7	966

Figure A24-24 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A24-22 during the Summer 2023 peak hour.

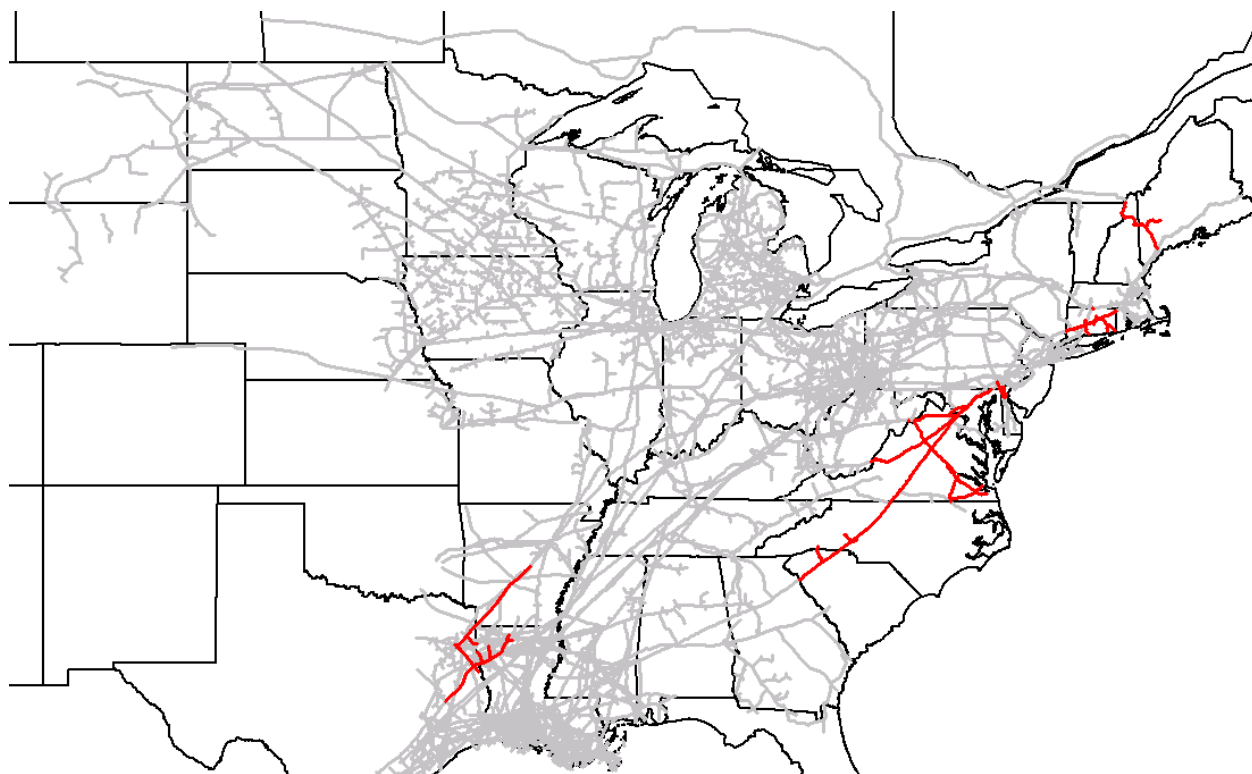


Figure A24-24. RGDS S14 Summer 2023: Peak Hour Constraints

Table A24-16 summarizes the results of the frequency and duration analysis.

Table A24-16. RGDS S14 Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	6	1	3	12
Columbia Gas VA/MD	2	1	3	4
Dominion Southeast	9	1	7	27
Eastern Shore	9	1	7	27
NB/NS Supply	5	2	27	70
PNGTS N of Westbrook	10	1	8	41
Texas Eastern Zone ETX	7	1	6	17
Transco Z5	6	1	6	16

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-179 and Figure A25-180 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-181 and Figure A25-182 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-183 and Figure A25-184 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A25-185 and Figure A25-186 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A25-187 and Figure A25-188 relative to the total production capacity.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-189 and Figure A25-190 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-191 and Figure A25-192 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-193 and Figure A25-194 relative to the capacity of the segment.

S16: Increased Sendout from Canaport and Distrigas LNG Terminals

RGDS S16 Winter 2018

Figure A24-25 summarizes the affected generation during the Winter 2018 peak hour by PPA.

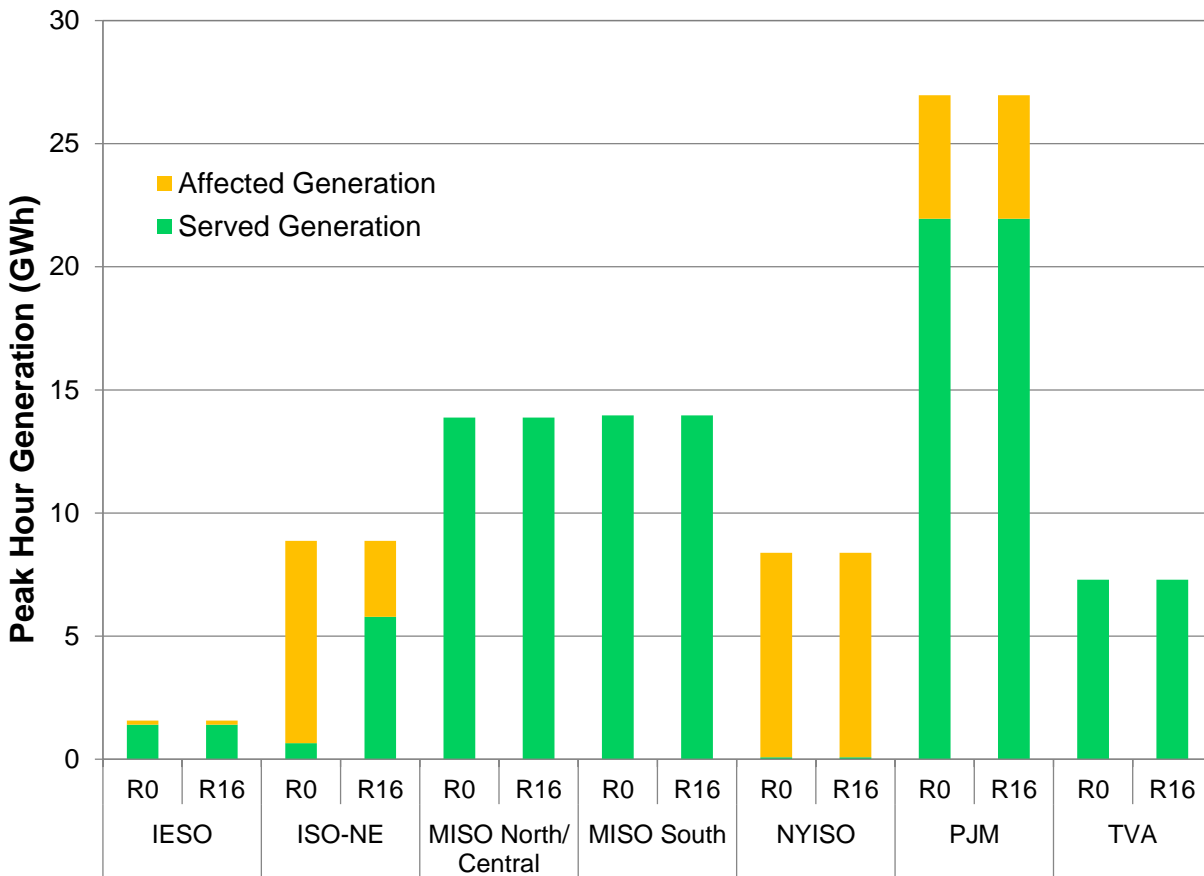


Figure A24-25. RGDS S16 Winter 2018: Peak Hour Affected Generation

Figure A24-26 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A24-17.

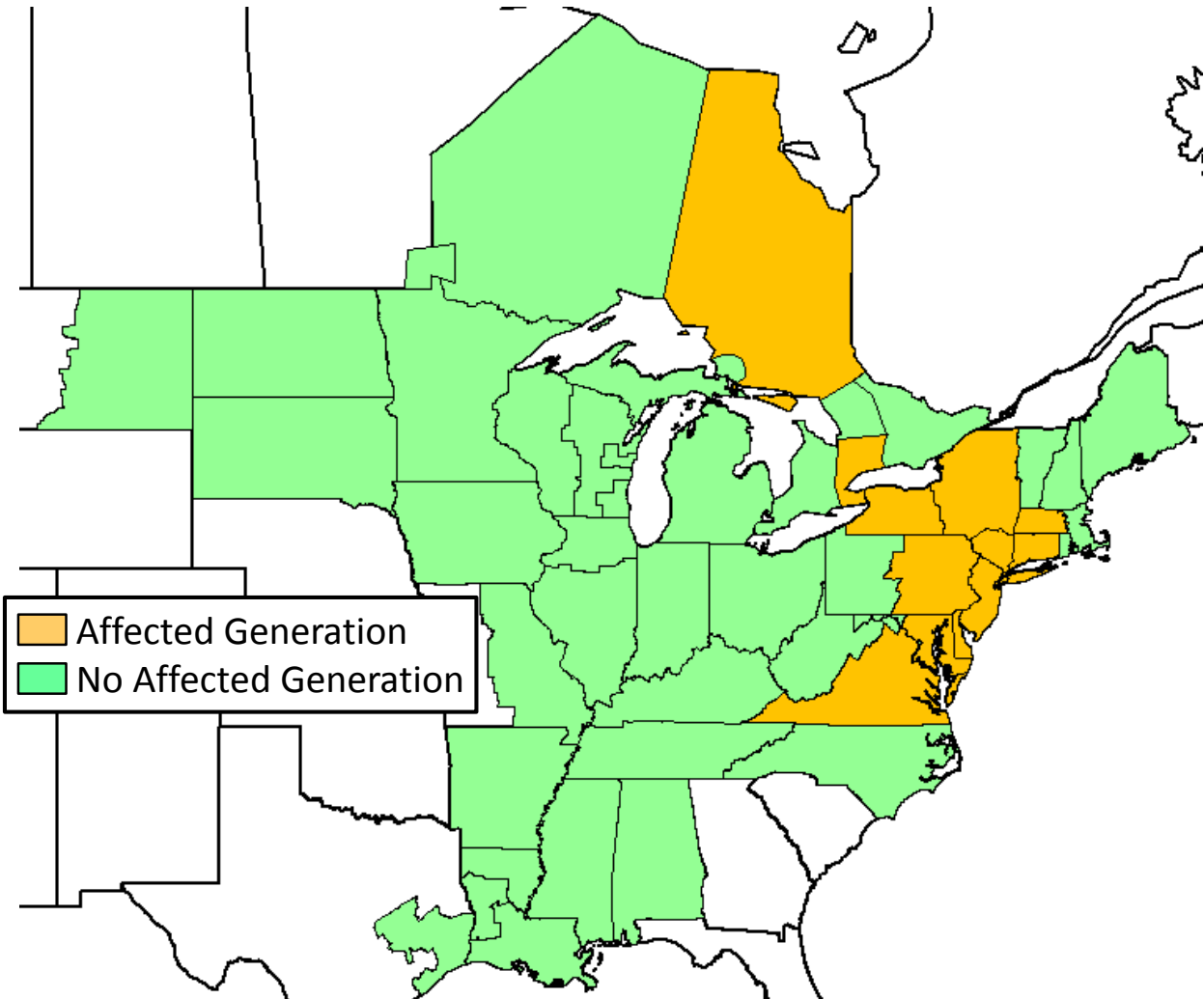


Figure A24-26. RGDS S16 Winter 2018: Locations with Peak Hour Affected Generation

Table A24-17. RGDS S16 Winter 2018: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	15.3	2,104
Delaware	1.6	199
Maryland Eastern	5.0	539
Massachusetts Western	7.3	985
New Jersey	11.2	1,385
New York Central Northern	24.4	3,419
New York City	17.7	2,336
New York Long Island	9.4	1,054
New York Southern	10.9	1,312
New York Western	1.6	179
Ontario (CDA)	0.5	55
Ontario (NDA)	0.8	114
Pennsylvania Eastern	1.0	143
Virginia	21.0	2,755

Figure A24-27 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A24-25 during the Winter 2018 peak hour.

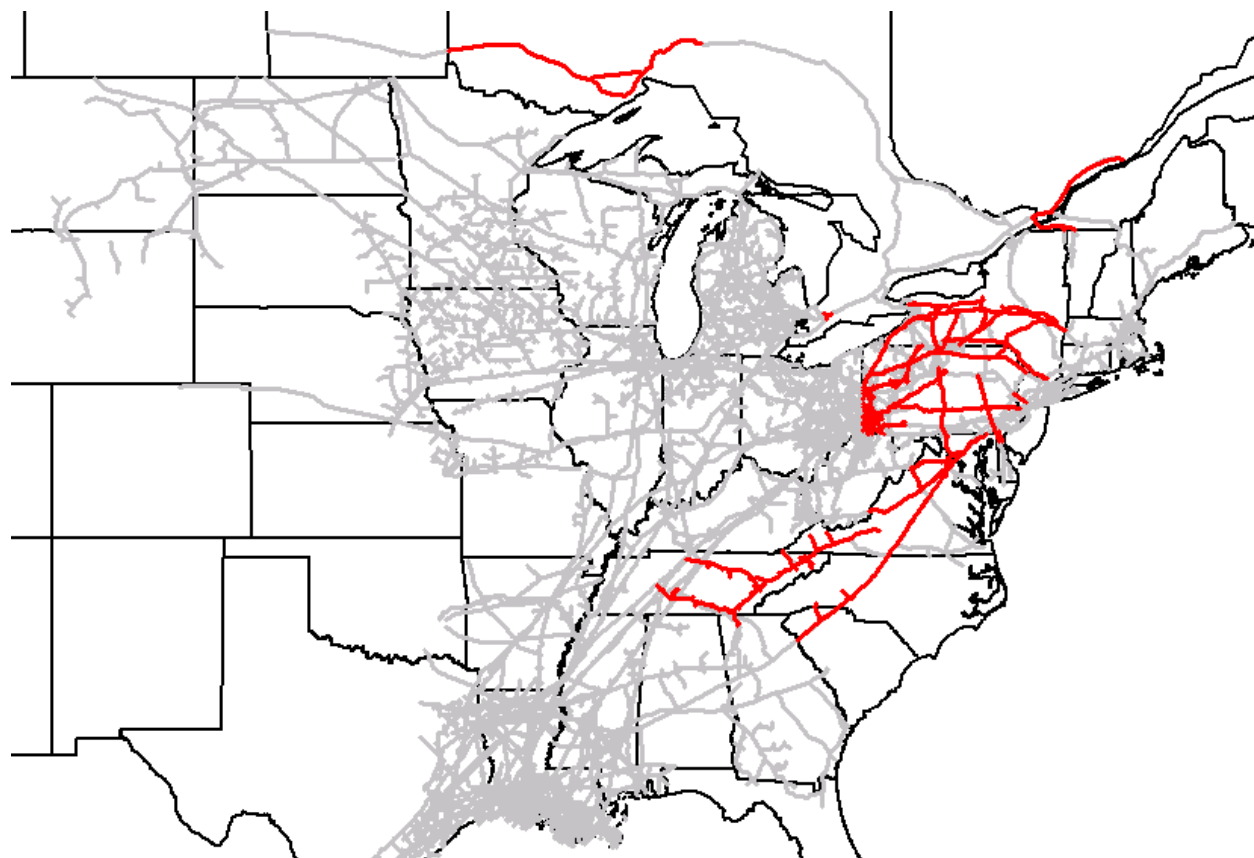


Figure A24-27. RGDS S16 Winter 2018: Peak Hour Constraints

Table A24-18 summarizes the results of the frequency and duration analysis.

Table A24-18. RGDS S16 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	12	1	5	23
Columbia Gas W PA/NY	11	1	5	21
Constitution	5	1	12	25
Dominion Eastern NY	6	1	6	15
Dominion Western NY	1	4	4	4
Dominion Southeast	7	1	12	22
East Tennessee Mainline	7	1	2	9
Eastern Shore	11	1	10	51
Empire Mainline	5	1	12	21
Millennium	12	1	7	29
Tennessee Z4 PA	2	2	2	4
Tennessee Z5 NY	13	1	27	64
Texas Eastern M2 PA South	10	1	15	50
Texas Eastern M3 North	12	1	7	33
TransCanada Ontario West	5	1	5	12
TransCanada Quebec	9	1	14	30
Transco Leidy Atlantic	8	2	23	59
Transco Z5	3	1	7	9
Transco Z6 Leidy to 210	5	1	3	8
Union Gas Dawn	2	1	3	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-195 and Figure A25-196 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-197 and Figure A25-198 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-199 and Figure A25-200 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-201 and Figure A25-202 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-203 and Figure A25-204 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-205 and Figure A25-206 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-207 and Figure A25-208 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A25-209 and Figure A25-210 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-211 and Figure A25-212 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-213 and Figure A25-214 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators

directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-215 and Figure A25-216 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-217 and Figure A25-218 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-219 and Figure A25-220 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A25-221 and Figure A25-222 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-223 and Figure A25-224 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A25-225 and Figure A25-226 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-227 and Figure A25-228 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-229 and Figure A25-230 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-231 and Figure A25-232 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A25-233 and Figure A25-234 relative to the capacity of the segment.

RGDS S16 Summer 2018

Figure A24-28 summarizes the affected generation during the Summer 2018 peak hour by PPA.

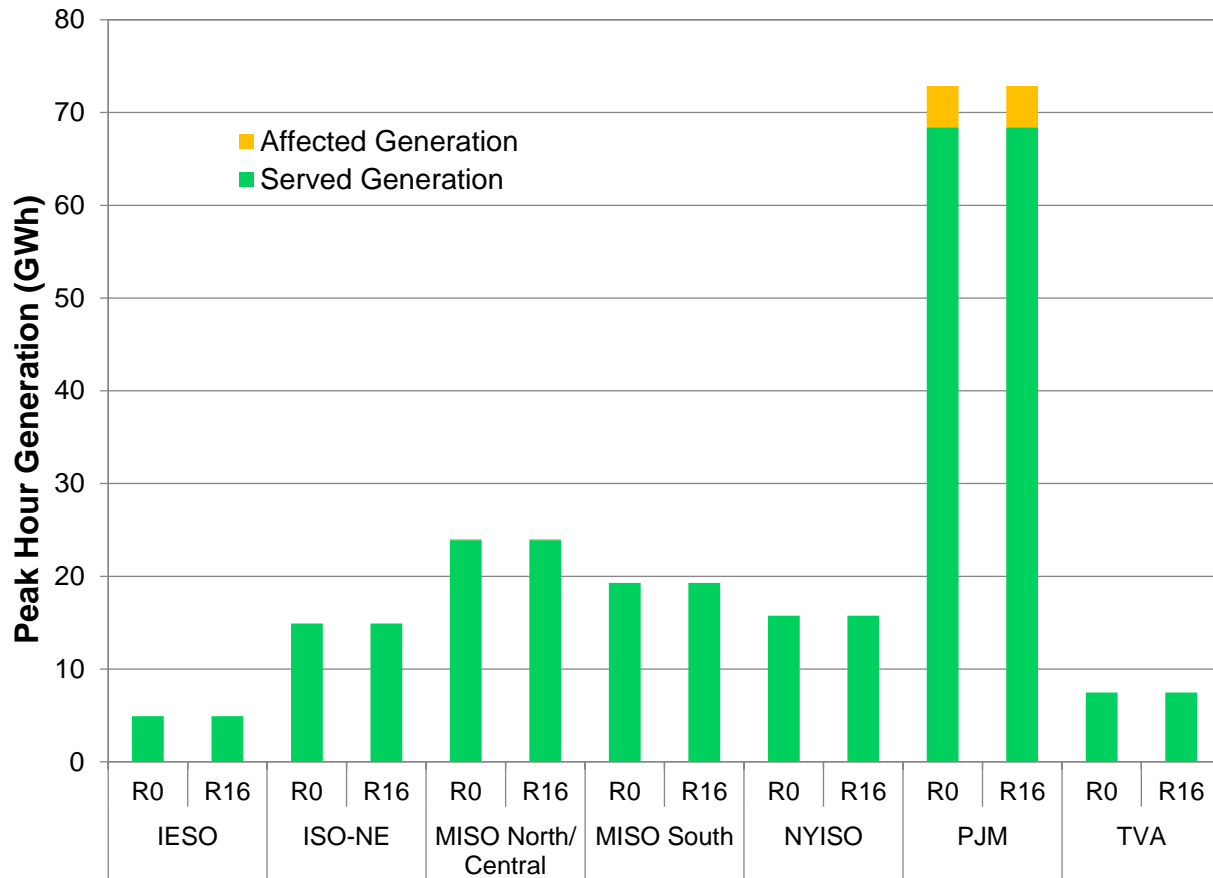


Figure A24-28. RGDS S16 Summer 2018: Peak Hour Affected Generation

Figure A24-29 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A24-19.

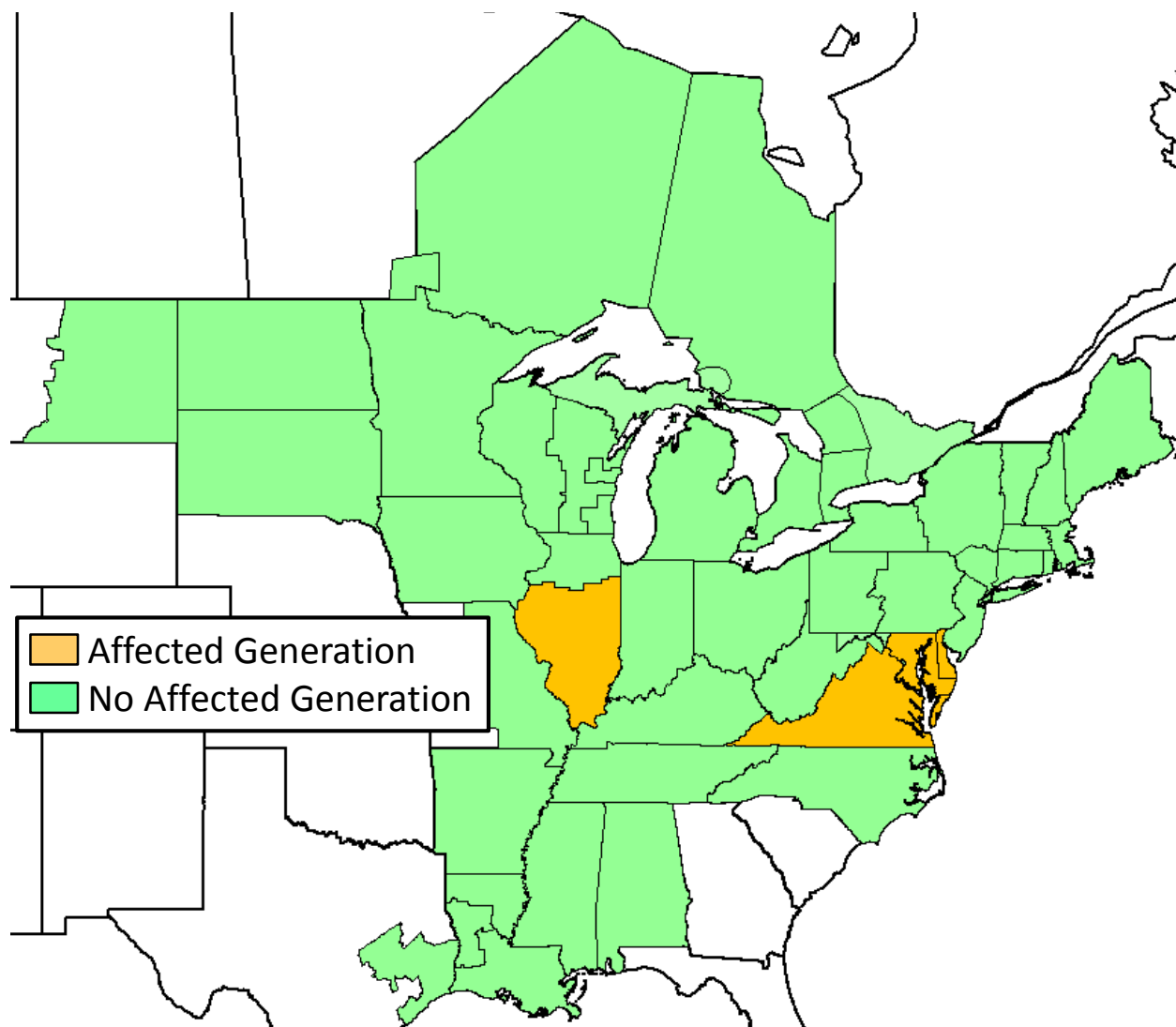


Figure A24-29. RGDS S16 Summer 2018: Locations with Peak Hour Affected Generation

Table A24-19. RGDS S16 Summer 2018 Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.3	1,149
Illinois Southern	1.0	110
Maryland Eastern	16.7	2,361
Virginia	8.4	936

Figure A24-30 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A24-28 during the Summer 2018 peak hour.

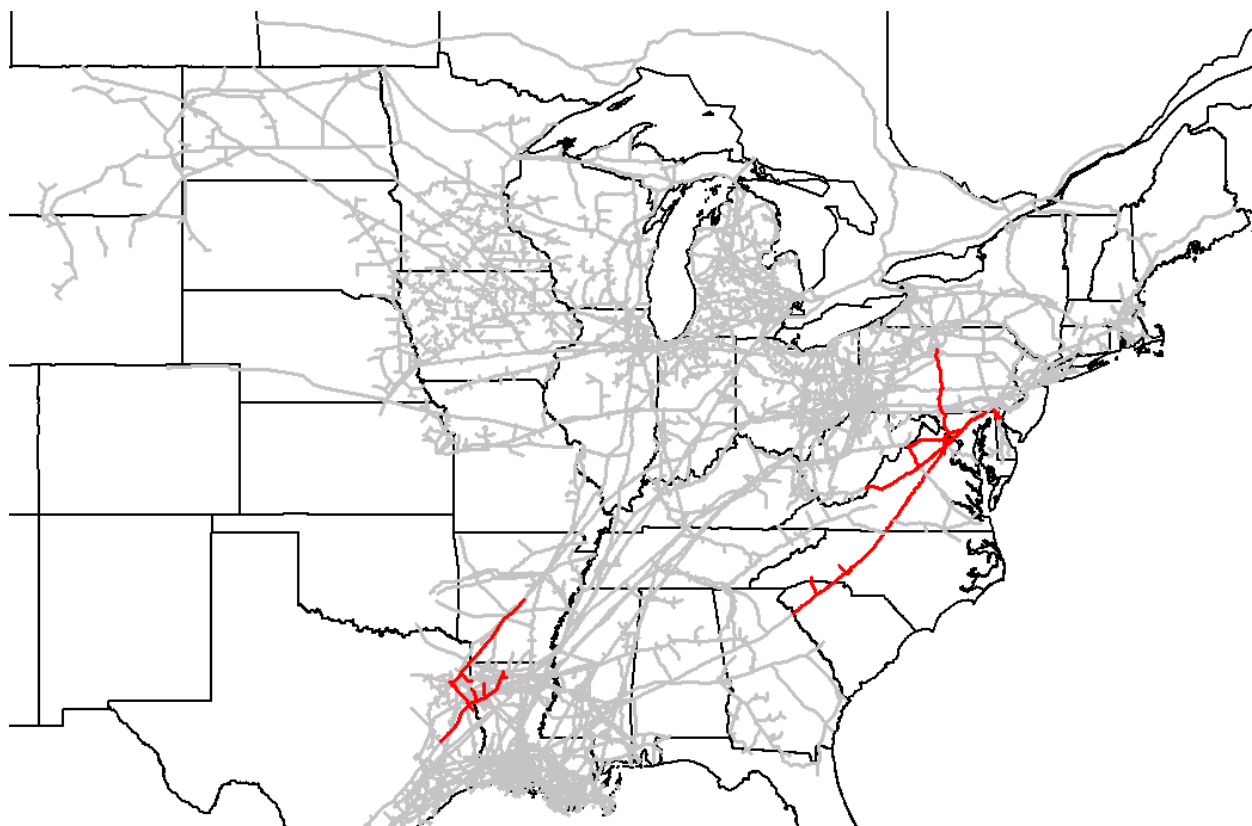


Figure A24-30. RGDS S16 Summer 2018: Peak Hour Constraints

Table A24-20 summarizes the results of the frequency and duration analysis.

Table A24-20. RGDS S16 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	1	1	1	1
Dominion Southeast	3	1	2	5
Eastern Shore	7	1	6	19
Texas Eastern Zone ETX	4	1	6	12
Transco Z5	7	2	6	18

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia, generators behind LDCs served by Columbia Gas in Maryland and Virginia, and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-235 and Figure A25-236 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-237 and Figure A25-238 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A25-239 and Figure A25-240 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-241 and Figure A25-242 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-243 and Figure A25-244 relative to the capacity of the segment.

RGDS S16 Winter 2023

Figure A24-31 summarizes the affected generation during the Winter 2023 peak hour by PPA.

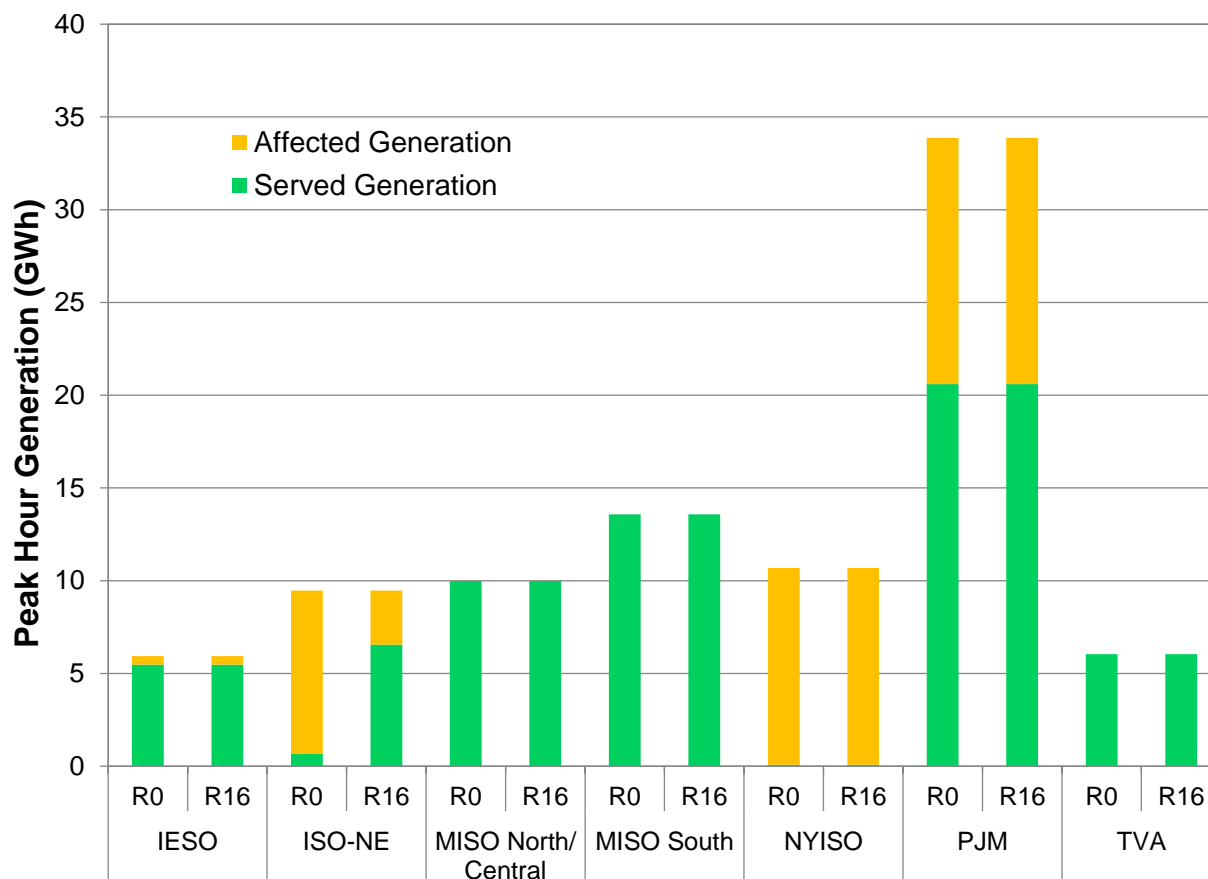


Figure A24-31. RGDS S16 Winter 2023: Peak Hour Affected Generation

Figure A24-32 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A24-21.

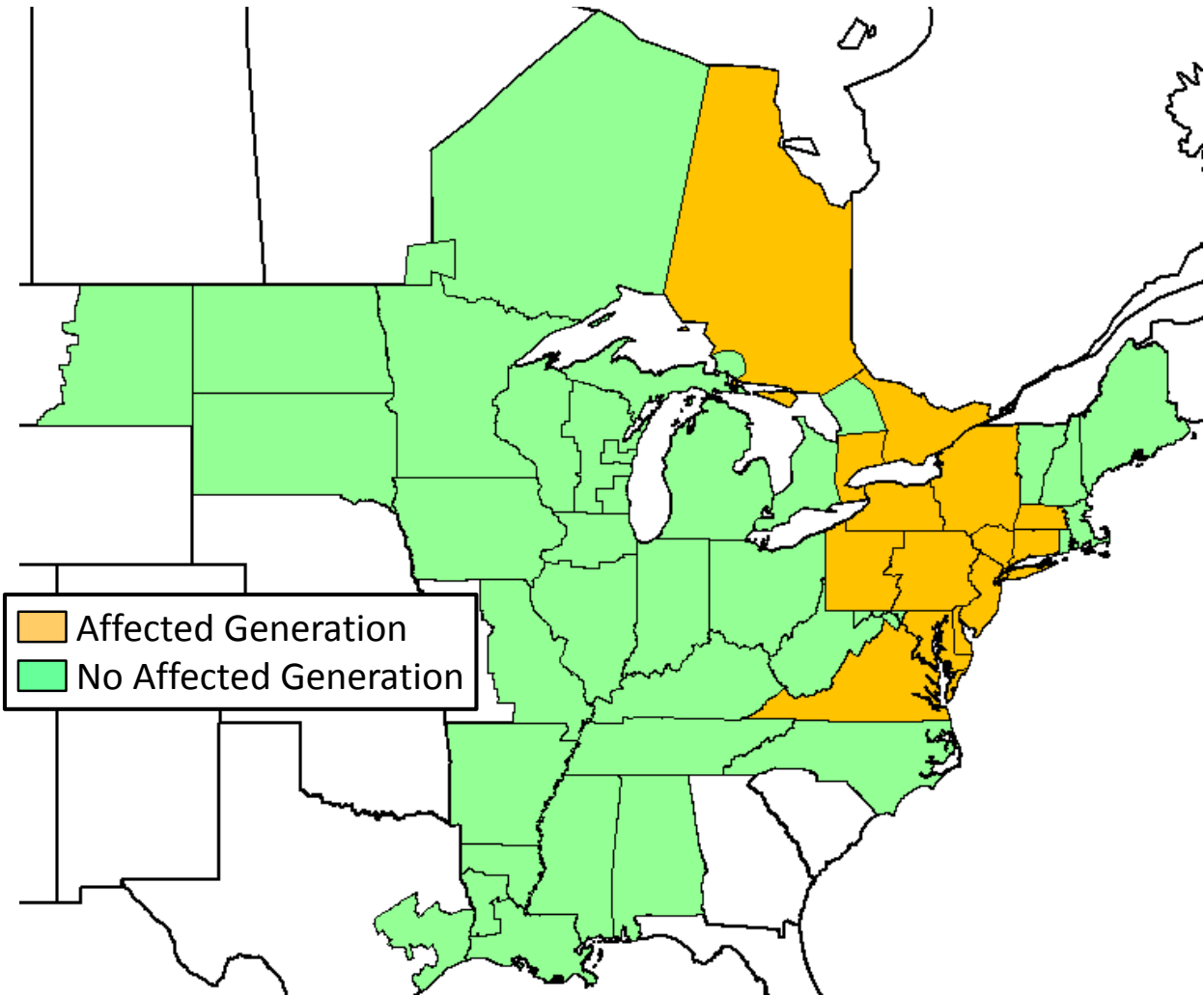


Figure A24-32. RGDS S16 Winter 2023: Locations with Peak Hour Affected Generation

Table A24-21. RGDS S16 Winter 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	13.6	1,878
Delaware	1.3	173
Maryland Eastern	5.0	539
Massachusetts Western	7.9	1,038
New Jersey	10.7	1,372
New York Central Northern	40.1	4,764
New York City	19.8	2,665
New York Long Island	12.8	1,292
New York Southern	15.1	1,629
New York Western	2.2	247
Ontario (CDA)	0.5	55
Ontario (EDA)	2.1	249
Ontario (NDA)	1.2	155
Pennsylvania Eastern	43.5	5,990
Pennsylvania Western	6.7	961
Virginia	35.4	4,237

Figure A24-33 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A24-31 during the Winter 2023 peak hour.

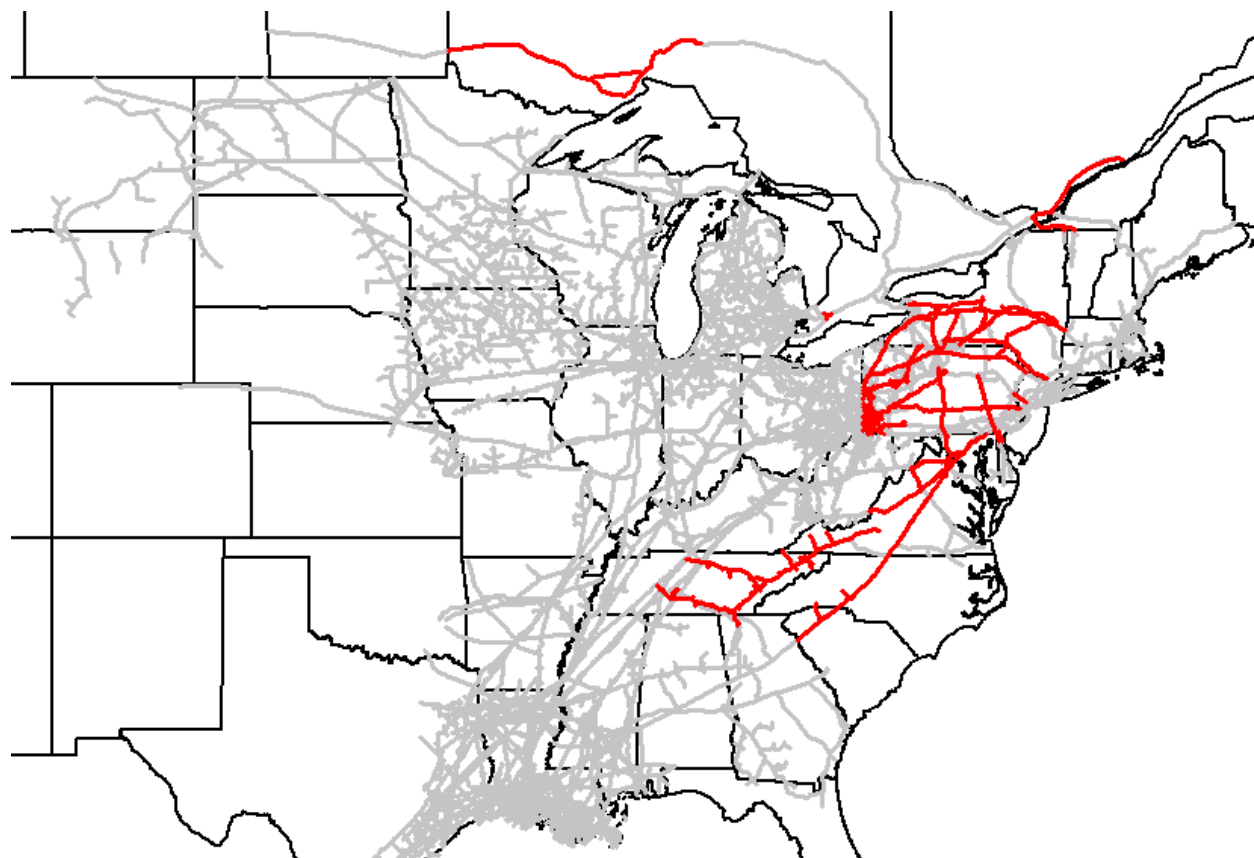


Figure A24-33. RGDS S16 Winter 2023: Peak Hour Constraints

Table A24-22 summarizes the results of the frequency and duration analysis.

Table A24-22. RGDS S16 Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	6	1	52	80
Columbia Gas W PA/NY	15	1	5	28
Constitution	2	31	59	90
Dominion Eastern NY	9	1	16	58
Dominion Western NY	1	5	5	5
Dominion Southeast	4	1	52	85
East Tennessee Mainline	5	1	5	11
Eastern Shore	12	1	15	63
Empire Mainline	8	1	44	61
Millennium	7	1	15	52
Tennessee Z4 PA	7	1	8	25
Tennessee Z5 NY	6	1	48	83
Texas Eastern M2 PA South	7	1	46	81
Texas Eastern M3 North	13	1	10	37
TransCanada Ontario West	4	1	6	11
TransCanada Quebec	6	1	14	34
Transco Leidy Atlantic	3	4	59	89
Transco Z5	8	1	2	9
Transco Z6 Leidy to 210	5	1	55	86
Union Gas Dawn	3	1	2	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas’s Virginia/Maryland segment, which is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d over the 2018 capacity. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-245 and Figure A25-246 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas’s Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-247 and Figure A25-248 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-249 and Figure A25-250 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-251 and Figure A25-252 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-253 and Figure A25-254 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase of 15 MDth/d over 2018. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-255 and Figure A25-256 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-257 and Figure A25-258 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A25-259 and Figure A25-260 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-261 and Figure A25-262 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-263 and Figure A25-264 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators

directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-265 and Figure A25-266 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-267 and Figure A25-268 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-269 and Figure A25-270 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A25-271 and Figure A25-272 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-273 and Figure A25-274 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A25-275 and Figure A25-276 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-277 and Figure A25-278 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-279 and Figure A25-280 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-281 and Figure A25-282 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A25-283 and Figure A25-284 relative to the capacity of the segment.

RGDS S16 Summer 2023

Figure A24-34 summarizes the affected generation during the Summer 2023 peak hour by PPA.

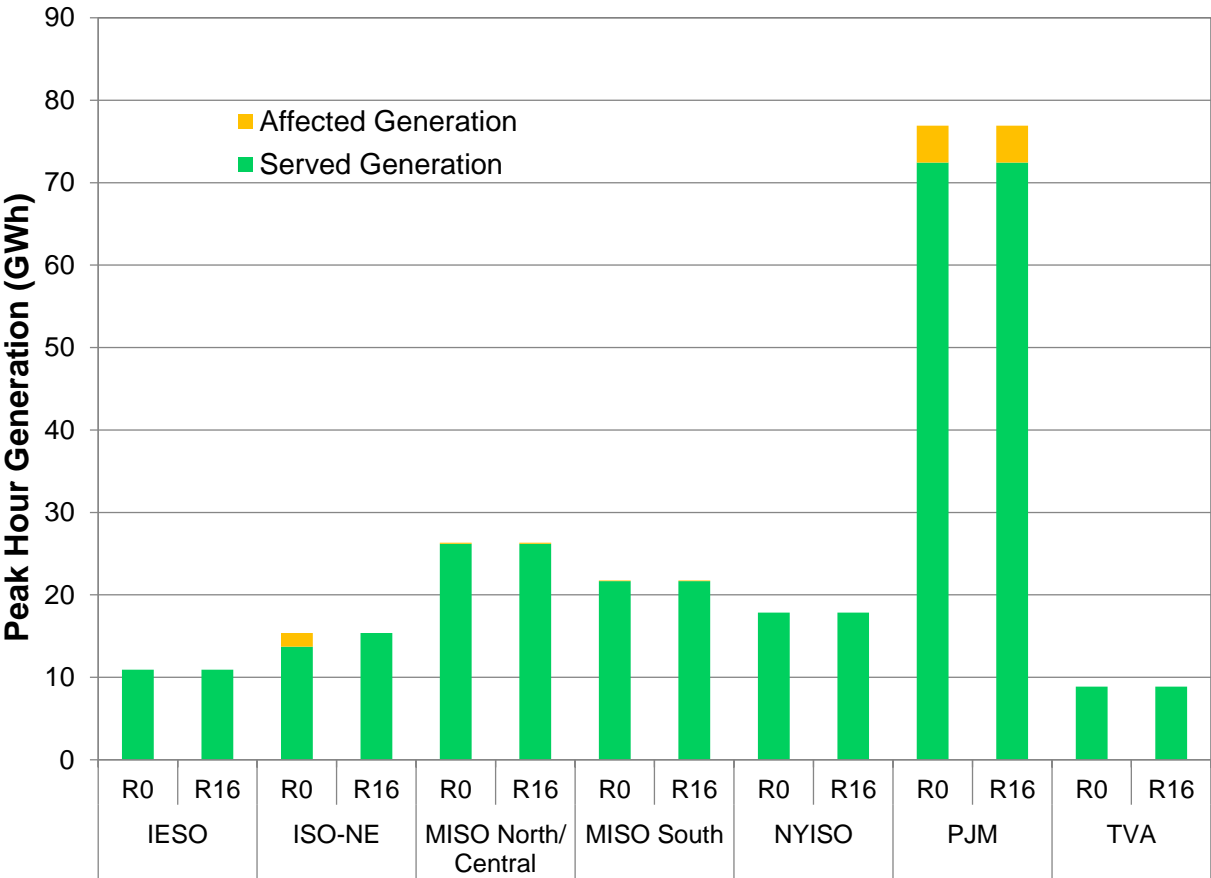


Figure A24-34. RGDS S16 Summer 2023: Peak Hour Affected Generation

Figure A24-35 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A24-23.

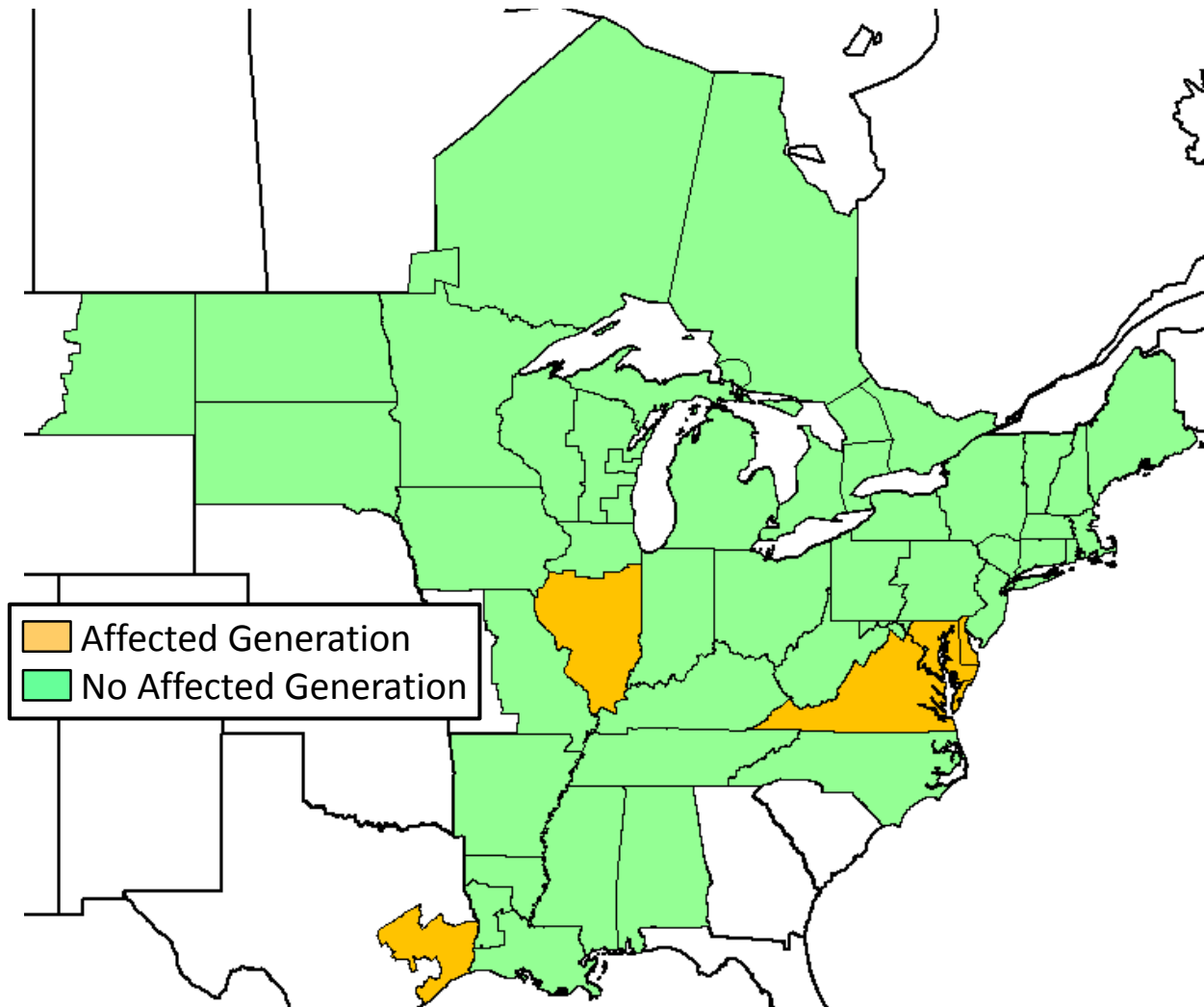


Figure A24-35. RGDS S16 Summer 2023: Locations with Peak Hour Affected Generation

Table A24-23. RGDS S16 Summer 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.5	1,175
Illinois Southern	1.0	112
Maryland Eastern	16.7	2,361
Texas East (SERC)	0.6	81
Virginia	8.4	936

Figure A24-36 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A24-34 during the Summer 2023 peak hour.

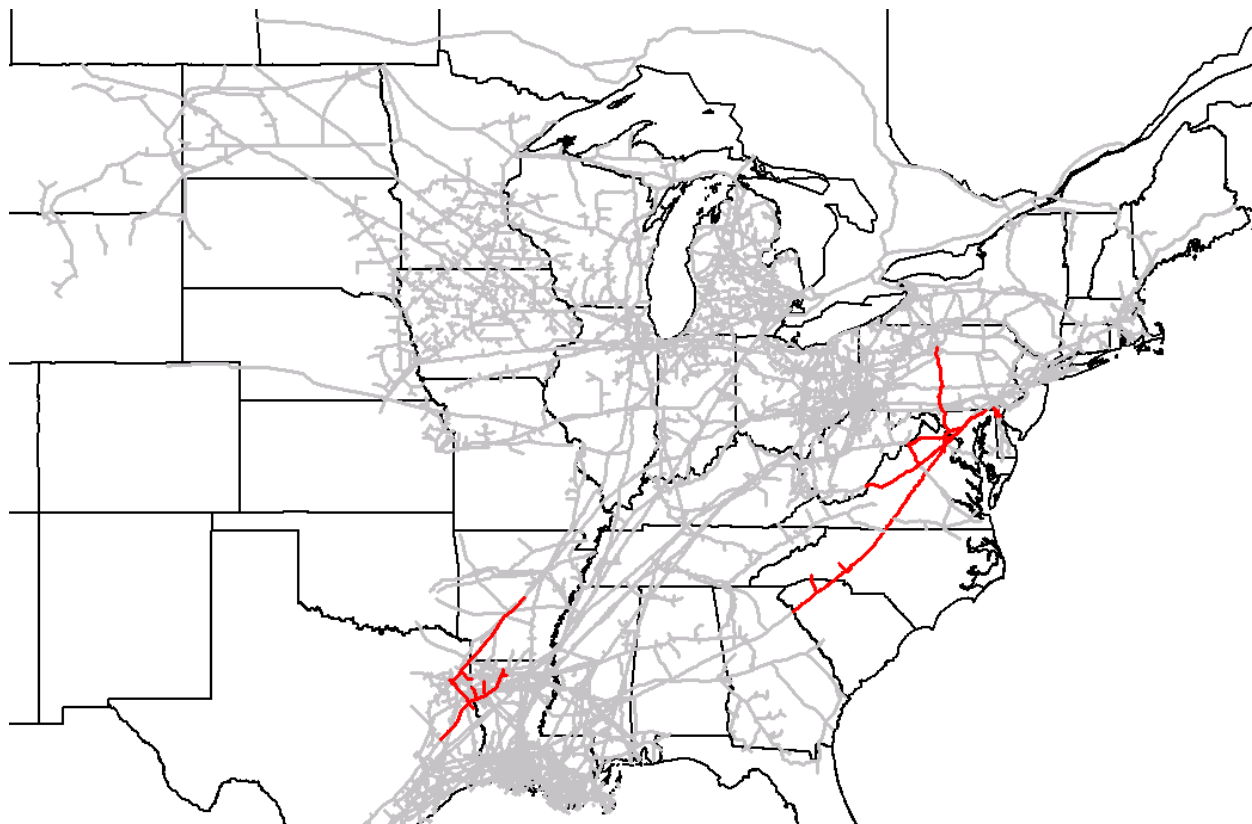


Figure A24-36. RGDS S16 Summer 2023: Peak Hour Constraints

Table A24-24 summarizes the results of the frequency and duration analysis.

Table A24-24. RGDS S16 Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	2	1	3	4
Dominion Southeast	9	1	7	27
Eastern Shore	9	1	7	27
Texas Eastern Zone ETX	7	1	6	17
Transco Z5	6	1	6	16

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas’s Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia, generators behind LDCs served by Columbia Gas in Maryland and Virginia, and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-285 and Figure A25-286 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-287 and Figure A25-288 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A25-289 and Figure A25-290 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-291 and Figure A25-292 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A25-293 and Figure A25-294 relative to the capacity of the segment.

Appendix 25

S13, S14 and S16 Chronological and Descending Demand Figures

(Contains CEII – Not included in this Volume)

Appendix 26
Increased Electric Load or Industrial Demand Sensitivities
S18 and S19

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S18: High Electric Load Growth

RGDS S18 Winter 2018

Figure A26-1 summarizes the affected generation during the Winter 2018 peak hour by PPA.

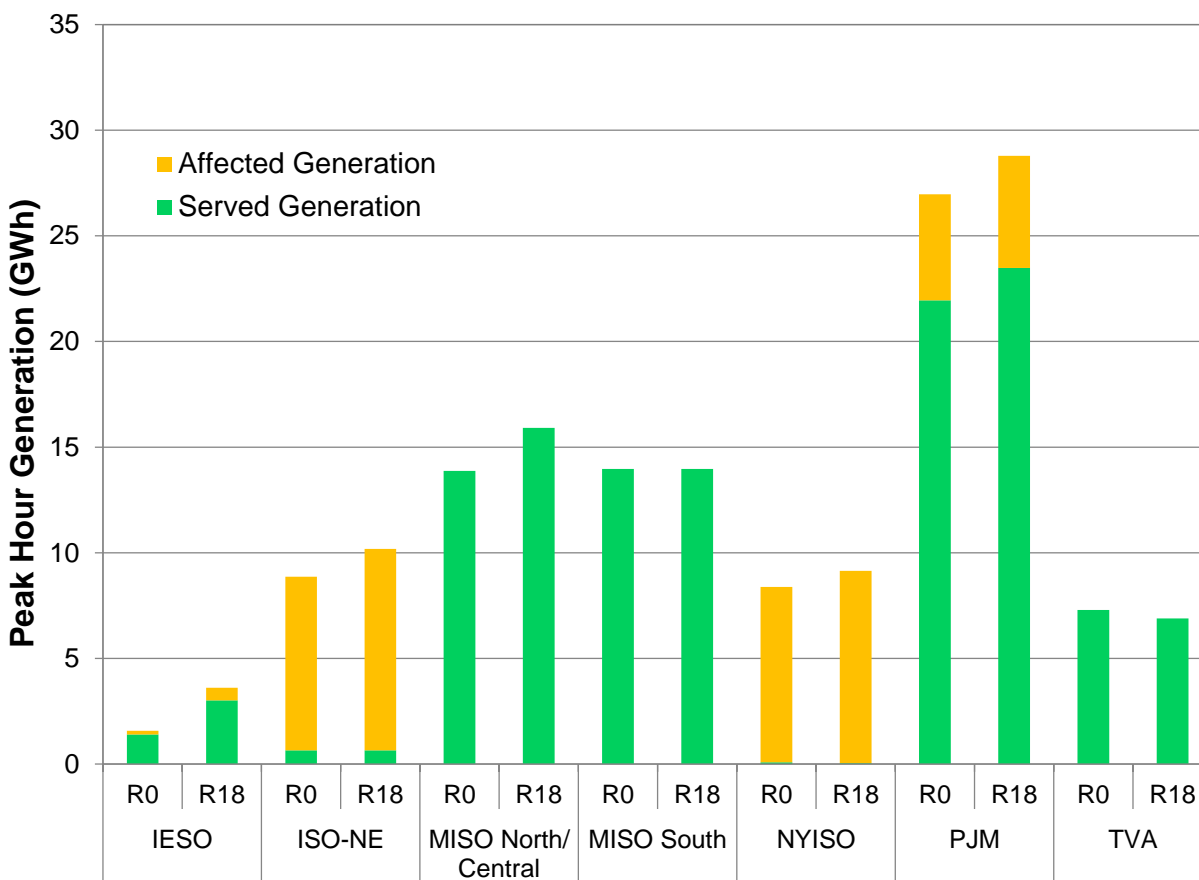


Figure A26-1. RGDS S18 Winter 2018: Peak Hour Affected Generation

Figure A26-2 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A26-1.

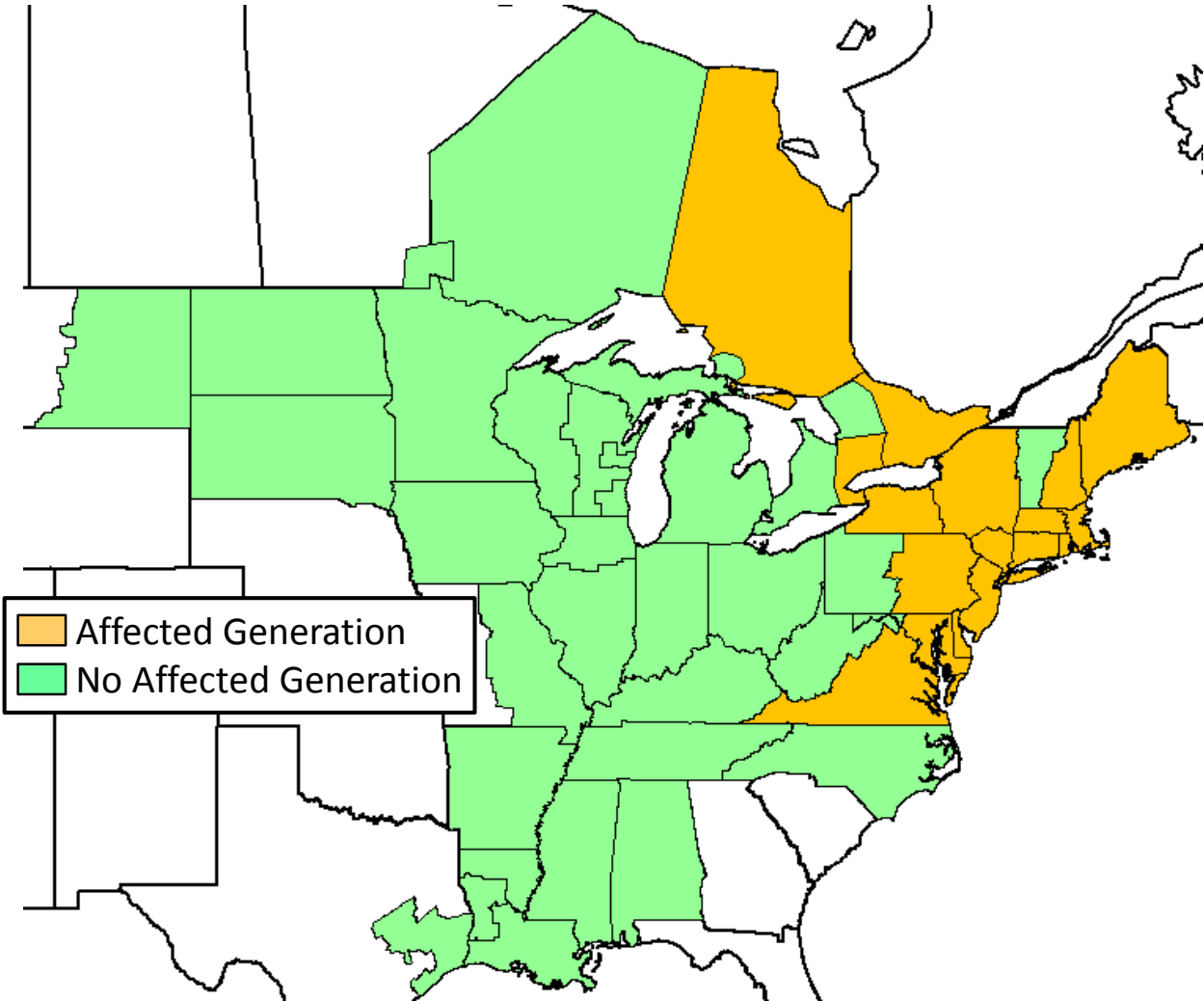


Figure A26-2. RGDS S18 Winter 2018: Locations with Peak Hour Affected Generation

Table A26-1. RGDS S18 Winter 2018: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	20.5	2,696
Delaware	1.8	220
Maine	9.5	1,292
Maryland Eastern	5.0	539
Massachusetts Eastern	16.6	2,299
Massachusetts Western	7.8	1,059
New Hampshire	9.4	1,245
New Jersey	15.0	1,858
New York Central Northern	26.3	3,710
New York City	18.3	2,399
New York Long Island	9.6	1,073
New York Southern	10.9	1,312
New York Western	1.6	179
Ontario (CDA)	0.5	56
Ontario (EDA)	4.1	424
Ontario (NDA)	0.8	114
Pennsylvania Eastern	2.5	360
Rhode Island	7.1	936
Virginia	21.0	2,755

Figure A26-3 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A26-1 during the Winter 2018 peak hour.

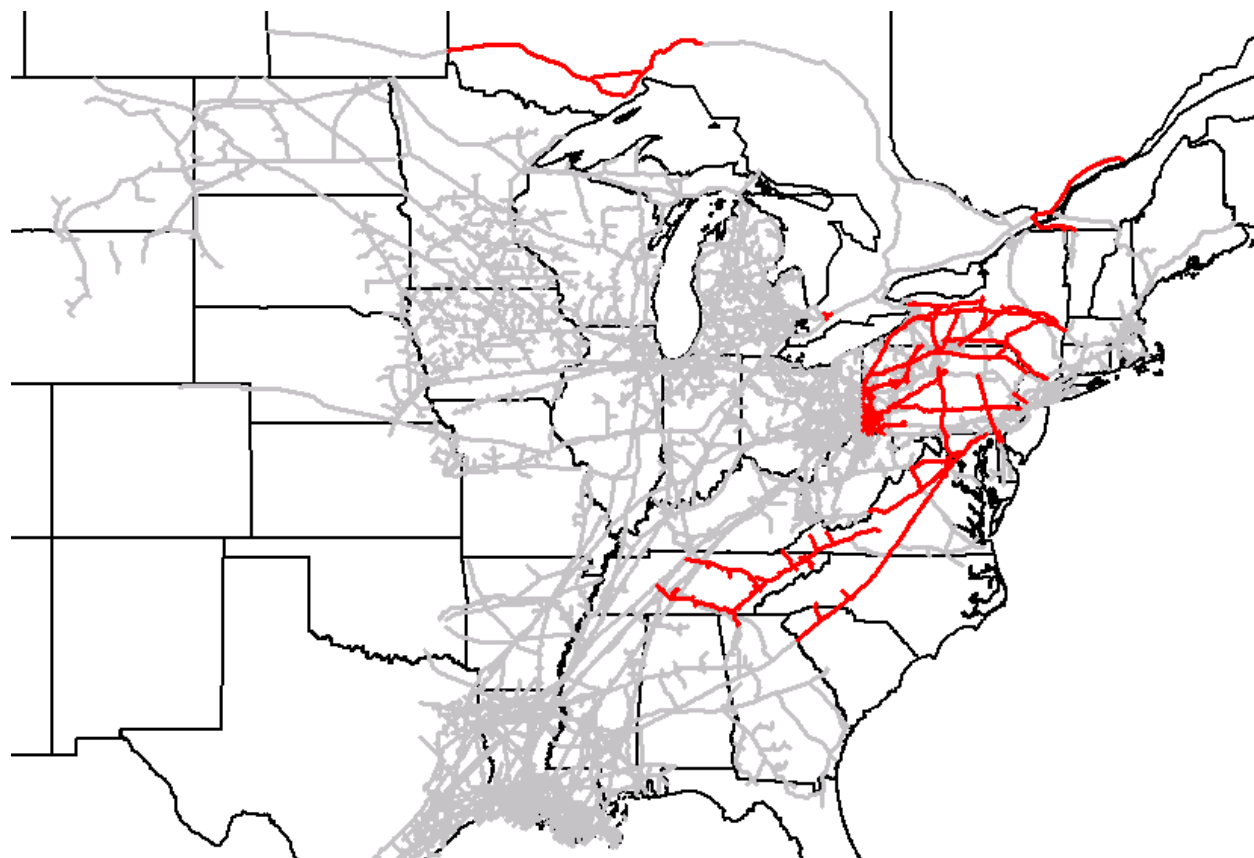


Figure A26-3. RGDS S18 Winter 2018: Peak Hour Constraints

Table A26-2 summarizes the results of the frequency and duration analysis.

Table A26-2. RGDS S18 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	13	1	5	22
Columbia Gas W PA/NY	9	1	3	15
Constitution	2	31	59	90
Dominion Eastern NY	5	1	9	16
Dominion Western NY	1	4	4	4
Dominion Southeast	2	1	2	3
East Tennessee Mainline	8	1	2	9
Eastern Shore	14	1	9	57
Empire Mainline	4	1	12	22
Millennium	7	1	38	69
NB/NS Supply	14	1	20	58
Tennessee Z4 PA	10	1	13	39
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	10	1	15	52
Texas Eastern M3 North	11	1	11	44
TransCanada Ontario West	6	1	11	26
TransCanada Quebec	7	1	20	31
Transco Leidy Atlantic	7	2	23	60
Transco Z5	4	1	3	7
Transco Z6 Leidy to 210	5	1	3	8
Union Gas Dawn	2	1	3	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-1 and Figure A27-2 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-3 and Figure A27-4 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-5 and Figure A27-6 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-7 and Figure A27-8 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-9 and Figure A27-10 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-11 and Figure A27-12 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East

Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-13 and Figure A27-14 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A27-15 and Figure A27-16 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-17 and Figure A27-18 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-19 and Figure A27-20 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A27-21 and Figure A27-22 relative to the total production

capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-23 and Figure A27-24 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-25 and Figure A27-26 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-27 and Figure A27-28 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A27-29 and Figure A27-30 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-31 and Figure A27-32 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A27-33 and Figure A27-34 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-35 and Figure A27-36 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-37 and Figure A27-38 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-39 and Figure A27-40 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A27-41 and Figure A27-42 relative to the capacity of the segment.

RGDS S18 Summer 2018

Figure A26-4 summarizes the affected generation during the Summer 2018 peak hour by PPA.

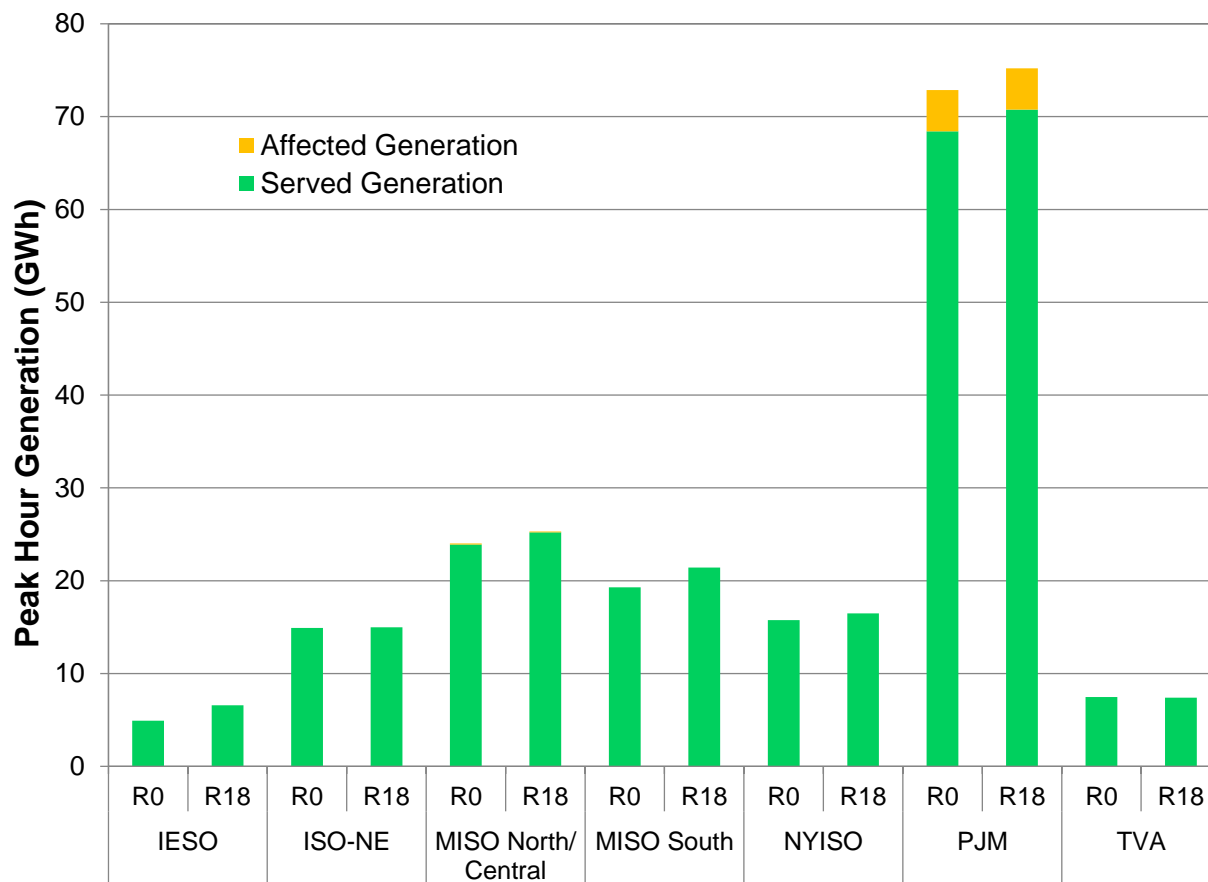


Figure A26-4. RGDS S18 Summer 2018: Peak Hour Affected Generation

Figure A26-5 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A26-3.

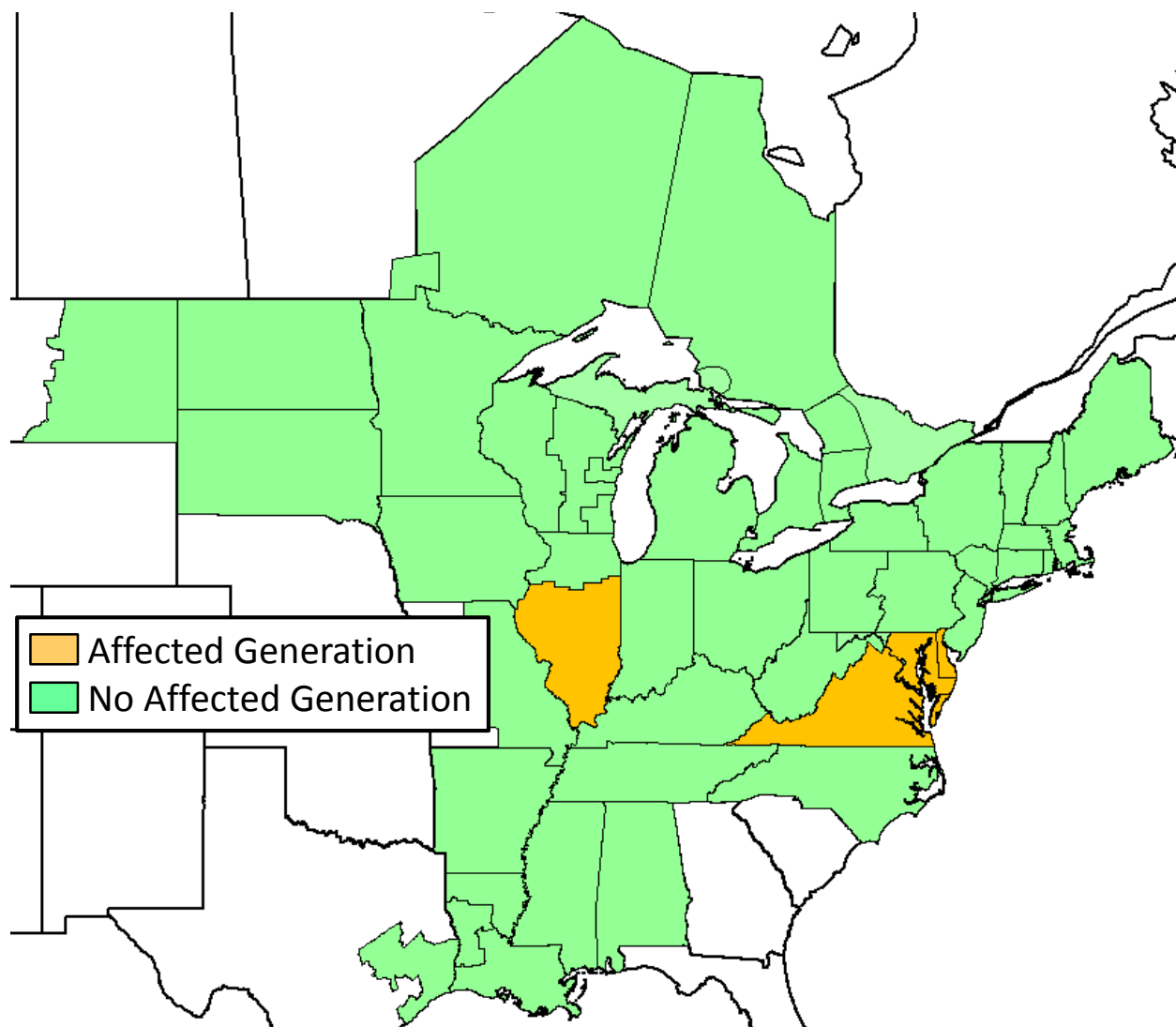


Figure A26-5. RGDS S18 Summer 2018: Locations with Peak Hour Affected Generation

Table A26-3. RGDS S18 Summer 2018 Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.3	1,149
Illinois Southern	1.0	110
Maryland Eastern	16.7	2,361
Virginia	8.4	936

Figure A26-6 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A26-4 during the Summer 2018 peak hour.

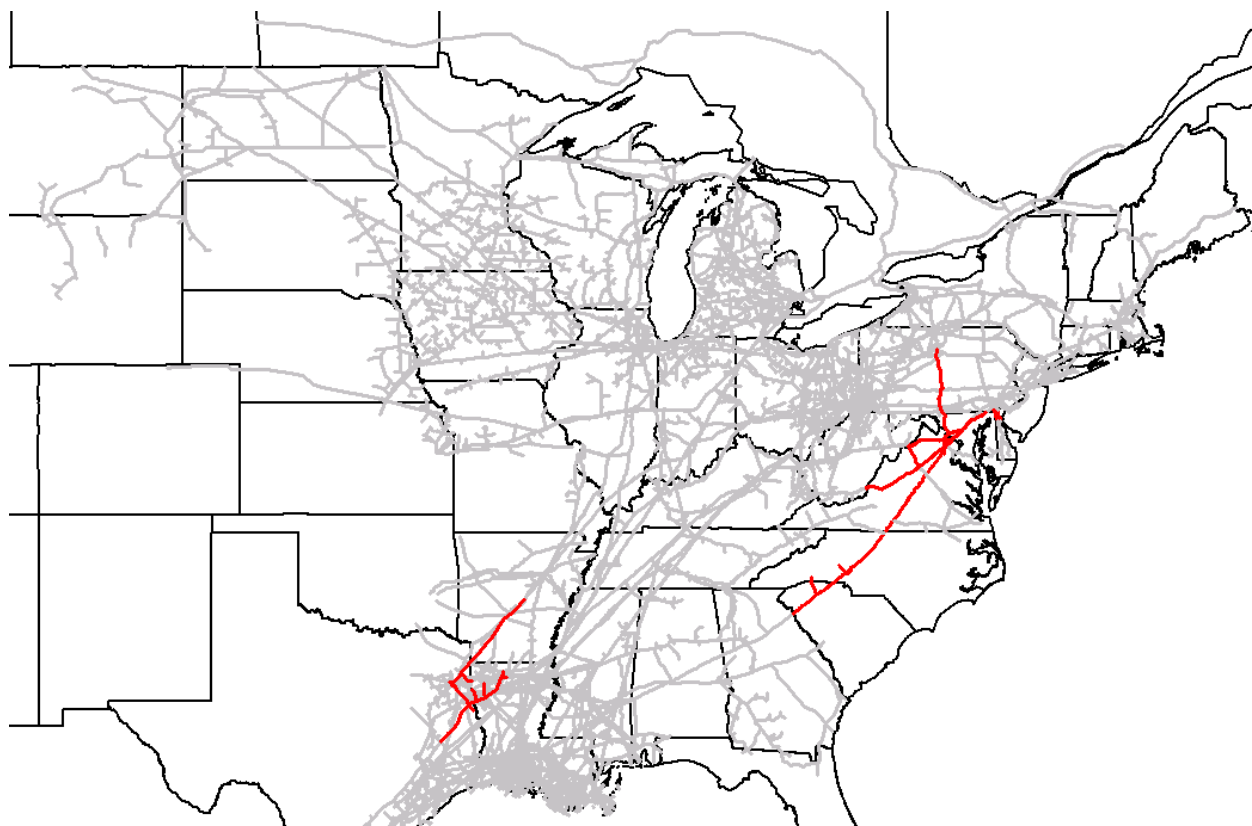


Figure A26-6. RGDS S18 Summer 2018: Peak Hour Constraints

Table A26-4 summarizes the results of the frequency and duration analysis.

Table A26-4. RGDS S18 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	1	1	1	1
Dominion Southeast	4	1	2	6
Eastern Shore	9	1	6	23
Transco Z5	7	1	6	16
Texas Eastern Zone ETX	7	1	6	18

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-43 and Figure A27-44 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-45 and Figure A27-46 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A27-47 and Figure A27-48 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-49 and Figure A27-50 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-51 and Figure A27-52 relative to the capacity of the segment.

RGDS S18 Winter 2023

Figure A26-7 summarizes the affected generation during the Winter 2023 peak hour by PPA.

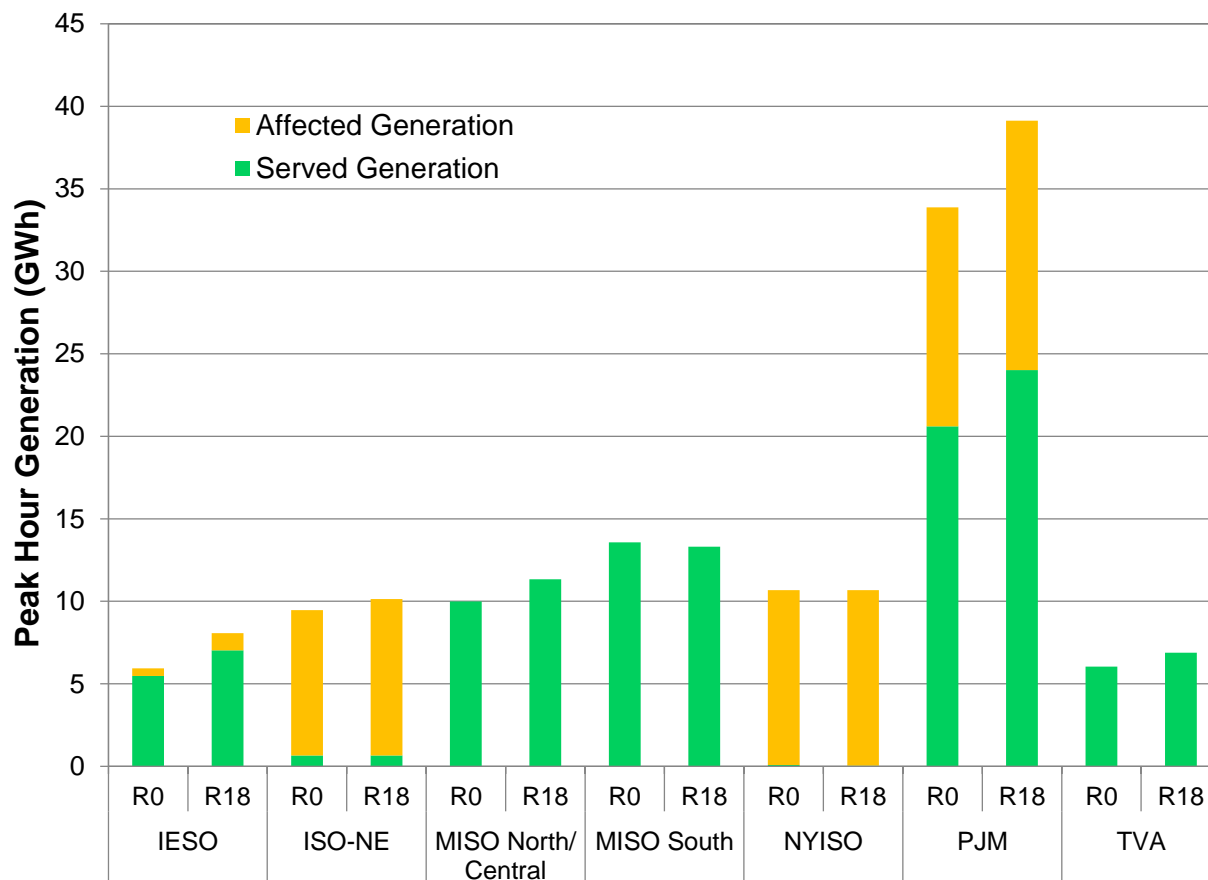


Figure A26-7. RGDS S18 Winter 2023: Peak Hour Affected Generation

Figure A26-8 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A26-5.

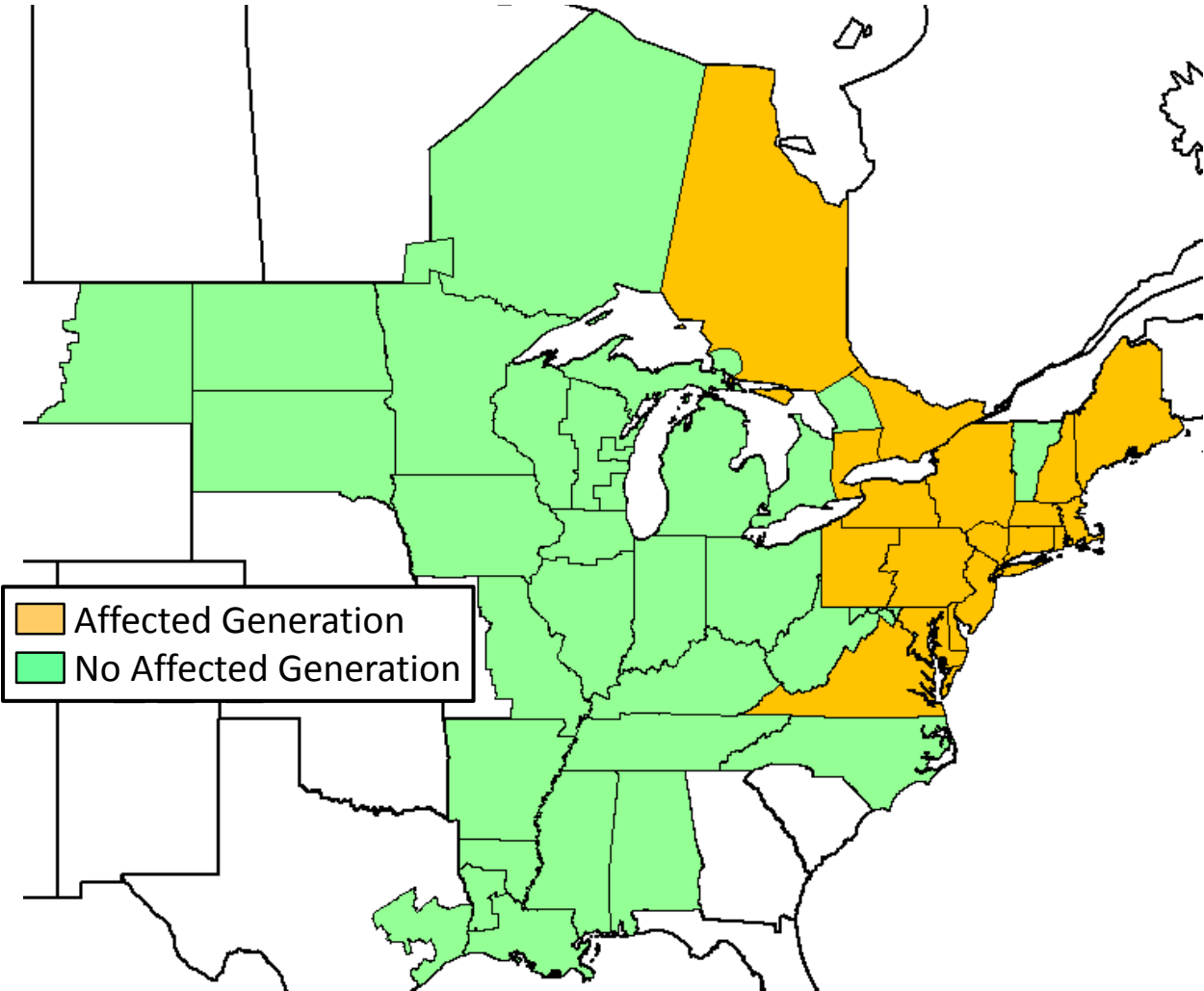


Figure A26-8. RGDS S18 Winter 2023: Locations with Peak Hour Affected Generation

Table A26-5. RGDS S18 Winter 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	15.6	2,140
Delaware	1.3	173
Maine	8.3	1,130
Maryland Eastern	5.0	539
Massachusetts Eastern	18.2	2,545
Massachusetts Western	9.1	1,219
New Hampshire	9.4	1,245
New Jersey	13.2	1,650
New York Central Northern	40.2	4,751
New York City	19.2	2,545
New York Long Island	12.3	1,335
New York Southern	16.4	1,753
New York Western	2.2	247
Ontario (CDA)	0.2	28
Ontario (EDA)	6.5	891
Ontario (NDA)	0.8	114
Pennsylvania Eastern	50.2	6,789
Pennsylvania Western	5.9	842
Rhode Island	9.2	1,206
Virginia	41.6	5,121

Figure A26-9 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A26-7 during the Winter 2023 peak hour.

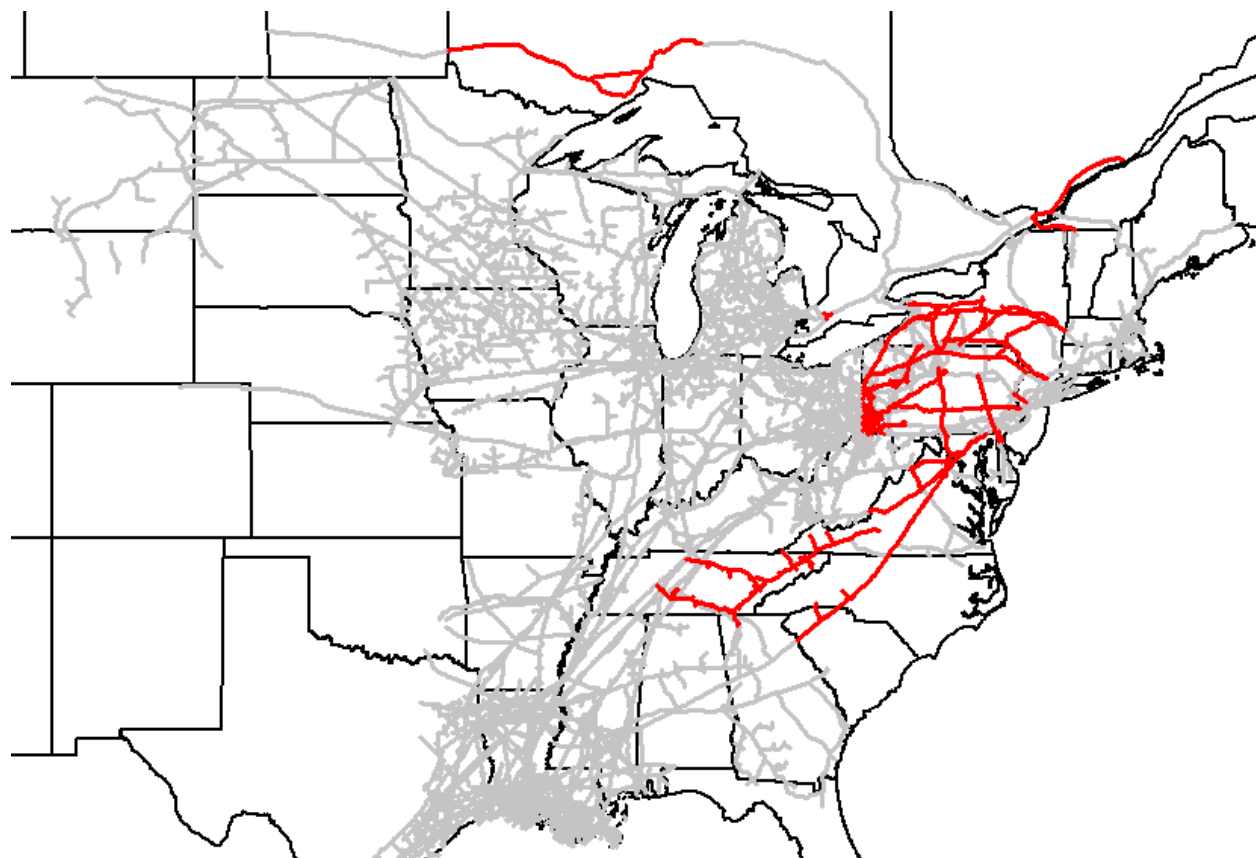


Figure A26-9. RGDS S18 Winter 2023: Peak Hour Constraints

Table A26-6 summarizes the results of the frequency and duration analysis.

Table A26-6. RGDS S18 Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	6	1	52	80
Columbia Gas W PA/NY	2	31	59	90
Constitution	2	31	59	90
Dominion Eastern NY	7	1	16	58
Dominion Western NY	1	5	5	5
Dominion Southeast	5	4	31	69
East Tennessee Mainline	5	1	4	12
Eastern Shore	11	1	26	67
Empire Mainline	9	1	42	62
Millennium	7	1	38	69
NB/NS Supply	2	31	59	90
Tennessee Z4 PA	6	2	16	47
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	6	1	27	66
Texas Eastern M3 North	11	1	10	50
TransCanada Ontario West	6	1	12	27
TransCanada Quebec	8	1	14	33
Transco Leidy Atlantic	9	1	27	66
Transco Z5	8	1	2	9
Transco Z6 Leidy to 210	4	1	55	88
Union Gas Dawn	5	1	2	6

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-53 and Figure A27-54 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-55 and Figure A27-56 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-57 and Figure A27-58 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-59 and Figure A27-60 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-61 and Figure A27-62 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-63 and Figure A27-64 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East

Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-65 and Figure A27-66 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A27-67 and Figure A27-68 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-69 and Figure A27-70 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-71 and Figure A27-72 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A27-73 and Figure A27-74 relative to the total production

capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-75 and Figure A27-76 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-77 and Figure A27-78 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-79 and Figure A27-80 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A27-81 and Figure A27-82 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-83 and Figure A27-84 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A27-85 and Figure A27-86 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-87 and Figure A27-88 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-89 and Figure A27-90 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-91 and Figure A27-92 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A27-93 and Figure A27-94 relative to the capacity of the segment.

RGDS S18 Summer 2023

Figure A26-10 summarizes the affected generation during the Summer 2023 peak hour by PPA.

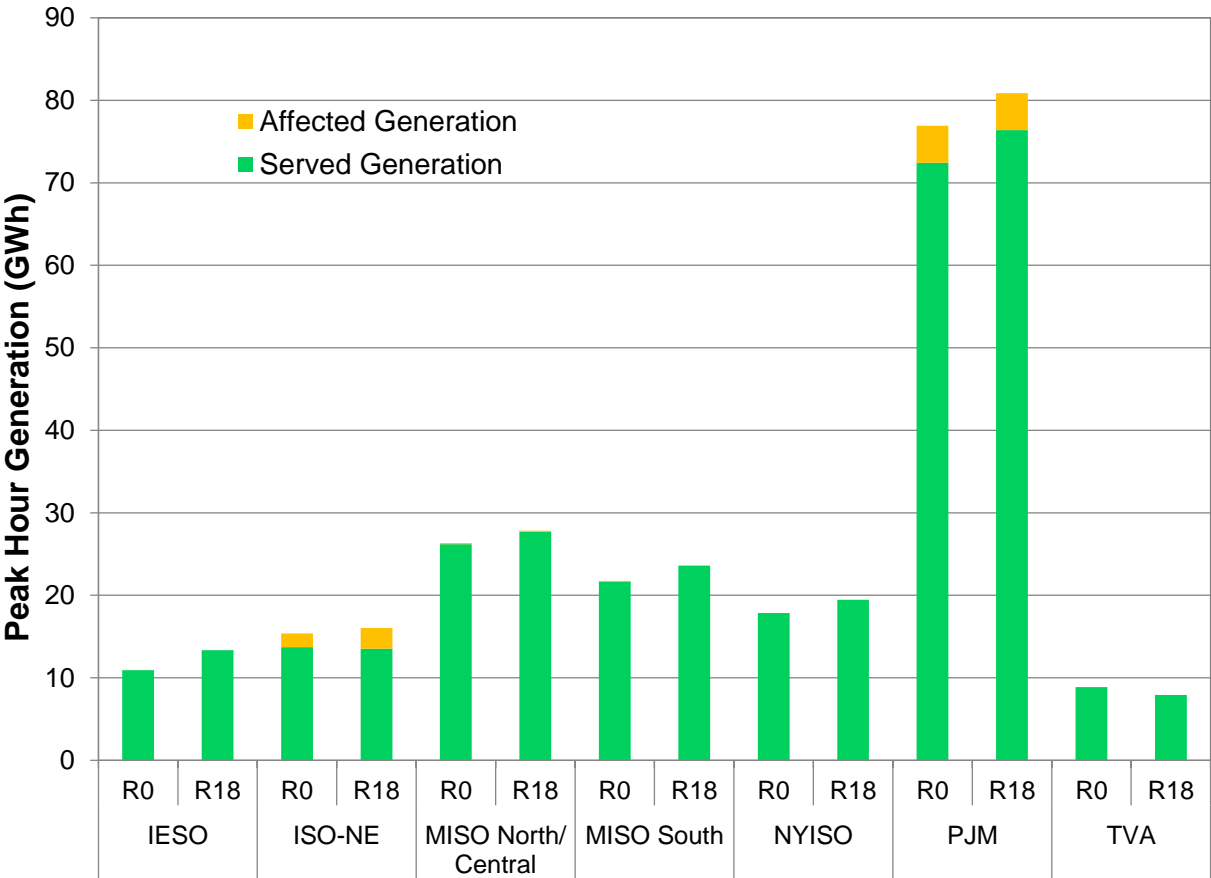


Figure A26-10. RGDS S18 Summer 2023: Peak Hour Affected Generation

Figure A26-11 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A26-7.

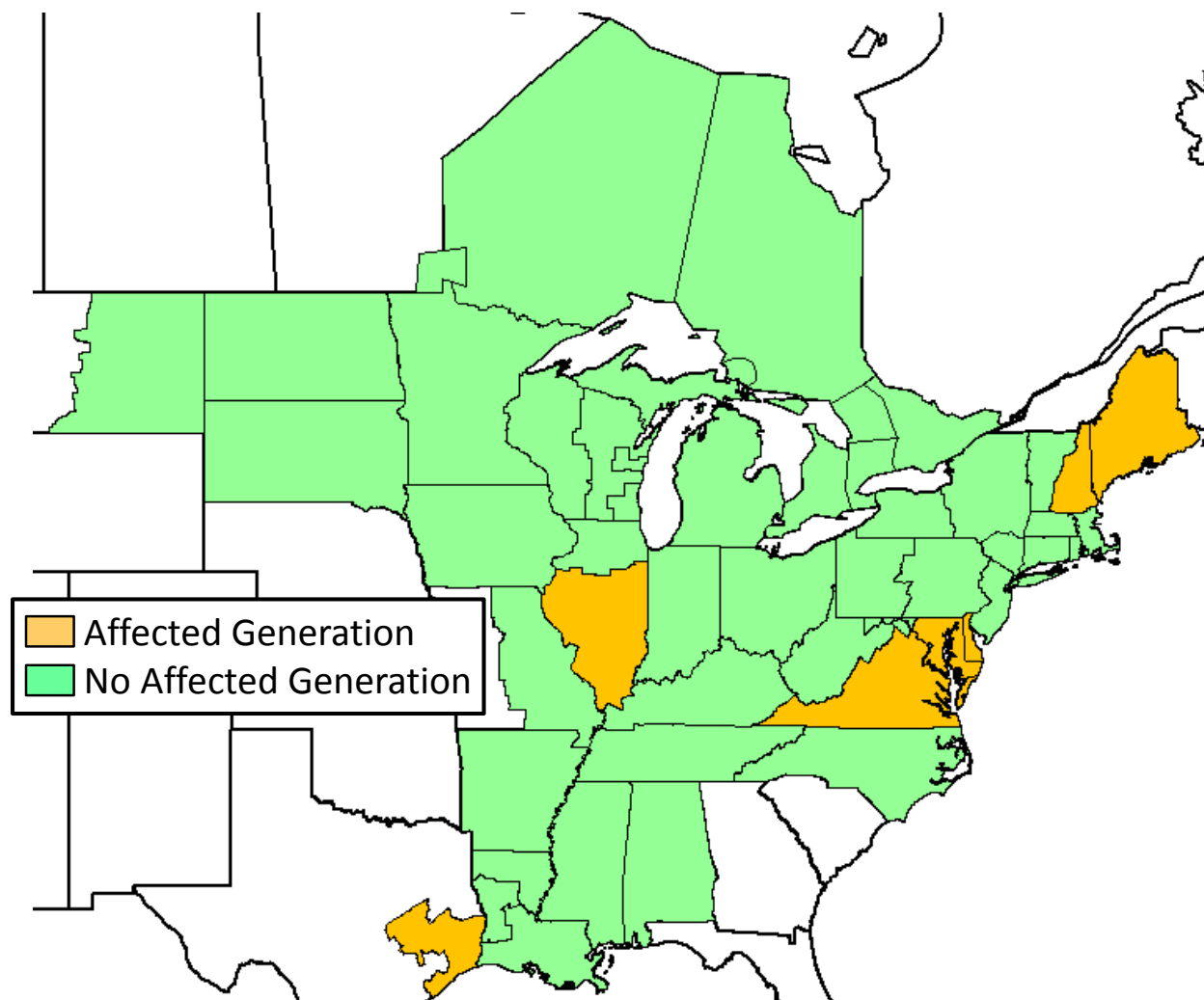


Figure A26-11. RGDS S18 Summer 2023: Locations with Peak Hour Affected Generation

Table A26-7. RGDS S18 Summer 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.5	1,175
Illinois Southern	1.0	112
Maine	10.5	1,357
Maryland Eastern	16.7	2,361
New Hampshire	9.7	1,135
Texas East (SERC)	0.6	81
Virginia	8.4	936

Figure A26-12 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A26-10 during the Summer 2023 peak hour.

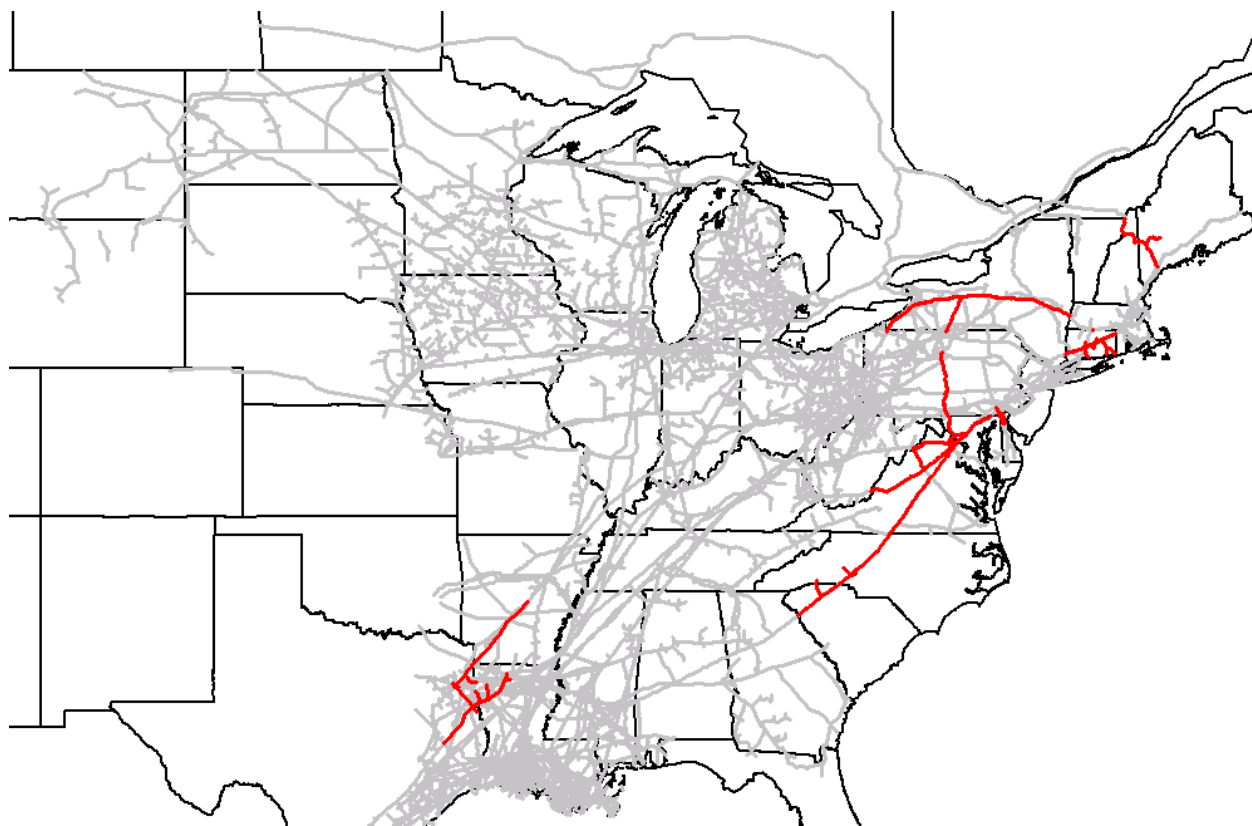


Figure A26-12. RGDS S18 Summer 2023: Peak Hour Constraints

Table A26-8 summarizes the results of the frequency and duration analysis.

Table A26-8. RGDS S18 Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	8	1	5	20
Columbia Gas VA/MD	2	1	3	4
Dominion Southeast	8	1	8	25
Eastern Shore	10	1	8	31
NB/NS Supply	6	3	27	73
PNGTS N of Westbrook	13	1	12	46
Tennessee Z5 NY	1	92	92	92
Texas Eastern Zone ETX	7	1	10	23
Transco Z5	6	1	6	17

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine

and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-95 and Figure A27-96 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-97 and Figure A27-98 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-99 and Figure A27-100 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A27-101 and Figure A27-102 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A27-103 and Figure A27-104 relative to the total production capacity.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-105 and Figure A27-106 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-107 and Figure A27-108 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-109 and Figure A27-110 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-111 and Figure A27-112 relative to the capacity of the segment.

S19: High Industrial Sector Gas Load Growth

RGDS S19 Winter 2018

Figure A26-13 summarizes the affected generation during the Winter 2018 peak hour by PPA.

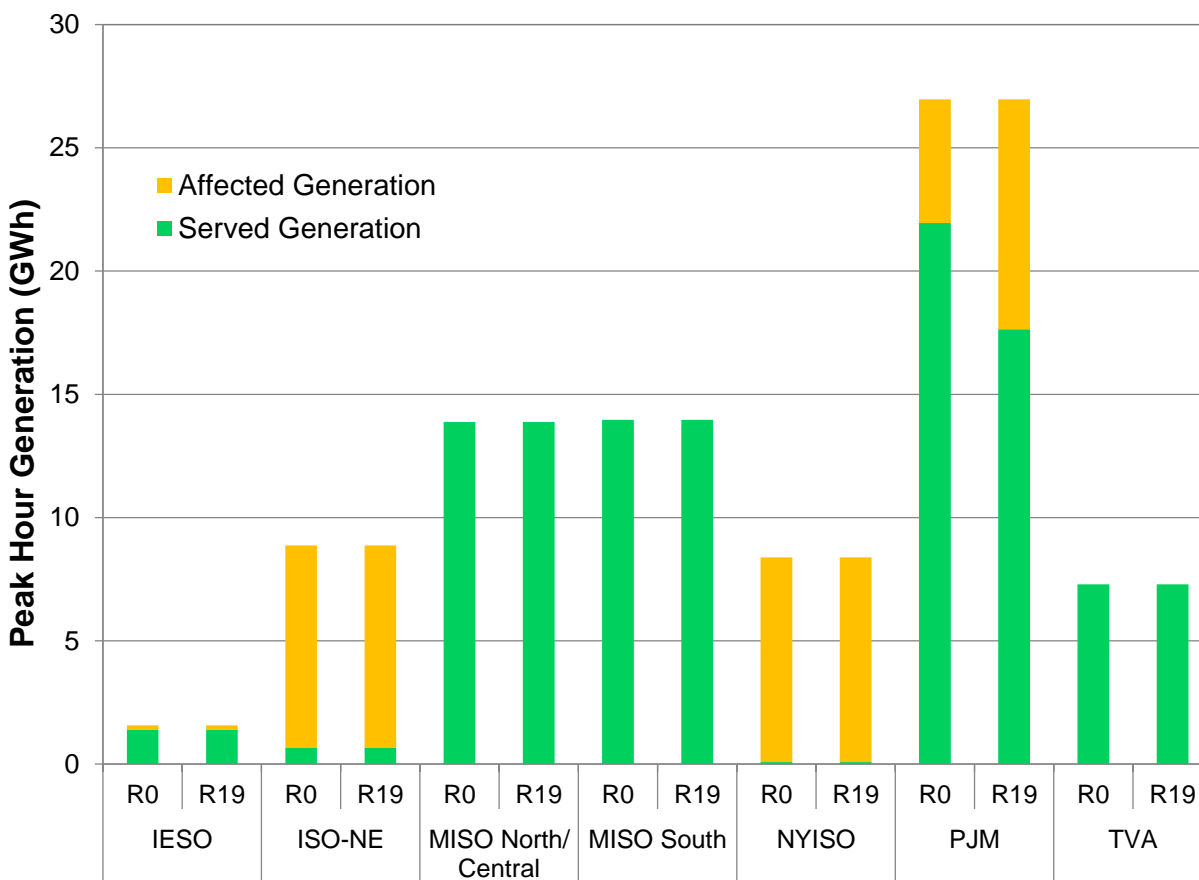


Figure A26-14 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A26-9.

Figure A26-13. RGDS S19 Winter 2018: Peak Hour Affected Generation

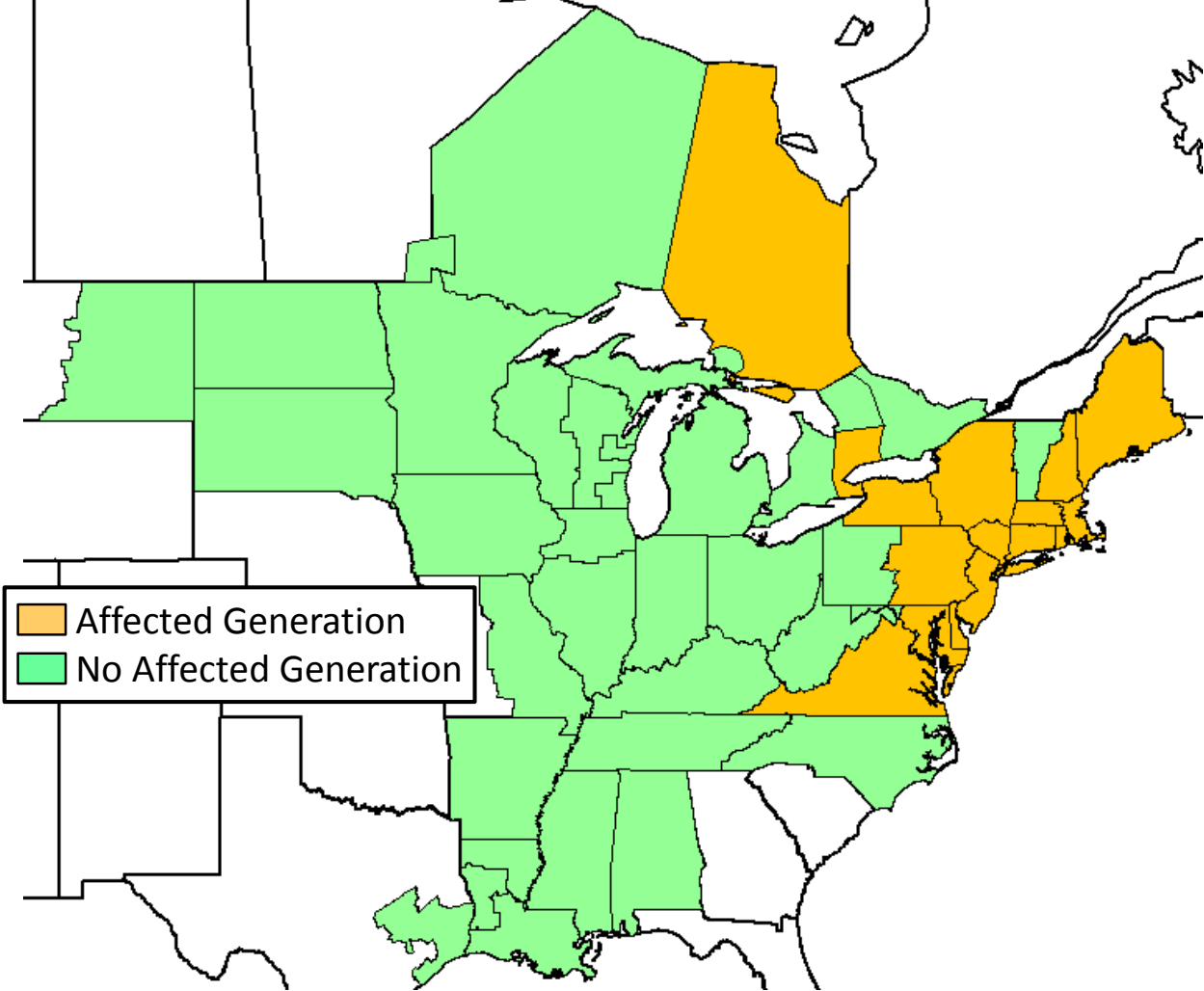


Figure A26-14. RGDS S19 Winter 2018: Locations with Peak Hour Affected Generation

Table A26-9. RGDS S19 Winter 2018: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	16.0	2,200
Delaware	1.8	222
Maine	7.6	1,045
Maryland Eastern	5.0	539
Massachusetts Eastern	12.8	1,781
Massachusetts Western	7.8	1,059
New Hampshire	9.4	1,245
New Jersey	15.9	1,951
New York Central Northern	24.4	3,419
New York City	17.7	2,336
New York Long Island	9.4	1,054
New York Southern	10.9	1,312
New York Western	1.6	179
Ontario (CDA)	0.5	55
Ontario (NDA)	0.8	114
Pennsylvania Eastern	28.8	3,862
Rhode Island	6.7	887
Virginia	21.0	2,755

Figure A26-15 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A26-13 during the Winter 2018 peak hour.

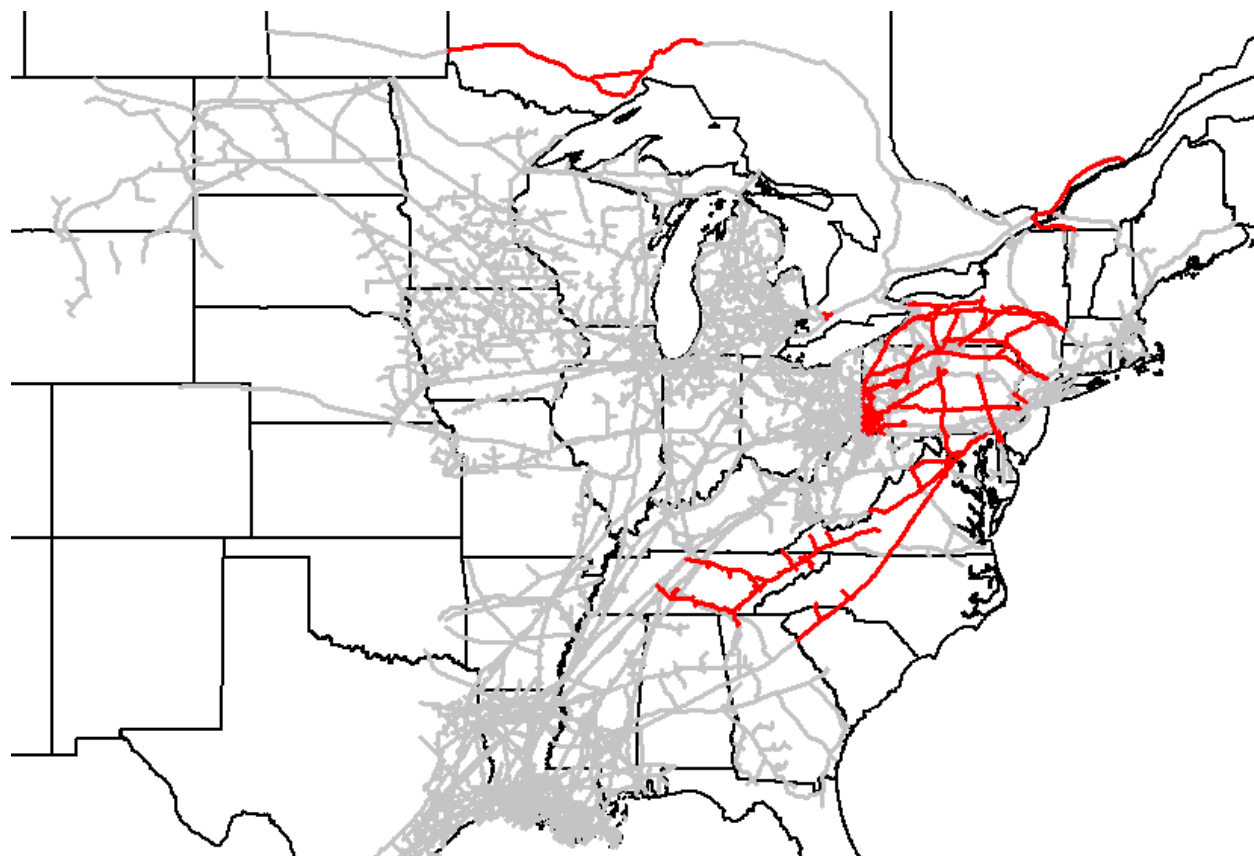


Figure A26-15. RGDS S19 Winter 2018: Peak Hour Constraints

Table A26-10 summarizes the results of the frequency and duration analysis.

Table A26-10. RGDS S19 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	11	1	7	26
Columbia Gas W PA/NY	15	1	6	31
Constitution	5	1	12	25
Dominion Eastern NY	5	1	9	17
Dominion Western NY	1	4	4	4
Dominion Southeast	7	1	12	22
East Tennessee Mainline	7	1	2	9
Eastern Shore	9	1	16	68
Empire Mainline	4	1	12	22
Millennium	4	1	59	83
NB/NS Supply	13	1	20	58
Tennessee Z4 PA	10	1	7	30
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	12	1	19	62
Texas Eastern M3 North	12	1	7	46
TransCanada Ontario West	5	1	5	15
TransCanada Quebec	9	1	13	29
Transco Leidy Atlantic	9	1	23	60
Transco Z5	3	1	7	9
Transco Z6 Leidy to 210	10	1	24	66
Union Gas Dawn	2	1	3	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-113 and Figure A27-114 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-115 and Figure A27-116 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-117 and Figure A27-118 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-119 and Figure A27-120 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-121 and Figure A27-122 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-123 and Figure A27-124 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-125 and Figure A27-126 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 204 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A27-127 and Figure A27-128 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-129 and Figure A27-130 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-131 and Figure A27-132 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects

generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A27-133 and Figure A27-134 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-135 and Figure A27-136 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-137 and Figure A27-138 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-139 and Figure A27-140 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A27-141 and Figure A27-142 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-143 and Figure A27-144 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A27-145 and Figure A27-146 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-147 and Figure A27-148 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-149 and Figure A27-150 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-151 and Figure A27-152 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A27-153 and Figure A27-154 relative to the capacity of the segment.

RGDS S19 Summer 2018

Figure A26-16 summarizes the affected generation during the Summer 2018 peak hour by PPA.

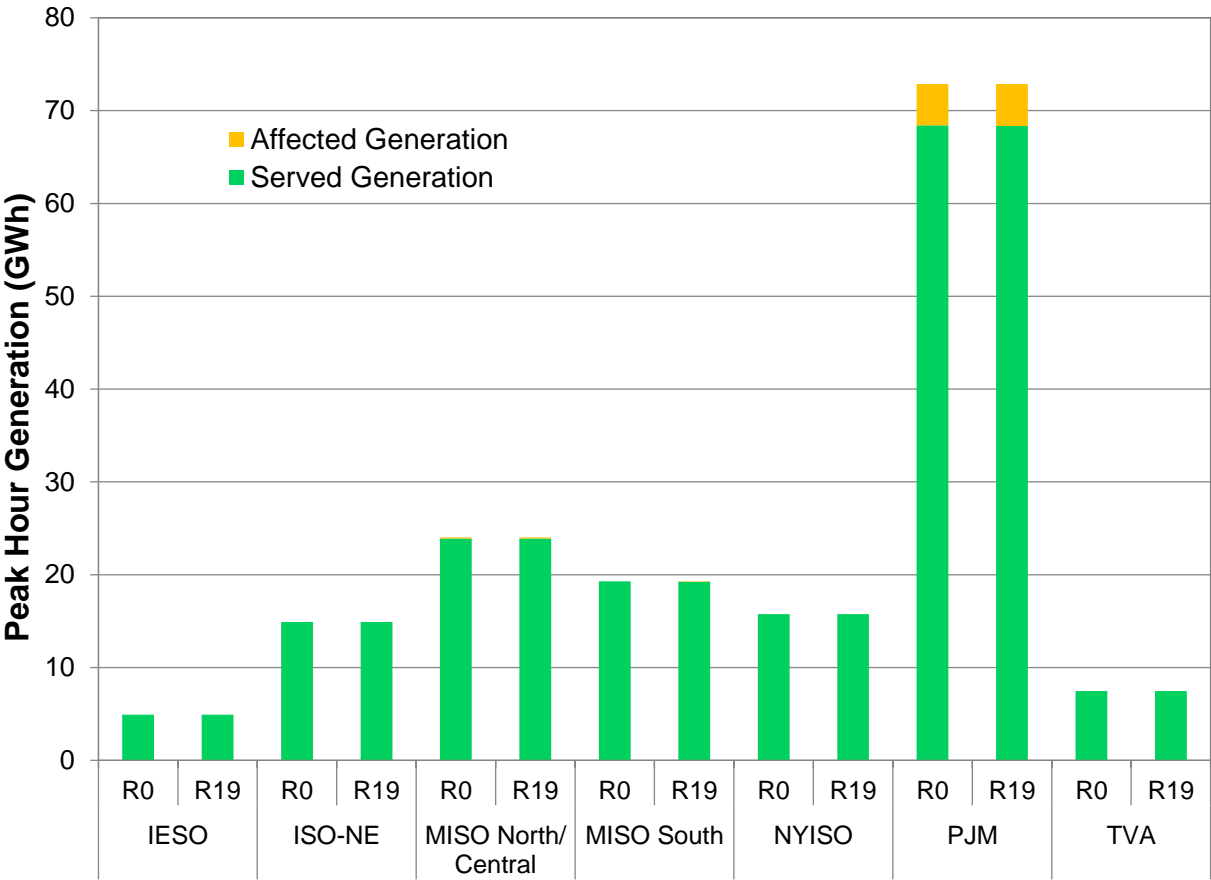


Figure A26-17 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A26-11.

Figure A26-16. RGDS S19 Summer 2018: Peak Hour Affected Generation

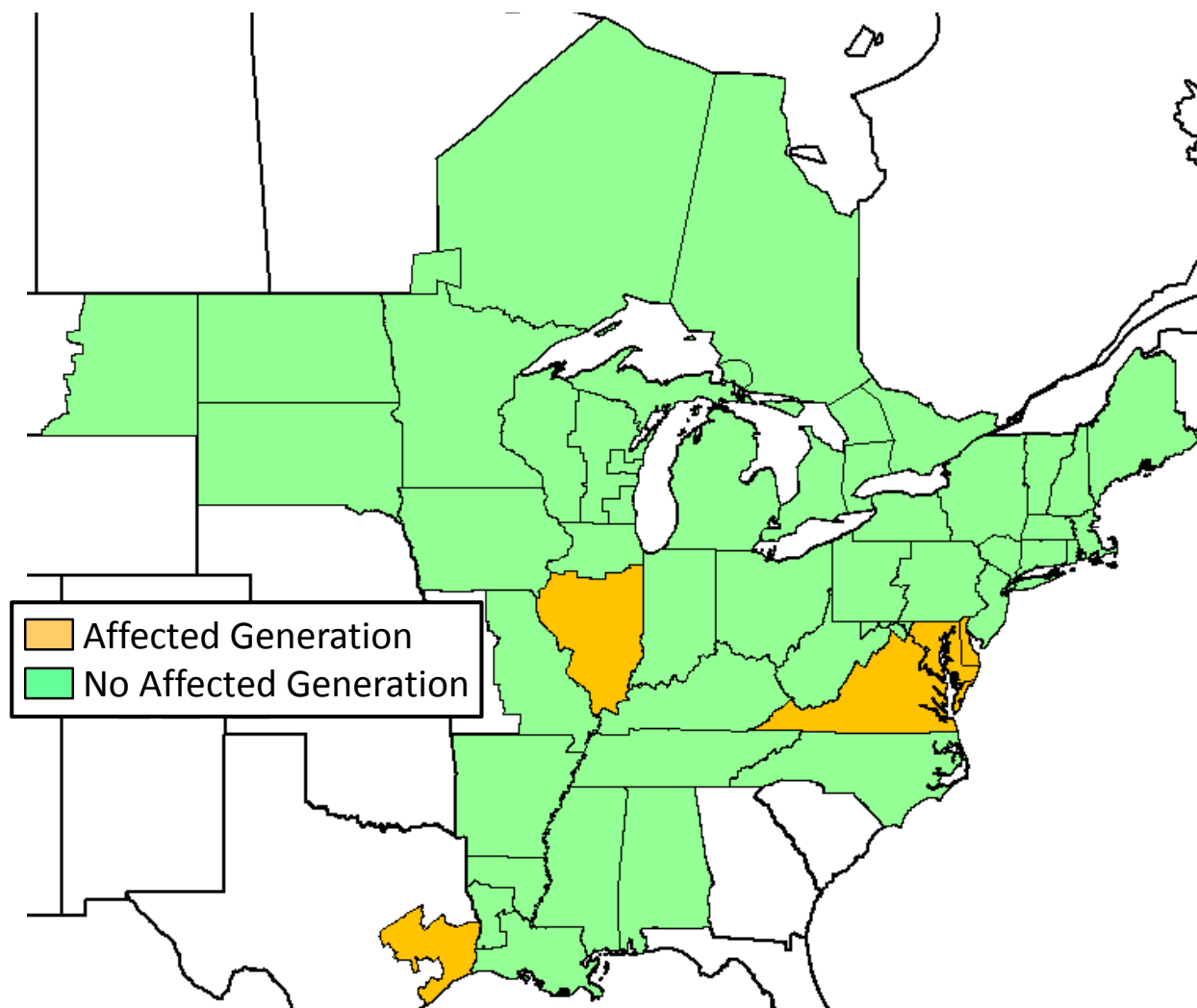


Figure A26-17. RGDS S19 Summer 2018: Locations with Peak Hour Affected Generation

Table A26-11. RGDS S19 Summer 2018 Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.9	1,223
Illinois Southern	1.0	112
Maryland Eastern	16.7	2,361
Texas East (SERC)	0.2	35
Virginia	8.4	936

Figure A26-18 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A26-16 during the Summer 2018 peak hour.

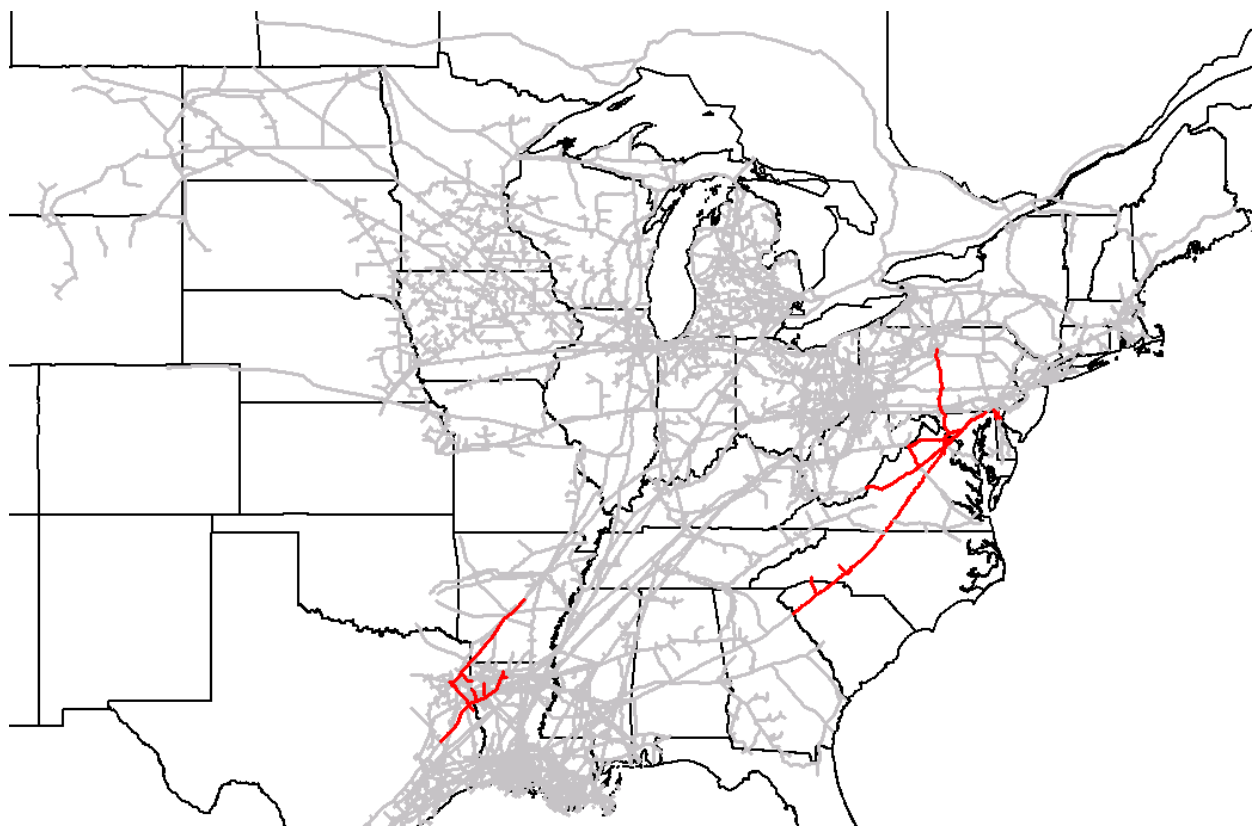


Figure A26-18. RGDS S19 Summer 2018: Peak Hour Constraints

Table A26-12 summarizes the results of the frequency and duration analysis.

Table A26-12. RGDS S19 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	1	1	1	1
Dominion Southeast	3	1	2	5
Eastern Shore	8	1	6	21
Texas Eastern Zone ETX	4	1	6	12
Transco Z5	7	1	6	18

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia, generators behind LDCs served by Columbia Gas in Maryland and Virginia, and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-155 and Figure A27-156 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-157 and Figure A27-158 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A27-159 and Figure A27-160 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-161 and Figure A27-162 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-163 and Figure A27-164 relative to the capacity of the segment.

RGDS S19 Winter 2023

Figure A26-19 summarizes the affected generation during the Winter 2023 peak hour by PPA.

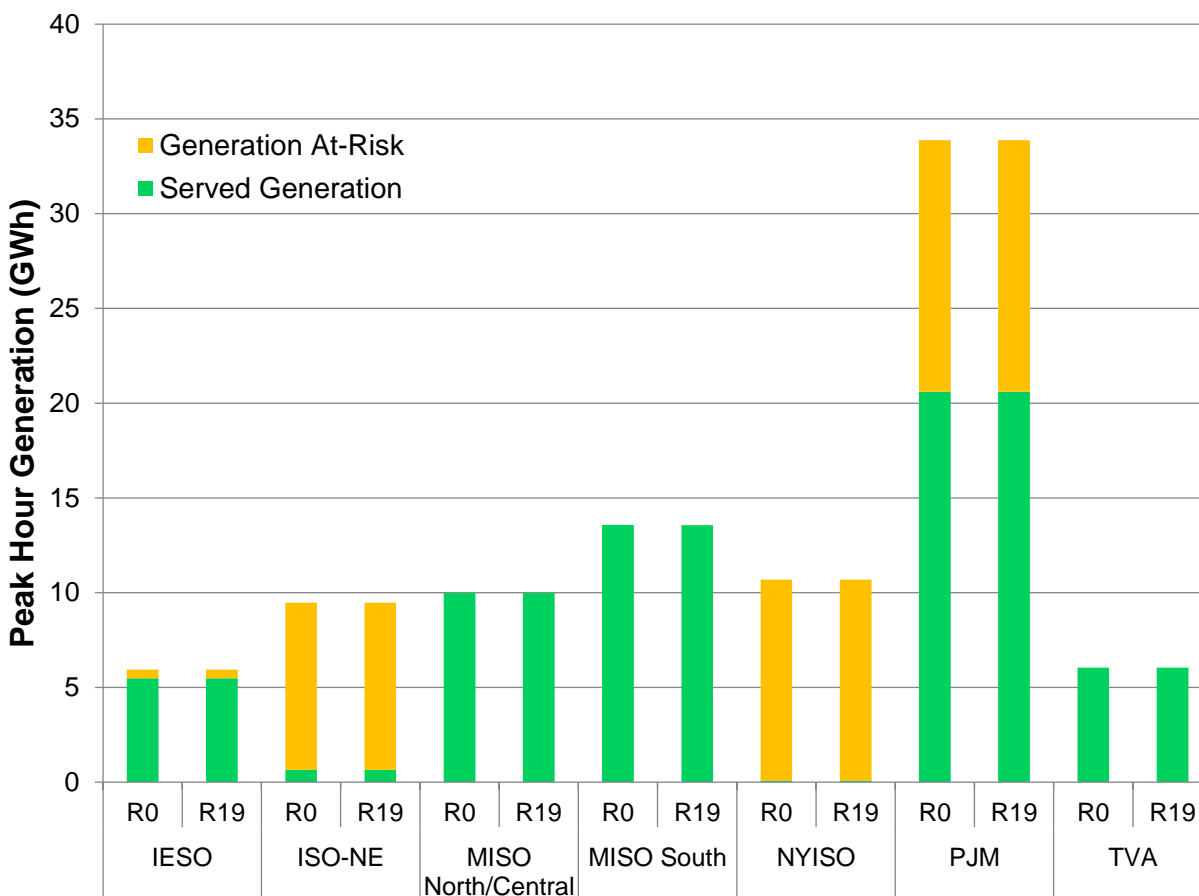


Figure A26-19. RGDS S19 Winter 2023: Peak Hour Affected Generation

Figure A26-20 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A26-13.

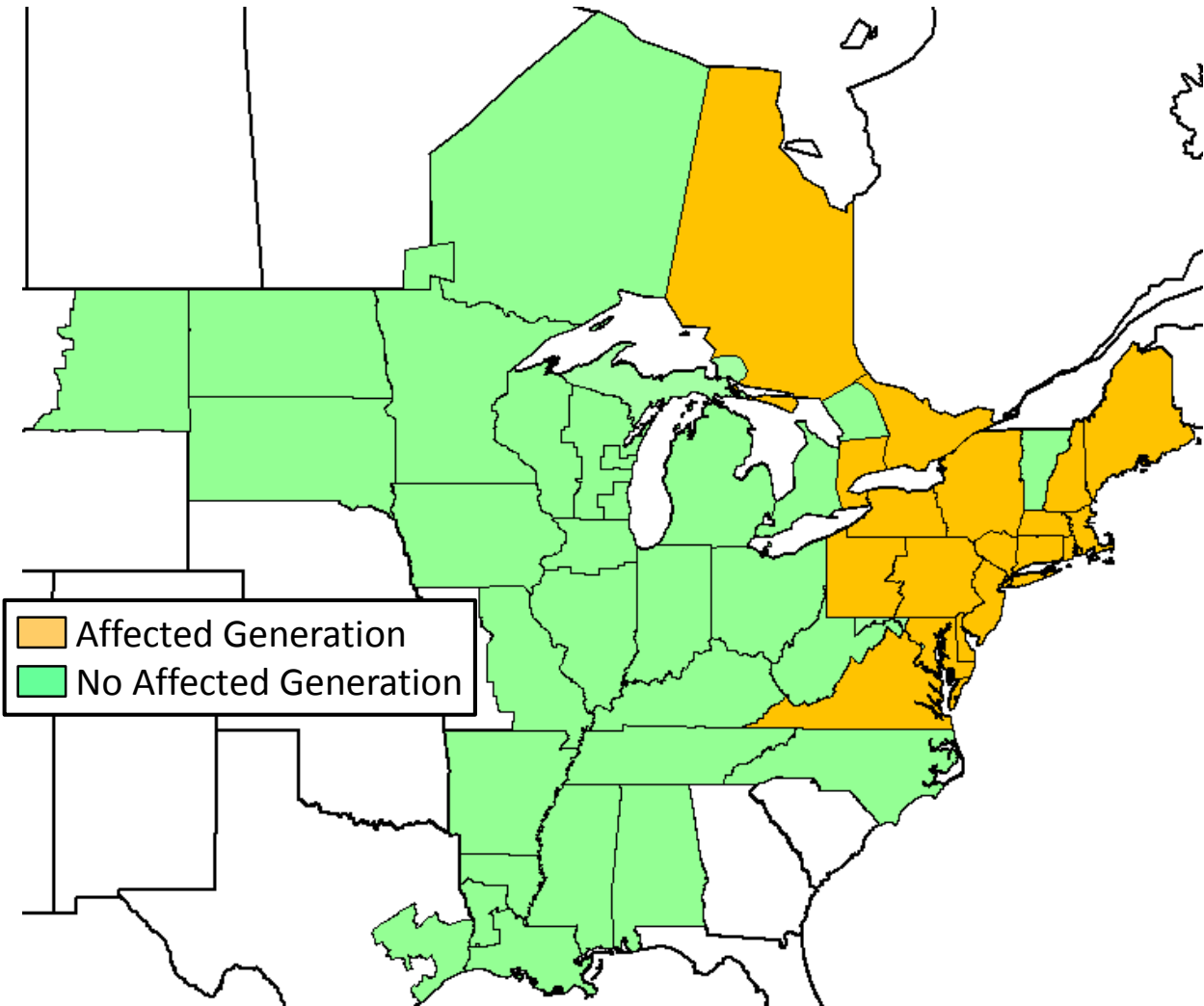


Figure A26-20. RGDS S19 Winter 2023: Locations with Peak Hour Affected Generation

Table A26-13. RGDS S19 Winter 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	15.6	2,140
Delaware	1.3	175
Maine	9.1	1,232
Maryland Eastern	5.0	539
Massachusetts Eastern	14.6	2,025
Massachusetts Western	9.3	1,239
New Hampshire	9.4	1,245
New Jersey	10.7	1,372
New York Central Northern	40.1	4,764
New York City	19.8	2,665
New York Long Island	12.8	1,292
New York Southern	15.1	1,629
New York Western	2.2	247
Ontario (CDA)	0.5	55
Ontario (EDA)	2.1	249
Ontario (NDA)	1.2	155
Pennsylvania Eastern	43.5	5,990
Pennsylvania Western	6.7	961
Rhode Island	7.1	936
Virginia	35.4	4,237

Figure A26-21 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A26-19 during the Winter 2023 peak hour.

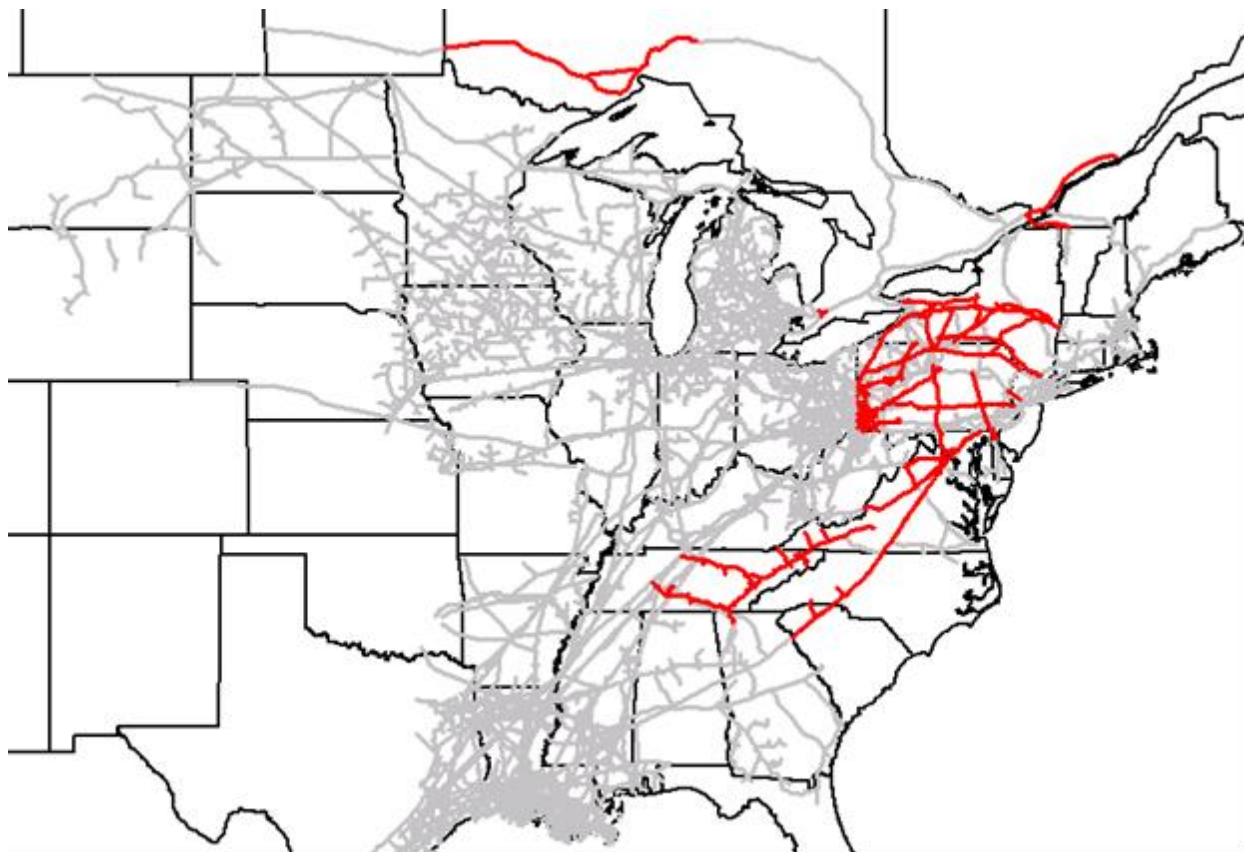


Figure A26-21. RGDS S19 Winter 2023: Peak Hour Constraints

Table A26-14 summarizes the results of the frequency and duration analysis.

Table A26-14. RGDS S19 Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	4	3	59	86
Columbia Gas W PA/NY	15	1	5	28
Constitution	2	31	59	90
Dominion Eastern NY	9	1	16	58
Dominion Western NY	1	5	5	5
Dominion Southeast	4	1	52	85
East Tennessee Mainline	5	1	5	11
Eastern Shore	12	1	15	63
Empire Mainline	8	1	44	61
Millennium	7	1	37	68
NB/NS Supply	2	31	59	90
Tennessee Z4 PA	6	1	15	27
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	7	1	46	81
Texas Eastern M3 North	12	1	10	49
TransCanada Ontario West	4	1	10	15
TransCanada Quebec	6	1	14	34
Transco Leidy Atlantic	3	4	59	89
Transco Z5	8	1	2	9
Transco Z6 Leidy to 210	5	1	55	86
Union Gas Dawn	3	1	4	8

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas’s Virginia/Maryland segment, which is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d over the 2018 capacity. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-165 and Figure A27-166 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas’s Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-167 and Figure A27-168 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-169 and Figure A27-170 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-171 and Figure A27-172 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-173 and Figure A27-174 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase of 15 MDth/d over 2018. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-175 and Figure A27-176 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-177 and Figure A27-178 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 213 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A27-179 and Figure A27-180 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-181 and Figure A27-182 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-183 and Figure A27-184 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects

generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A27-185 and Figure A27-186 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-187 and Figure A27-188 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-189 and Figure A27-190 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-191 and Figure A27-192 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A27-193 and Figure A27-194 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-195 and Figure A27-196 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A27-197 and Figure A27-198 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-199 and Figure A27-200 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-201 and Figure A27-202 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-203 and Figure A27-204 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A27-205 and Figure A27-206 relative to the capacity of the segment.

RGDS S19 Summer 2023

Figure A26-22 summarizes the affected generation during the Summer 2023 peak hour by PPA.

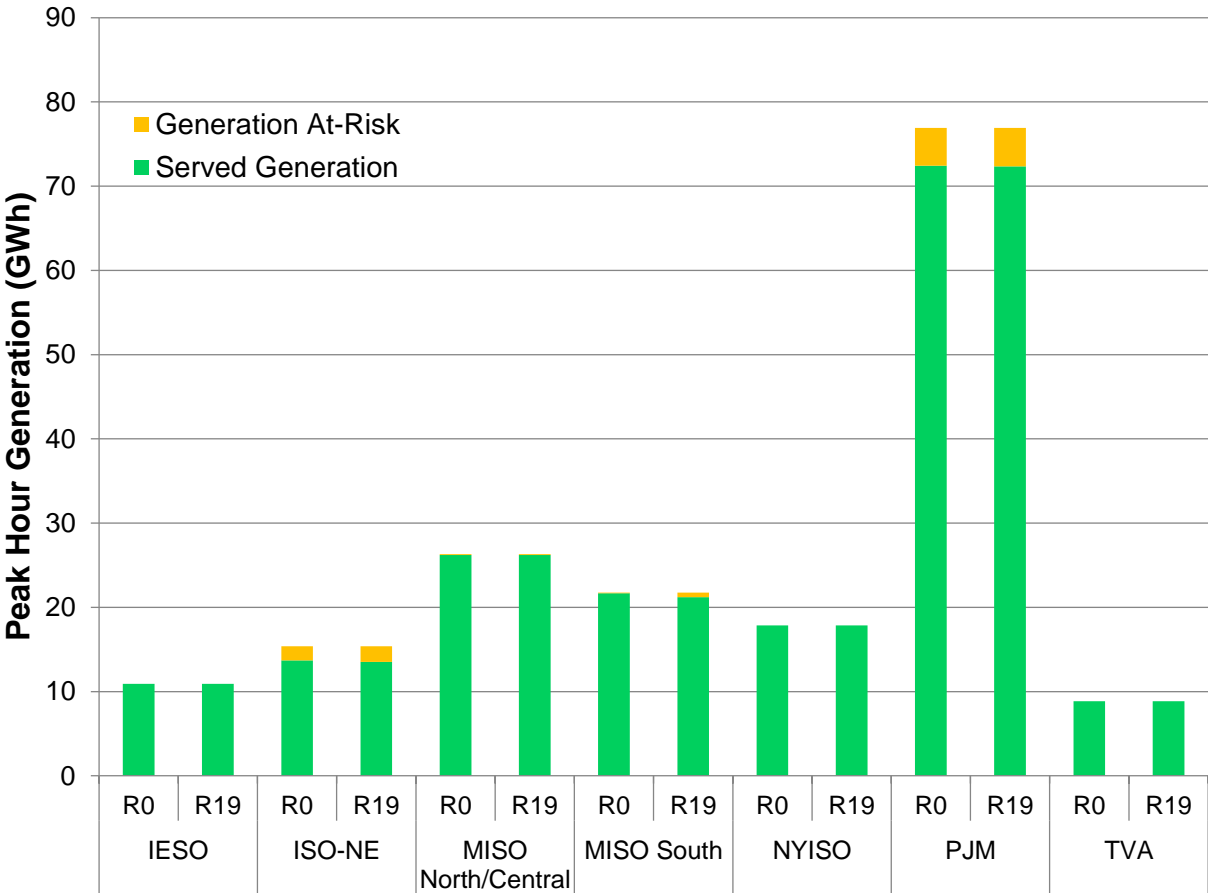


Figure A26-22. RGDS S19 Summer 2023: Peak Hour Affected Generation

Figure A26-23 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A26-15.

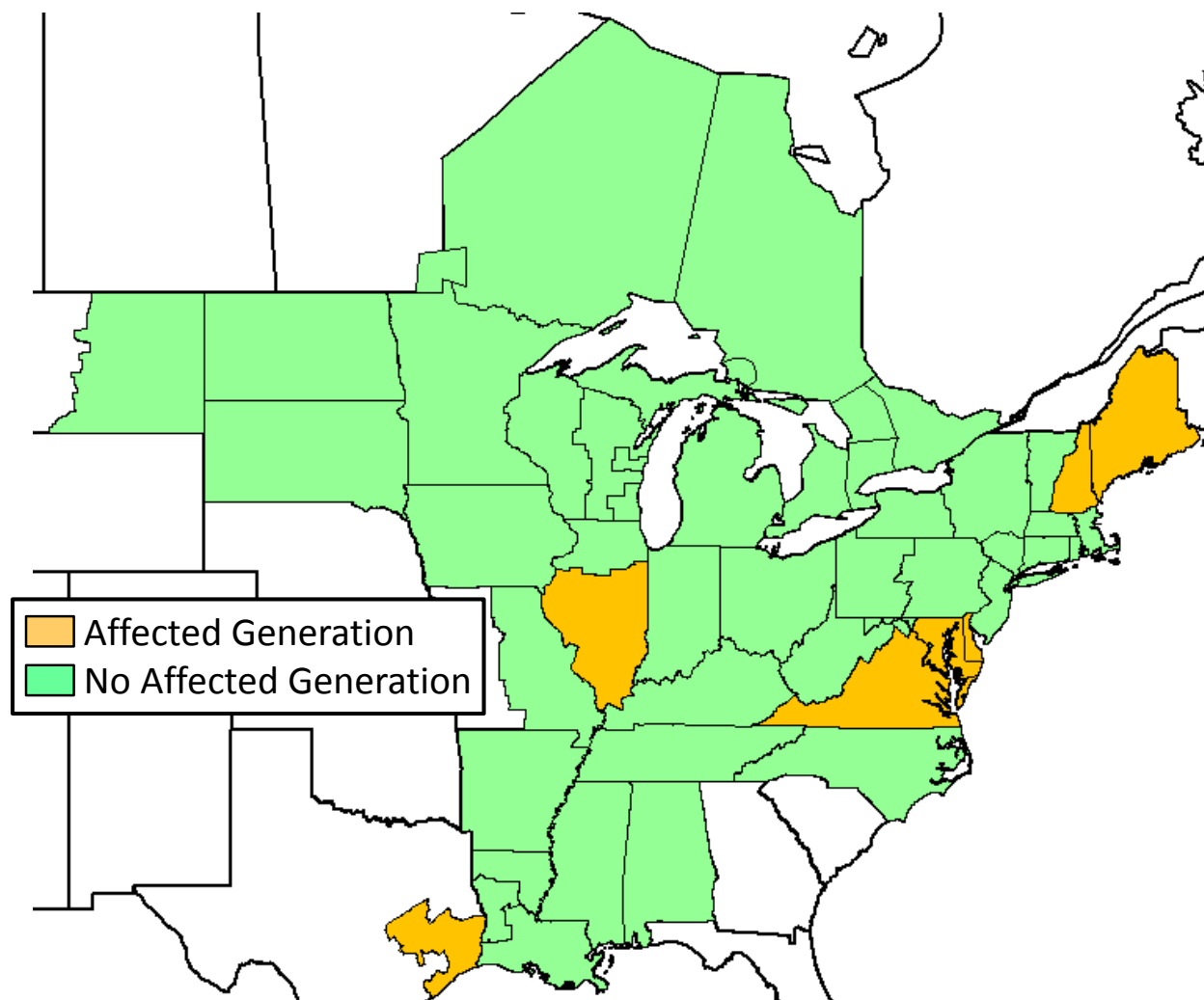


Figure A26-23. RGDS S19 Summer 2023: Locations with Peak Hour Affected Generation

Table A26-15. RGDS S19 Summer 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	9.1	1,250
Illinois Southern	1.0	112
Maine	7.5	1,001
Maryland Eastern	16.7	2,361
New Hampshire	7.6	857
Texas East (SERC)	1.1	151
Virginia	8.4	936

Figure A26-24 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A26-22 during the Summer 2023 peak hour.

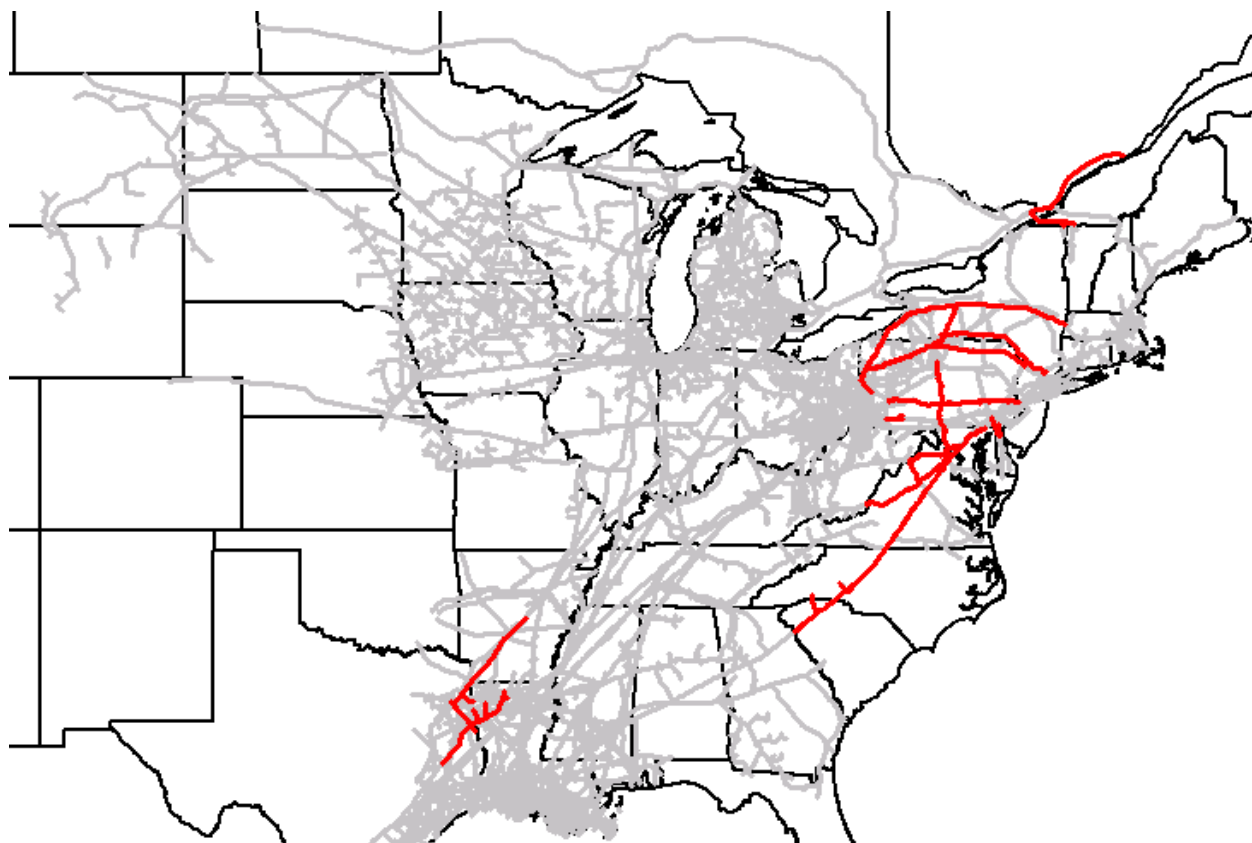


Figure A26-24. RGDS S19 Summer 2023: Peak Hour Constraints

Table A26-16 summarizes the results of the frequency and duration analysis.

Table A26-16. RGDS S19 Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	3	1	4	7
Dominion Southeast	9	1	7	27
Eastern Shore	11	1	7	29
Millennium	1	2	2	2
NB/NS Supply	2	2	81	83
Tennessee Z4 PA	4	1	3	7
Tennessee Z5 NY	6	2	33	75
Texas Eastern ETX	7	1	6	16
Texas Eastern M2 PA South	8	1	19	45
Texas Eastern M3 North	5	1	2	6
TransCanada Quebec	2	1	1	2
Transco Z5	6	1	6	16

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-207 and Figure A27-208 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-209 and Figure A27-210 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A27-211 and Figure A27-212 relative to the capacity of the segments.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-213 and Figure A27-214 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in

Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A27-215 and Figure A27-216 relative to the total production capacity.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-217 and Figure A27-218 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-219 and Figure A27-220 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-221 and Figure A27-222 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania,

generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-223 and Figure A27-224 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A27-225 and Figure A27-226 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A27-227 and Figure A27-228 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A27-229 and Figure A27-230 relative to the capacity of the segment.

Appendix 27

S18 and S19 Chronological and Descending Demand Figures

(Contains CEII – Not included in this Volume)

Appendix 28
LNG Export Sensitivities
S23 and S37

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S23: High/Increased LNG Exports

RGDS S23 Winter 2018

Figure A28-1 summarizes the affected generation during the Winter 2018 peak hour by PPA.

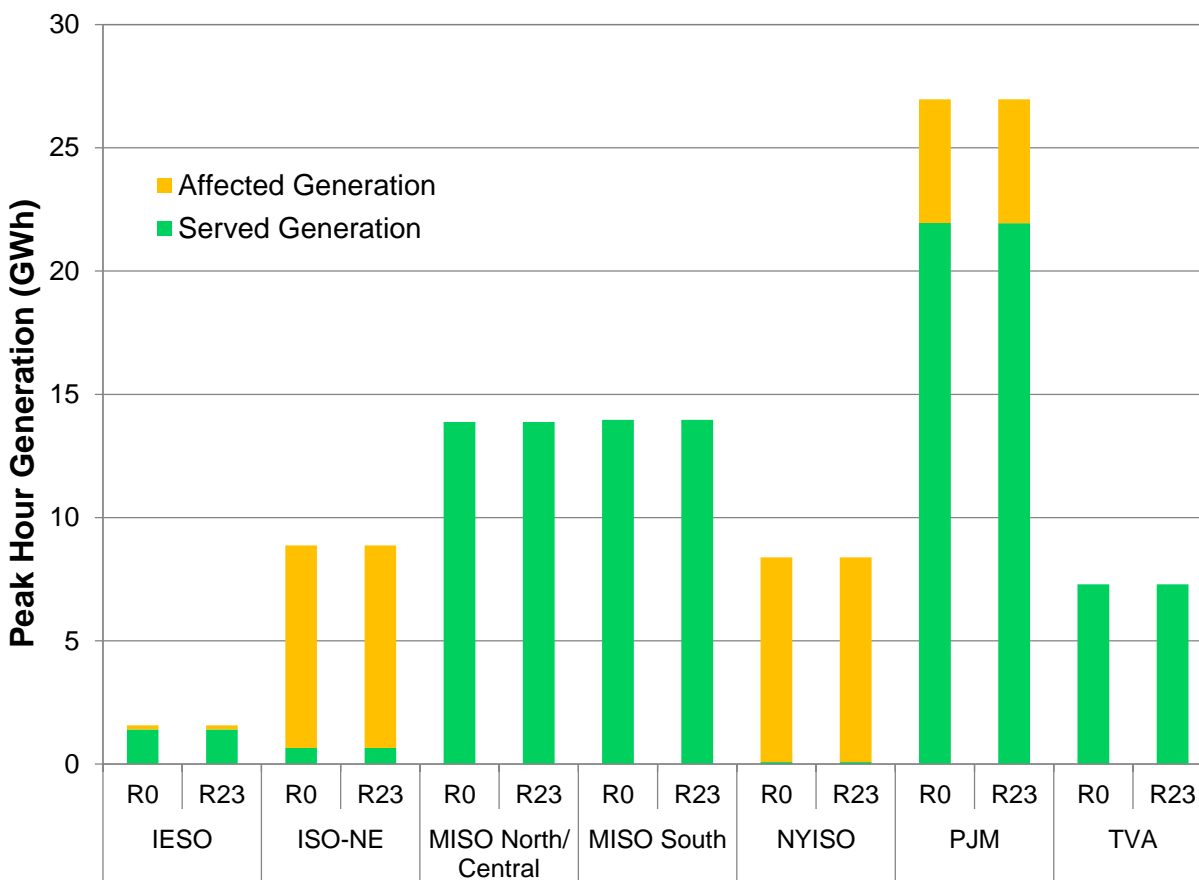


Figure A28-1. RGDS S23 Winter 2018: Peak Hour Affected Generation

Figure A28-2 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A28-1.

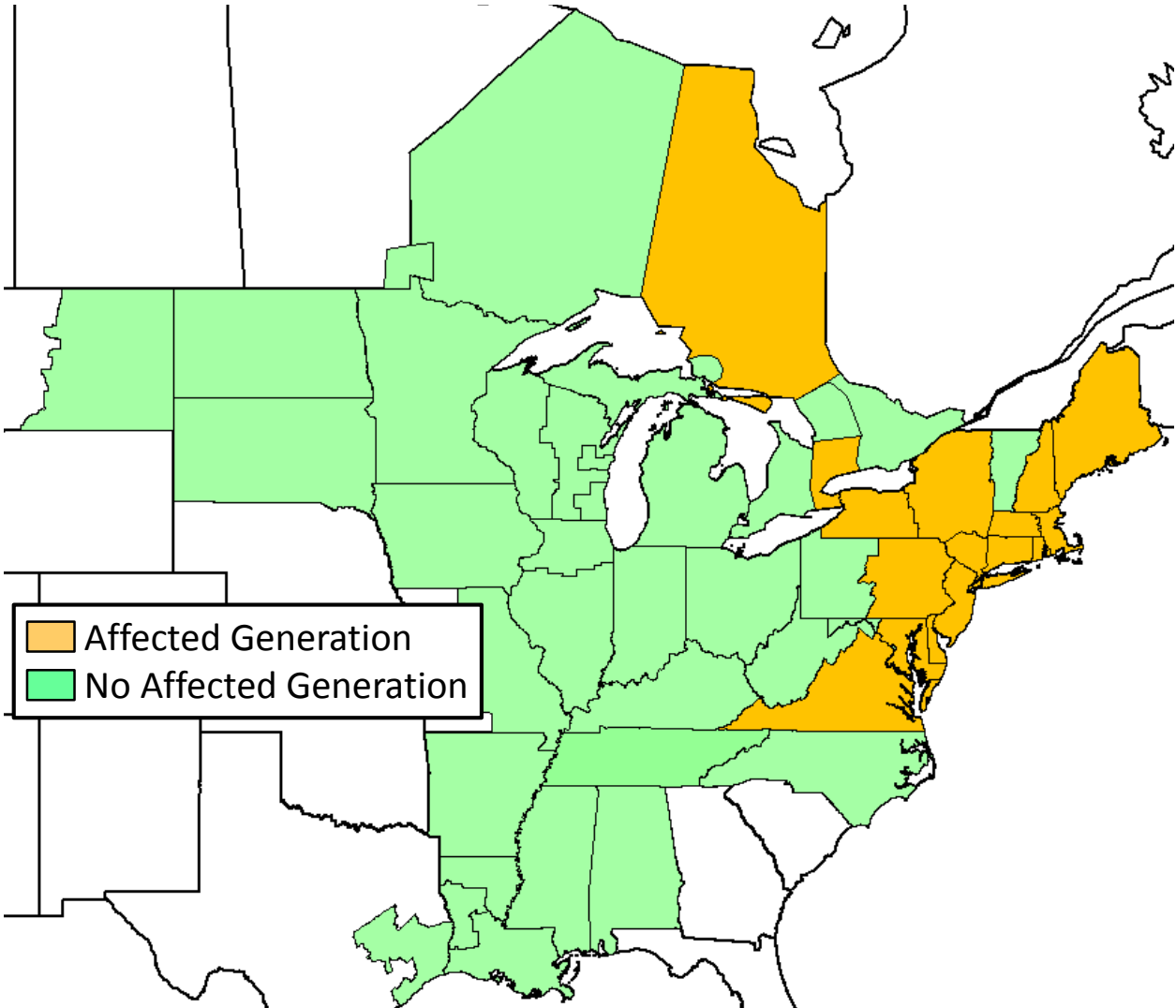


Figure A28-2. RGDS S23 Winter 2018: GPCM Locations with Peak Hour Affected Generation

Table A28-1. RGDS S23 Winter 2018: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	16.0	2,200
Delaware	1.8	220
Maine	7.6	1,045
Maryland Eastern	5.0	539
Massachusetts Eastern	12.8	1,781
Massachusetts Western	7.8	1,059
New Hampshire	9.4	1,245
New Jersey	12.0	1,506
New York Central Northern	24.4	3,419
New York City	17.7	2,336
New York Long Island	9.4	1,054
New York Southern	10.9	1,312
New York Western	1.6	179
Ontario (CDA)	0.5	55
Ontario (NDA)	0.8	114
Rhode Island	6.7	887
Virginia	21.0	2,755

Figure A28-3 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A28-3 during the Winter 2018 peak hour.

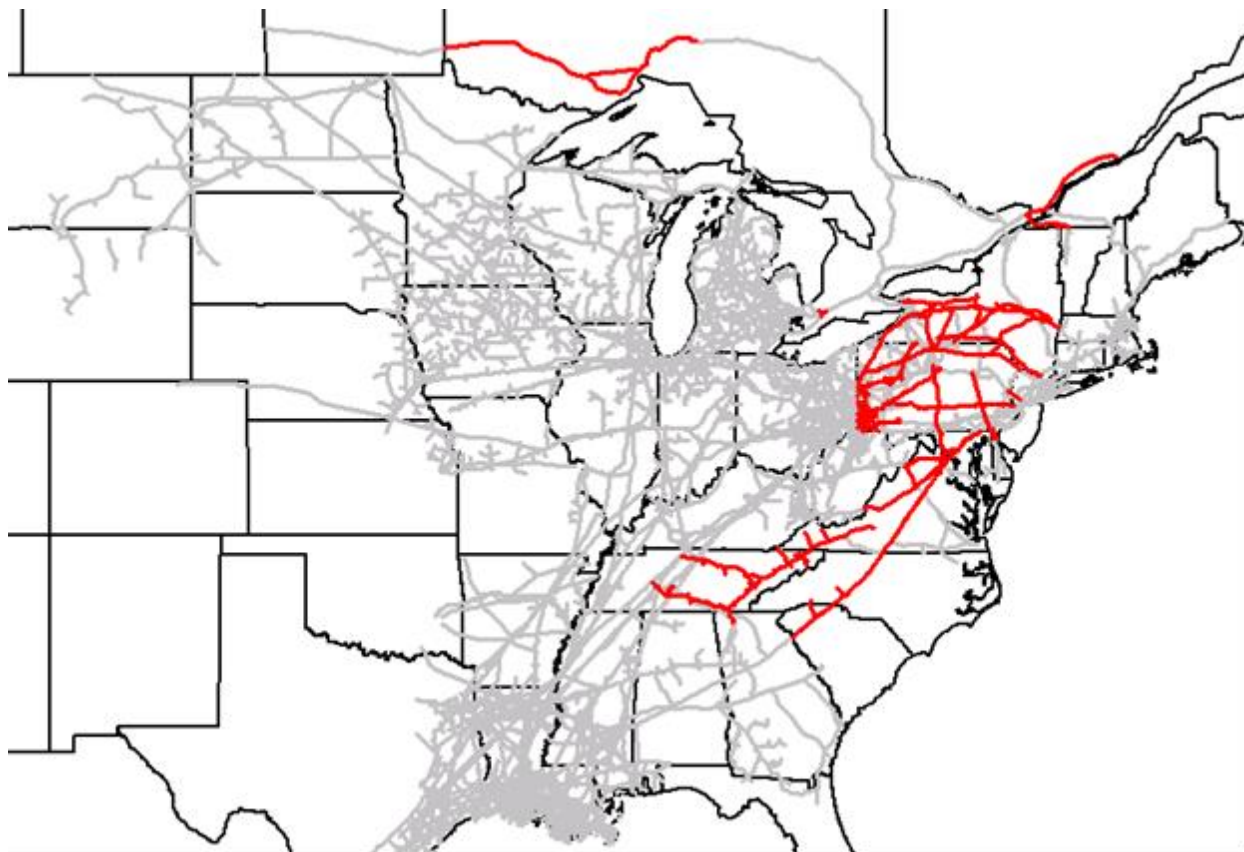


Figure A28-3. RGDS S23 Winter 2018: Peak Hour Constraints

Table A28-2 summarizes the results of the frequency and duration analysis.

Table A28-2. RGDS S23 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	4	3	59	87
Columbia Gas W PA/NY	11	1	5	21
Constitution	5	1	12	25
Dominion Eastern NY	6	1	6	15
Dominion Western NY	1	4	4	4
Dominion Southeast	4	3	31	77
East Tennessee Mainline	7	1	2	9
Eastern Shore	11	1	10	51
Empire Mainline	5	1	12	21
Millennium	4	1	59	83
NB/NS Supply	13	1	20	58
Tennessee Z4 PA	10	1	7	30
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	10	1	15	50
Texas Eastern M3 North	10	2	7	39
TransCanada Ontario West	5	1	5	12
TransCanada Quebec	9	1	14	30
Transco Leidy Atlantic	8	2	23	59
Transco Z5	7	1	10	20
Transco Z6 Leidy to 210	5	1	3	8
Union Gas Dawn	2	1	3	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-1 and Figure A29-2 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-3 and Figure A29-4 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-5 and Figure A29-5 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-7 and Figure A29-8 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-9 and Figure A29-10 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-11 and Figure A29-12 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East

Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-13 and Figure A29-14 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A29-15 and Figure A29-16 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-17 and Figure A29-18 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-19 and Figure A29-20 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A29-21 and Figure A29-22 relative to the total production

capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-23 and Figure A29-24 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-25 and Figure A29-26 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-27 and Figure A29-28 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A29-29 and Figure A29-30 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-31 and Figure A29-32 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A29-33 and Figure A29-34 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-35 and Figure A29-36 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-37 and Figure A29-38 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-39 and Figure A29-40 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A29-41 and Figure A29-42 relative to the capacity of the segment.

RGDS S23 Summer 2018

Figure A28-4 summarizes the affected generation during the Summer 2018 peak hour by PPA.

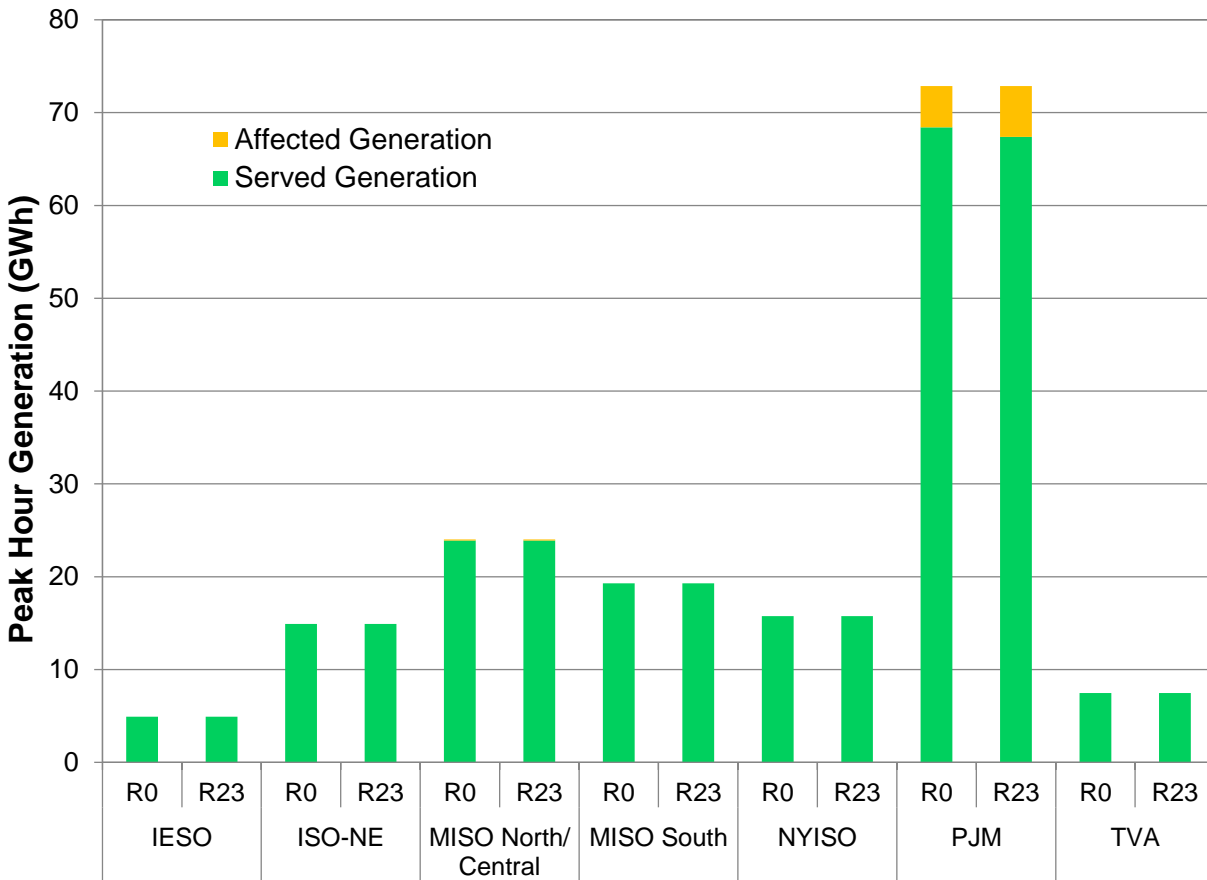


Figure A28-4. RGDS S23 Summer 2018: Peak Hour Affected Generation

Figure A28-5 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A28-3.

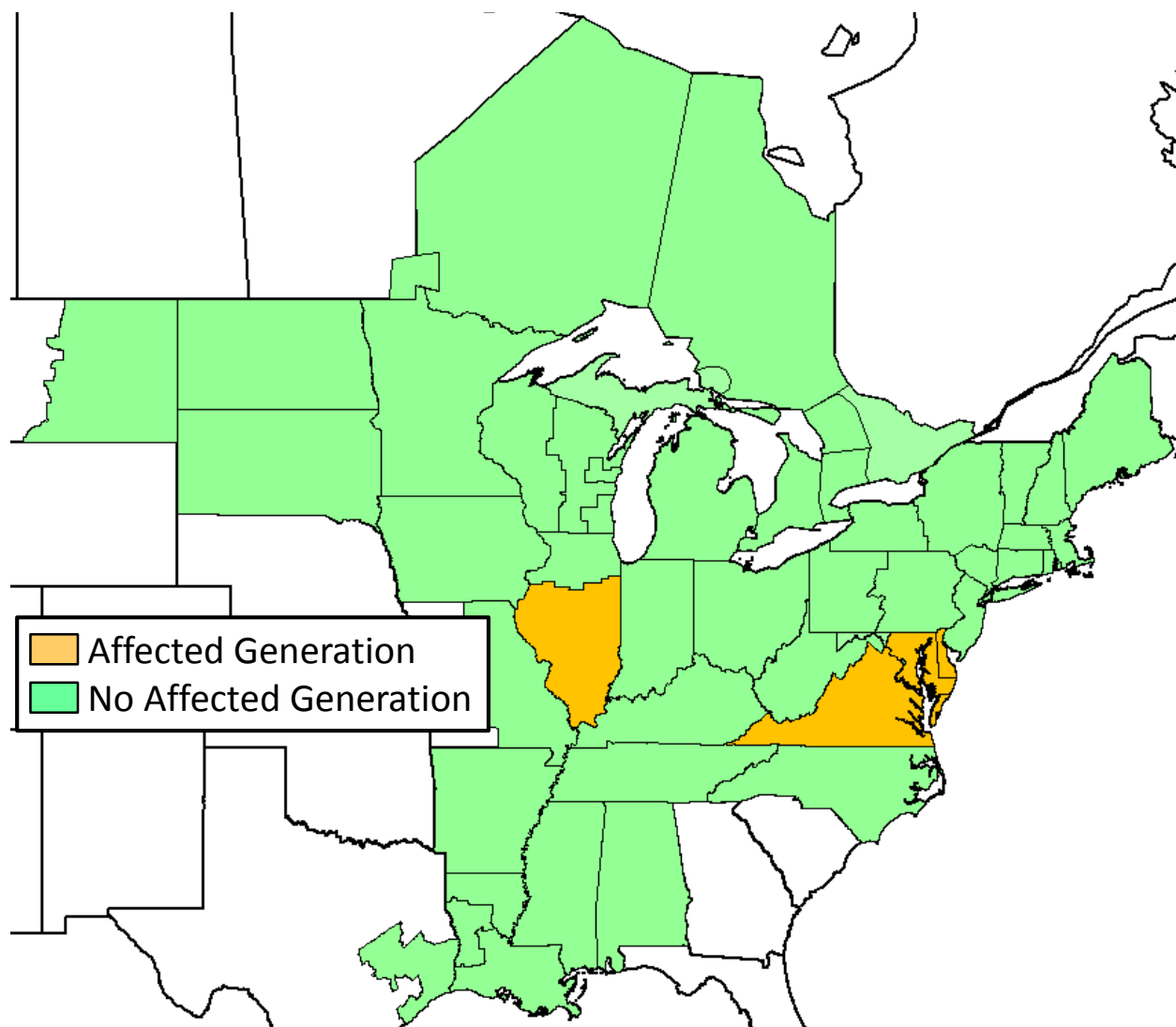


Figure A28-5. RGDS S23 Summer 2018: GPCM Locations with Peak Hour Affected Generation

Table A28-3. RGDS S23 Summer 2018 Unserved Peak Hour Generation Demand and Generation At-Risk

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.3	1,149
Illinois Southern	1.0	112
Maryland Eastern	22.0	3,118
Virginia	11.1	1,208

Figure A28-6 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A28-4 during the Summer 2018 peak hour.

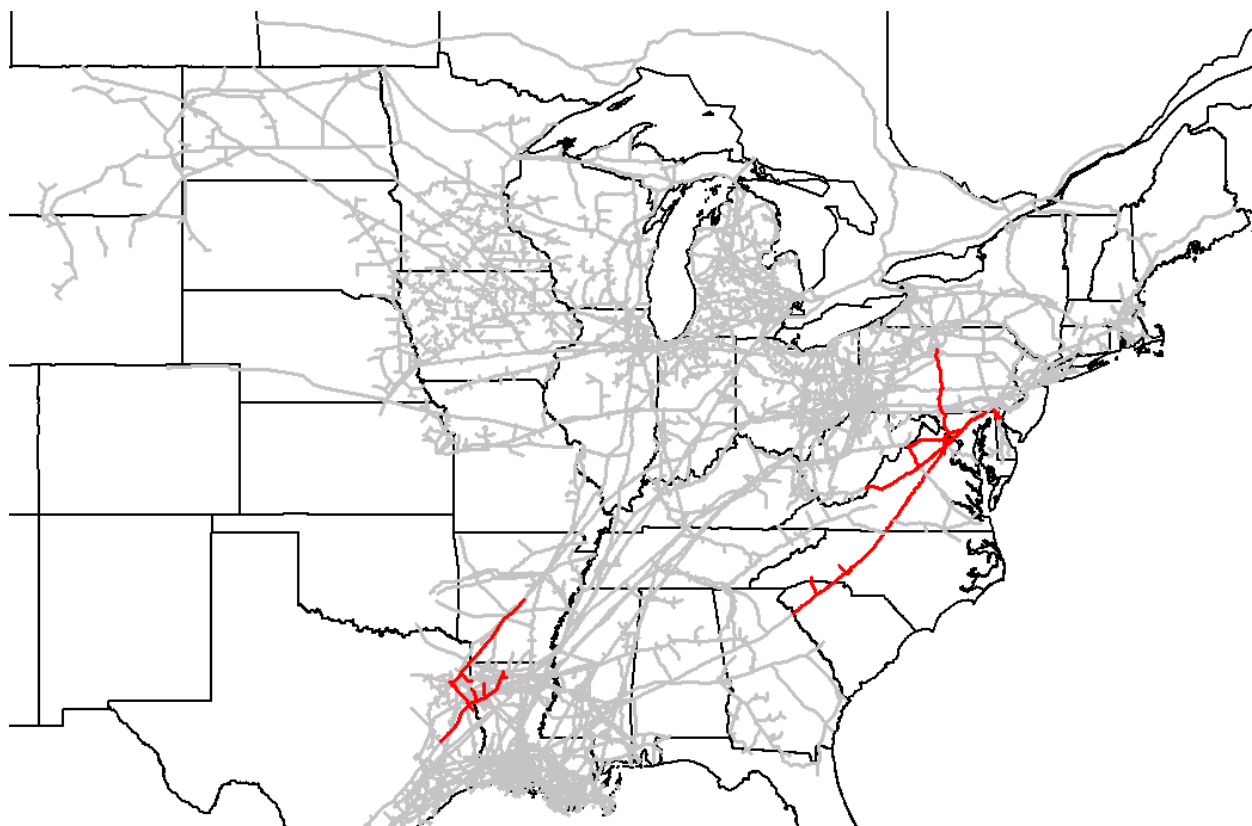


Figure A28-6. RGDS S23 Summer 2018: Peak Hour Constraints

Table A28-4 summarizes the results of the frequency and duration analysis.

Table A28-4. RGDS S23 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	8	1	6	21
Dominion Southeast	11	1	7	24
Eastern Shore	7	1	6	19
Texas Eastern Zone ETX	4	1	6	12
Transco Z5	7	1	6	18

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia, generators behind LDCs served by Columbia Gas in Maryland and Virginia, and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-43 and Figure A29-44 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-45 and Figure A29-46 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A29-47 and Figure A29-48 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-49 and Figure A29-50 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-51 and Figure A29-52 relative to the capacity of the segment.

RGDS S23 Winter 2023

Figure A28-7 summarizes the affected generation during the Winter 2023 peak hour by PPA.

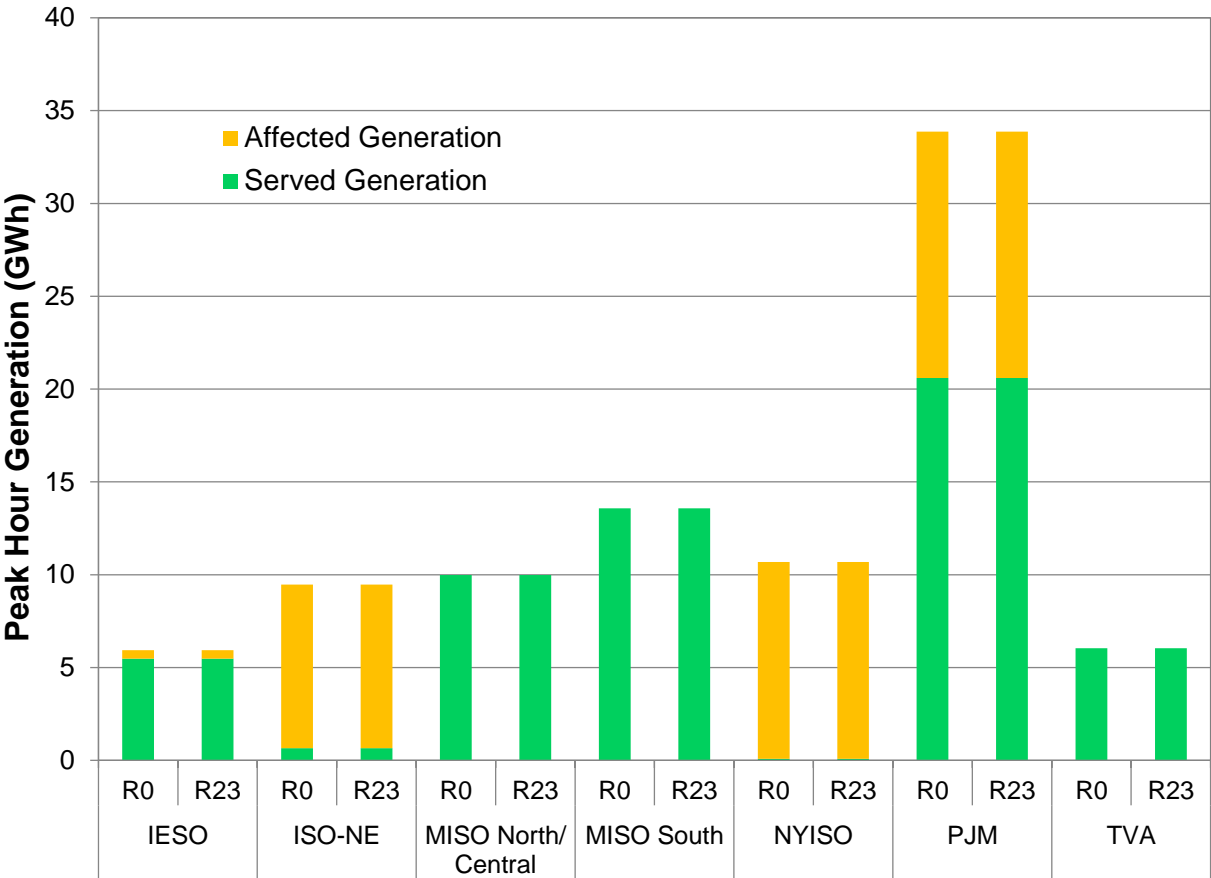


Figure A28-7. RGDS S23 Winter 2023: Peak Hour Affected Generation

Figure A28-8 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A28-5.

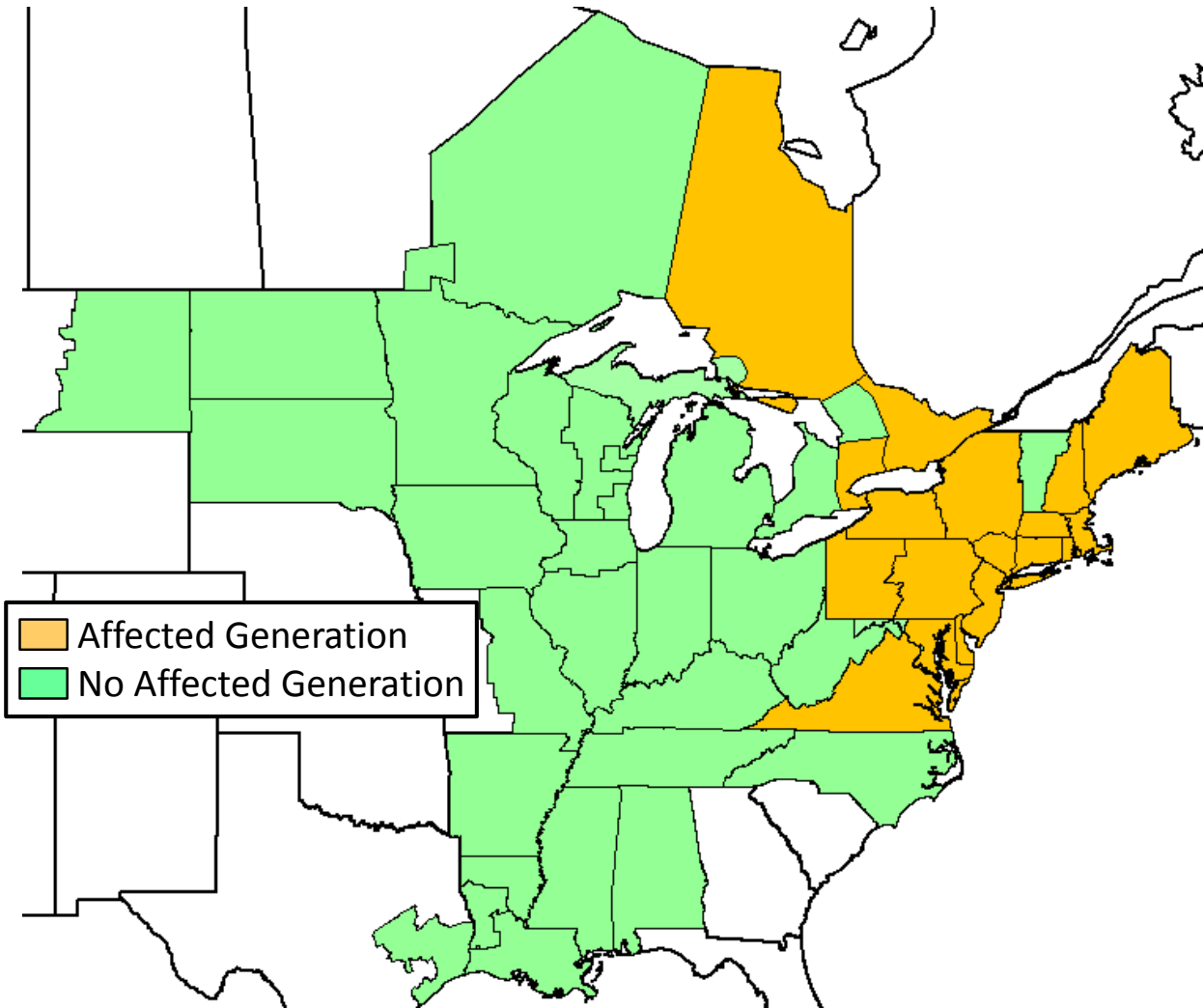


Figure A28-8. RGDS S23 Winter 2023: GPCM Locations with Peak Hour Affected Generation

Table A28-5. RGDS S23 Winter 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	15.6	2,140
Delaware	1.3	173
Maine	9.1	1,232
Maryland Eastern	5.0	539
Massachusetts Eastern	14.6	2,025
Massachusetts Western	9.3	1,239
New Hampshire	9.4	1,245
New Jersey	10.7	1,372
New York Central Northern	40.1	4,764
New York City	19.8	2,665
New York Long Island	12.8	1,292
New York Southern	15.1	1,629
New York Western	2.2	247
Ontario (CDA)	0.5	55
Ontario (EDA)	2.1	249
Ontario (NDA)	1.2	155
Pennsylvania Eastern	43.5	5,990
Pennsylvania Western	6.7	961
Rhode Island	7.1	936
Virginia	35.4	4,237

Figure A28-9 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A28-7 during the Winter 2023 peak hour.

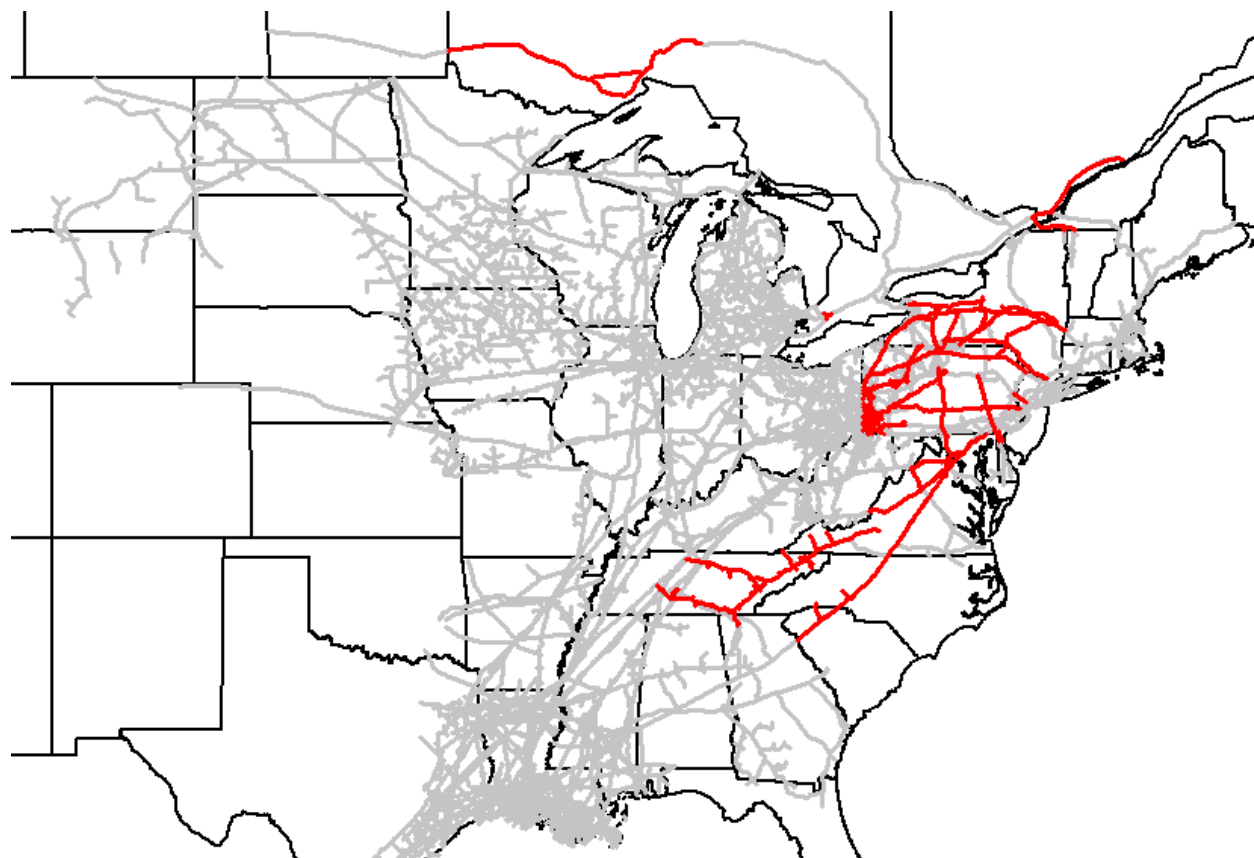


Figure A28-9. RGDS S23 Winter 2023: Peak Hour Constraints

Table A28-6 summarizes the results of the frequency and duration analysis.

Table A28-6. RGDS S23 Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	3	4	59	89
Columbia Gas W PA/NY	15	1	5	28
Constitution	2	31	59	90
Dominion Eastern NY	9	1	16	58
Dominion Western NY	1	5	5	5
Dominion Southeast	2	31	59	90
East Tennessee Mainline	5	1	5	11
Eastern Shore	12	1	15	63
Empire Mainline	8	1	44	61
Millennium	7	1	37	68
NB/NS Supply	2	31	59	90
Tennessee Z4 PA	7	1	8	25
Tennessee Z5 NY	3	1	59	89
Texas Eastern M2 PA South	7	1	46	81
Texas Eastern M3 North	6	1	17	47
TransCanada Ontario West	4	1	6	11
TransCanada Quebec	6	1	14	34
Transco Leidy Atlantic	3	4	59	89
Transco Z5	9	1	10	24
Transco Z6 Leidy to 210	5	1	55	86
Union Gas Dawn	3	1	2	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas’s Virginia/Maryland segment, which is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d over the 2018 capacity. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-53 and Figure A29-54 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas’s Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-55 and Figure A29-56 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-57 and Figure A29-58 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-59 and Figure A29-60 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-61 and Figure A29-62 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase of 15 MDth/d over 2018. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-63 and Figure A29-64 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-65 and Figure A29-66 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A29-67 and Figure A29-68 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-69 and Figure A29-70 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-71 and Figure A29-72 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A29-73 and Figure A29-74 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-75 and Figure A29-76 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-77 and Figure A29-78 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-79 and Figure A29-80 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A29-81 and Figure A29-82 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-83 and Figure A29-84 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A29-85 and Figure A29-86 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-87 and Figure A29-88 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-89 and Figure A29-90 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-91 and Figure A29-92 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A29-93 and Figure A29-94 relative to the capacity of the segment.

RGDS S23 Summer 2023

Figure A28-10 summarizes the affected generation during the Summer 2023 peak hour by PPA.

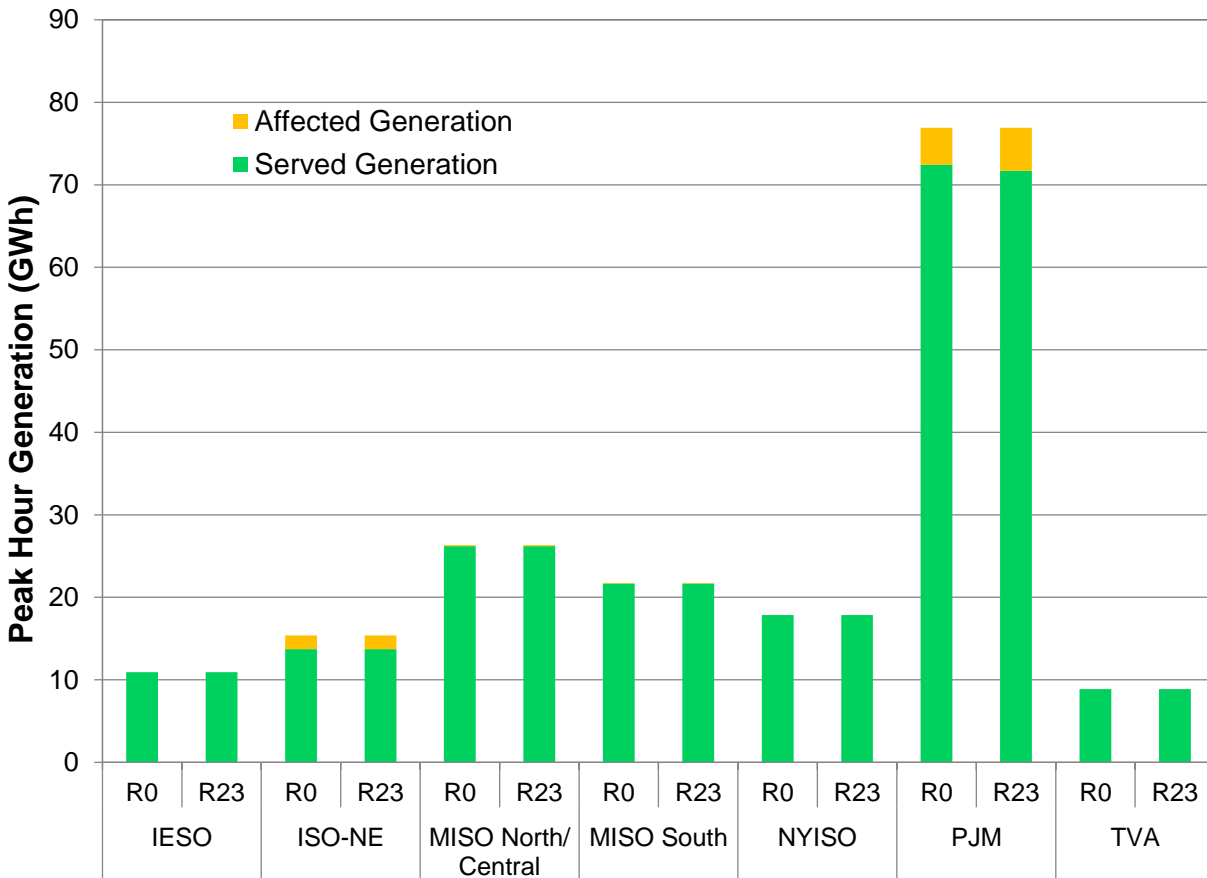


Figure A28-10. RGDS S23 Summer 2023: Peak Hour Affected Generation

Figure A28-11 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A28-7.

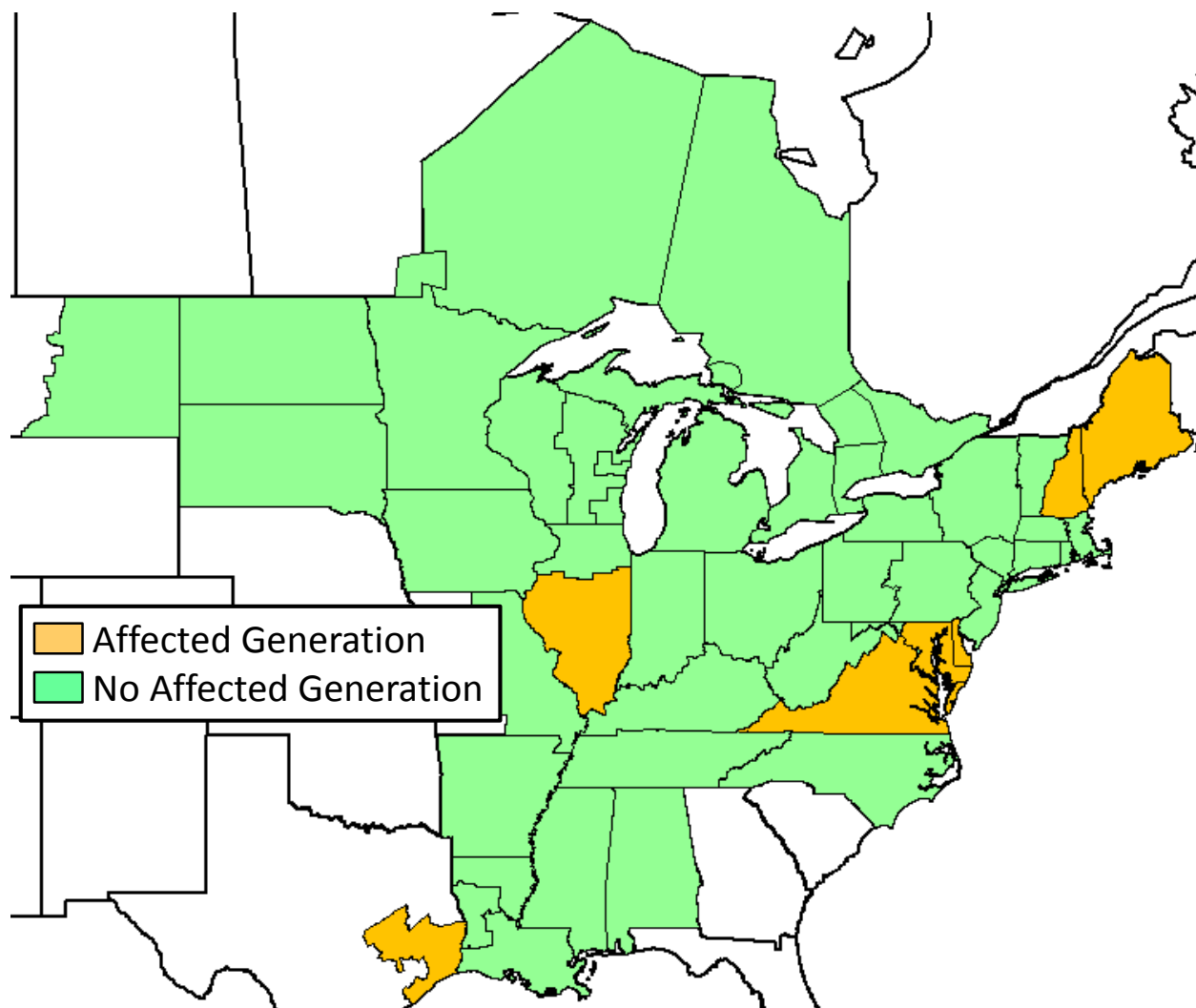


Figure A28-11. RGDS S23 Summer 2023: GPCM Locations with Peak Hour Affected Generation

Table A28-7. RGDS S23 Summer 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.5	1,175
Illinois Southern	1.0	112
Maine	6.0	809
Maryland Eastern	16.7	2,361
New Hampshire	7.6	857
Texas East (SERC)	0.6	81
Virginia	15.5	1,668

Figure A28-12 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A28-10 during the Summer 2023 peak hour.

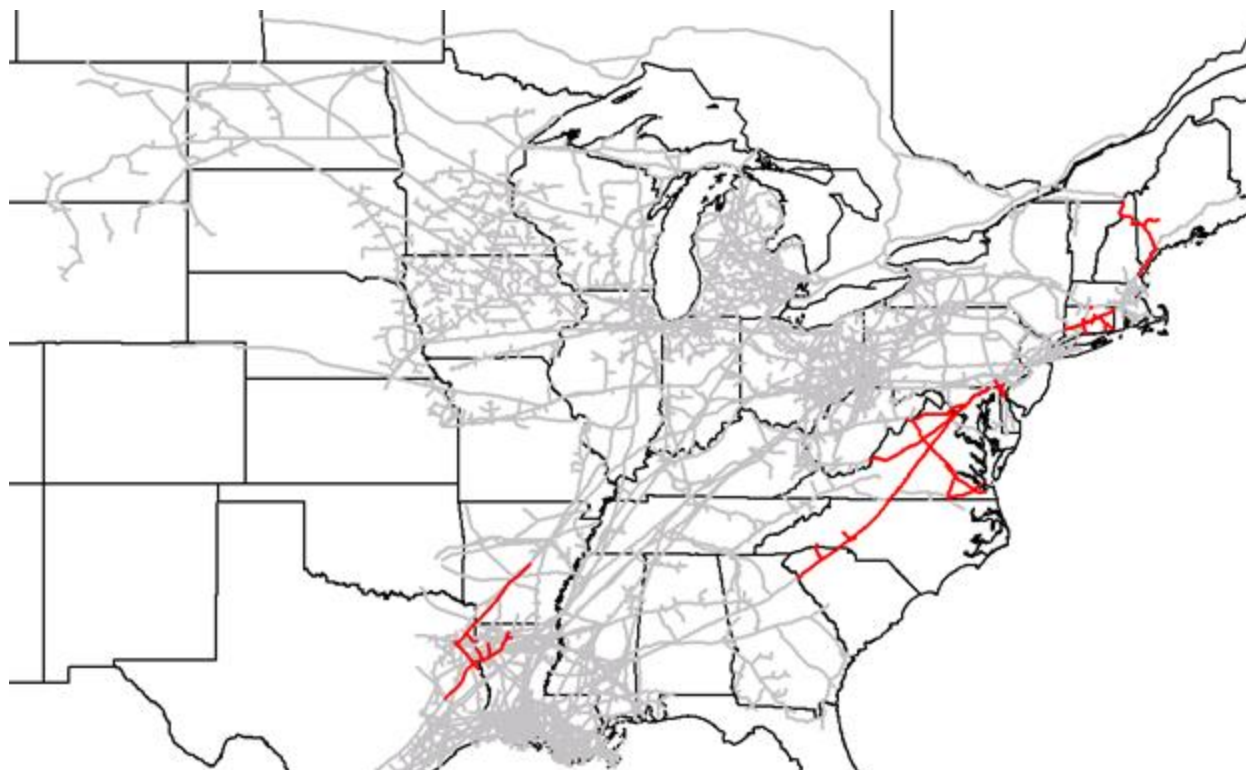


Figure A28-12. RGDS S23 Summer 2023: Peak Hour Constraints

Table A28-8 summarizes the results of the frequency and duration analysis.

Table A28-8. RGDS S23 Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	6	1	3	12
Columbia Gas VA/MD	9	1	6	20
Dominion Southeast	10	1	18	50
Eastern Shore	9	1	7	27
NB/NS Supply	5	2	27	70
PNGTS N of Westbrook	10	1	8	41
PNGTS S of Westbrook	11	1	7	33
Texas Eastern Zone ETX	7	1	6	17
Transco Z5	6	1	6	16

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-95 and Figure A29-96 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-97 and Figure A29-98 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-99 and Figure A29-100 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A29-101 and Figure A29-102 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A29-103 and Figure A29-104 relative to the total production capacity.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in

New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-105 and Figure A29-106 relative to the capacity of the segment.

PNGTS South of Westbrook

The 100% peak hour utilization on PNGTS's South of Westbrook segment, which is modeled with a capacity of 300 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire, generators served by Maine LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-113 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-107 and Figure A29-108 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-109 and Figure A29-110 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-111 and Figure A29-112 relative to the capacity of the segment.

S37: S13 + Canaport Converted to LNG Export Facility

RGDS S37 Winter 2023

Figure A28-13 summarizes the affected generation during the Winter 2023 peak hour by PPA.

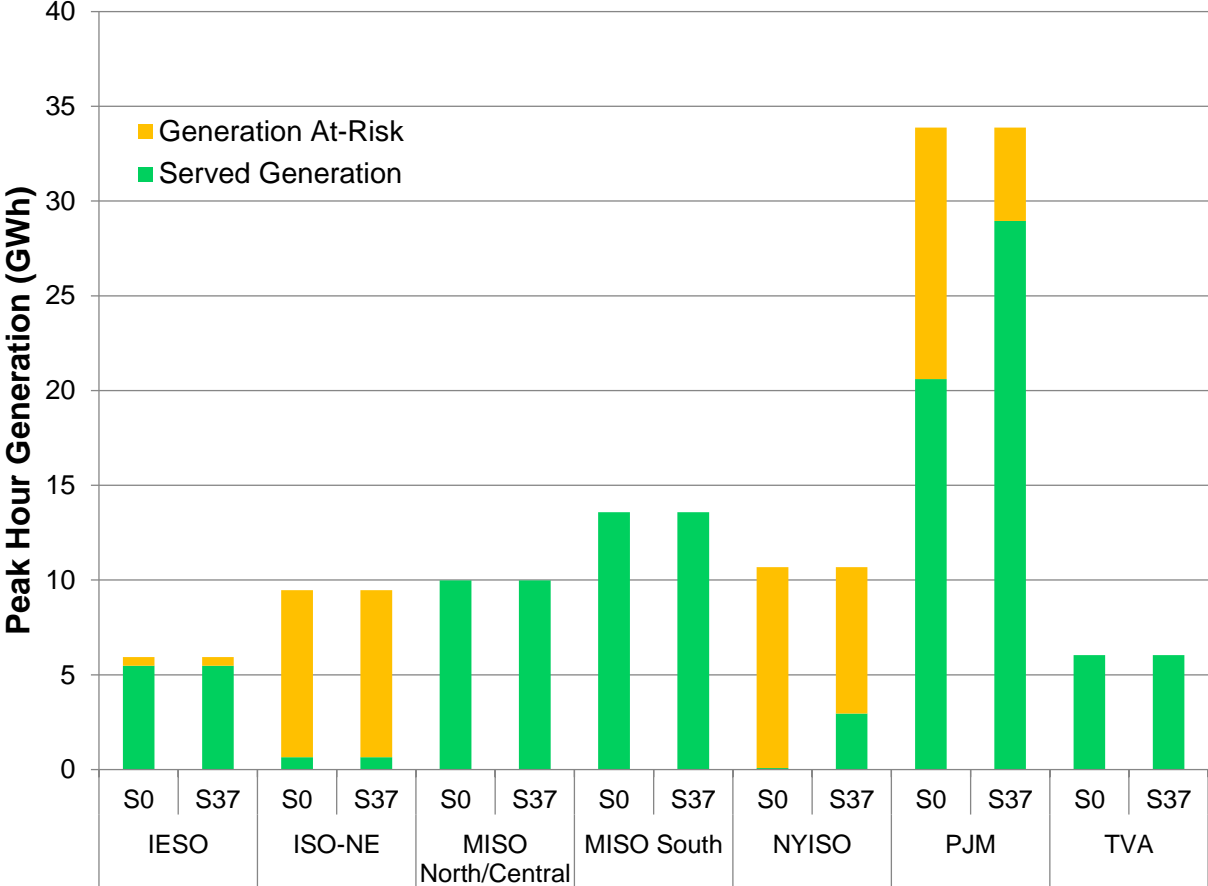


Figure A28-13. RGDS S37 Winter 2023: Peak Hour Affected Generation

Figure A28-14 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A28-9.

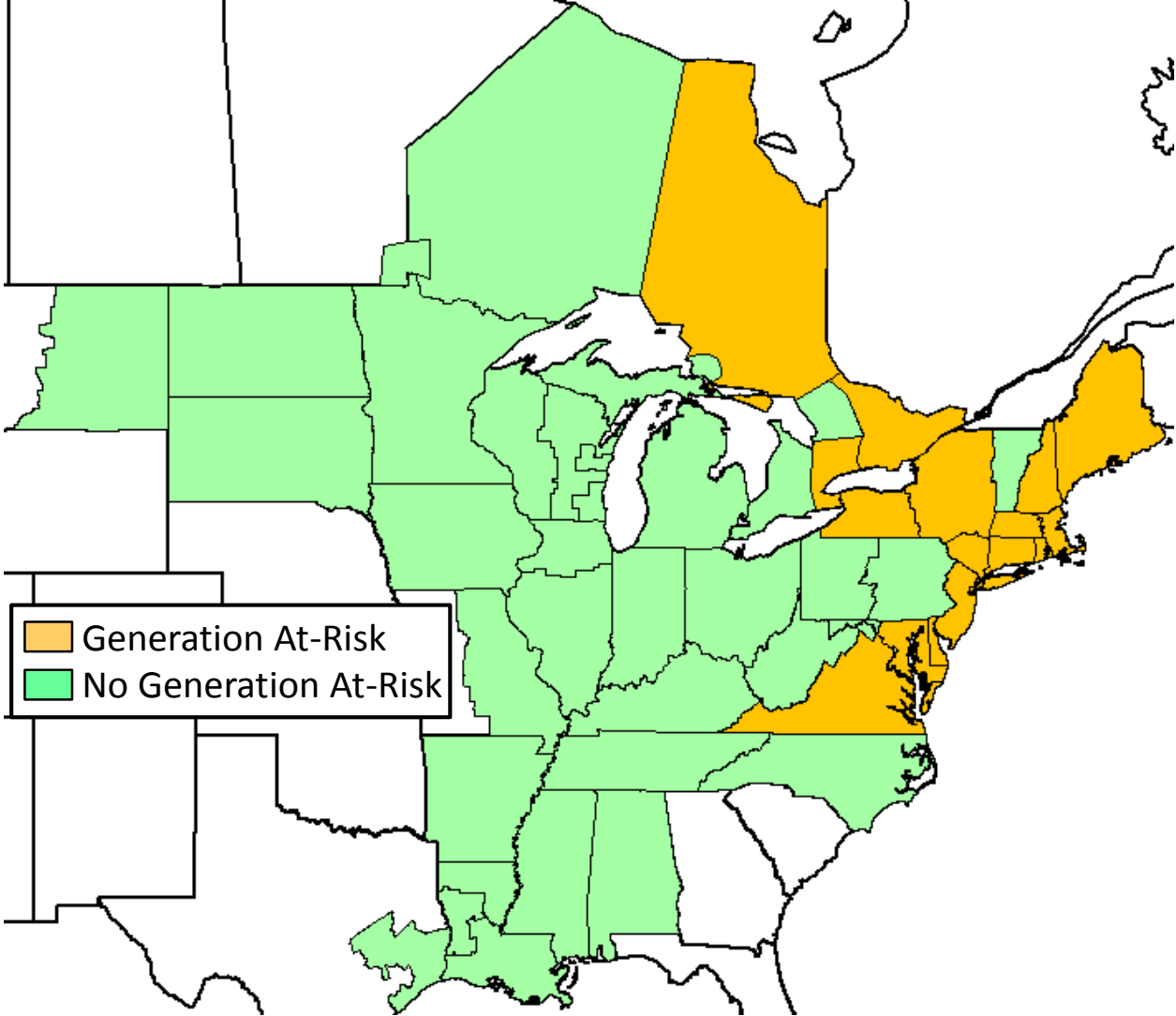


Figure A28-14. RGDS S37 Winter 2023: GPCM Locations with Peak Hour Affected Generation

Table A28-9. RGDS S37 Winter 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	15.6	2,140
Delaware	1.1	151
Maine	9.1	1,232
Maryland Eastern	5.0	539
Massachusetts Eastern	14.6	2,025
Massachusetts Western	9.3	1,239
New Hampshire	9.4	1,245
New York Central Northern	15.3	1,890
New York City	19.8	2,665
New York Long Island	12.8	1,292
New York Southern	15.1	1,629
New York Western	2.2	247
Ontario (CDA)	0.5	55
Ontario (EDA)	2.1	249
Ontario (NDA)	1.2	155
Rhode Island	7.1	936
Virginia	35.4	4,237

Figure A28-15 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A28-13 during the Winter 2023 peak hour.



Figure A28-15. RGDS S37 Winter 2023: Peak Hour Constraints

Table A28-10 summarizes the results of the frequency and duration analysis.

Table A28-10. RGDS S37 Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	6	1	52	80
Constitution	2	31	59	90
Dominion Eastern NY	5	1	6	12
Dominion Western NY	1	5	5	5
Dominion Southeast	4	1	52	85
East Tennessee	5	1	5	11
Eastern Shore	12	1	15	63
Empire Mainline	4	1	13	22
Iroquois Z1 → Z2	2	31	59	90
M&N U.S.	2	31	59	90
Millennium	7	1	37	68
Tennessee Z4 PA	7	1	8	25
Texas Eastern M2 PA South	7	1	46	81
Texas Eastern M3 North	6	1	17	47
TransCanada Ontario West	4	1	6	11
Transco Leidy Atlantic	3	4	59	89
Transco Z5	8	1	2	9
Transco Z6 Leidy to 210	5	1	55	86
Union Gas Dawn	2	1	2	3

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-113 and Figure A29-114 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-115 and Figure A29-116 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 1,019 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-117 and Figure A29-118 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-119 and Figure A29-120 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-121 and Figure A29-122 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-123 and Figure A29-124 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A29-125 and Figure A29-126 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 940 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-127 and Figure A29-128 relative to the capacity of the segment.

Iroquois Zone 1 to Zone 2

The 100% peak hour utilization of the link between Iroquois Zone 1 and Iroquois Zone 1, which is modeled with a capacity of 855 MDth/d, potentially affects generators directly connected to Iroquois in New York and Connecticut, and generators behind LDCs served by Iroquois in New York and Connecticut. The locations of these generators are shown in Figure A17-16.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-129 and Figure A29-130 relative to the capacity of the segment.

M&N U.S.

M&N U.S. is modeled with a capacity of 1,847 MDth/d. The 100% peak hour utilization on M&N's mainline potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure A28-16. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

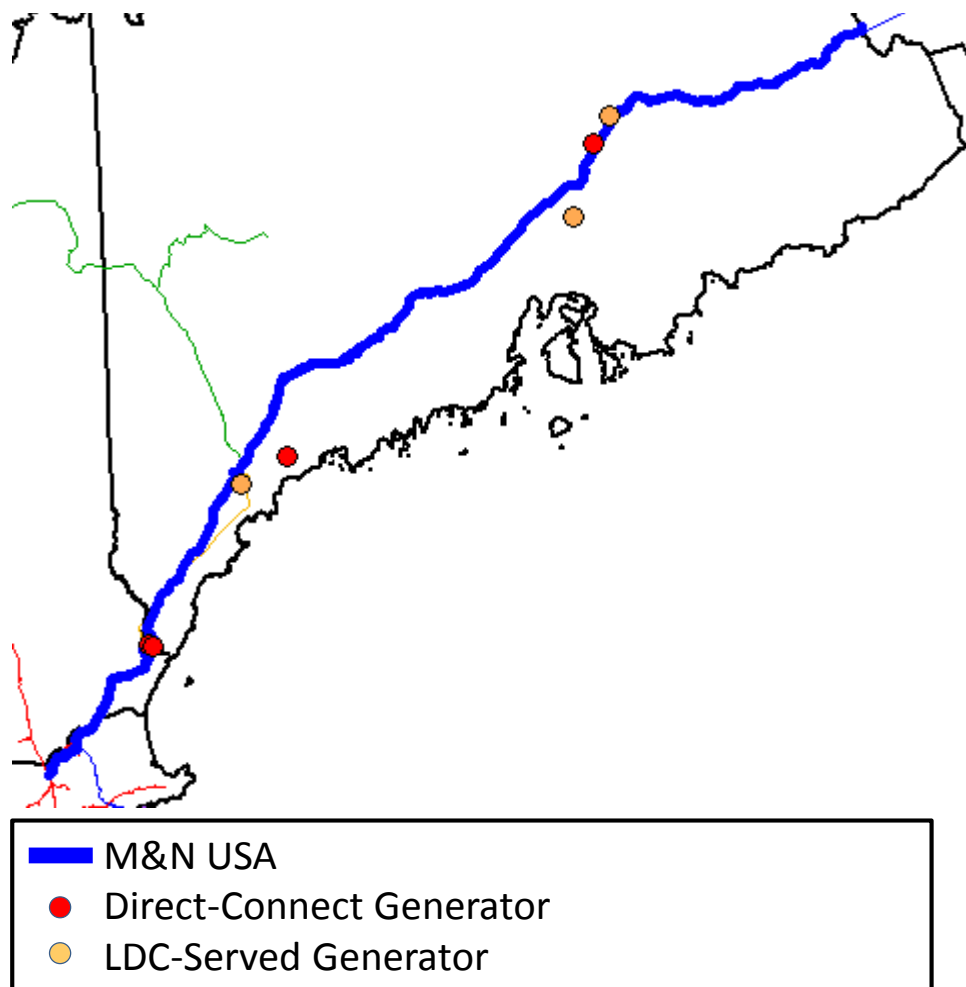


Figure A28-16. Generators Affected by M&N U.S. Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-131 and Figure A29-132 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-133 and Figure A29-134 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-135 and Figure A29-136 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-137 and Figure A29-138 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A29-139 and Figure A29-140 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-141 and Figure A29-142 relative to the capacity of the segment.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-143 and Figure A29-144 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-145 and Figure A29-146 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-147 and Figure A29-148 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 6,612 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A29-149 and Figure A29-150 relative to the capacity of the segment.

RGDS S37 Summer 2023

Figure A28-17 summarizes the affected generation during the Summer 2023 peak hour by PPA.

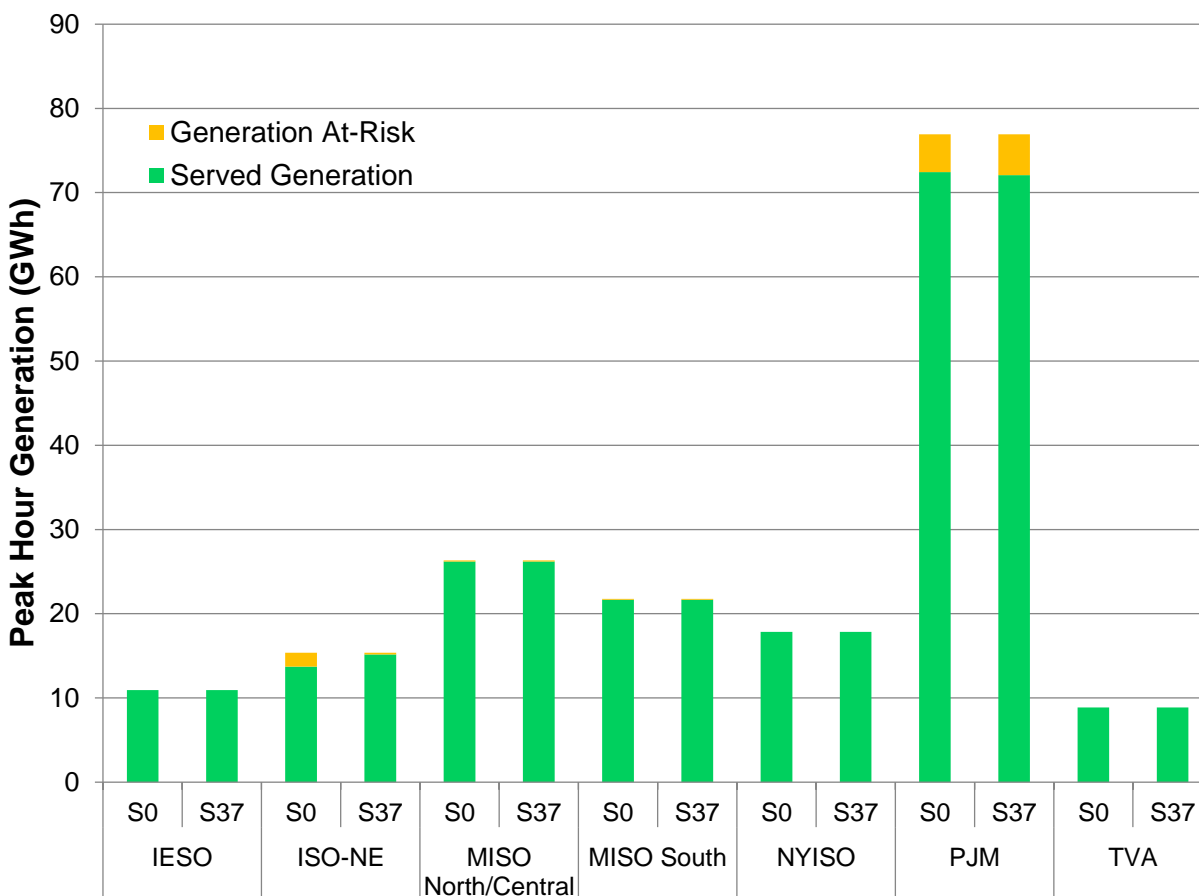


Figure A28-17. RGDS S37 Summer 2023: Peak Hour Affected Generation

Figure A28-18 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A28-11.

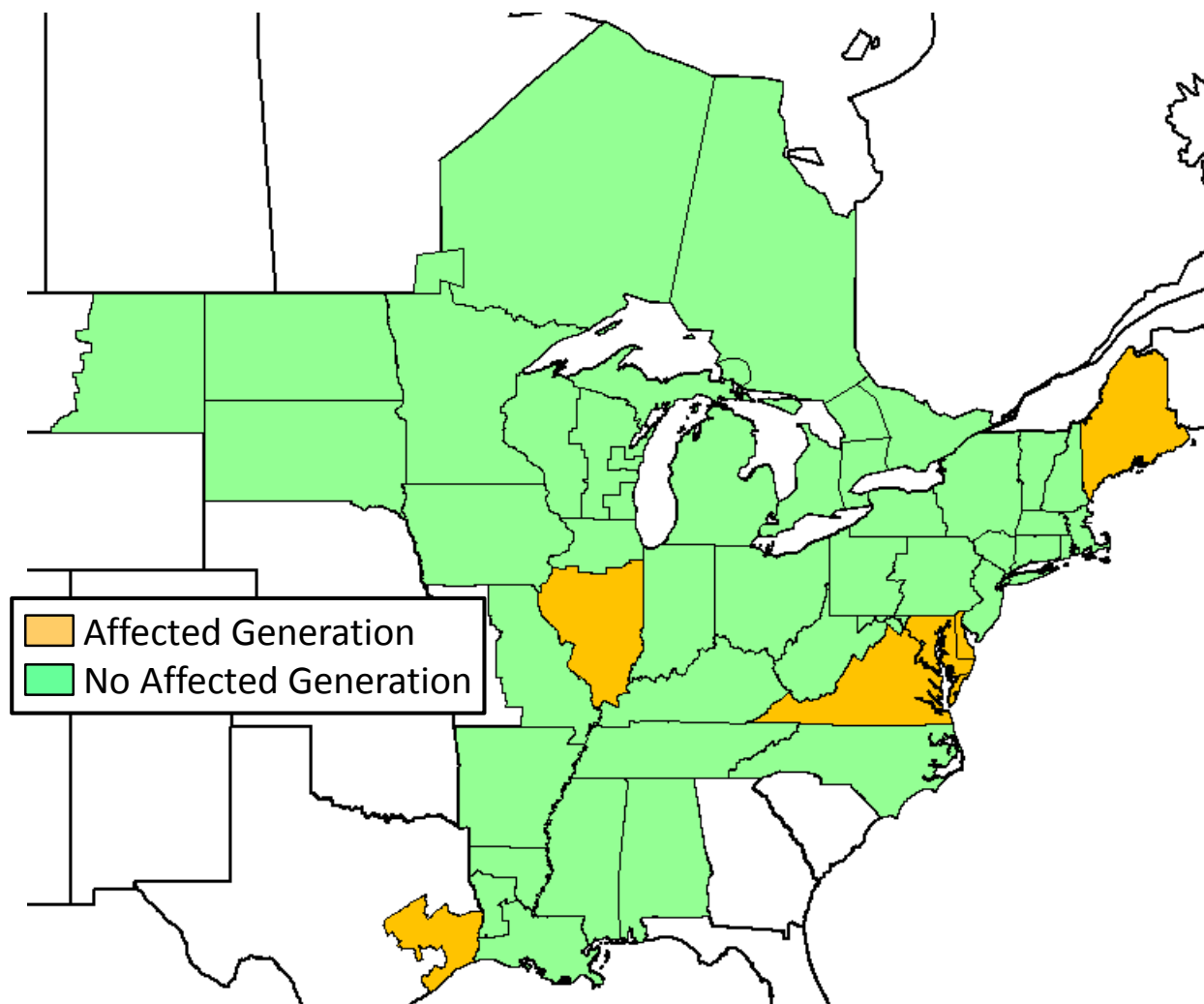


Figure A28-18. RGDS S37 Summer 2023: GPCM Locations with Peak Hour Affected Generation

Table A28-11. RGDS S37 Summer 2023: Unserved Peak Hour Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.5	1,175
Illinois Southern	1.0	112
Maine	1.7	217
Maryland Eastern	16.7	2,361
Texas East (SERC)	0.6	81
Virginia	11.8	1,303

Figure A28-19 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A28-21 during the Summer 2023 peak hour.

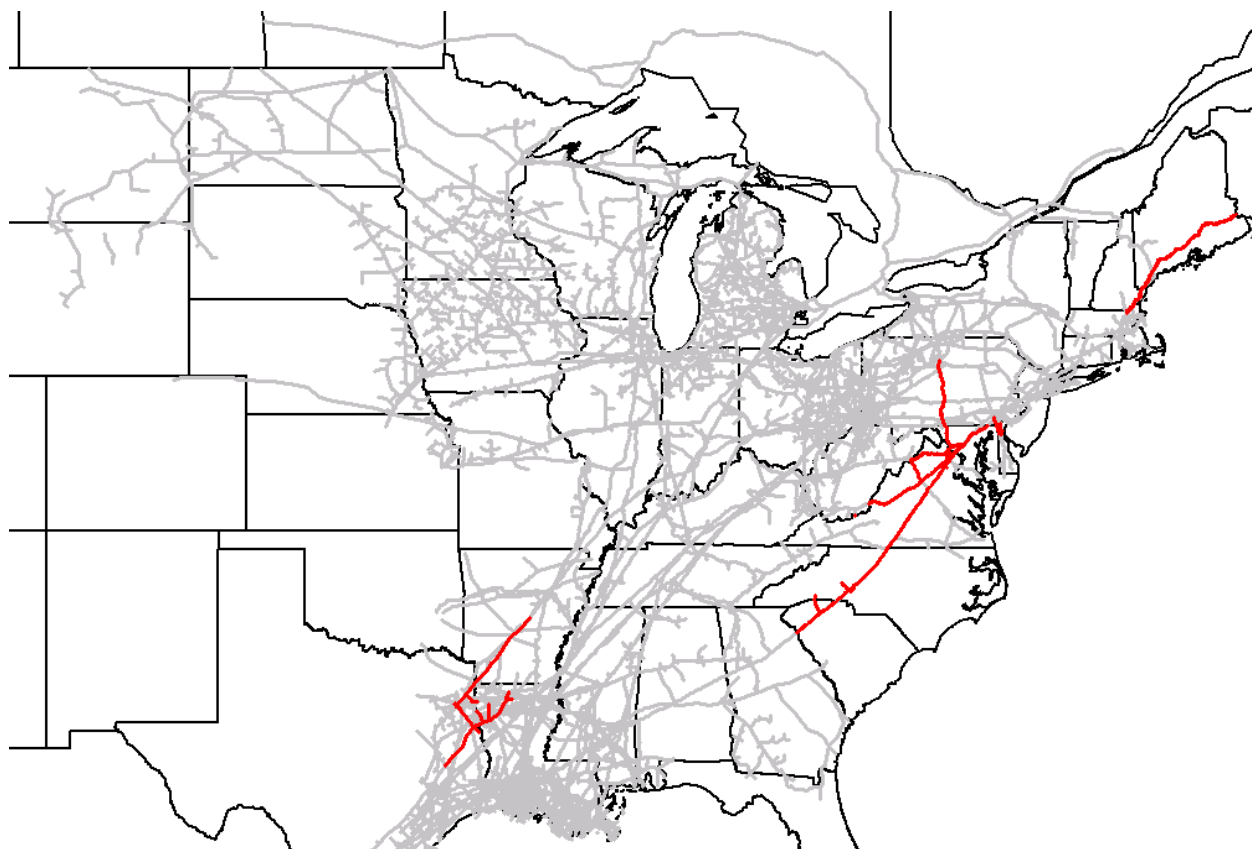


Figure A28-19. RGDS S37 Summer 2023: Peak Hour Constraints

Table A28-12 summarizes the results of the frequency and duration analysis.

Table A28-12. RGDS S37 Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	2	1	3	4
Dominion Southeast	9	1	7	27
Eastern Shore	9	1	7	27
M&N USA	1	92	92	92
Texas Eastern Zone ETX	7	1	6	17
Transco Z5	6	1	6	16

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia, generators behind LDCs served by Columbia Gas in Maryland and Virginia, and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-151 and Figure A29-152 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-153 and Figure A29-154 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A29-155 and Figure A29-156 relative to the capacity of the segments.

M&N U.S.

M&N U.S. is modeled with a capacity of 1,300 MDth/d. The 100% peak hour utilization on M&N's mainline potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure A28-16. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-157 and Figure A29-158 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-159 and Figure A29-160 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A29-161 and Figure A29-162 relative to the capacity of the segment.

Appendix 29

S23 and S37 Chronological and Descending Demand Figures

(Contains CEII – Not included in this Volume)

Appendix 30
Force Fuel Type Sensitivities
S30 and S34

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S30: Force Oil Burn for Dual Fuel Resources

RGDS S30 Winter 2018

Figure A30-1 summarizes the affected generation during the Winter 2018 peak hour by PPA.

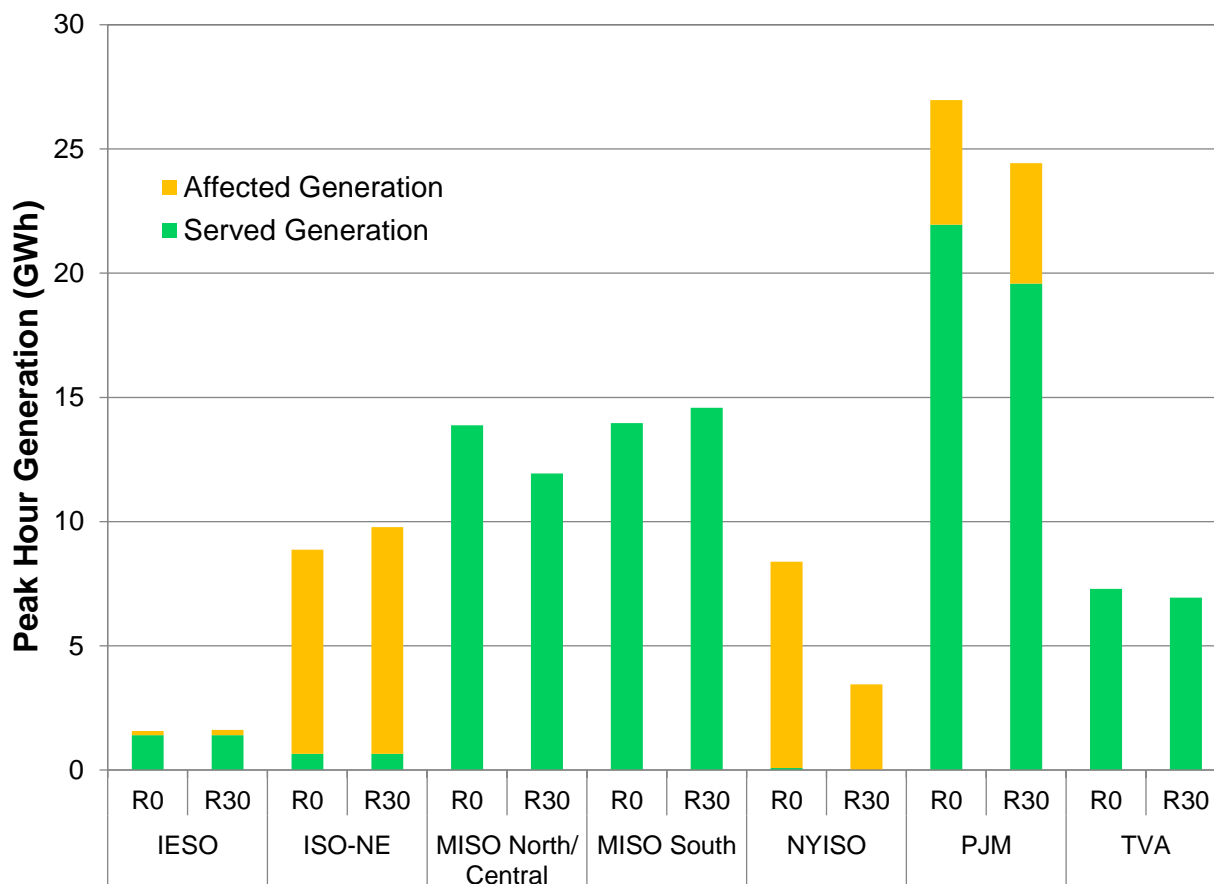


Figure A30-1. RGDS S30 Winter 2018: Peak Hour Affected Generation

Figure A30-2 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A30-1.

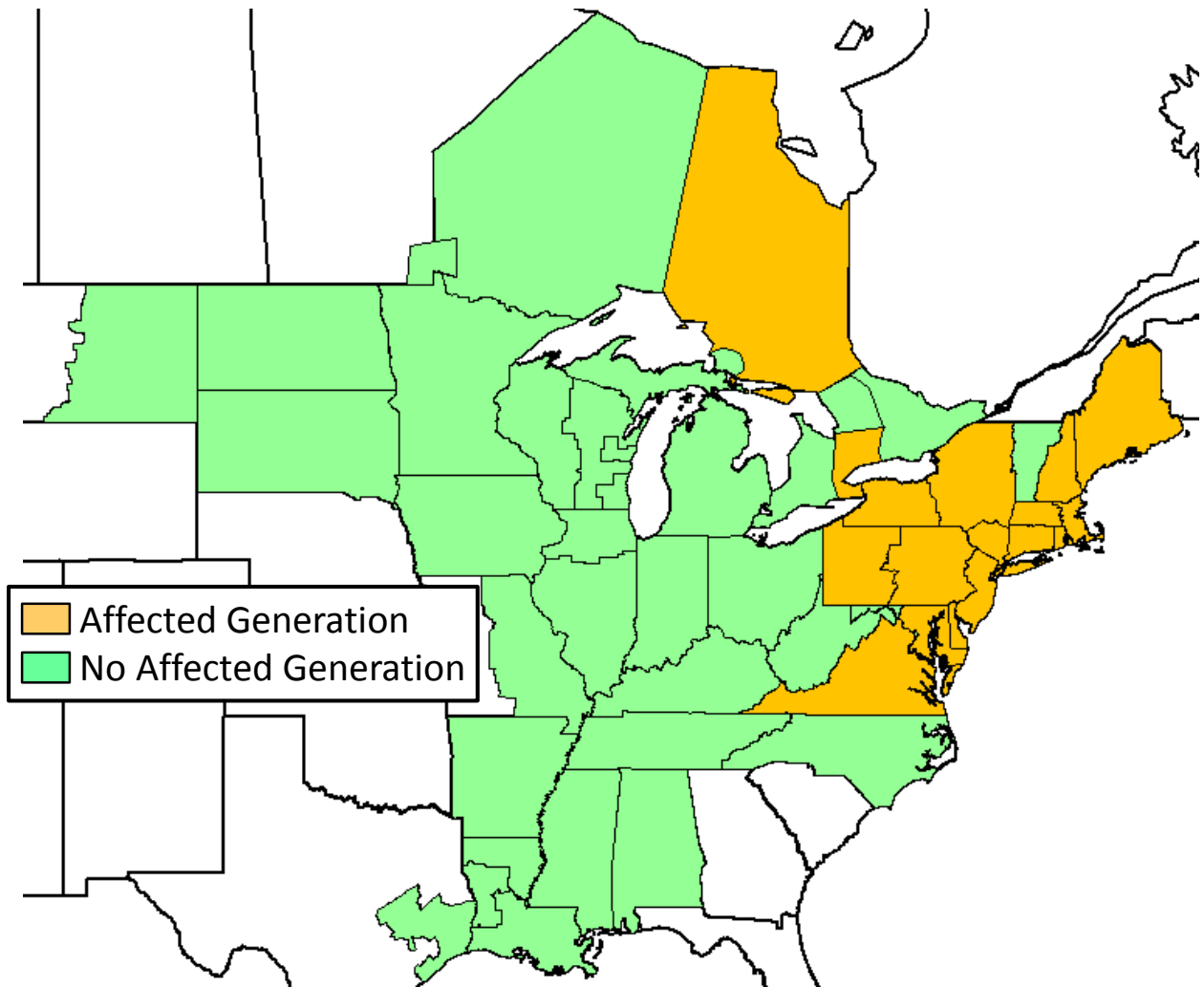


Figure A30-2. RGDS S30 Winter 2018: Locations with Peak Hour Affected Generation

Table A30-1. RGDS S30 Winter 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	15.4	2,052
Delaware	1.7	207
Maine	9.5	1,292
Maryland Eastern	7.0	682
Massachusetts Eastern	17.9	2,458
Massachusetts Western	5.3	717
New Hampshire	5.4	717
New Jersey	7.1	855
New York Central Northern	9.6	1,256
New York City	7.3	863
New York Long Island	4.0	430
New York Southern	5.4	767
New York Western	1.2	136
Ontario (CDA)	0.5	55
Ontario (NDA)	1.2	155
Pennsylvania Eastern	8.0	1,140
Rhode Island	14.8	1,889
Virginia	15.0	1,965

Figure A30-3 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A30-1 during the Winter 2018 peak hour.

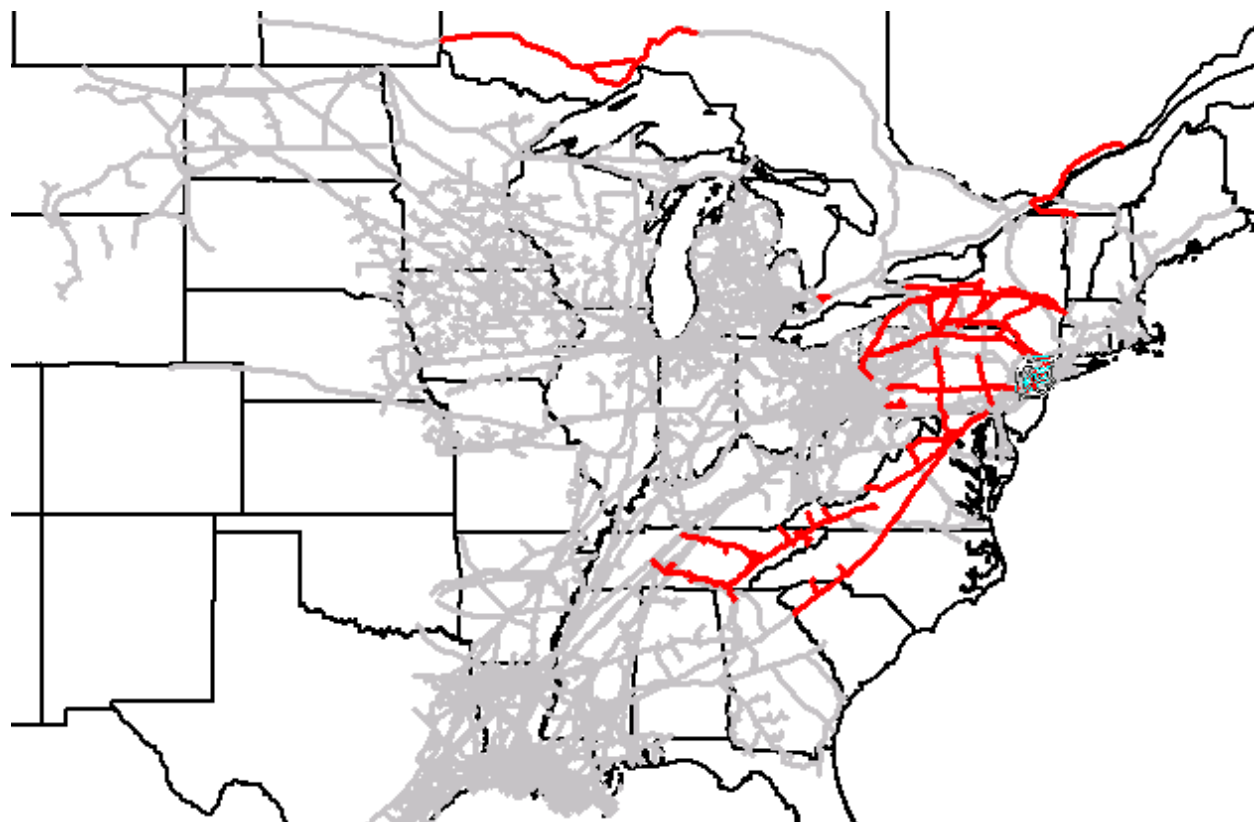


Figure A30-3. RGDS S30 Winter 2018: Peak Hour Constraints

Table A30-2 summarizes the results of the frequency and duration analysis.

Table A30-2. RGDS S30 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	9	1	5	14
Constitution	5	1	57	81
Dominion Eastern NY	1	4	4	4
Dominion Western NY	2	1	1	2
Dominion Southeast	5	1	11	20
East Tennessee Mainline	5	1	2	7
Eastern Shore	11	1	15	55
Empire Mainline	1	3	3	3
Millennium	11	1	8	32
NB/NS Supply	8	1	19	45
Tennessee Z4 PA	7	1	15	30
Tennessee Z5 NY	4	2	59	86
Texas Eastern M2 PA South	10	1	9	32
Texas Eastern M3 North	11	1	10	38
TransCanada Ontario West	5	1	5	11
TransCanada Quebec	8	1	14	31
Transco Leidy Atlantic	7	1	29	63
Transco Z5	3	1	1	3
Transco Z6 Leidy to 210	1	2	2	2
Union Gas Dawn	2	1	2	3

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-1 and Figure A31-2 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-3 and Figure A31-4 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-5 and Figure A31-6 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-7 and Figure A31-8 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-9 and Figure A31-10 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-11 and Figure A31-12 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A31-13 and Figure A31-14 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-15 and Figure A31-16 relative to the capacity of the segment. Total demand on Empire exceeds pipeline capacity on 16 days.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-17 and Figure A31-18 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A31-19 and Figure A31-20 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-21 and Figure A31-22 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-23 and Figure A31-24 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-25 and Figure A31-26 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A31-27 and Figure A31-28 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-29 and Figure A31-30 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A31-31 and Figure A31-32 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-33 and Figure A31-34 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-35 and Figure A31-36 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-37 and Figure A31-38 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas’s Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A31-39 and Figure A31-40 relative to the capacity of the segment.

RGDS S30 Summer 2018

Figure A30-4 summarizes the affected generation during the Summer 2018 peak hour by PPA.

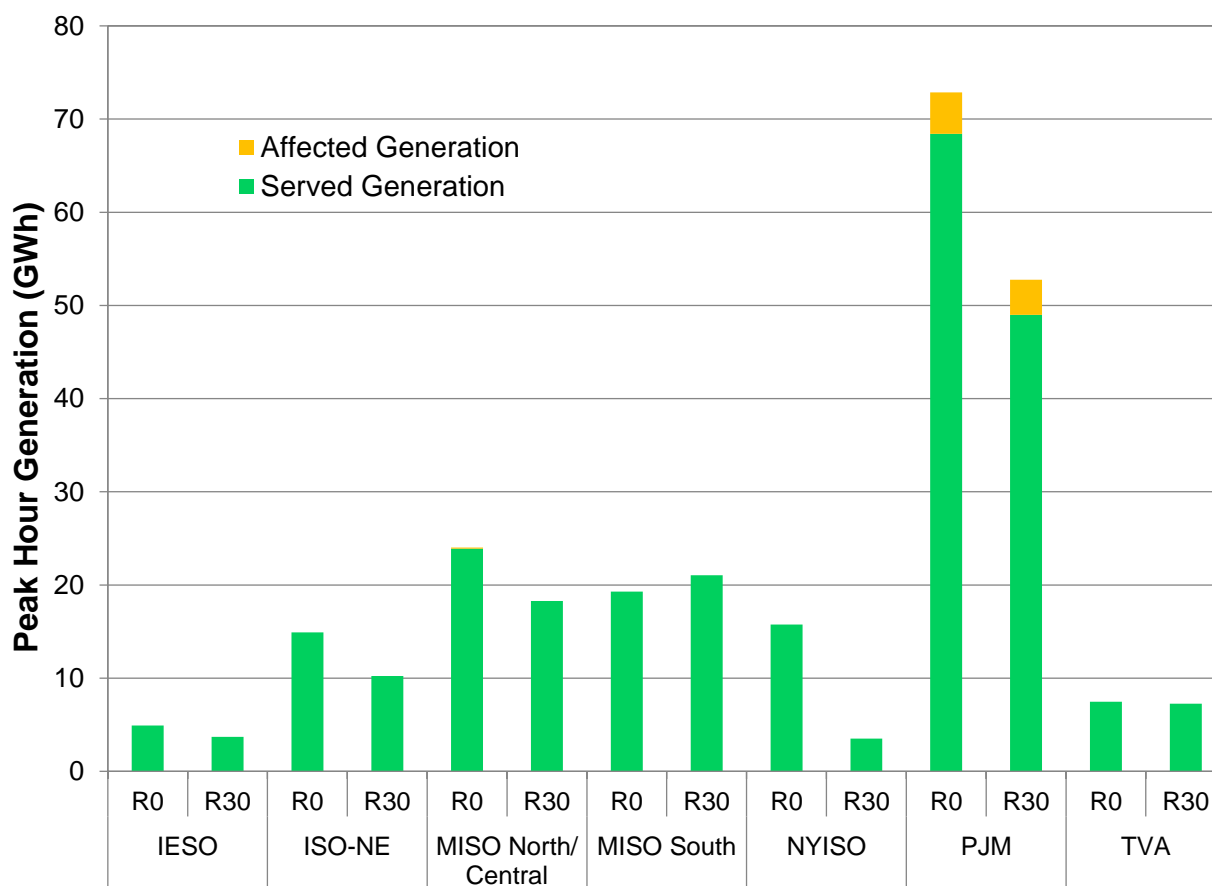


Figure A30-4. RGDS S30 Summer 2018: Peak Hour Affected Generation

Figure A30-5 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A30-3.

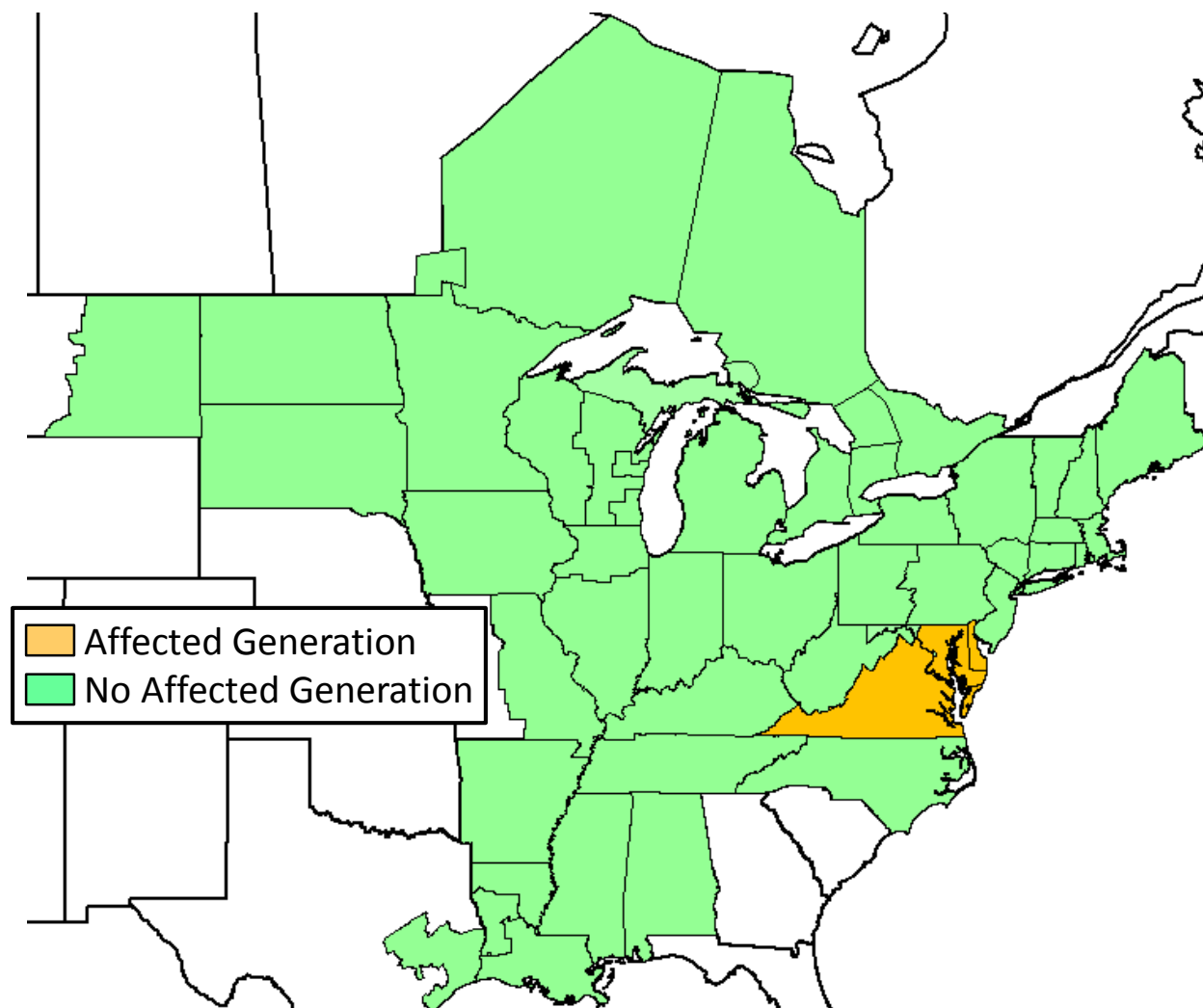


Figure A30-5. RGDS S30 Summer 2018: Locations with Peak Hour Affected Generation

Table A30-3. RGDS S30 Summer 2018 Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.4	1,155
Maryland Eastern	16.3	2,326
Virginia	2.7	297

Figure A30-6 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A30-4 during the Summer 2018 peak hour.

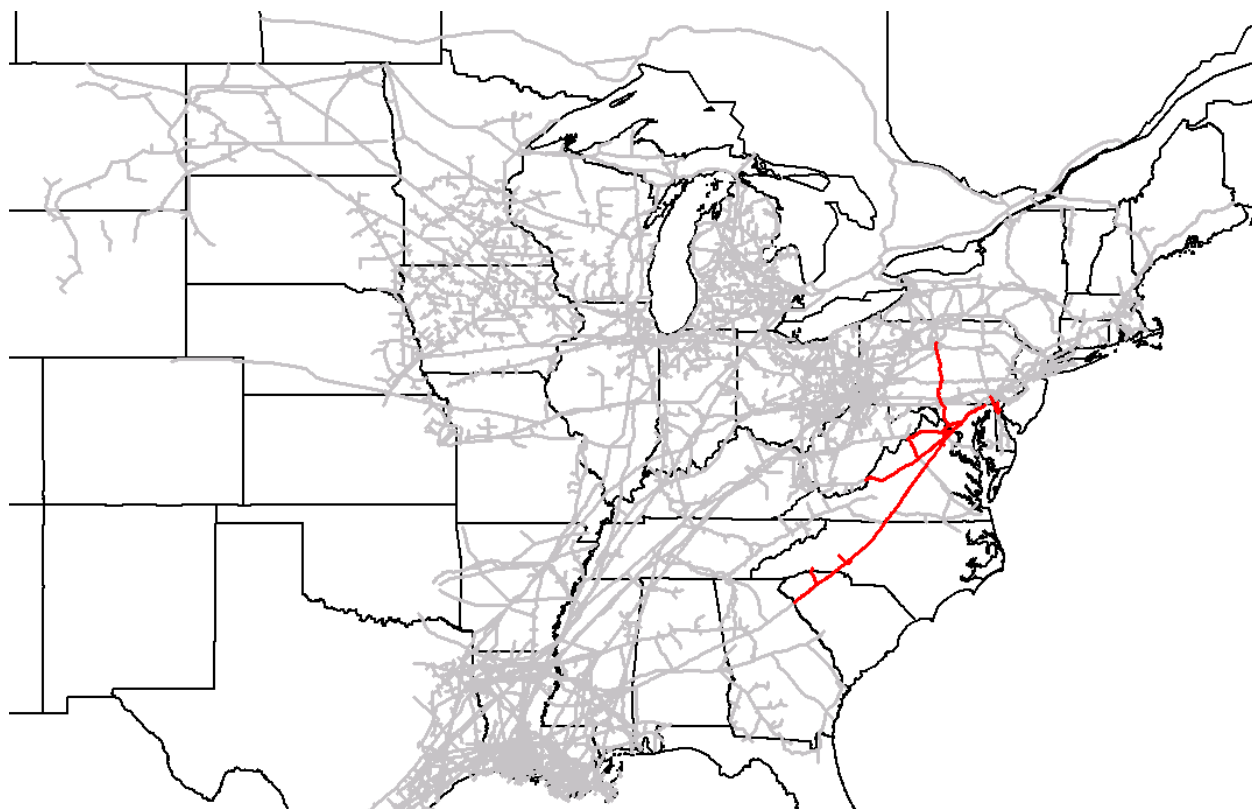


Figure A30-6. RGDS S30 Summer 2018: Peak Hour Constraints

Table A30-4 summarizes the results of the frequency and duration analysis.

Table A30-4. RGDS S30 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	3	1	1	3
Dominion Southeast	3	1	1	3
Eastern Shore	8	1	16	47
Transco Z5	6	1	7	18

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia, generators behind LDCs served by Columbia Gas in Maryland and Virginia, and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-41 and Figure A31-42 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-43 and Figure A31-44 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A31-45 and Figure A31-46 relative to the capacity of the segments.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-47 and Figure A31-48 relative to the capacity of the segment.

HGDS S30 Winter 2018

Figure A30-7 summarizes the affected generation during the Winter 2018 peak hour by PPA.

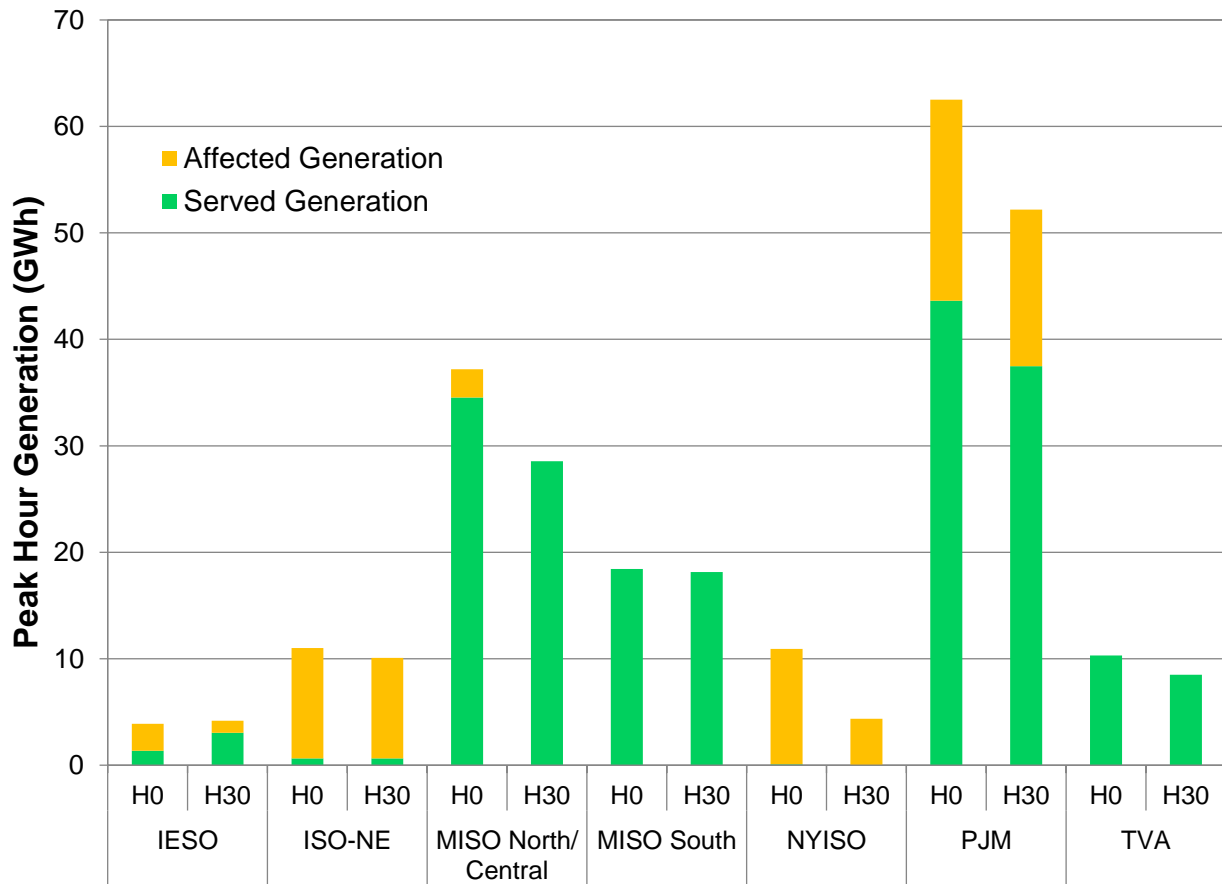


Figure A30-7. HGDS S30 Winter 2018: Peak Hour Affected Generation

Figure A30-8 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A30-5.

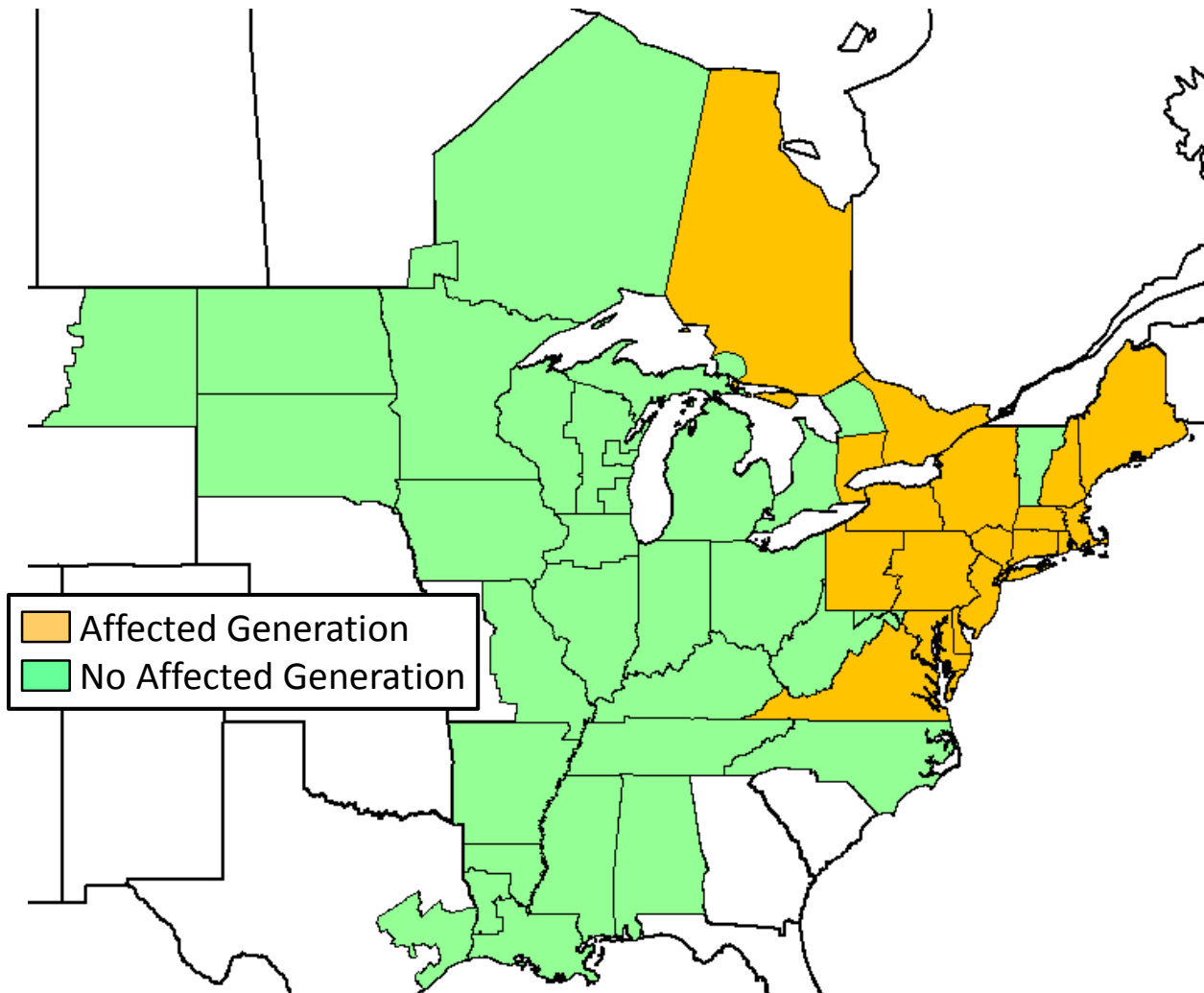


Figure A30-8. HGDS S30 Winter 2018: Locations with Peak Hour Affected Generation

Table A30-5. HGDS S30 Winter 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	16.8	2,342
Delaware	1.7	207
Maine	9.5	1,292
Maryland Eastern	12.4	1,213
Massachusetts Eastern	16.4	2,284
Massachusetts Western	5.1	698
New Hampshire	9.0	1,237
New Jersey	14.3	1,684
New York Central Northern	11.2	1,444
New York City	8.7	998
New York Long Island	4.0	430
New York Southern	5.4	767
New York Western	5.4	721
Ontario (CDA)	1.6	181
Ontario (EDA)	5.7	769
Ontario (NDA)	1.5	186
Pennsylvania Eastern	57.1	7,759
Pennsylvania Western	11.0	1,574
Rhode Island	12.4	1,569
Virginia	17.2	2,213

Figure A30-9 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A30-7 during the Winter 2018 peak hour.

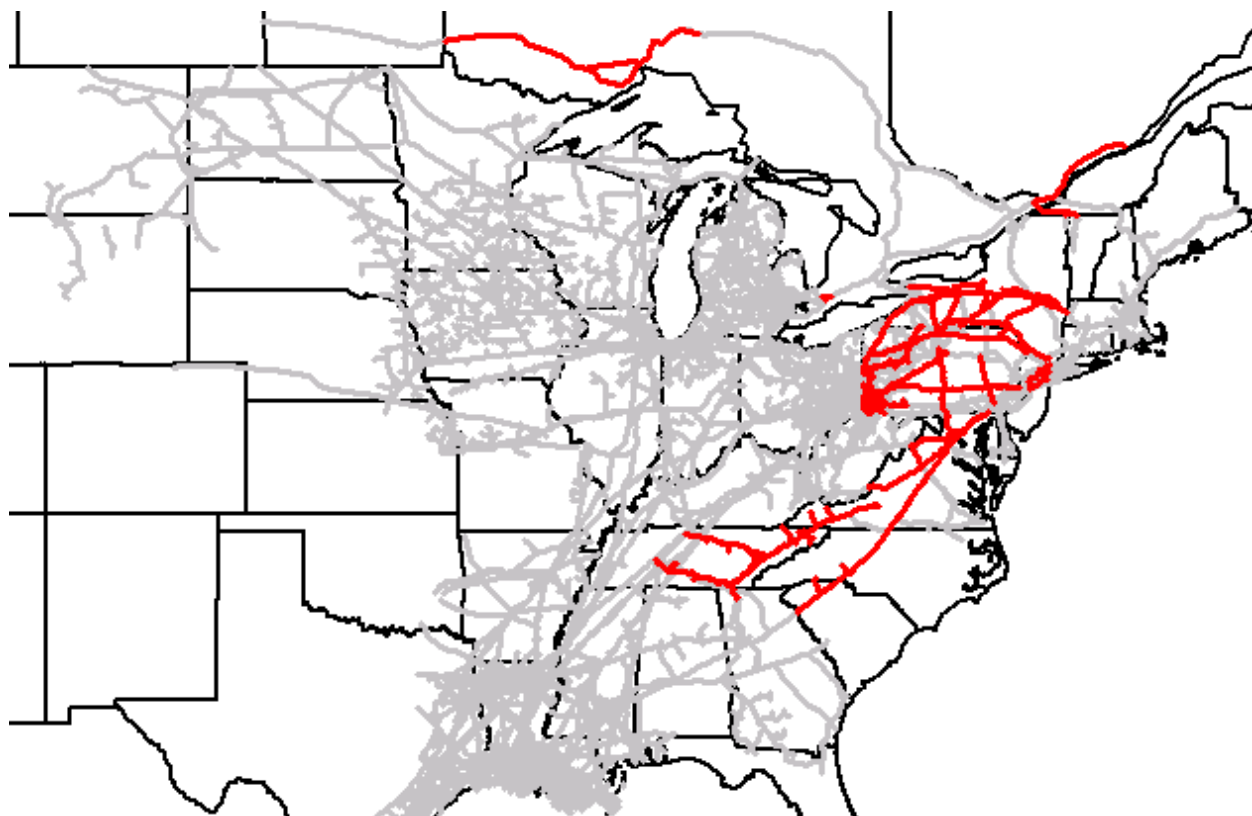


Figure A30-9. HGDS S30 Winter 2018: Peak Hour Constraints

Table A30-6 summarizes the results of the frequency and duration analysis.

Table A30-6. HGDS S30 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	11	1	5	18
Columbia Gas W PA/NY	3	1	2	4
Constitution	3	3	29	89
Dominion Eastern NY	1	4	4	4
Dominion Western NY	5	1	14	29
Dominion Southeast	6	1	14	30
East Tennessee Mainline	6	1	8	26
Eastern Shore	8	2	31	73
Empire Mainline	1	3	3	3
Millennium	7	1	38	70
NB/NS Supply	14	1	20	51
Tennessee Z4 PA	6	2	47	73
Tennessee Z5 NY	9	1	41	71
Texas Eastern M2 PA South	2	31	59	90
Texas Eastern M3 North	4	3	48	88
TransCanada Ontario West	5	1	5	10
TransCanada Quebec	6	3	23	39
Transco Leidy Atlantic	5	1	48	86
Transco Z5	2	1	1	2
Transco Z6 Leidy to 210	3	1	59	86
Union Gas Dawn	4	1	3	6

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d over the 2018 capacity. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-49 and Figure A31-50 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-51 and Figure A31-52 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-53 and Figure A31-54 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-55 and Figure A31-56 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-57 and Figure A31-58 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase of 15 MDth/d over 2018. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-59 and Figure A31-60 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-61 and Figure A31-62 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A31-63 and Figure A31-64 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-65 and Figure A31-66 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-67 and Figure A31-68 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A31-69 and Figure A31-70 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-71 and Figure A31-72 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-73 and Figure A31-74 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-75 and Figure A31-76 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A31-77 and Figure A31-78 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-79 and Figure A31-80 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A31-81 and Figure A31-82 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-83 and Figure A31-84 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-85 and Figure A31-86 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-87 and Figure A31-88 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A31-89 and Figure A31-90 relative to the capacity of the segment.

HGDS S30 Summer 2018

Figure A30-10 summarizes the affected generation during the Winter 2018 peak hour by PPA.

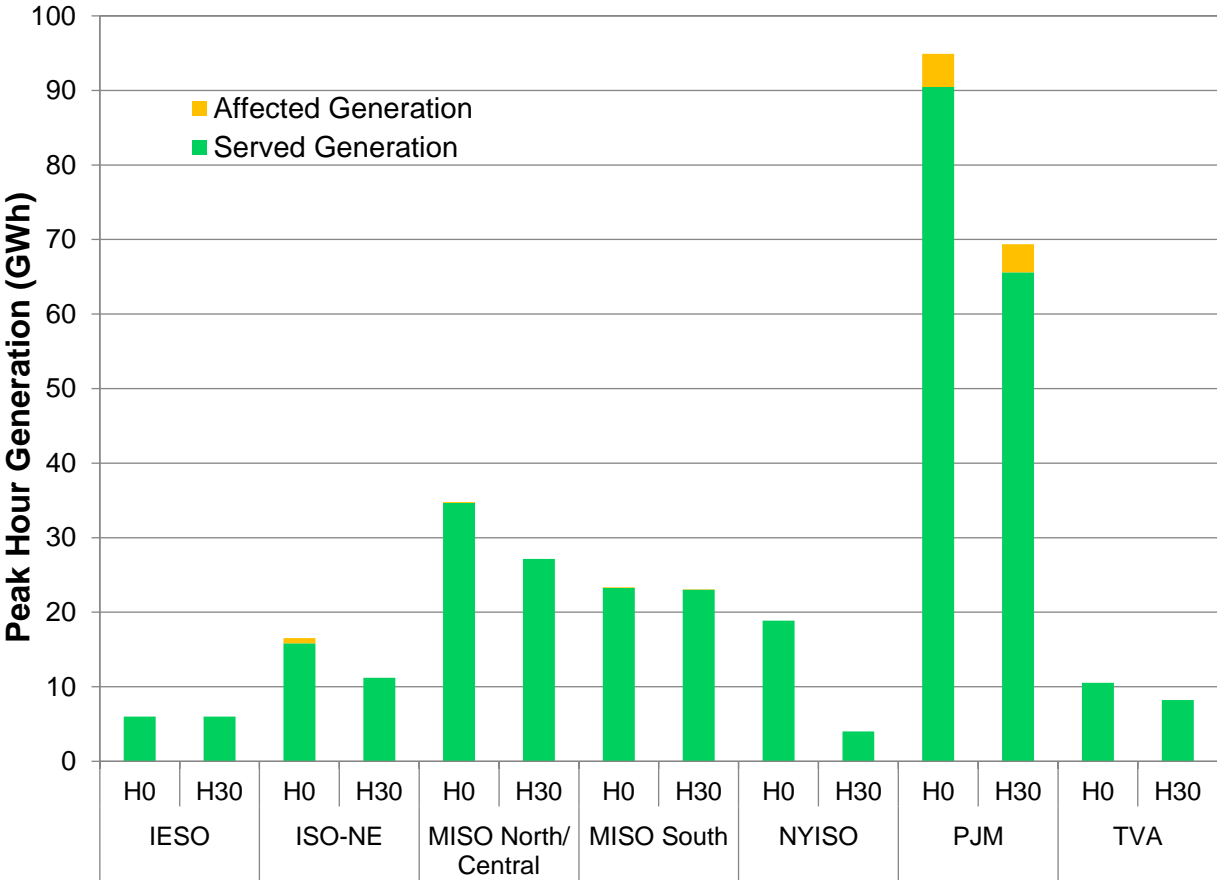


Figure A30-10. HGDS S30 Summer 2018: Peak Hour Affected Generation

Figure A30-11 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A30-7.

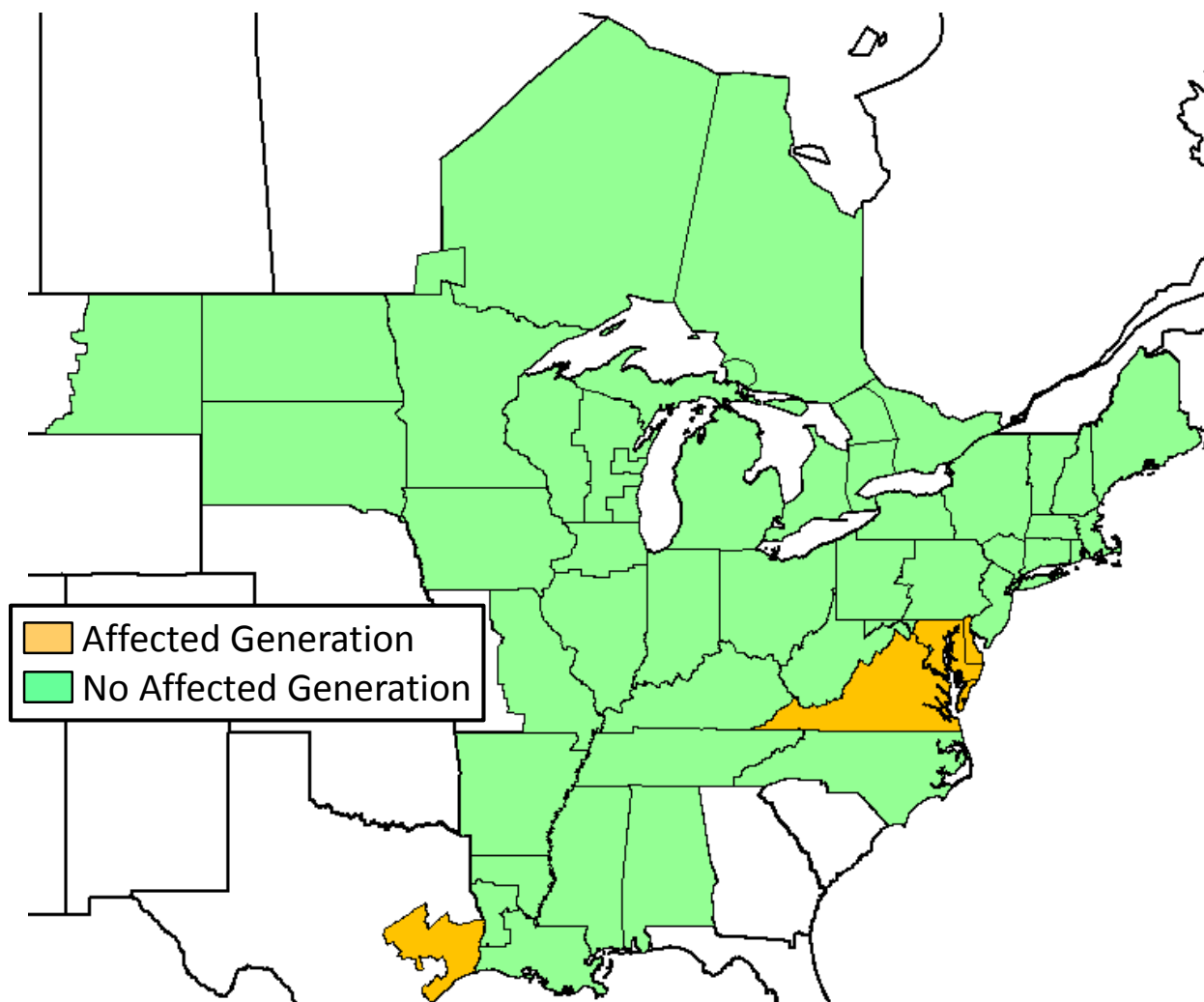


Figure A30-11. HGDS S30 Summer 2018: Locations with Peak Hour Affected Generation

Table A30-7. HGDS S30 Summer 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.4	1,155
Maryland Eastern	16.3	2,326
Texas East (SERC)	0.5	70
Virginia	2.7	297

Figure A30-12 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A30-10 during the Summer 2018 peak hour.

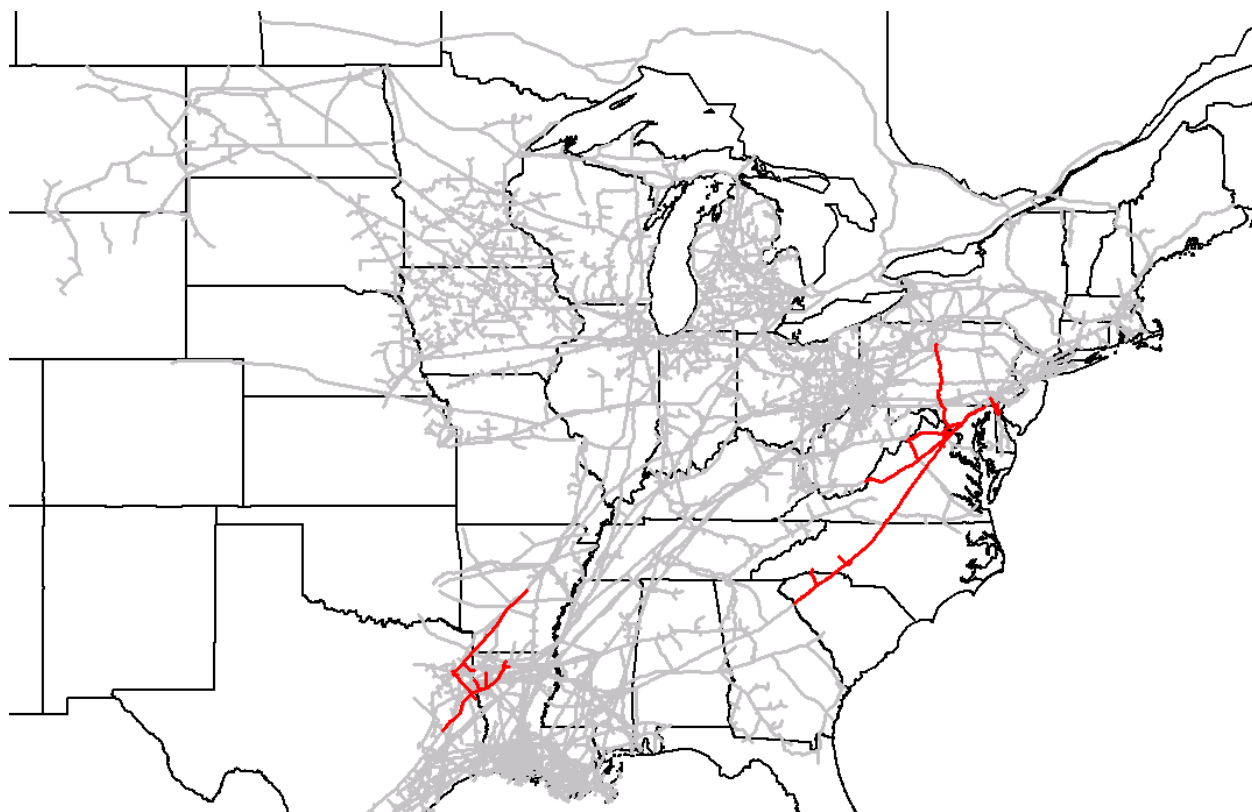


Figure A30-12. HGDS S30 Summer 2018: Peak Hour Constraints

Table A30-8 summarizes the results of the frequency and duration analysis.

Table A30-8. HGDS S30 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	14	1	6	28
Dominion Southeast	12	1	18	50
Eastern Shore	6	3	24	70
Texas Eastern ETX	9	1	10	35
Transco Z5	9	1	32	75

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas’s Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-91 and Figure A31-92 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-93 and Figure A31-94 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A31-95 and Figure A31-96 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-97 and Figure A31-98 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-99 and Figure A31-100 relative to the capacity of the segment.

S34: Maximum Gas Demand on Electric Sector

RGDS S34 Winter 2018

Figure A30-13 summarizes the affected generation during the Winter 2018 peak hour by PPA.

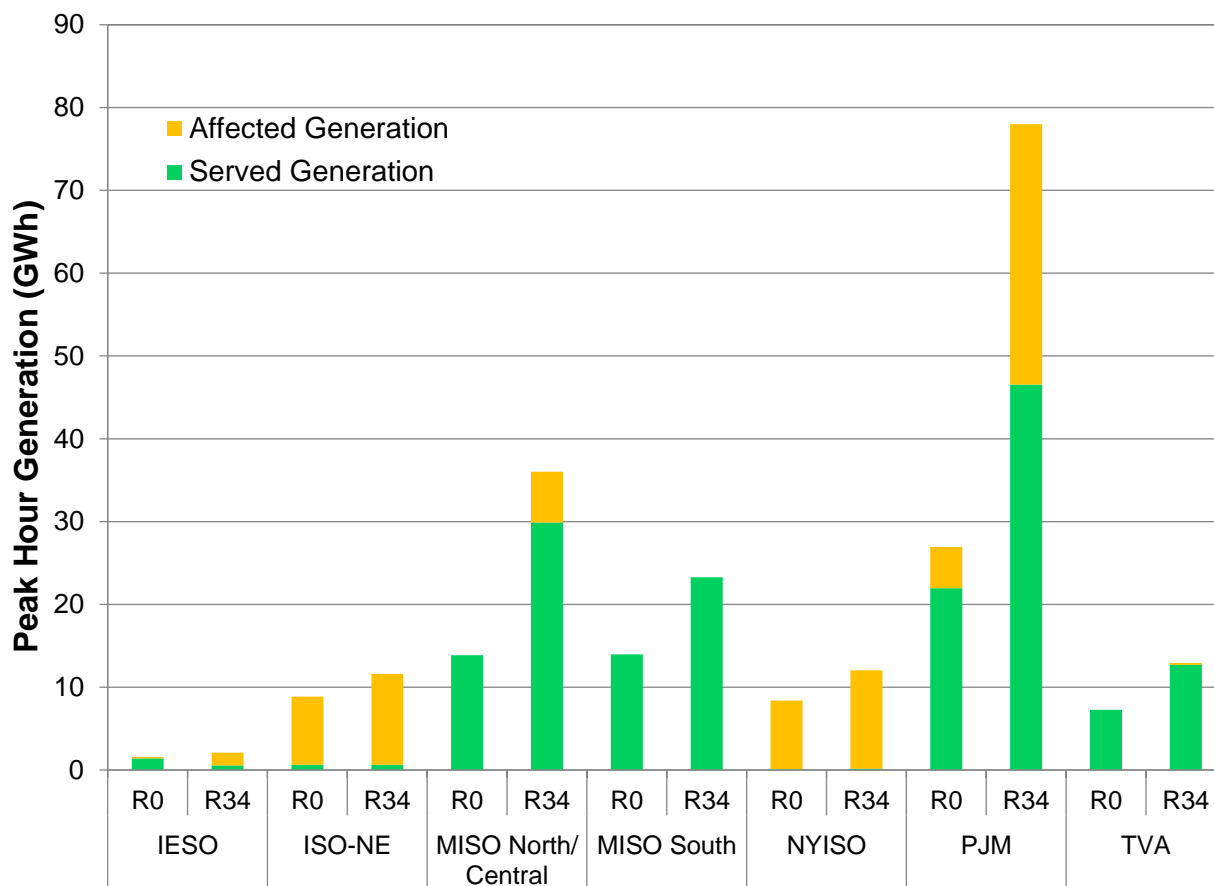


Figure A30-13. RGDS S34 Winter 2018: Peak Hour Affected Generation

Figure A30-14 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A30-9.

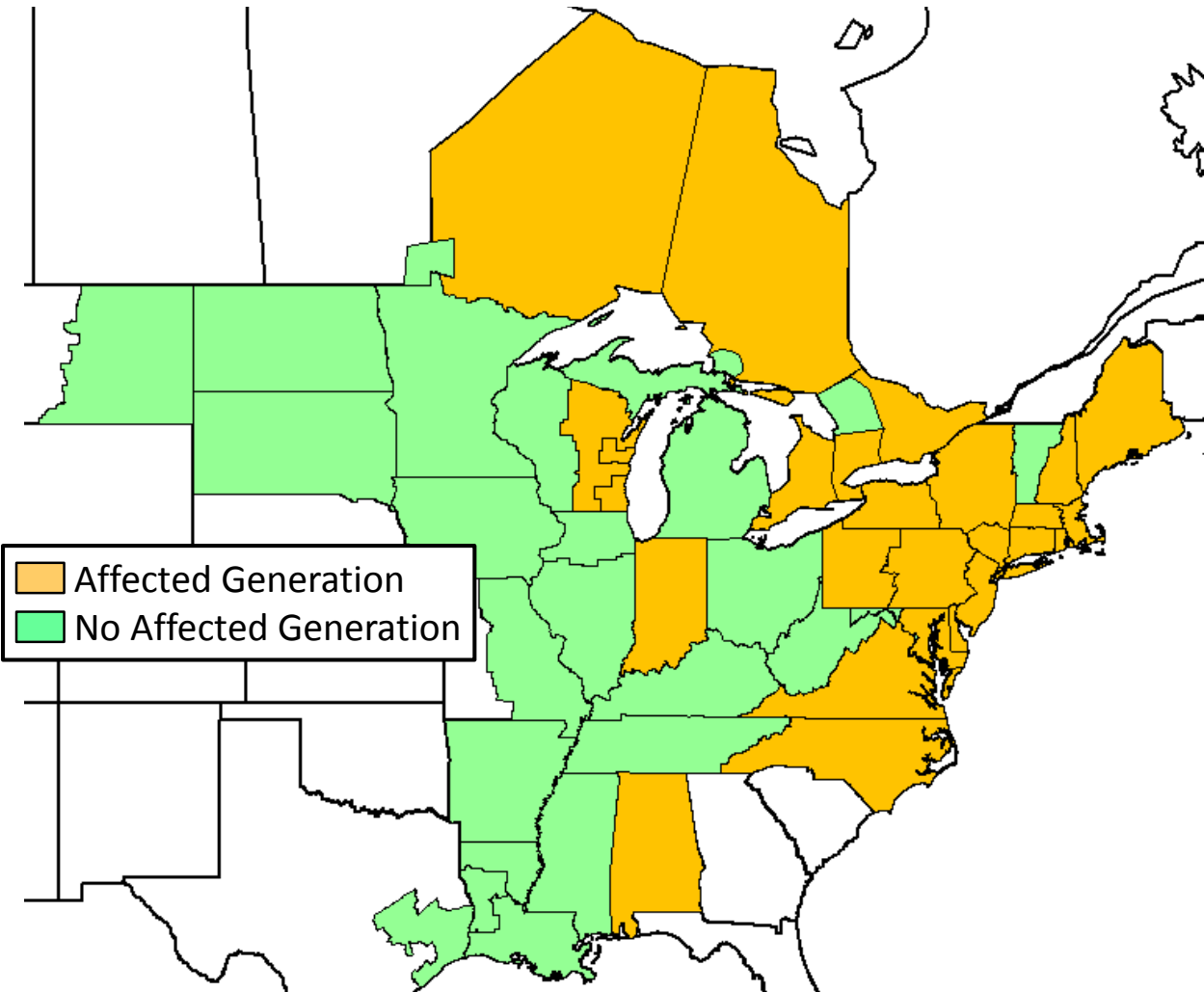


Figure A30-14. RGDS S34 Winter 2018: Locations with Peak Hour Affected Generation

Table A30-9. RGDS S34 Winter 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Alabama	3.2	238
Connecticut	25.4	3,173
Delaware	2.3	279
Indiana	1.3	131
Maine	7.5	969
Maryland Eastern	27.0	2,903
Massachusetts Eastern	17.4	2,135
Massachusetts Western	9.3	1,183
New Hampshire	13.3	1,621
New Jersey	74.3	9,474
New York Central Northern	48.2	5,813
New York City	25.3	2,622
New York Long Island	17.6	1,732
New York Southern	10.9	1,312
New York Western	3.6	400
North Carolina	1.2	169
Ontario (CDA)	1.6	181
Ontario (EDA)	1.6	175
Ontario (NDA)	1.5	186
Ontario (StClair)	7.0	950
Ontario (WDA)	0.4	38
Pennsylvania Eastern	64.1	8,272
Pennsylvania Western	11.0	1,574
Rhode Island	14.8	1,889
Virginia	71.8	8,772
Wisconsin Eastern (RFC)	21.6	2,671
Wisconsin Western (MROE)	31.4	3,317

Figure A30-15 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A30-13 during the Winter 2018 peak hour.

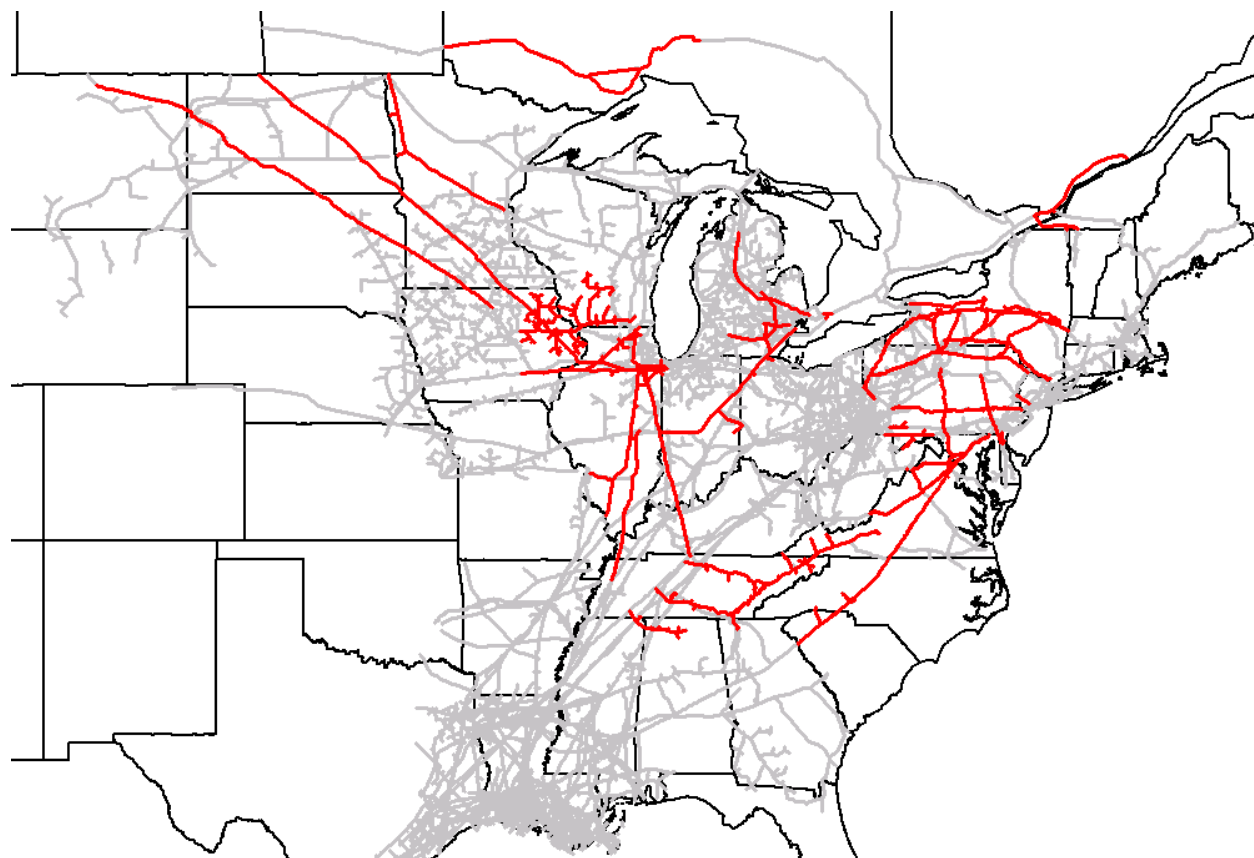


Figure A30-15. RGDS S34 Winter 2018: Peak Hour Constraints

Table A30-10 summarizes the results of the frequency and duration analysis.

Table A30-10. RGDS S34 Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
AlaTenn	5	2	52	86
Alliance	9	1	8	22
ANR Northern Illinois	2	29	59	88
Columbia Gas VA/MD	9	1	21	73
Columbia Gas W PA/NY	3	1	59	89
Constitution	2	31	59	90
Dominion Eastern NY	6	3	16	69
Dominion Western NY	1	4	4	4
Dominion Southeast	5	1	45	72
East Tennessee Mainline	7	1	5	21
Eastern Shore	4	5	44	87
Empire Mainline	4	1	59	71
Great Lakes East	10	1	12	44
Midwestern	5	1	3	8
Millennium	7	1	38	69
NB/NS Supply	2	31	59	90
NGPL IA/IL North	1	2	2	2
NGPL IA/IL South	3	1	8	10
Northern Border Mainline	6	2	10	29
Northern Natural D	8	1	13	27
Panhandle Eastern Z3	7	1	4	13
Tennessee Z4 PA	8	3	22	68
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	2	31	59	90
Texas Eastern M3 North	3	3	59	89
TransCanada Ontario West	4	1	9	18
TransCanada Quebec	11	1	18	59
Transco Leidy Atlantic	2	31	59	90
Transco Z5	7	1	22	53
Transco Z6 Leidy to 210	2	31	59	90
Trunkline 1B	7	3	14	41
Union Gas Dawn	2	1	3	4
Vector Z1	3	1	4	7
Viking Z1	13	1	15	41

AlaTenn

The 100% peak hour utilization on AlaTenn's mainline, which is modeled with a capacity of 197 MDth/d, potentially affects generators served by AlaTenn in Alabama. The locations of these generators are shown in Figure A30-16.

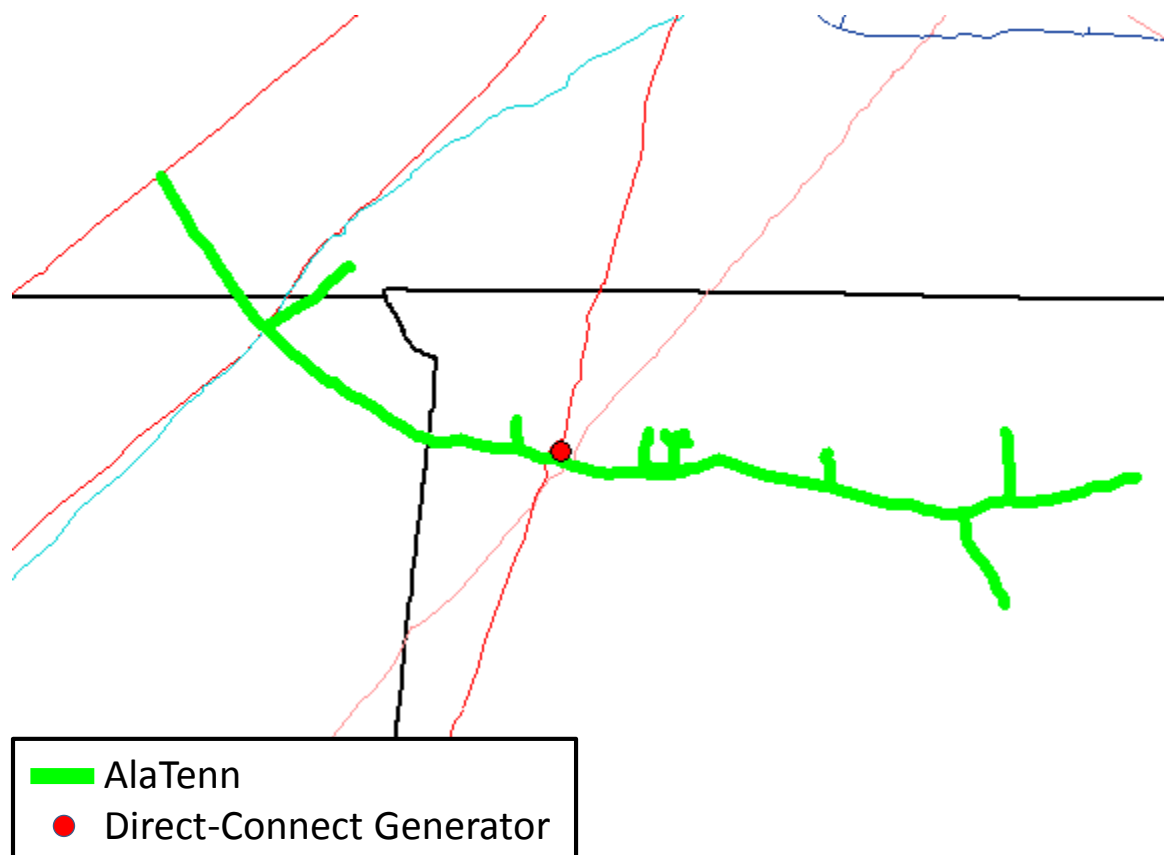


Figure A30-16. Generators Affected by AlaTenn Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-101 and Figure A31-102 relative to the capacity of the segment.

Alliance

The 100% peak hour utilization on Alliance's mainline, which is modeled with a capacity of 1,800 MDth/d, potentially affects generators behind LDCs served by Alliance and generators behind LDCs served by Guardian. The locations of these generators are shown in Figure A17-1.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-103 and Figure A31-104 relative to the capacity of the segment.

ANR Northern Illinois

The 100% peak hour utilization on ANR's Northern Illinois segment, which is modeled with a capacity of 1,337 MDth/d, potentially affects generators directly connected to ANR in Illinois and Wisconsin and generators behind LDCs served by ANR in Illinois and Wisconsin. The locations of these generators are shown in Figure A17-2.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-105 and Figure A31-106 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-107 and Figure A31-108 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-109 and Figure A31-110 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-111 and Figure A31-112 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-113 and Figure A31-114 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-115 and Figure A31-116 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-117 and Figure A31-118 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-119 and Figure A31-120 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A31-121 and Figure A31-122 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-123 and Figure A31-124 relative to the capacity of the segment.

Great Lakes East

The 100% peak hour utilization on Great Lakes Gas's East segment, which is modeled with a capacity of 1,164 MDth/d, potentially affects generators directly connected to Great Lakes in Michigan, generators behind LDCs served by Great Lakes in Michigan, generators directly connected to Vector, and generators behind Union Gas. The locations of these generators are shown in Figure A17-3.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-125 and Figure A31-126 relative to the capacity of the segment.

Midwestern

The 100% peak hour utilization on Midwestern's mainline segment, which is modeled with a capacity of 635 MDth/d, potentially affects generators that are directly connected to Midwestern in Indiana and Indiana, generators behind LDCs served by Midwestern in Indiana and Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-4.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-127 and Figure A31-128 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-129 and Figure A31-130 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A31-131 and Figure A31-132 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

NGPL Iowa/Illinois North

The 100% peak hour utilization on NGPL's Iowa/Illinois North segment, which is modeled with a capacity of 1,677 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Iowa, Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-5.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-133 and Figure A31-134 relative to the capacity of the segment.

NGPL Iowa/Illinois South

The 100% peak hour utilization on NGPL's Iowa/Illinois South segment, which is modeled with a capacity of 1,624 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-6.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-135 and Figure A31-136 relative to the capacity of the segment.

Northern Border Mainline

The 100% peak hour utilization on Northern Border's mainline, which is modeled with a capacity of 2,311 MDth/d, potentially affects generators directly connected to Northern Border in Minnesota and Illinois, generators behind LDCs served by Northern Border in Minnesota, Iowa, Illinois and Indiana, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-11.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-137 and Figure A31-138 relative to the capacity of the segment.

Northern Natural Zone D

The 100% peak hour utilization on Northern Natural's Zone D segment, which is modeled with a capacity of 800 MDth/d, potentially affects generators directly connected to Northern Natural in Wisconsin, generators behind LDCs served by Northern Natural in Illinois and Wisconsin, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-8.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-139 and Figure A31-140 relative to the capacity of the segment.

Panhandle Eastern Z3

The 100% peak hour utilization on Panhandle Eastern's Z3 segment, which is modeled with a capacity of 1,593 MDth/d, potentially affects generators directly connected to Panhandle Eastern in Indiana and Ohio, generators behind LDCs served by Panhandle Eastern in Indiana, Ohio and Michigan, and generators served by ANR or Texas Eastern in Michigan and Ohio, either directly or behind an LDC. The locations of these generators are shown in Figure A30-17.

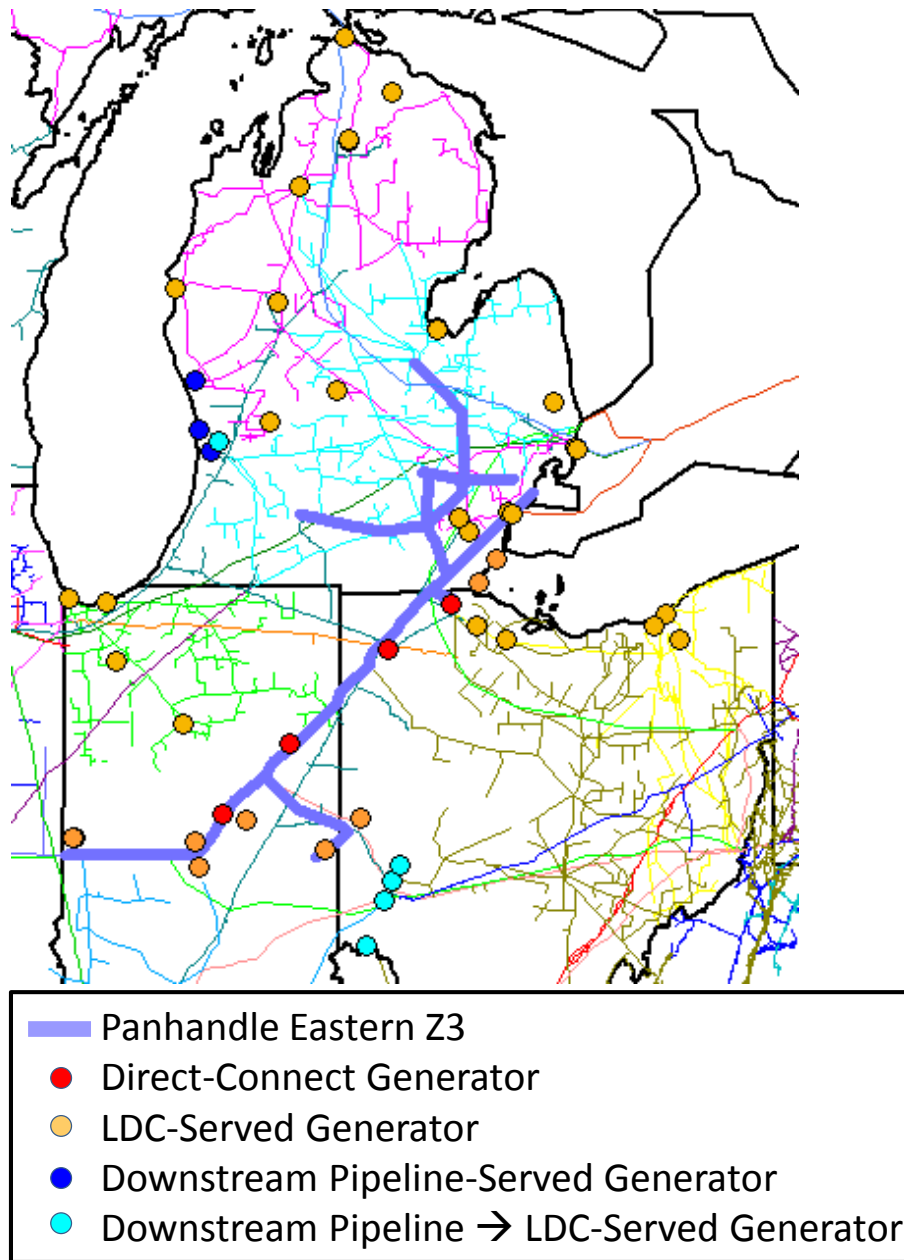


Figure A30-17. Generators Affected by Panhandle Eastern Z3 Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-141 and Figure A31-142 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee’s Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and

generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-143 and Figure A31-144 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-145 and Figure A31-146 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-147 and Figure A31-148 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A31-149 and Figure A31-150 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-151 and Figure A31-152 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A31-153 and Figure A31-154 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-155 and Figure A31-156 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-157 and Figure A31-158 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-159 and Figure A31-160 relative to the capacity of the segment.

Trunkline Zone 1B

The 100% peak hour utilization on Trunkline's Zone 1B segment, which is modeled with a capacity of 947 MDth/d, potentially affects generators that are directly connected to Trunkline in Tennessee, Kentucky and Illinois. The locations of these generators are shown in Figure A30-18.

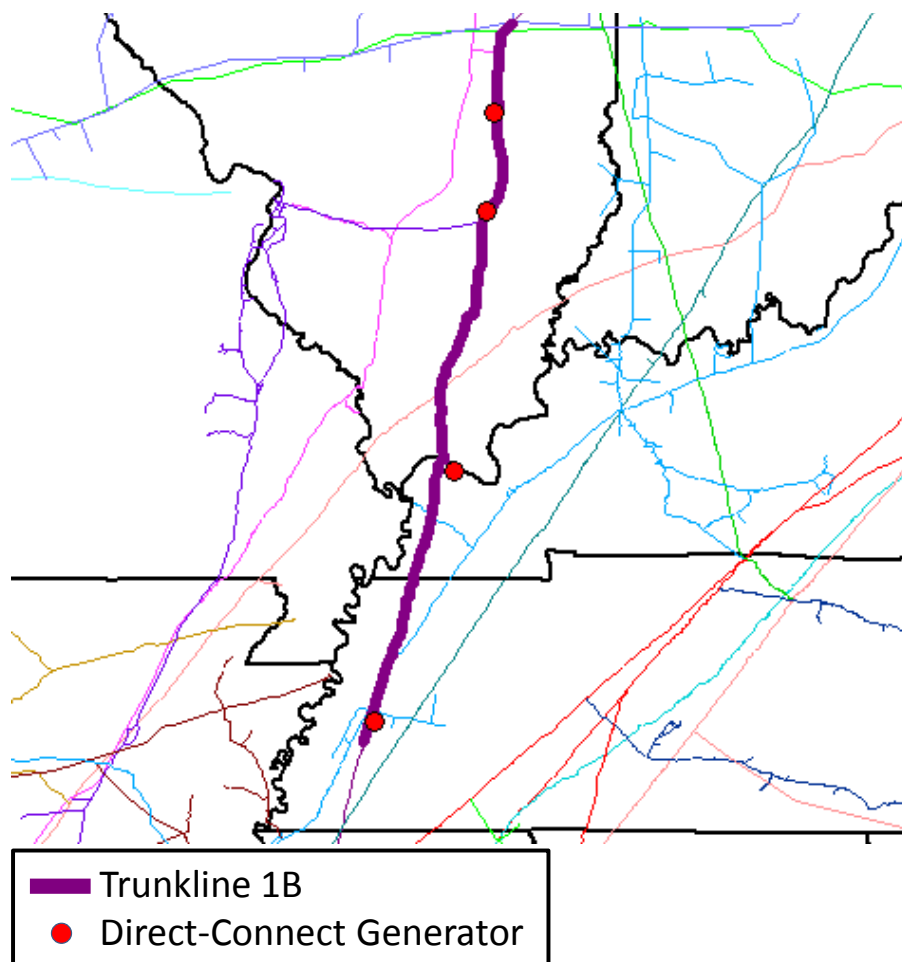


Figure A30-18. Generators Affected by Trunkline 1B Constraint

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-161 and Figure A31-162 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A31-163 and Figure A31-164 relative to the capacity of the segment.

Vector Zone 1

The 100% peak hour utilization on Vector's Zone 1 segment, which is modeled with a capacity of 1,600 MDth/d, potentially affects generators directly connected to Vector in Illinois, Indiana,

Michigan and Ontario and generators behind LDCs served by Vector in Indiana and Michigan. The locations of these generators are shown in Figure A17-14.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-165 and Figure A31-166 relative to the capacity of the segment.

Viking Zone 1

The 100% peak hour utilization on Viking’s Zone 1 segment, which is modeled with a capacity of 543 MDth/d, potentially affects generators directly connected to Viking, generators behind LDCs served by Viking, generators directly connected to ANR, and generators behind LDCs served by ANR. The locations of these generators are shown in Figure A17-9.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-167 and Figure A31-168 relative to the capacity of the segment.

RGDS S34 Summer 2018

Figure A30-19 summarizes the affected generation during the Summer 2018 peak hour by PPA.

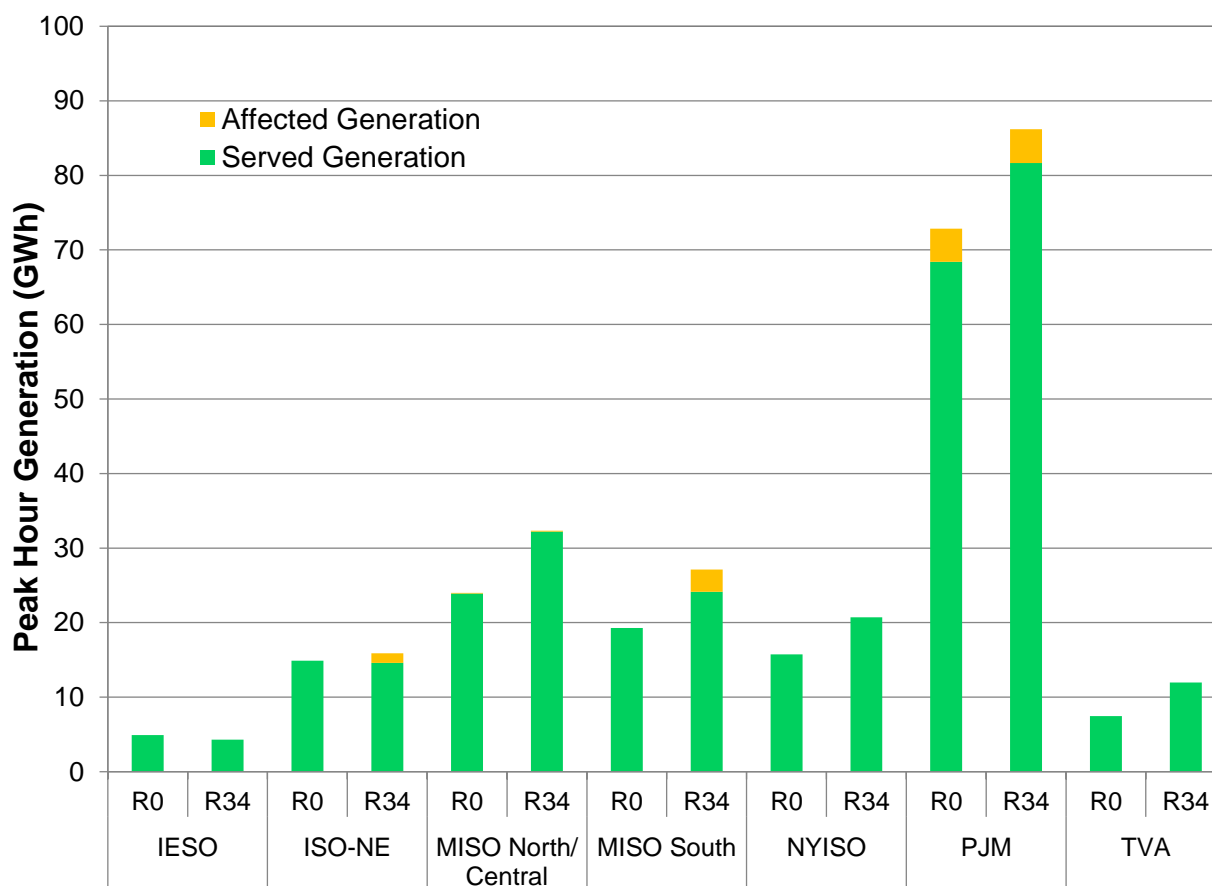


Figure A30-19. RGDS S34 Summer 2018: Peak Hour Affected Generation

Figure A30-20 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A30-11.

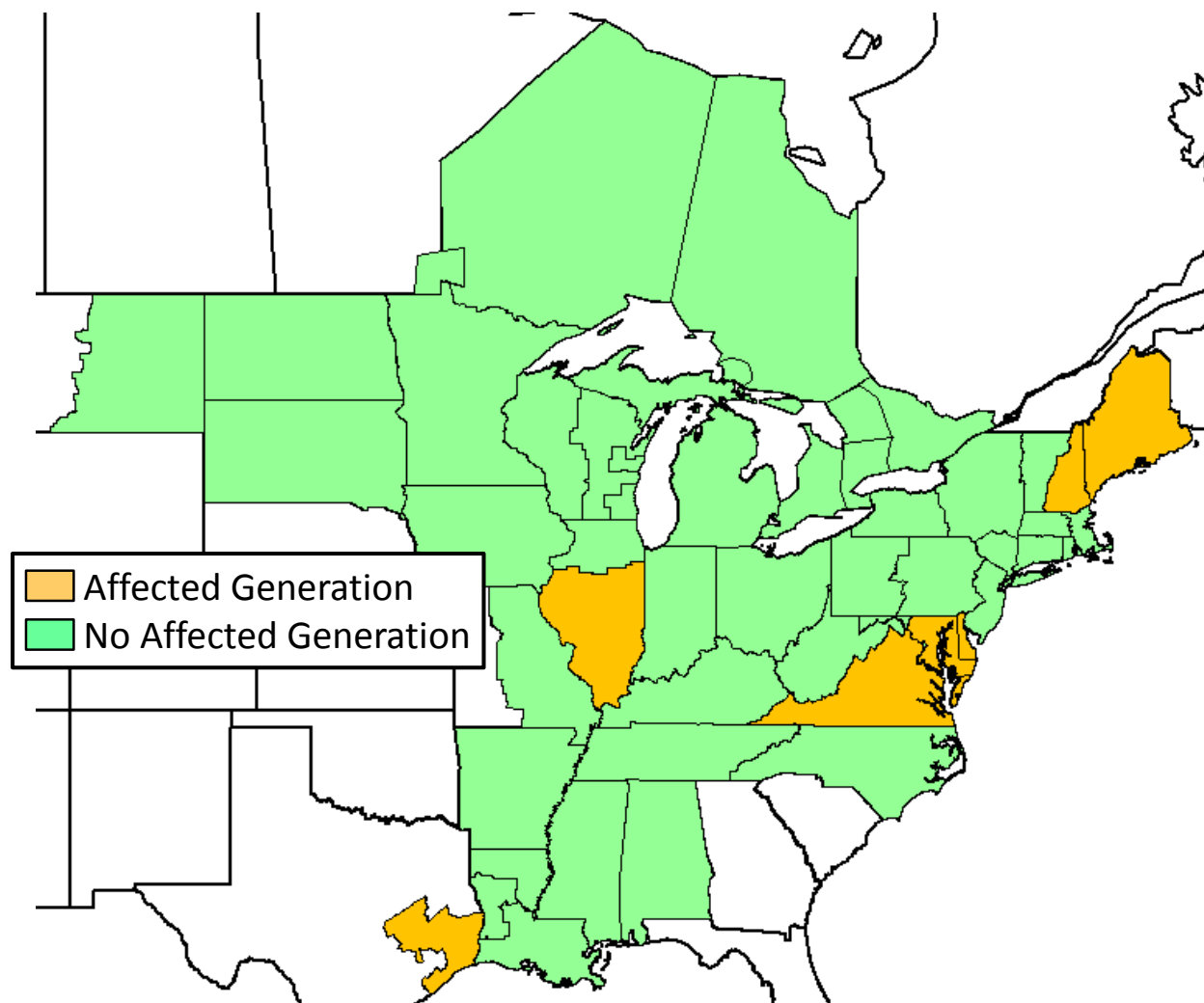


Figure A30-20. RGDS S34 Summer 2018: Locations with Peak Hour Affected Generation

Table A30-11. RGDS S34 Summer 2018 Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	9.3	1,241
Illinois Southern	1.0	112
Louisiana Southern	23.6	2,421
Maine	4.0	540
Maryland Eastern	16.7	2,361
New Hampshire	6.1	738
Texas East (SERC)	1.2	174
Virginia	8.4	936

Figure A30-21 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A30-19 during the Summer 2018 peak hour.

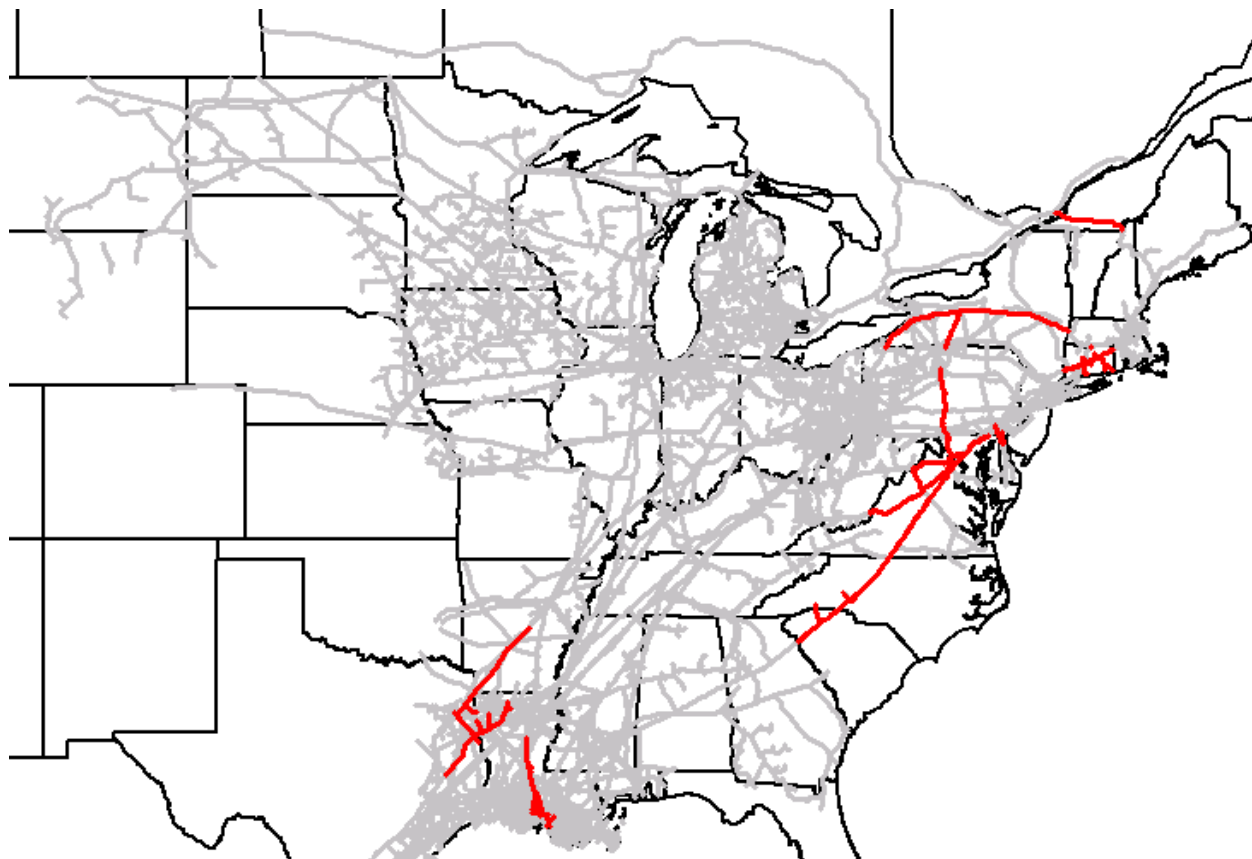


Figure A30-21. RGDS S34 Summer 2018: Peak Hour Constraints

Table A30-12 summarizes the results of the frequency and duration analysis.

Table A30-12. RGDS S34 Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	8	1	5	22
Columbia Gas VA/MD	13	1	15	55
Dominion Southeast	3	1	72	85
Eastern Shore	9	1	23	65
Gulf South Zone 2 HH	1	92	92	92
NB/NS Supply	8	1	5	18
Tennessee Z5 NY	9	1	5	22
Texas Eastern ETX	10	1	17	53
TransCanada Quebec to PNGTS	6	1	28	75
Transco Z5	10	1	19	60

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report..

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-169 and Figure A31-170 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-171 and Figure A31-172 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-173 and Figure A31-174 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A31-175 and Figure A31-176 relative to the capacity of the segments.

Gulf South Zone 2 Henry Hub

The 100% peak hour utilization on the Henry Hub segment of Gulf South Zone 2, which is modeled with a capacity of 700 MDth/d, potentially affects generators directly connected to Gulf South in Louisiana, and generators behind LDCs served by Gulf South in Louisiana. The locations of these generators are shown in Figure A17-15.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-177 and Figure A31-178 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 623 MDth/d in 2018. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A31-179 and Figure A31-180 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-181 and Figure A31-182 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-183 and Figure A31-184 relative to the capacity of the segment.

TransCanada Quebec to PNGTS

TransCanada's Quebec to PNGTS segment is modeled with a capacity of 270 MDth/d. The 100% peak hour utilization on this segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure A17-13.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-185 and Figure A31-186 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-187 and Figure A31-188 relative to the capacity of the segment.

RGDS S34 Winter 2023

Figure A30-22 summarizes the affected generation during the Winter 2023 peak hour by PPA.

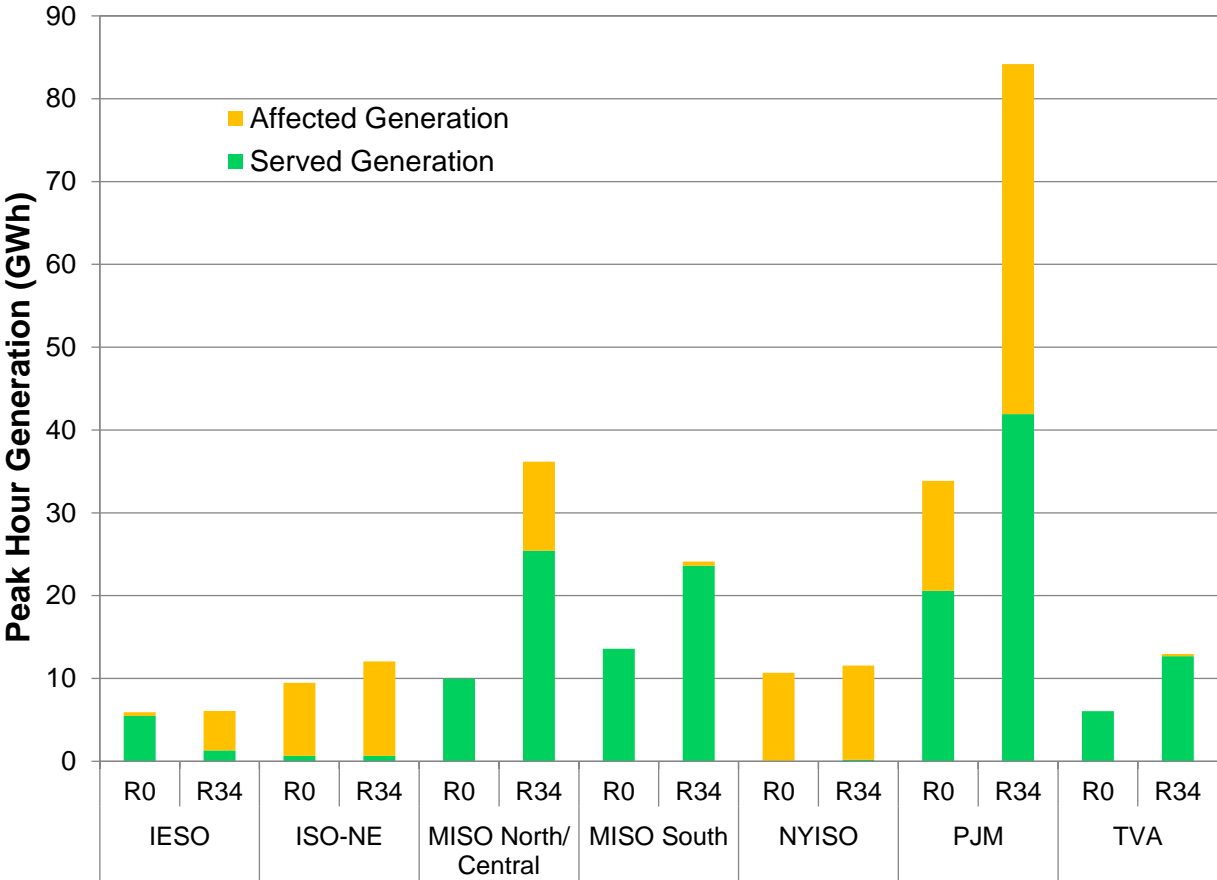


Figure A30-22. RGDS S34 Winter 2023: Peak Hour Affected Generation

Figure A30-23 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A30-13.

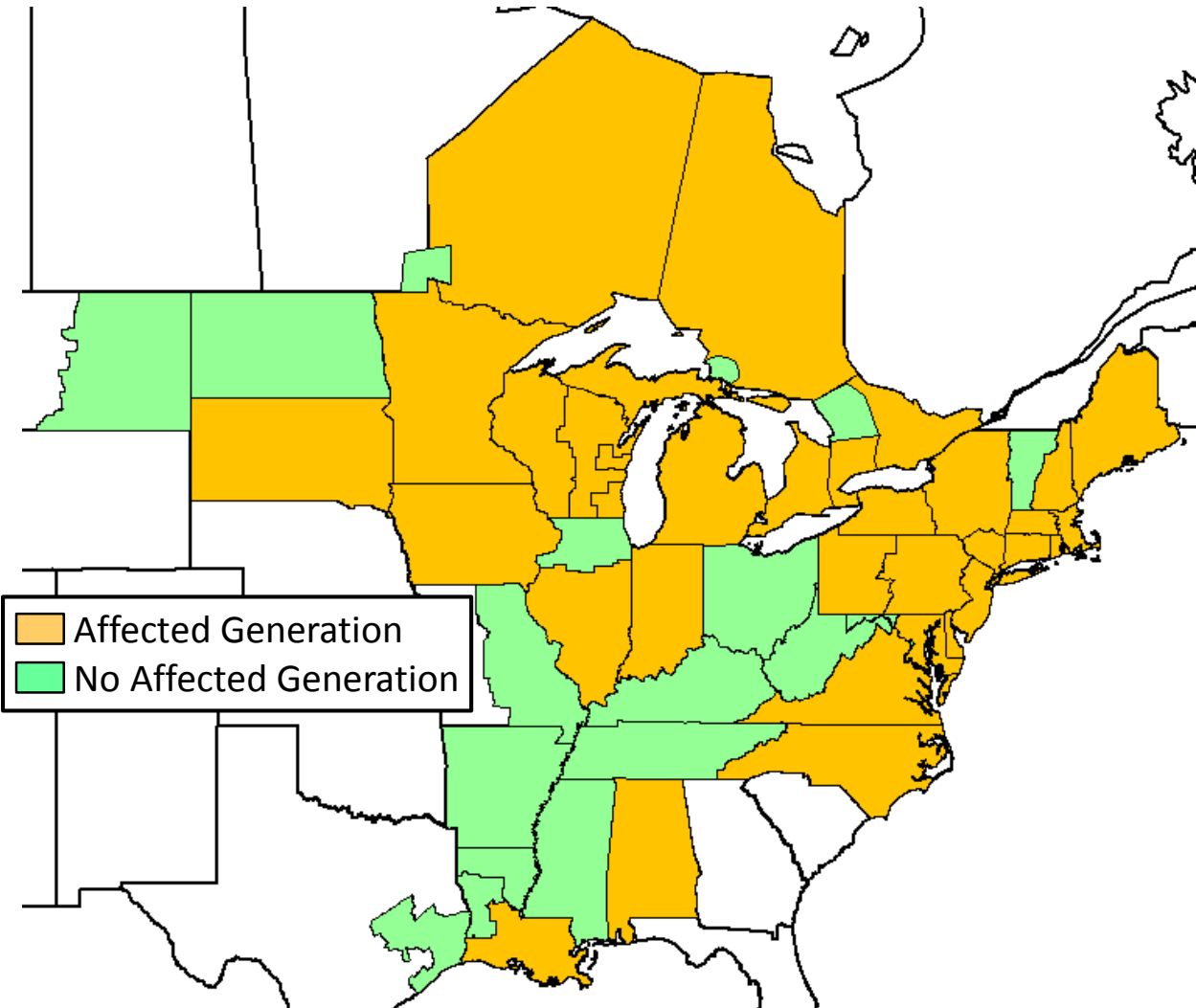


Figure A30-23. RGDS S34 Winter 2023: Locations with Peak Hour Affected Generation

Table A30-13. RGDS S34 Winter 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Alabama	3.2	243
Connecticut	25.6	3,189
Delaware	4.3	572
Illinois Southern	0.5	61
Indiana	14.9	1,603
Iowa	14.3	1,565
Louisiana Southern	4.8	501
Maine	11.6	1,502
Maryland Eastern	39.6	4,223
Massachusetts Eastern	14.0	1,774
Massachusetts Western	11.0	1,414
Michigan Lower Peninsula	4.7	599
Michigan Upper Peninsula	0.1	11
Minnesota	1.7	96
New Hampshire	13.4	1,627
New Jersey	93.8	12,115
New York Central Northern	45.8	5,667
New York City	23.1	2,421
New York Long Island	16.3	1,604
New York Southern	10.9	1,312
New York Western	3.3	367
North Carolina	1.2	169
Ontario (CDA)	10.5	1,068
Ontario (EDA)	16.0	1,635
Ontario (NDA)	1.5	186
Ontario (StClair)	15.8	1,838
Ontario (WDA)	0.4	38
Pennsylvania Eastern	101.6	13,281
Pennsylvania Western	11.0	1,574
Rhode Island	14.8	1,889
South Dakota	3.2	302
Virginia	82.2	9,882
Wisconsin Eastern (RFC)	23.4	2,909
Wisconsin Western (MROE)	33.7	3,548
Wisconsin Western (MROW)	7.4	499

Figure A30-24 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A30-22 during the Winter 2023 peak hour.

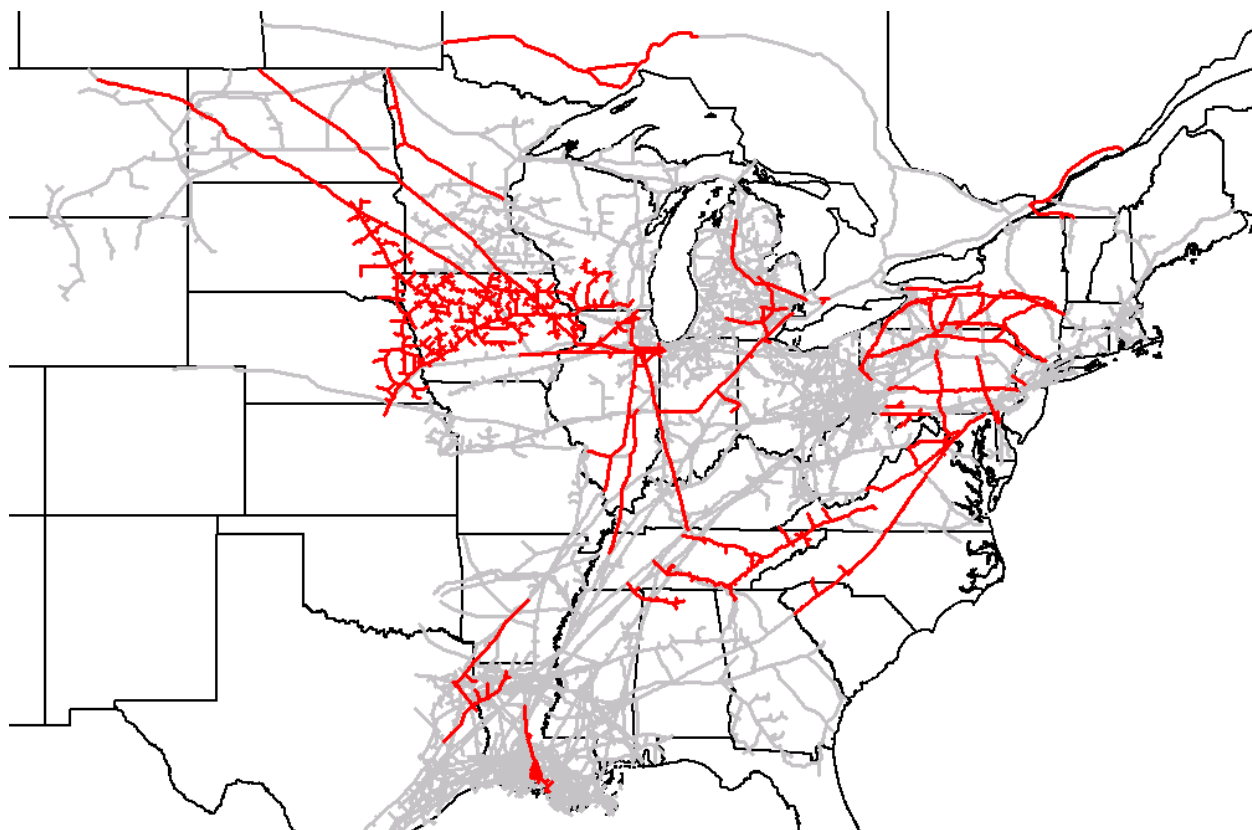


Figure A30-24. RGDS S34 Winter 2023: Peak Hour Constraints

Table A30-14 summarizes the results of the frequency and duration analysis.

Table A30-14. RGDS S34 Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
AlaTenn	15	1	10	63
Alliance	5	1	8	17
ANR Northern Illinois	2	28	59	87
Columbia Gas VA/MD	5	2	52	84
Columbia Gas W PA/NY	2	31	59	90
Constitution	2	31	59	90
Dominion Eastern NY	9	3	15	60
Dominion Western NY	1	4	4	4
Dominion Southeast	5	1	45	82
East Tennessee Mainline	7	1	5	19
Eastern Shore	12	1	16	72
Empire Mainline	10	1	20	53
Great Lakes East	2	31	59	90
Gulf South Z2 HH	8	1	3	15
Midwestern	14	1	18	60
Millennium	7	1	38	69
NB/NS Supply	2	31	59	90
NGPL IA/IL North	1	2	2	2
NGPL IA/IL South	3	1	8	10
Northern Border Mainline	7	1	4	14
Northern Natural ABC	2	31	59	90
Northern Natural D	8	1	37	77
Panhandle Eastern Z3	5	2	59	80
Tennessee Z4 PA	6	2	48	79
Tennessee Z5 NY	2	31	59	90
Texas Eastern ETX	5	2	10	29
Texas Eastern M2 PA South	2	31	59	90
Texas Eastern M3 North	2	31	59	90
TransCanada Ontario West	10	1	17	44
TransCanada Quebec	7	1	41	61
Transco Leidy Atlantic	2	31	59	90
Transco Z5	9	1	27	61
Transco Z6 Leidy to 210	2	31	59	90
Trunkline 1B	8	1	14	40
Union Gas Dawn	5	1	5	13
Vector Z1	3	1	1	1
Viking Z1	9	1	24	66

AlaTenn

The 100% peak hour utilization on AlaTenn's mainline, which is modeled with a capacity of 197 MDth/d, potentially affects generators served by AlaTenn in Alabama. The locations of these generators are shown in Figure A30-16.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-189 and Figure A31-190 relative to the capacity of the segment.

Alliance

The 100% peak hour utilization on Alliance's mainline, which is modeled with a capacity of 1,800 MDth/d, potentially affects generators behind LDCs served by Alliance and generators behind LDCs served by Guardian. The locations of these generators are shown in Figure A17-1.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-191 and Figure A31-192 relative to the capacity of the segment.

ANR Northern Illinois

The 100% peak hour utilization on ANR's Northern Illinois segment, which is modeled with a capacity of 1,337 MDth/d, potentially affects generators directly connected to ANR, generators behind LDCs served by ANR. The locations of these generators are shown in Figure A17-2.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-193 and Figure A31-194 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,867 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-195 and Figure A31-196 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland and generators

behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-197 and Figure A31-198 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-199 and Figure A31-200 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-201 and Figure A31-202 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-203 and Figure A31-204 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-205 and Figure A31-206 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-207 and Figure A31-208 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A31-209 and Figure A31-210 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-211 and Figure A31-212 relative to the capacity of the segment.

Great Lakes East

The 100% peak hour utilization on Great Lakes Gas's East segment, which is modeled with a capacity of 1,164 MDth/d, potentially affects generators directly connected to Great Lakes in Michigan, generators behind LDCs served by Great Lakes in Michigan, generators directly connected to Vector, and generators behind Union Gas. The locations of these generators are shown in Figure A17-3.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-213 and Figure A31-214 relative to the capacity of the segment.

Gulf South Zone 2 Henry Hub

The 100% peak hour utilization on the Henry Hub segment of Gulf South Zone 2, which is modeled with a capacity of 700 MDth/d, potentially affects generators directly connected to Gulf South in Louisiana, and generators behind LDCs served by Gulf South in Louisiana. The locations of these generators are shown in Figure A17-15.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-215 and Figure A31-216 relative to the capacity of the segment.

Midwestern

The 100% peak hour utilization on Midwestern's mainline segment, which is modeled with a capacity of 635 MDth/d, potentially affects generators behind LDCs served by Midwestern and behind LDCs served by Guardian downstream of the Joliet Hub. The locations of these generators are shown in Figure A17-4.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-217 and Figure A31-218 relative to the capacity of the segment

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, in particular, in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-219 and Figure A31-220 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 283 MDth/d in 2023. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A31-221 and Figure A31-222 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

NGPL Iowa/Illinois North

The 100% peak hour utilization on NGPL's Iowa/Illinois North segment, which is modeled with a capacity of 1,677 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Iowa, Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-5.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-223 and Figure A31-224 relative to the capacity of the segment.

NGPL Iowa/Illinois South

The 100% peak hour utilization on NGPL's Iowa/Illinois South segment, which is modeled with a capacity of 1,624 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-6.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-225 and Figure A31-226 relative to the capacity of the segment.

Northern Border Mainline

The 100% peak hour utilization on Northern Border's mainline, which is modeled with a capacity of 2,311 MDth/d, potentially affects generators directly connected to Northern Border in Minnesota and Illinois, generators behind LDCs served by Northern Border in Minnesota, Iowa, Illinois and Indiana, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-11.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-227 and Figure A31-228 relative to the capacity of the segment.

Northern Natural Zone ABC

The 100% peak hour utilization on Northern Natural's Zone ABC segment, which is modeled with a capacity of 2,138 MDth/d, potentially affects generators directly connected to Northern Natural in Iowa, South Dakota, Wisconsin and Minnesota, generators behind LDCs served by Northern Natural in Iowa, Wisconsin and Minnesota, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-12.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-229 and Figure A31-230 relative to the capacity of the segment.

Northern Natural Zone D

The 100% peak hour utilization on Northern Natural's Zone D segment, which is modeled with a capacity of 800 MDth/d, potentially affects generators directly connected to Northern Natural in Wisconsin, generators behind LDCs served by Northern Natural in Illinois and Wisconsin, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-8.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-231 and Figure A31-232 relative to the capacity of the segment.

Panhandle Eastern Z3

The 100% peak hour utilization on Panhandle Eastern's Z3 segment, which is modeled with a capacity of 1,593 MDth/d, potentially affects generators directly connected to Panhandle Eastern in Indiana and Ohio, generators behind LDCs served by Panhandle Eastern in Indiana, Ohio and Michigan, and generators served by ANR or Texas Eastern in Michigan and Ohio, either directly or behind an LDC. The locations of these generators are shown in Figure A30-17.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-233 and Figure A31-234 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC. The locations of these generators are shown in Figure 9-91 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-235 and Figure A31-236 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,404 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-237 and Figure A31-238 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2023. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-239 and Figure A31-240 relative to the capacity of the segment.

Texas Eastern M2 Pennsylvania – Southern Branch

The Texas Eastern M2 Pennsylvania – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York that are served by Texas Eastern, and generators that are served by Algonquin and Eastern Shore, either directly or behind an LDC. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-241 and Figure A31-242 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 3,357 MDth/d. The 100% peak hour utilization on Texas Eastern's Zone M3 northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, and generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-243 and Figure A31-244 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,508 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-245 and Figure A31-246 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-247 and Figure A31-248 relative to the capacity of the segment.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-249 and Figure A31-250 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 4,117 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-251 and Figure A31-252 relative to the capacity of the segment. The electric demand data set in these figures includes only gas demand at generators in the Study Region.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station segment is modeled with a capacity of 3,430 MDth/d. The 100% peak hour utilization on Transco's Leidy Line to Station 210 segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind

LDCs served by Transco in New Jersey, Pennsylvania and both New York City and Long Island. Locations of these generators are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-253 and Figure A31-254 relative to the capacity of the segment.

Trunkline Zone 1B

The 100% peak hour utilization on Trunkline's Zone 1B segment, which is modeled with a capacity of 947 MDth/d, potentially affects generators that are directly connected to Trunkline in Tennessee, Kentucky and Illinois. The locations of these generators are shown in Figure A30-18.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-255 and Figure A31-256 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-257 and Figure A31-258 relative to the capacity of the segment.

Vector Zone 1

The 100% peak hour utilization on Vector's Zone 1 segment, which is modeled with a capacity of 1,600 MDth/d, potentially affects generators directly connected to Vector in Illinois, Indiana, Michigan and Ontario and generators behind LDCs served by Vector in Indiana and Michigan. The locations of these generators are shown in Figure A17-14.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-259 and Figure A31-260 relative to the capacity of the segment.

Viking Zone 1

The 100% peak hour utilization on Viking's Zone 1 segment, which is modeled with a capacity of 543 MDth/d, potentially affects generators directly connected to Viking, generators behind LDCs served by Viking, generators directly connected to ANR, and generators behind LDCs served by ANR. The locations of these generators are shown in Figure A17-9.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-261 and Figure A31-262 relative to the capacity of the segment.

RGDS S34 Summer 2023

Figure A30-25 summarizes the affected generation during the Summer 2023 peak hour by PPA.

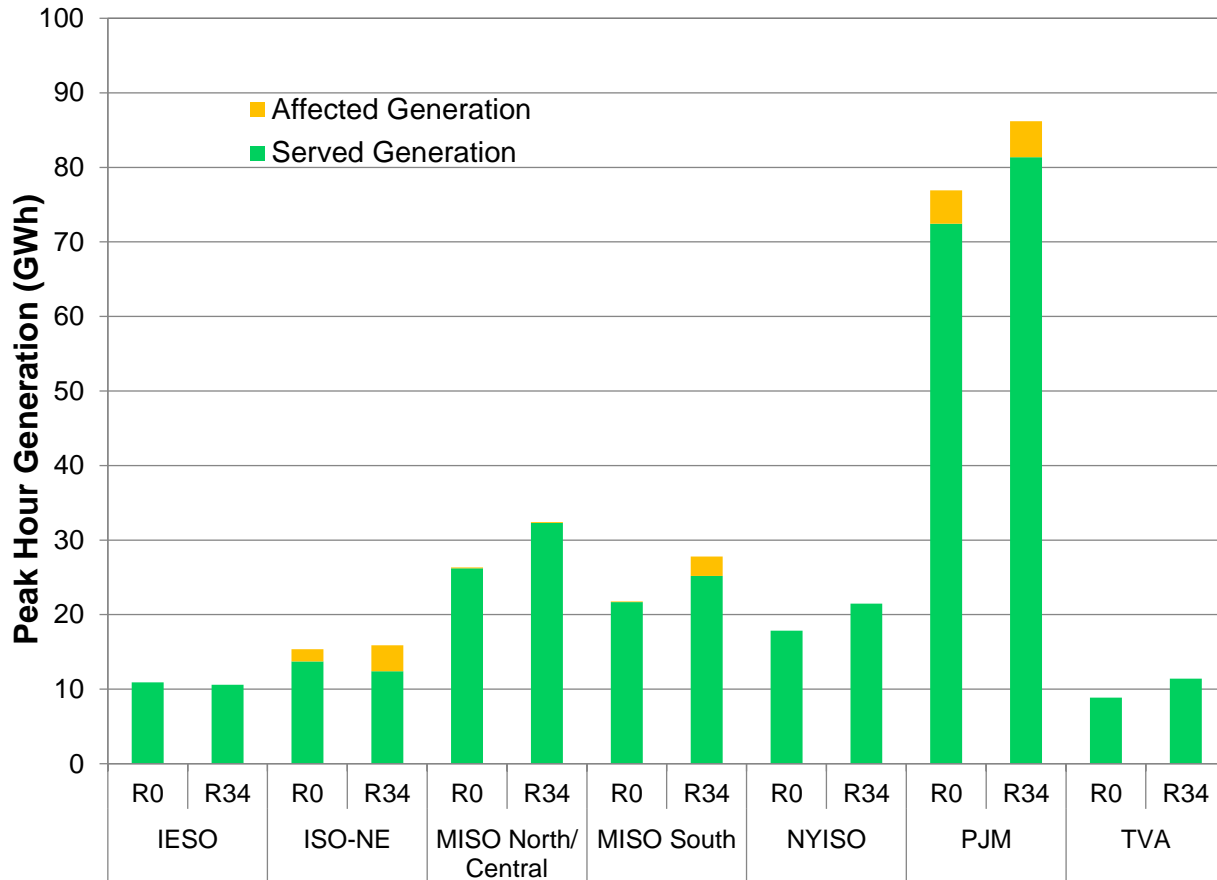


Figure A30-25. RGDS S34 Summer 2023: Peak Hour Affected Generation

Figure A30-26 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A30-15.

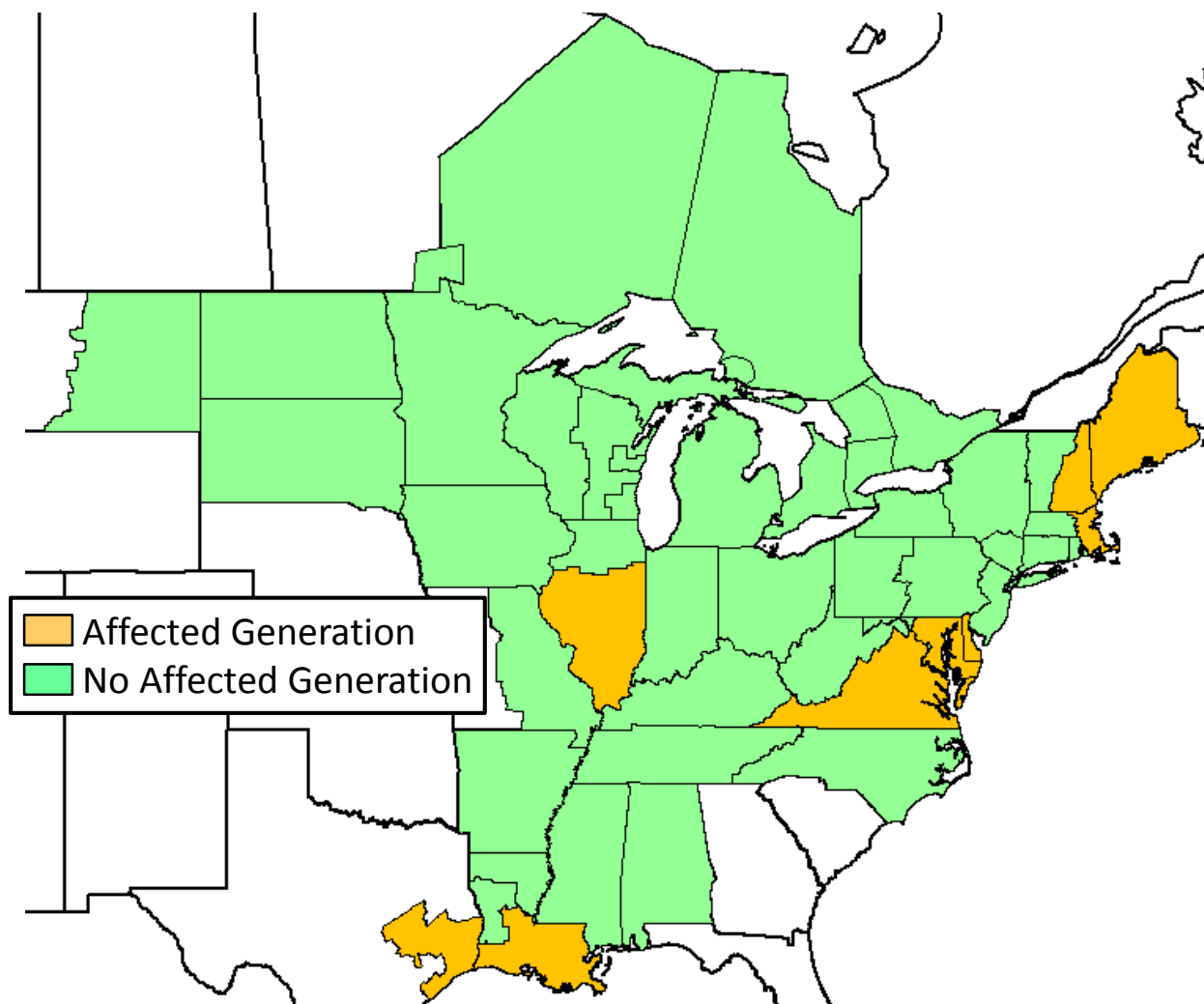


Figure A30-26. RGDS S34 Summer 2023: Locations with Peak Hour Affected Generation

Table A30-15. RGDS S34 Summer 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	9.4	1,255
Illinois Southern	1.0	112
Louisiana Southern	24.5	2,514
Maine	10.5	1,357
Maryland Eastern	16.7	2,361
Massachusetts Eastern	5.6	657
New Hampshire	12.3	1,480
Texas East (SERC)	0.6	81
Virginia	11.1	1,208

Figure A30-27 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A30-25 during the Summer 2023 peak hour.

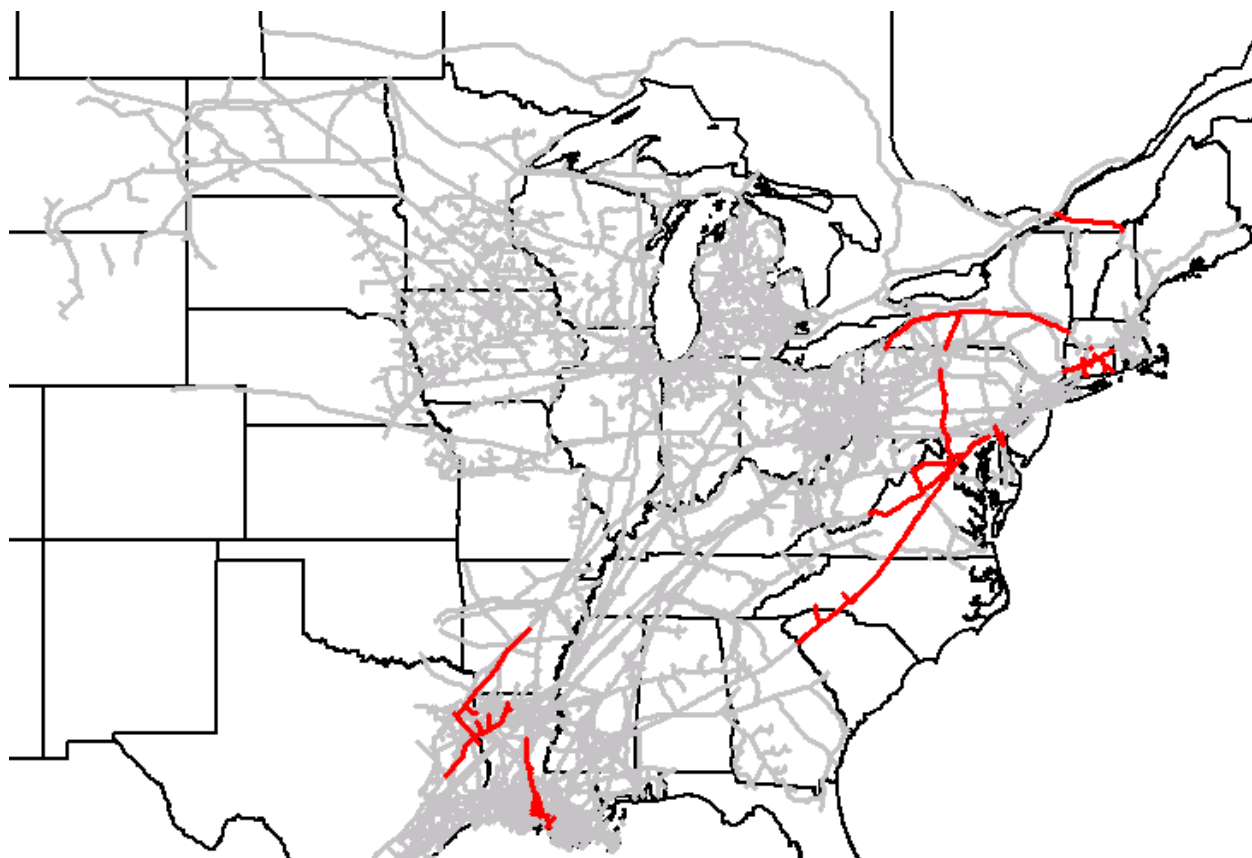


Figure A30-27. RGDS S34 Summer 2023: Peak Hour Constraints

Table A30-16 summarizes the results of the frequency and duration analysis.

Table A30-16. RGDS S34 Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	7	1	22	54
Columbia Gas VA/MD	9	3	24	80
Dominion Southeast	2	18	73	91
Eastern Shore	8	1	24	80
Gulf South Zone 2 HH	1	92	92	92
NB/NS Supply	3	2	82	90
Tennessee Z5 NY	8	1	10	32
Texas Eastern ETX	9	1	18	58
TransCanada Quebec to PNGTS	3	2	81	89
Transco Z5	10	1	24	76

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in

Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-263 and Figure A31-264 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,867 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-265 and Figure A31-266 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-267 and Figure A31-268 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A31-269 and Figure A31-270 relative to the capacity of the segments.

Gulf South Zone 2 Henry Hub

The 100% peak hour utilization on the Henry Hub segment of Gulf South Zone 2, which is modeled with a capacity of 700 MDth/d, potentially affects generators directly connected to Gulf

South in Louisiana, and generators behind LDCs served by Gulf South in Louisiana. The locations of these generators are shown in Figure A17-15.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-271 and Figure A31-272 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 283 MDth/d in 2023. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A31-273 and Figure A31-274 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-275 and Figure A31-276 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-277 and Figure A31-278 relative to the capacity of the segment.

TransCanada Quebec to PNGTS

TransCanada's Quebec to PNGTS segment is modeled with a capacity of 270 MDth/d. The 100% peak hour utilization on this segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure A17-13.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-279 and Figure A31-280 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A31-281 and Figure A31-282 relative to the capacity of the segment.

Appendix 31

S30 and S34 Chronological and Descending Demand Figures

(Contains CEII – Not included in this Volume)

Appendix 32
Extreme Cold Conditions Sensitivities
S31, S33 and S36

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S31: Very Cold Snap with 90/10 Electric and RCI Gas Demands

Sensitivity 31 envisions a Study Region-wide cold-weather event when all PPAs coincidentally experience an extreme winter peak electric load and RCI gas demand.

RGDS S31 Winter 2018

Figure A32-1 summarizes the affected generation during the Winter 2018 peak hour by PPA. The amount of affected generation decreases significantly in NYISO and is eliminated entirely in ISO-NE, as oil and coal are in merit and substitute for gas-fired generation. In PJM, increases in gas demand resulting from forced outages and higher electric load were roughly offset by substitution of oil and coal-fired generation in response to higher gas prices, while affected generation increased due to higher RCI gas demand. In IESO, generation gas demand and affected generation increased because gas prices for Ontario generators did not increase much and energy exports to other PPAs were higher. Affected generation in IESO did not increase proportionally with total generation because of the firm transportation rights held by many IESO generators.

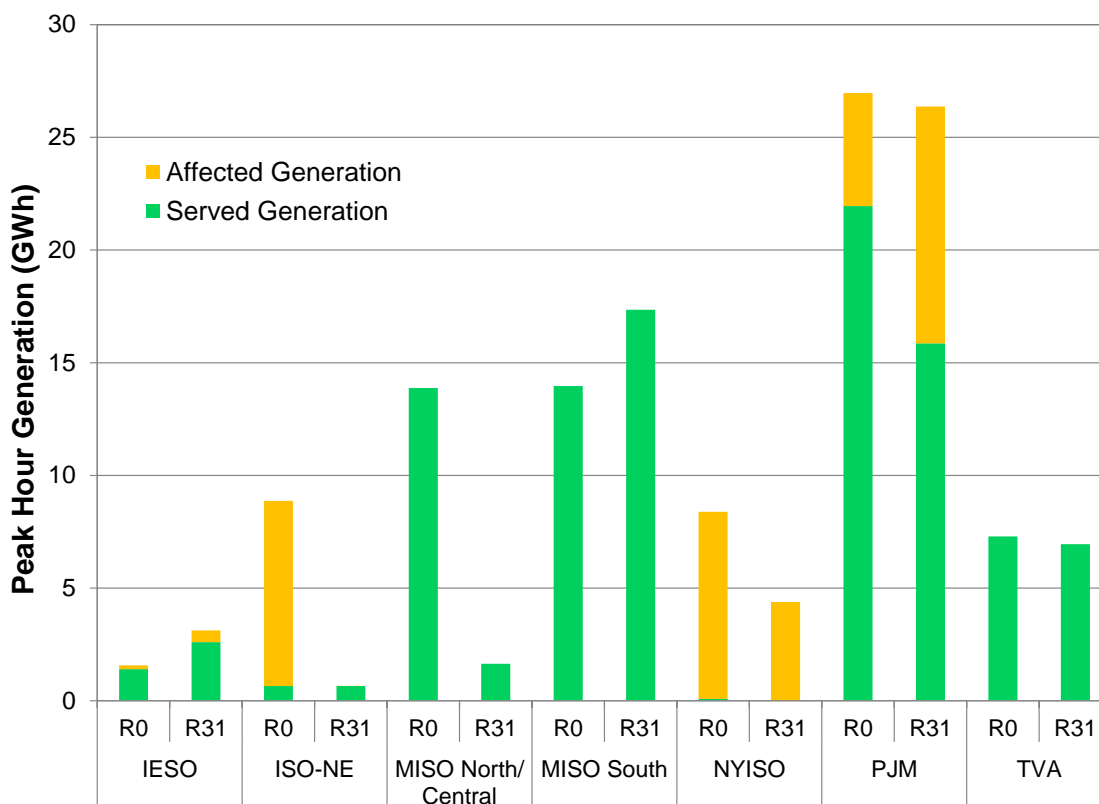


Figure A32-1. RGDS S31 Winter 2018: Peak Hour Affected Generation

Figure A32-2 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A32-1. While much of IESO is shaded orange, the quantities of unserved demand and affected generation are relatively small. The green shading in New England and in Delaware indicating that there is no affected generation is a result of the relative fuel prices putting generation in those locations out of merit.

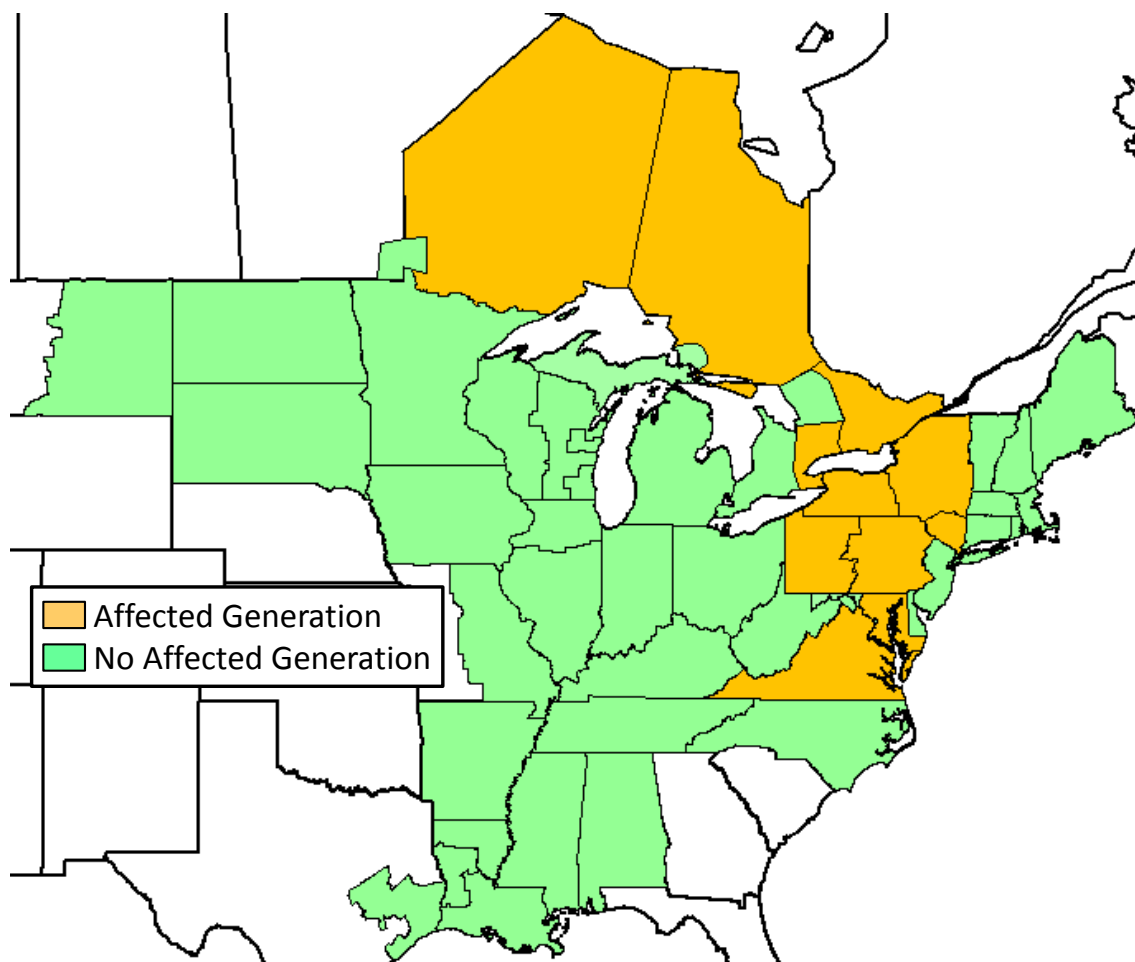


Figure A32-2. RGDS S31 Winter 2018: GPCM Locations with Peak Hour Affected Generation

Table A32-1. RGDS S31 Winter 2018: Peak Hour Unserved Generator Gas Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Maryland Eastern	3.3	315
New York Central Northern	25.8	2,634
New York Southern	14.3	1,537
New York Western	1.9	216
Ontario (CDA)	0.5	55
Ontario (EDA)	2.1	249
Ontario (NDA)	1.5	186
Ontario (WDA)	0.4	38
Pennsylvania Eastern	43.8	5,557
Pennsylvania Western	4.1	393
Virginia	35.4	4,237

Figure A32-3 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A32-1 during the Winter 2018 peak hour. Relative to the constraints seen in RGDS S0, Eastern Shore, NB/NS Supply, and TransCanada Quebec are not shown here, because although the segments are still highly utilized serving RCI demand, the reduced generator dispatch in New England and Delaware means that no generation is affected. The NFG mainline, which is not constrained in RGDS S0, serves incremental generation in RGDS S31 because of relative gas price changes. Although the Transco Z5 segment is still highly utilized in RGDS S31, it does not appear as a constraint because the two segments which deliver gas into it, Transco Z4 and Transco Z6, and 100% utilized and therefore constrained.

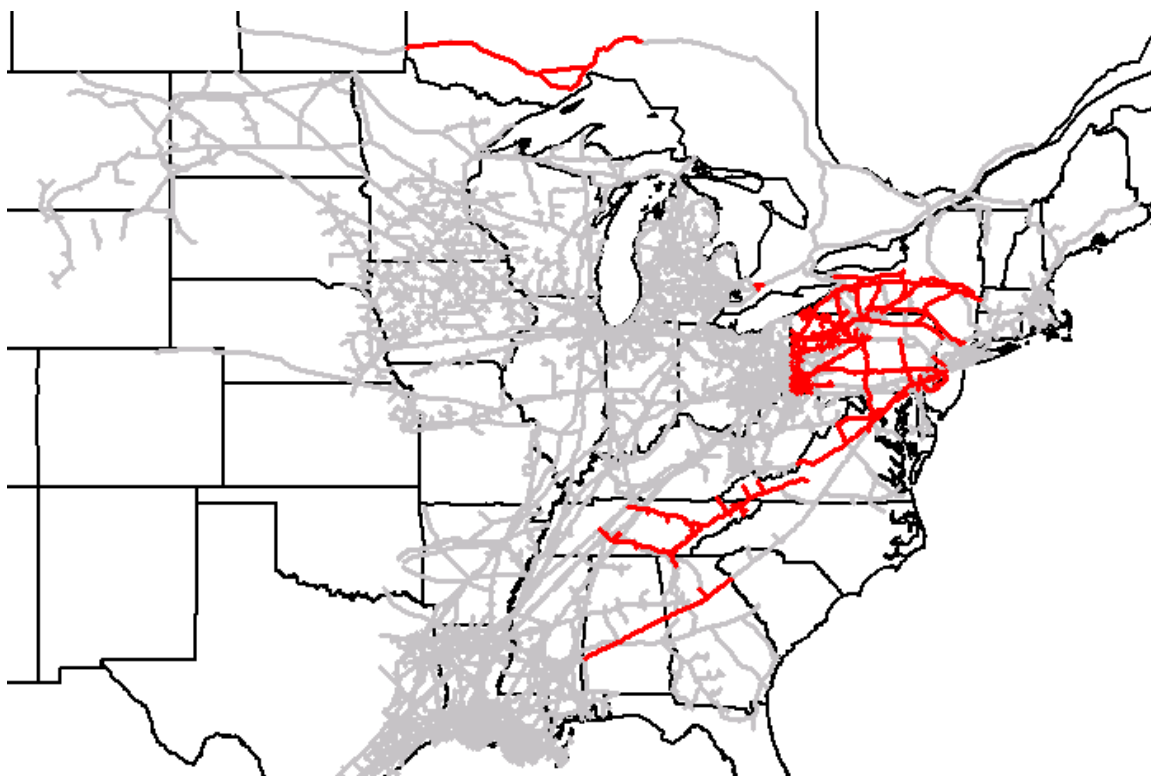


Figure A32-3. RGDS S31 Winter 2018: Peak Hour Constraints

Table A32-2 lists the segments that are constrained during the peak hour.

Table A32-2. RGDS S31 Winter 2018: Peak Hour Constraints

Columbia Gas VA/MD	Empire Mainline	TransCanada Ontario West
Columbia Gas W PA/NY	Millennium	Transco Leidy Atlantic
Constitution	NFG Mainline	Transco Z4
Dominion Eastern NY	Tennessee Z4 PA	Transco Z6
Dominion Western NY	Tennessee Z5 NY	Transco Z6 Leidy to 210
Dominion Southeast	Texas Eastern M2 PA South	Union Gas Dawn
East Tennessee Mainline	Texas Eastern M3 North	

RGDS S31 Winter 2023

Figure A32-4 summarizes the affected generation during the Winter 2023 peak hour by PPA. Changes in affected generation relative to RGDS S0 are similar to those seen in Winter 2018, with the exception of PJM, the quantity of affected generation in RGDS S31 has not changed significantly from Winter 2018, but is now less than the amount of affected generation in RGDS S0. This shift is because to the large increase in affected generation in Pennsylvania Eastern between Winter 2018 and Winter 2023 in RGDS S0 does not occur in RGDS S31. In RGDS S31, affected generation in Pennsylvania Eastern is already at a similar level in Winter 2018 to the Winter 2023 level in RGDS S0 because of the changes to the relative fuel prices.

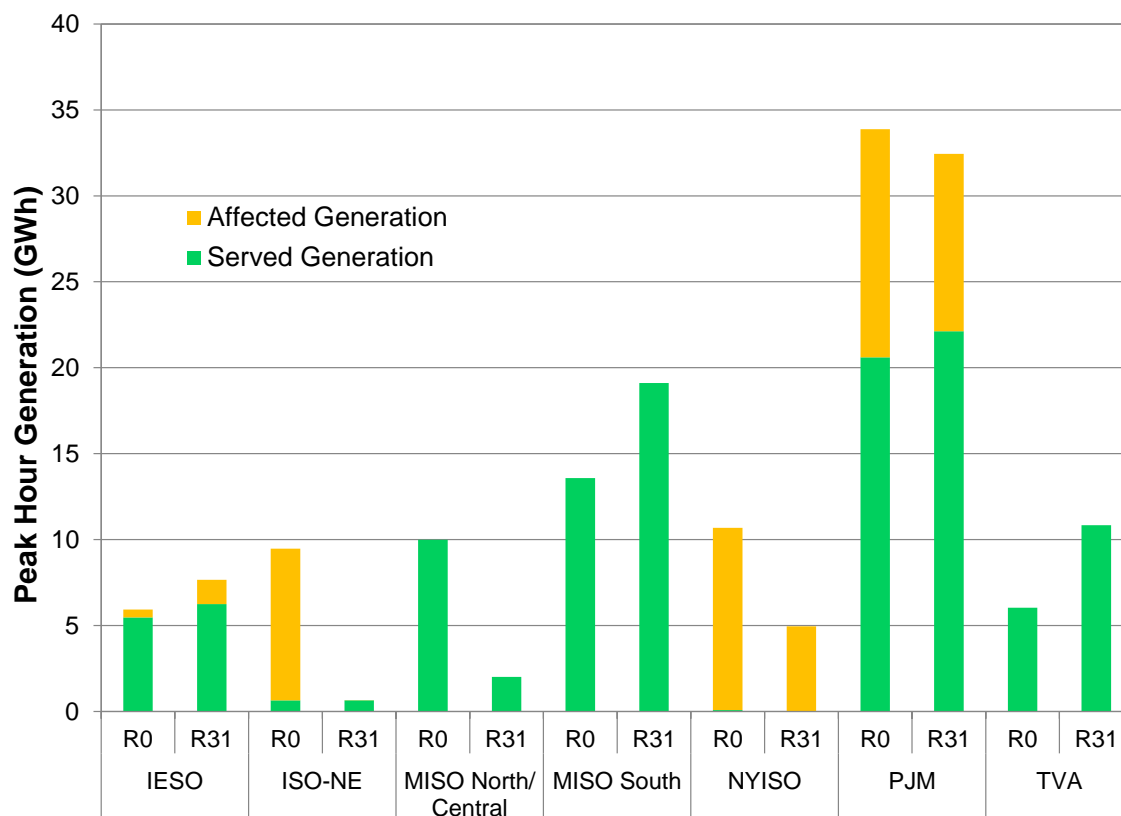


Figure A32-4. RGDS S31 Winter 2023: Peak Hour Affected Generation

Figure A32-5 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A32-3. The locations with affected generation and the relative amounts of affected generation in each location are largely unchanged from Winter 2018, with the exception of New Jersey, which has a small amount of affected generation in Winter 2023.

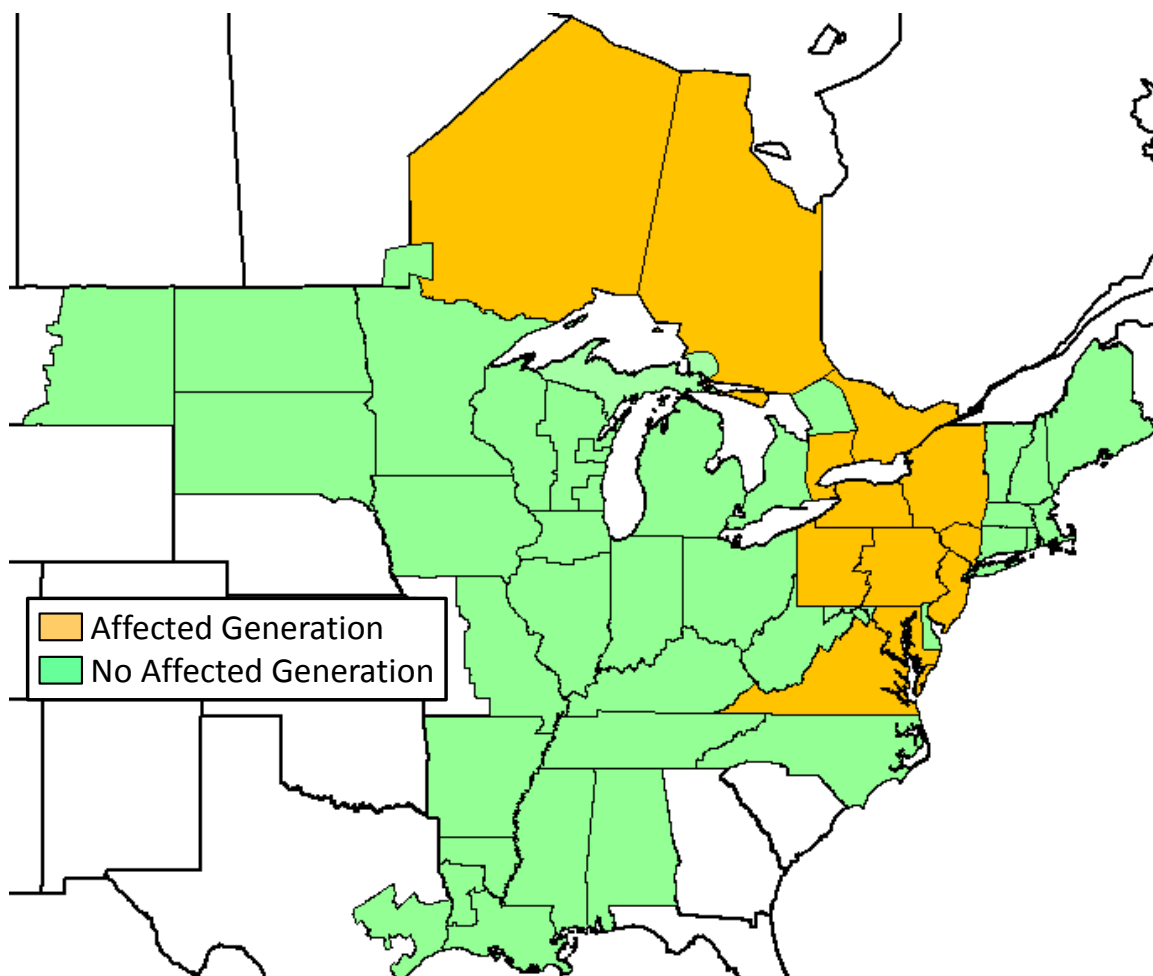


Figure A32-5. RGDS S31 Winter 2023: GPCM Locations with Peak Hour Affected Generation

Table A32-3. RGDS S31 Winter 2023: Peak Hour Unserved Generator Gas Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Maryland Eastern	3.3	315
New Jersey	0.3	46
New York Central Northern	30.0	3,199
New York Southern	14.3	1,537
New York Western	1.9	216
Ontario (CDA)	0.5	55
Ontario (EDA)	8.5	1,133
Ontario (NDA)	1.5	186
Ontario (WDA)	0.4	38
Pennsylvania Eastern	43.8	5,557
Pennsylvania Western	1.1	119
Virginia	36.2	4,285

Figure A32-6 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A32-4 during the Winter 2023 peak hour. The constraint on Transco is shifted from Transco Z4 and Transco Z6 to Transco Z5, relative to Winter 2018.

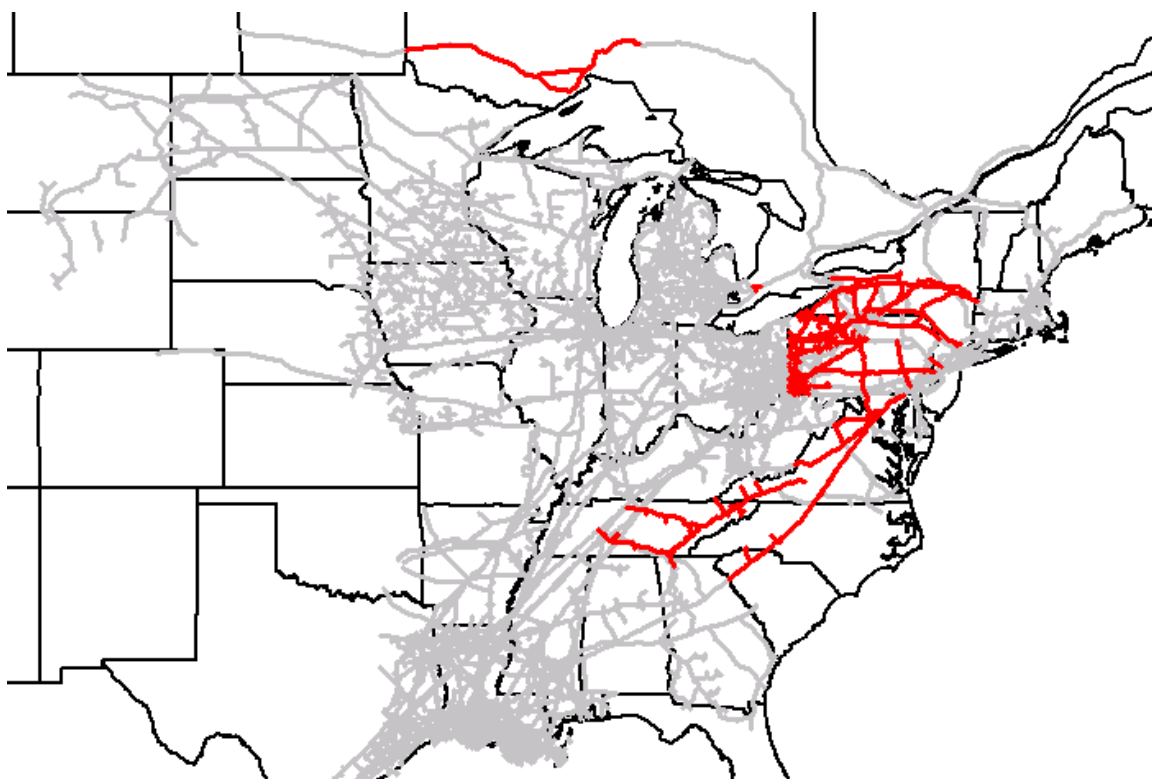


Figure A32-6. RGDS S31 Winter 2023: Peak Hour Constraints

Table A32-4 lists the segments that are constrained during the peak hour.

Table A32-4. RGDS S31 Winter 2023: Peak Hour Constraints

Columbia Gas VA/MD	Empire Mainline	Texas Eastern M3 North
Columbia Gas W PA/NY	Millennium	TransCanada Ontario West
Constitution	NFG Mainline	Transco Leidy Atlantic
Dominion Eastern NY	Tennessee Z4 PA	Transco Z5
Dominion Western NY	Tennessee Z5 NY	Transco Z6 Leidy to 210
Dominion Southeast	Texas Eastern M2 PA South	Union Gas Dawn
East Tennessee Mainline		

S33: S31 + High Forced Outage Rate for Coal and Oil Units

Sensitivity 33 tested the ability to compensate for unavailable coal and oil-fired capacity during the cold weather event modeled in Sensitivity 31.

RGDS S33 Winter 2018

Figure A32-7 summarizes the affected generation during the Winter 2018 peak hour by PPA. The changes in affected generation relative to RGDS S0 are very similar to those seen in RGDS S31 above, with slightly higher total generation in most PPAs due to forced outages of coal- and oil-fired units.

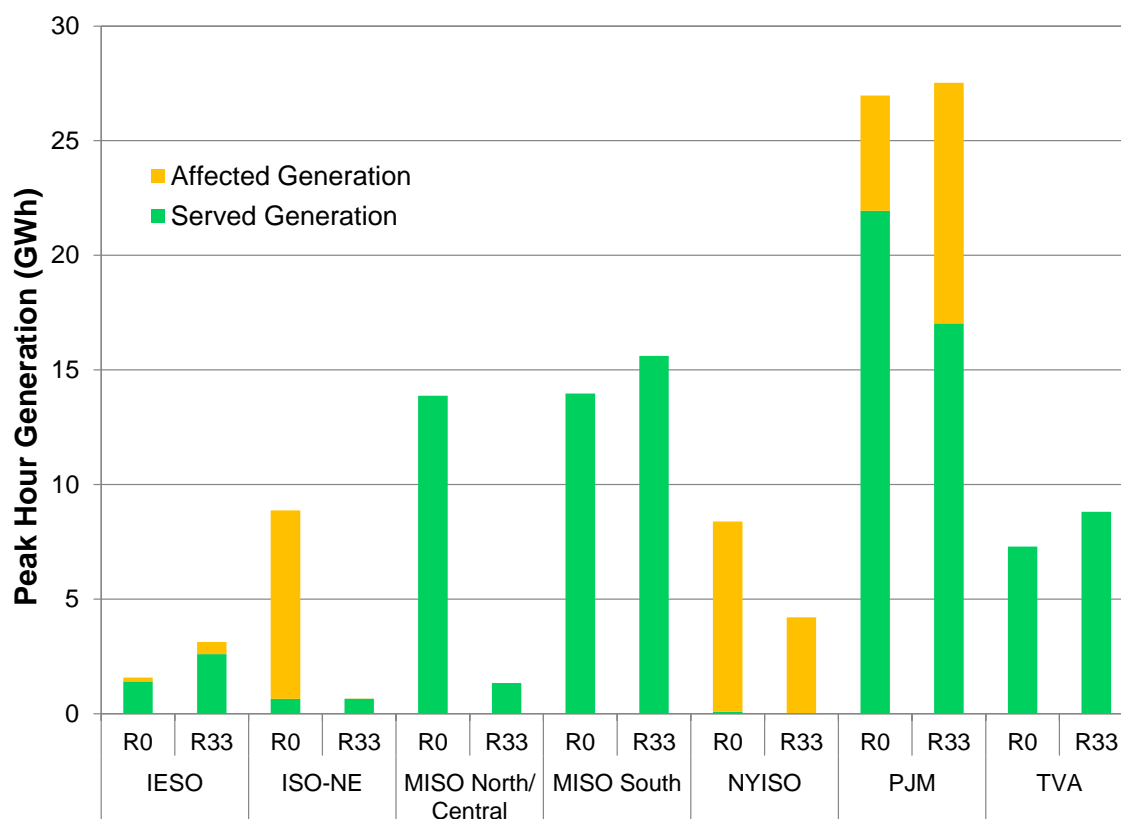


Figure A32-7. RGDS S33 Winter 2018: Peak Hour Affected Generation

Figure A32-8 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A32-5. These results are again very similar to the RGDS 31 results, with affected generation in the same locations.

Figure A32-9 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A32-7 during the Winter 2018 peak hour. Due to the similar gas demand patterns between RGDS S31 and RGDS S33, constraints are unchanged.

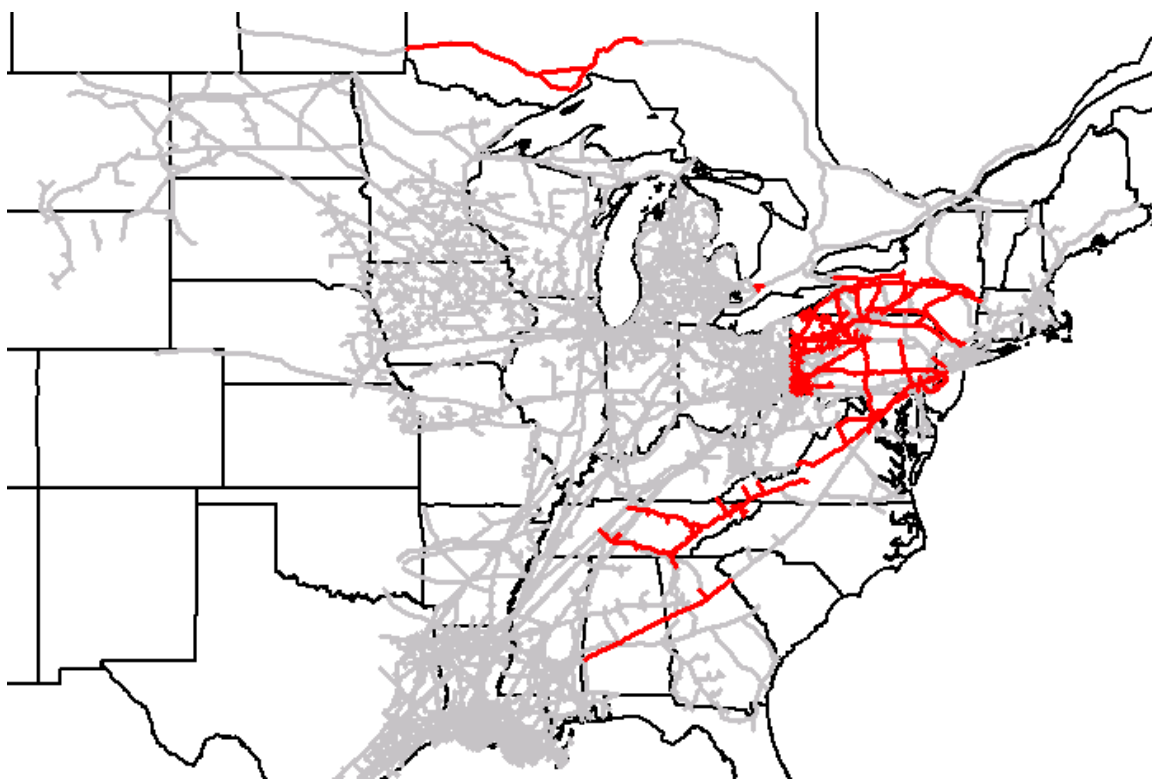


Figure A32-9. RGDS S33 Winter 2018: Peak Hour Constraints

Table A32-6 lists the segments that are constrained during the peak hour.

Table A32-6. RGDS S33 Winter 2018: Peak Hour Constraints

Columbia Gas VA/MD	Empire Mainline	TransCanada Ontario West
Columbia Gas W PA/NY	Millennium	Transco Leidy Atlantic
Constitution	NFG Mainline	Transco Z4
Dominion Eastern NY	Tennessee Z4 PA	Transco Z6
Dominion Western NY	Tennessee Z5 NY	Transco Z6 Leidy to 210
Dominion Southeast	Texas Eastern M2 PA South	Union Gas Dawn
East Tennessee Mainline	Texas Eastern M3 North	

RGDS S33 Winter 2023

The RGDS S33 Winter 2023 results are very similar to the RGDS S31 Winter 2023 results for the same reasons expressed regarding Winter 2018 in the previous section. Figure A32-10 summarizes the affected generation during the Winter 2023 peak hour by PPA.

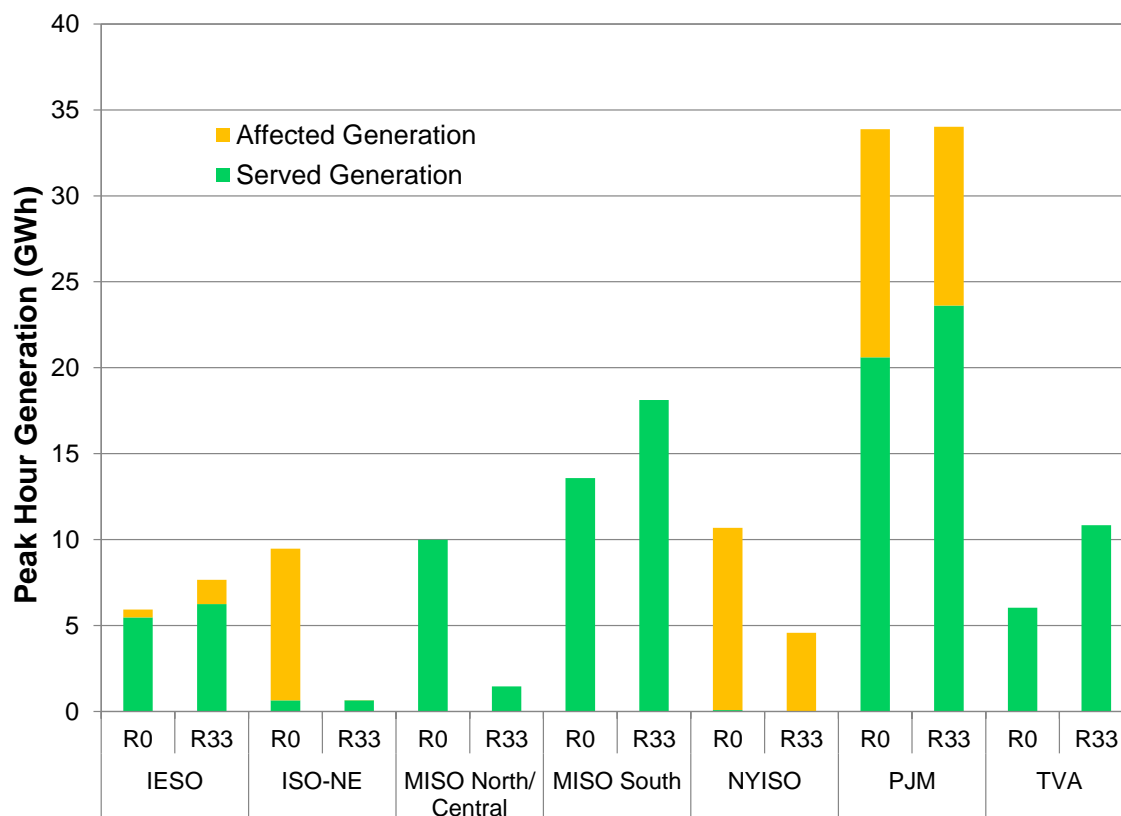


Figure A32-10. RGDS S33 Winter 2023: Peak Hour Affected Generation

Figure A32-11 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A32-7.

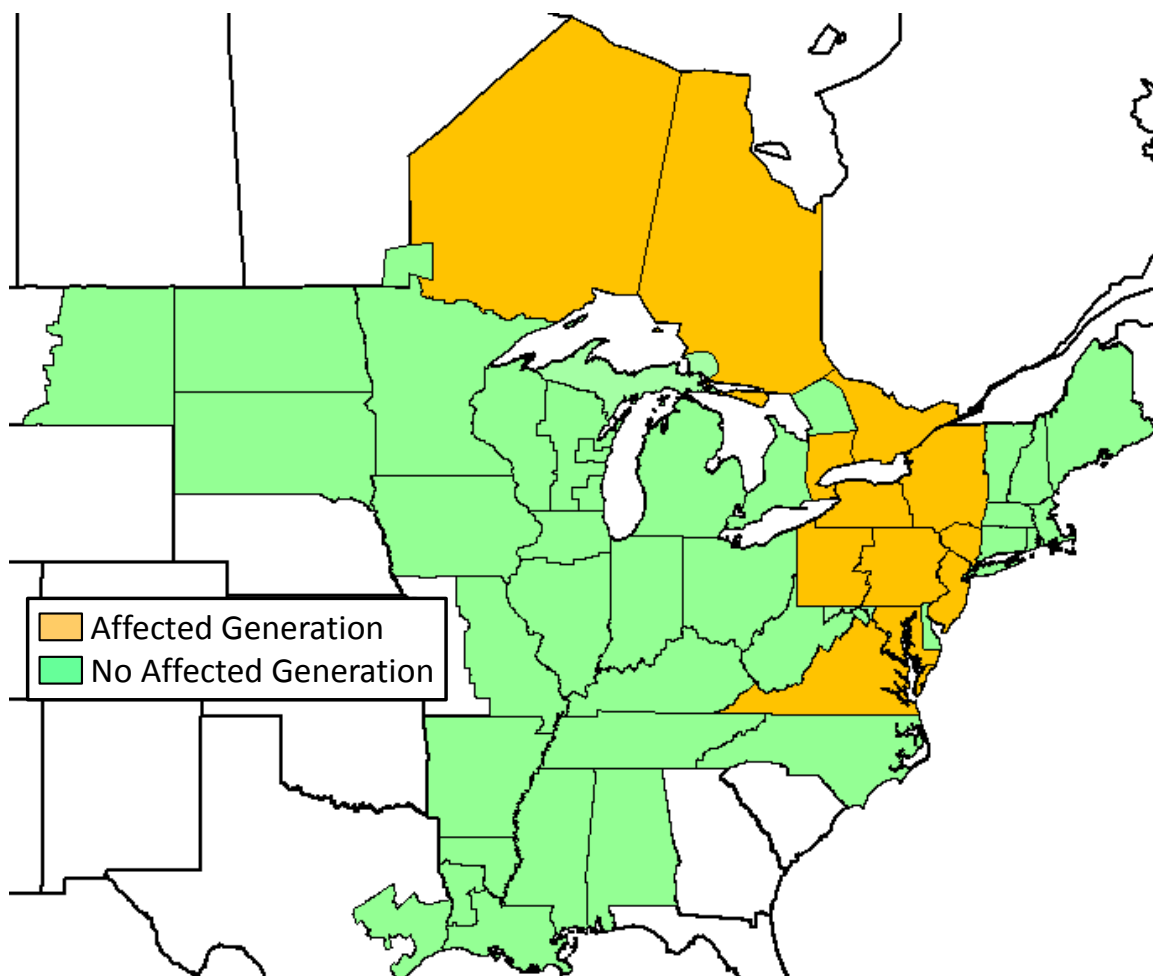


Figure A32-11. RGDS S33 Winter 2023: GPCM Locations with Peak Hour Affected Generation

Table A32-7. RGDS S33 Winter 2023: Peak Hour Unserved Generator Gas Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Maryland Eastern	3.3	315
New Jersey	0.6	77
New York Central Northern	27.2	2,824
New York Southern	14.3	1,537
New York Western	1.9	216
Ontario (CDA)	0.5	55
Ontario (EDA)	8.5	1,133
Ontario (NDA)	1.5	186
Ontario (WDA)	0.4	38
Pennsylvania Eastern	44.3	5,629
Pennsylvania Western	1.1	101
Virginia	36.2	4,285

Figure A32-12 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A32-10 during the Winter 2023 peak hour.

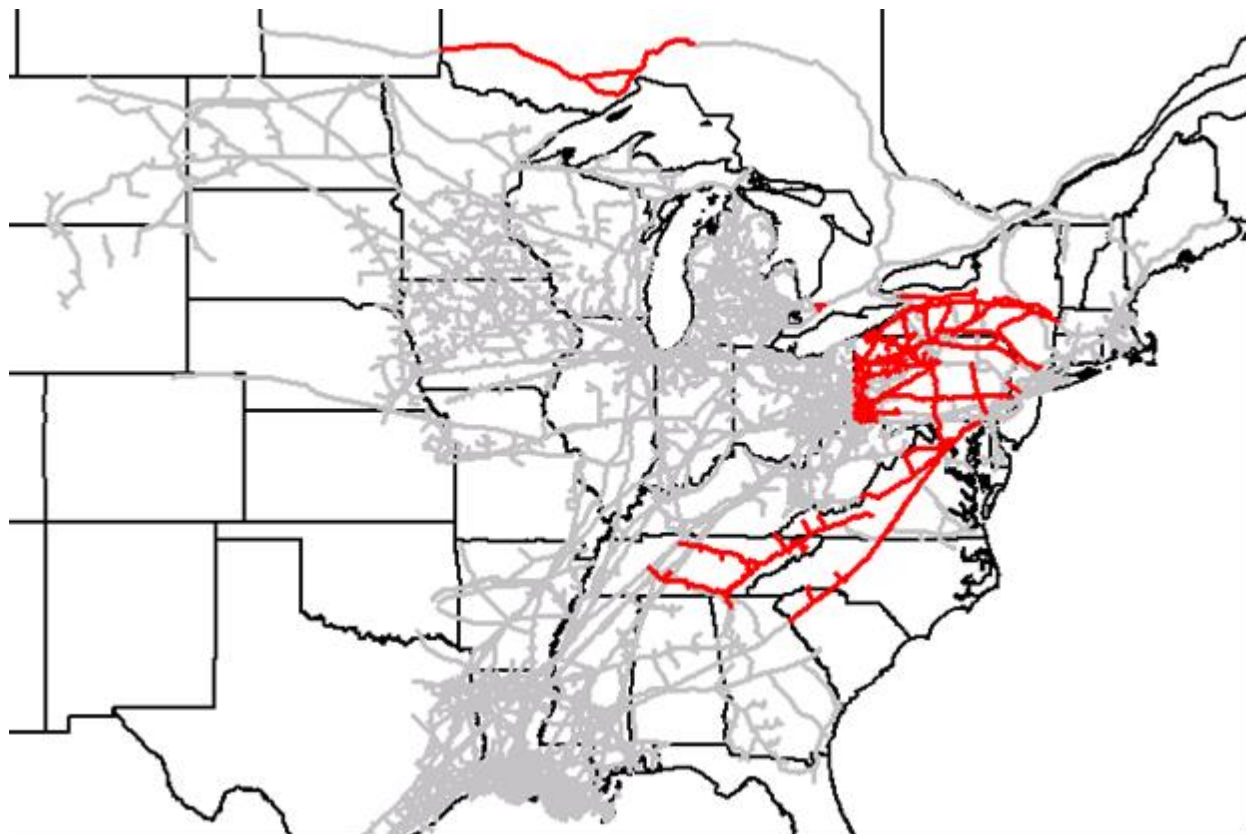


Figure A32-12. RGDS S33 Winter 2023: Peak Hour Constraints

Table A32-8 lists the segments that are constrained during the peak hour.

Table A32-8. RGDS S33 Winter 2023: Peak Hour Constraints

Columbia Gas VA/MD	Empire Mainline	Texas Eastern M3 North
Columbia Gas W PA/NY	Millennium	TransCanada Ontario West
Constitution	NFG Mainline	Transco Leidy Atlantic
Dominion Eastern NY	Tennessee Z4 PA	Transco Z5
Dominion Western NY	Tennessee Z5 NY	Transco Z6 Leidy to 210
Dominion Southeast	Texas Eastern M2 PA South	Union Gas Dawn
East Tennessee Mainline		

S36: S33 + Selected Nuclear Units Unavailable

Sensitivity 36 tests the gas system capability to compensate for selected nuclear plant outages in addition to the coal- and oil-fired unit outages modeled in Sensitivity 33, during the cold weather event modeled in Sensitivity 31.

RGDS S36 Winter 2018

Figure A32-13 summarizes the affected generation during the Winter 2018 peak hour by PPA. In IESO the amount of affected generation is unchanged relative to RGDS S33 because of firm transportation contracts held by generators. In New England and MISO North/Central, neither then total generation nor the unserved generation changes relative to RGDS S33. In MISO South and TVA, total generation increases, but all generation is still served. In NYISO, affected generation increases commensurately with total generation. In PJM, both total generation and affected generation increase relative to RGDS S33, but the increases are not proportional due to the locations and connectivity of the incremental generation, therefore a slightly smaller percentage of PJM’s generation is affected in RGDS S36.

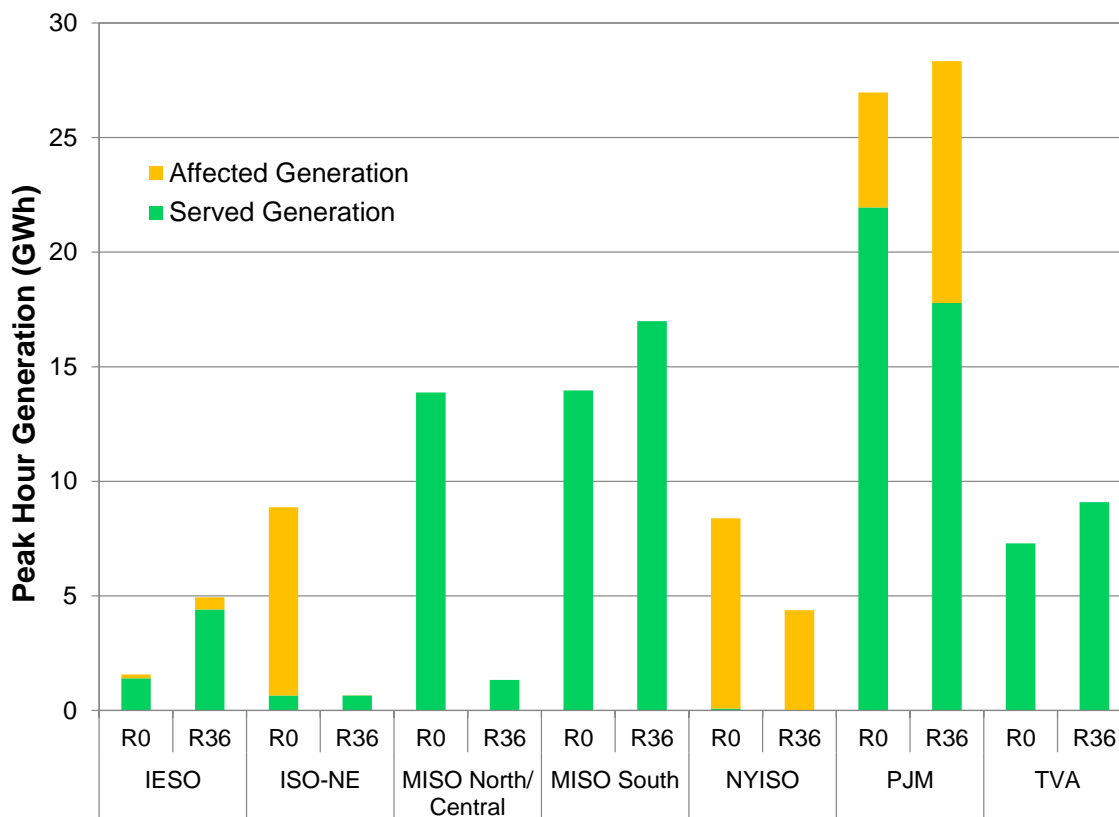


Figure A32-13. RGDS S36 Winter 2018: Peak Hour Affected Generation

Figure A32-14 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A32-9. Generation is affected in the same GPCM locations as in RGDS S33.

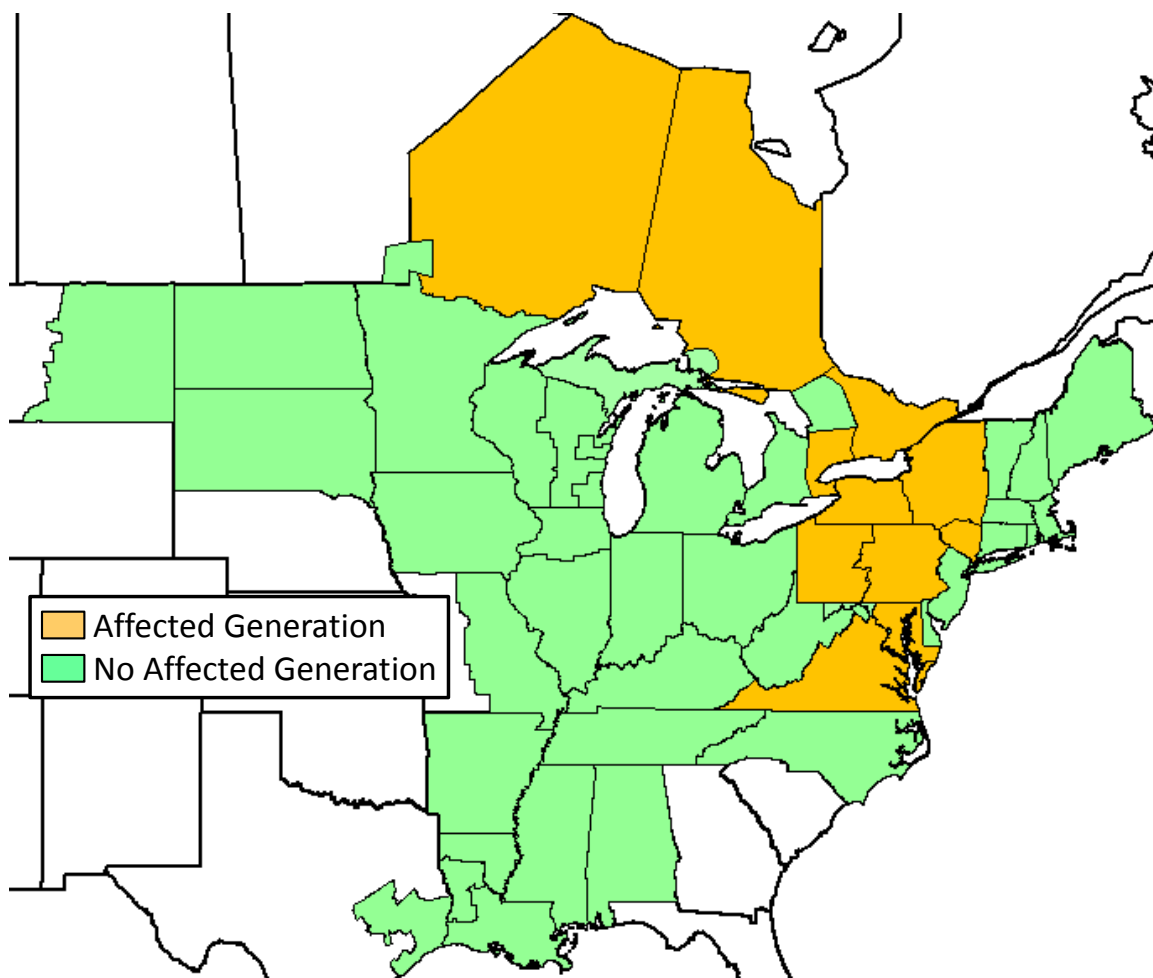


Figure A32-14. RGDS S36 Winter 2018: GPCM Locations with Peak Hour Affected Generation

Table A32-9. RGDS S36 Winter 2018: Peak Hour Unserved Generator Gas Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Maryland Eastern	3.3	315
New York Central Northern	25.8	2,633
New York Southern	14.3	1,537
New York Western	1.8	209
Ontario (CDA)	0.5	55
Ontario (EDA)	2.1	249
Ontario (NDA)	1.5	186
Ontario (WDA)	0.4	38
Pennsylvania Eastern	43.8	5,557
Pennsylvania Western	4.1	393
Virginia	36.2	4,285

Figure A32-15 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A32-13 during the Winter 2018 peak hour. The same segments are constrained in RGDS S36 as in RGDS S33.

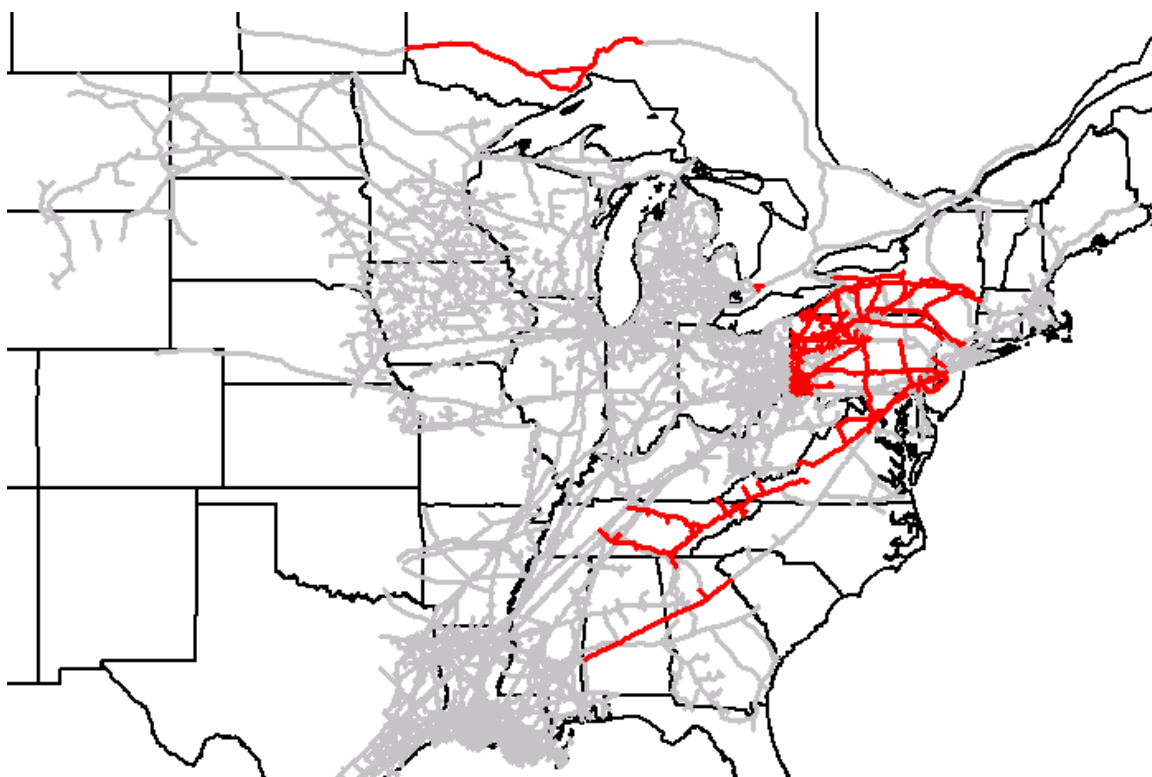


Figure A32-15. RGDS S36 Winter 2018: Peak Hour Constraints

Table A32-10 lists the segments that are constrained during the peak hour.

Table A32-10. RGDS S36 Winter 2018: Peak Hour Constraints

Columbia Gas VA/MD	Empire Mainline	TransCanada Ontario West
Columbia Gas W PA/NY	Millennium	Transco Leidy Atlantic
Constitution	NFG Mainline	Transco Z4
Dominion Eastern NY	Tennessee Z4 PA	Transco Z6
Dominion Western NY	Tennessee Z5 NY	Transco Z6 Leidy to 210
Dominion Southeast	Texas Eastern M2 PA South	Union Gas Dawn
East Tennessee Mainline	Texas Eastern M3 North	

RGDS S36 Winter 2023

The RGDS S36 Winter 2023 results are very similar to the RGDS S33 Winter 2023 results for the same reasons expressed regarding Winter 2018 in the previous section. Figure A32-16 summarizes the affected generation during the Winter 2023 peak hour by PPA.

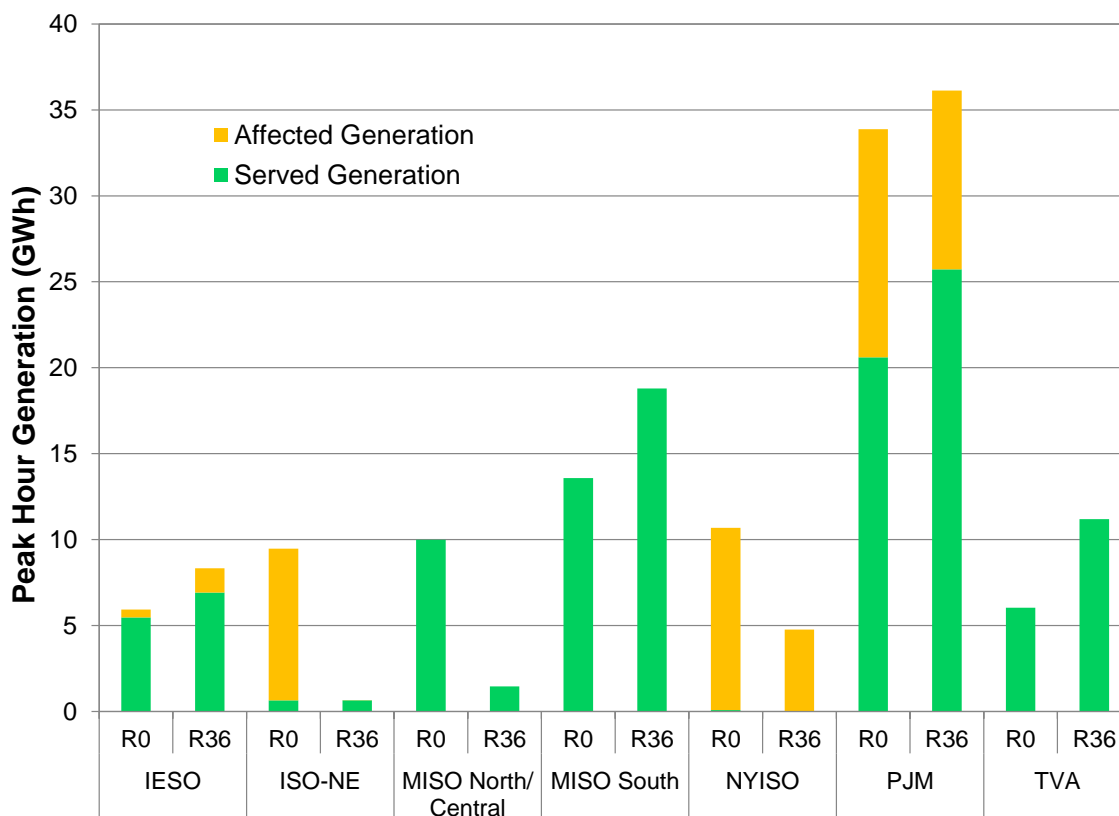


Figure A32-16. RGDS S36 Winter 2023: Peak Hour Affected Generation

Figure A32-17 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A32-11.

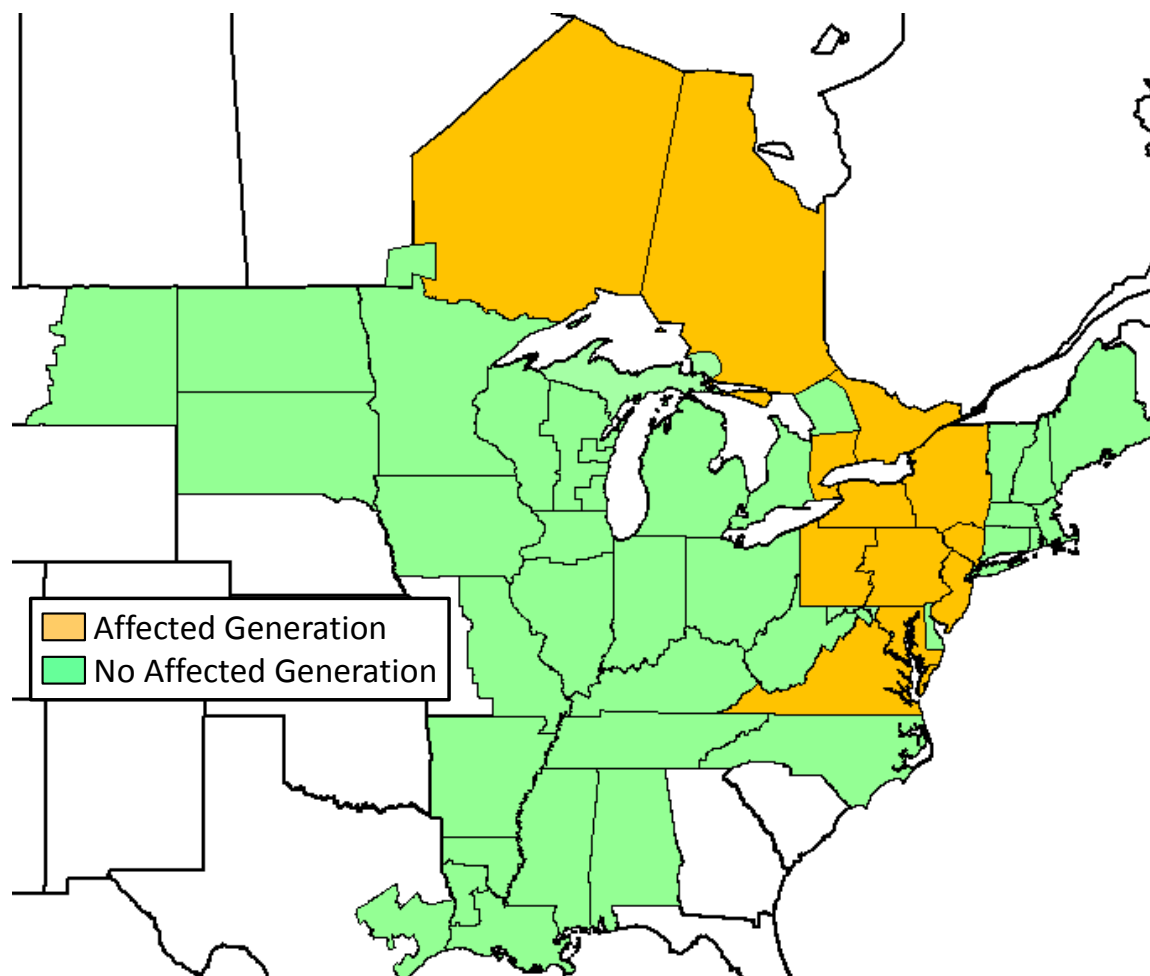


Figure A32-17. RGDS S36 Winter 2023: Locations with Peak Hour Affected Generation

Table A32-11. RGDS S36 Winter 2023: Peak Hour Unserved Generator Gas Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Maryland Eastern	3.3	315
New Jersey	0.6	77
New York Central Northern	28.6	3,011
New York Southern	14.3	1,537
New York Western	1.9	216
Ontario (CDA)	0.5	55
Ontario (EDA)	8.5	1,133
Ontario (NDA)	1.5	186
Ontario (WDA)	0.4	38
Pennsylvania Eastern	44.3	5,629
Pennsylvania Western	1.1	101
Virginia	36.2	4,285

Figure A32-18 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A32-16 during the Winter 2023 peak hour.

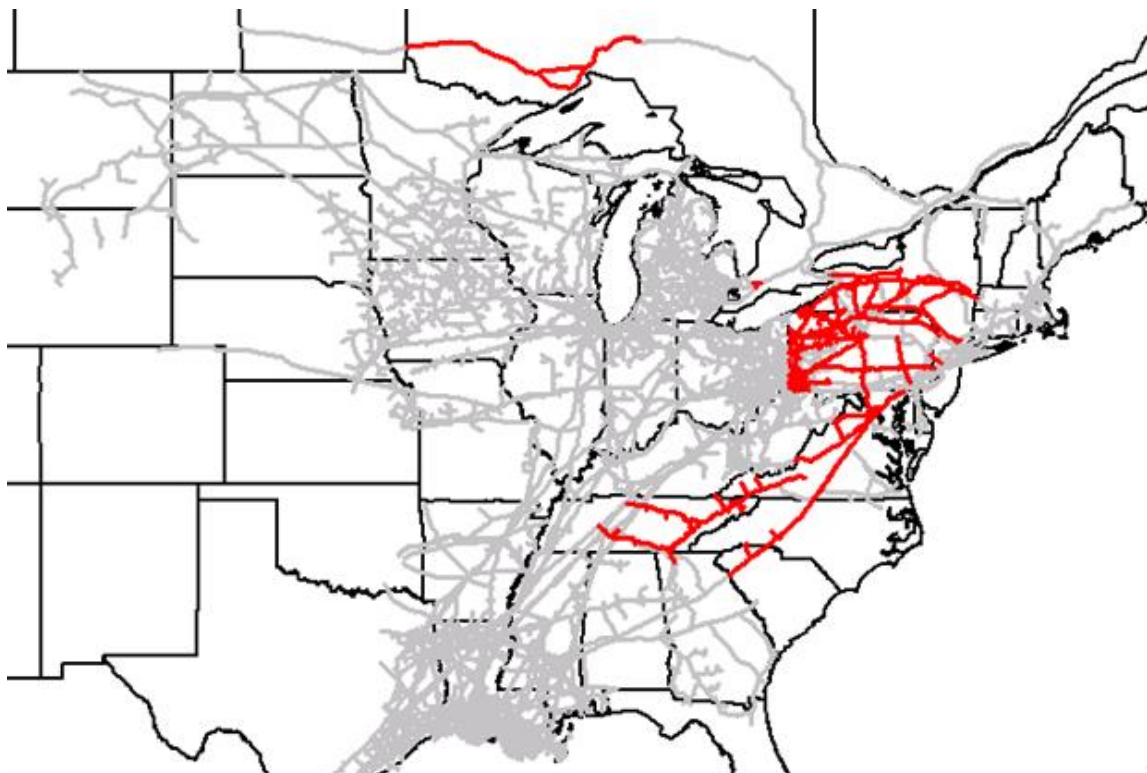


Figure A32-18. RGDS S36 Winter 2023: Peak Hour Constraints

Table A32-12 lists the segments that are constrained during the peak hour.

Table A32-12. RGDS S36 Winter 2023: Peak Hour Constraints

Columbia Gas VA/MD	Empire Mainline	Texas Eastern M3 North
Columbia Gas W PA/NY	Millennium	TransCanada Ontario West
Constitution	NFG Mainline	Transco Leidy Atlantic
Dominion Eastern NY	Tennessee Z4 PA	Transco Z5
Dominion Western NY	Tennessee Z5 NY	Transco Z6 Leidy to 210
Dominion Southeast	Texas Eastern M2 PA South	Union Gas Dawn
East Tennessee Mainline		

Appendix 33

Roll-up Scenarios

S31, S33 and S36

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RGDS Roll-Up

RGDS Roll-Up Winter 2018

Figure A33-1 summarizes the affected generation during the Winter 2018 peak hour by PPA.

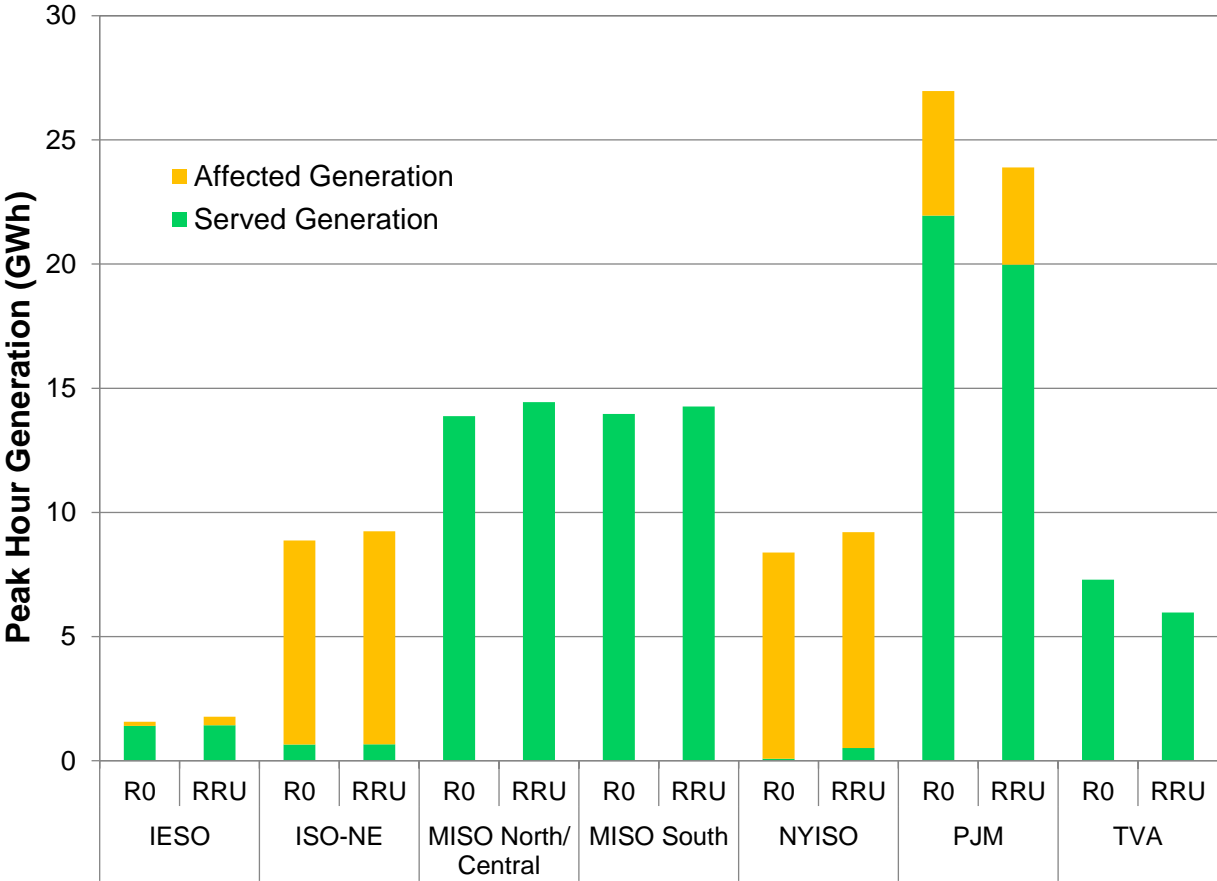


Figure A33-1. RGDS Roll-Up Winter 2018: Peak Hour Affected Generation

Figure A33-2 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A33-1.

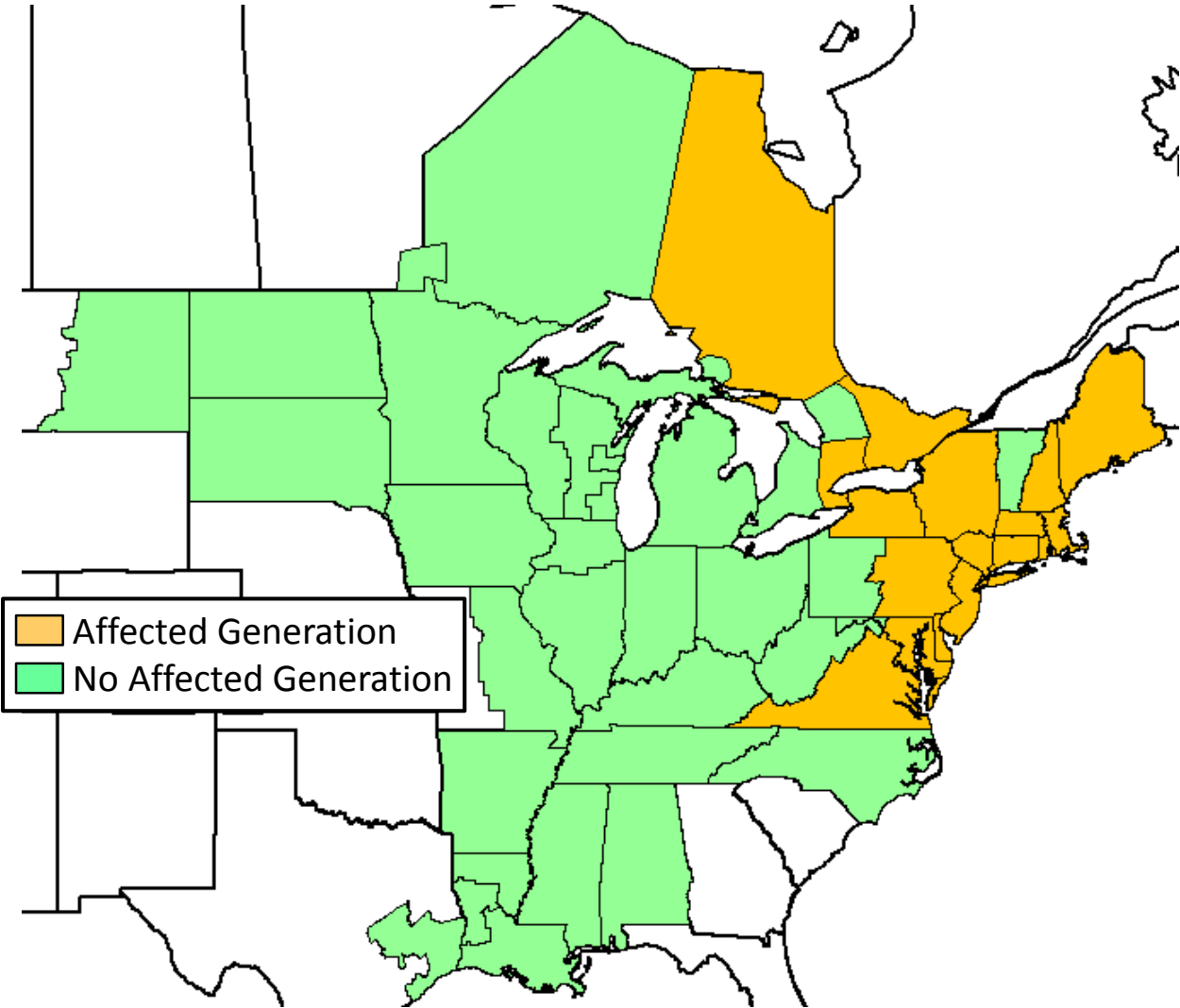


Figure A33-2. RGDS Roll-Up Winter 2018: Locations with Peak Hour Affected Generation

Table A33-1. RGDS Roll-Up Winter 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	12.2	1,666
Delaware	1.6	199
Maine	10.3	1,386
Maryland Eastern	5.3	574
Massachusetts Eastern	8.5	1,174
Massachusetts Western	14.0	1,931
New Hampshire	9.7	1,288
New Jersey	4.1	511
New York Central Northern	25.9	3,654
New York City	18.7	2,493
New York Long Island	9.2	1,054
New York Southern	10.9	1,312
New York Western	1.6	179
Ontario (CDA)	0.5	55
Ontario (EDA)	1.6	175
Ontario (NDA)	0.8	114
Pennsylvania Eastern	0.4	43
Rhode Island	8.6	1,130
Virginia	19.3	2,584

Figure A33-3 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A33-1 during the Winter 2018 peak hour.

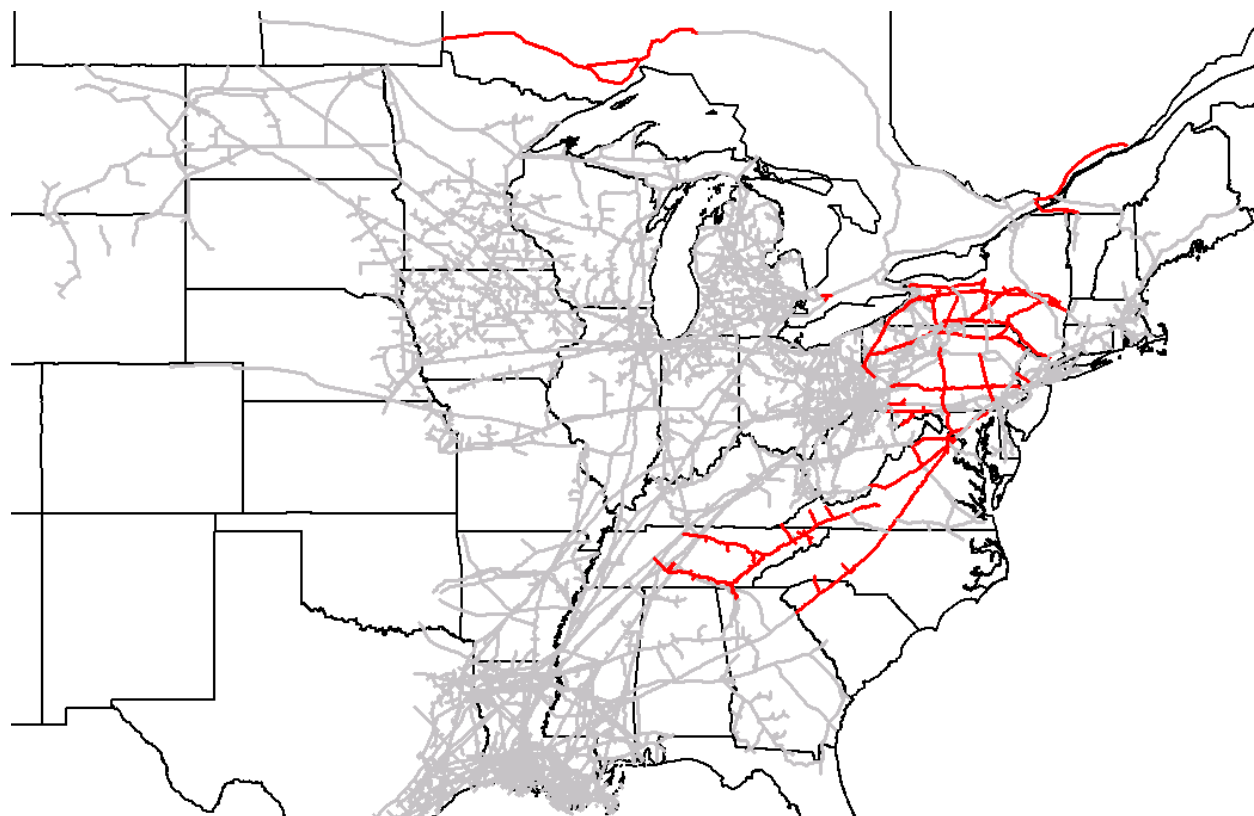


Figure A33-3. RGDS Roll-Up Winter 2018: Peak Hour Constraints

Table A33-2 summarizes the results of the frequency and duration analysis.

Table A33-2. RGDS Roll-Up Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	12	1	5	21
Columbia Gas W PA/NY	8	1	3	13
Constitution	2	31	59	90
Dominion Eastern NY	6	12	9	16
Dominion Western NY	1	4	4	4
Dominion Southeast	6	1	3	9
East Tennessee Mainline	5	1	1	5
Eastern Shore	12	1	10	58
Empire Mainline	6	1	12	20
Millennium	7	1	38	69
NB/NS Supply	13	1	20	51
Tennessee Z4 PA	10	1	7	24
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	10	1	13	44
Texas Eastern M3 North	12	1	6	32
TransCanada Ontario West	4	1	8	17
TransCanada Quebec	7	1	13	23
Transco Leidy Atlantic	3	10	48	89
Transco Z5	5	1	2	7
Transco Z6 Leidy to 210	4	1	3	6
Union Gas Dawn	2	1	3	4

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-1 and Figure A34-2 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-3 and Figure A34-4 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-5 and Figure A34-6 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-7 and Figure A34-8 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-9 and Figure A34-10 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-11 and Figure A34-12 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East

Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-13 and Figure A34-14 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9- 87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A34-15 and Figure A34-16 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-17 and Figure A34-18 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-19 and Figure A34-20 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A34-21 and Figure A34-22 relative to the total production

capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-23 and Figure A34-24 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-25 and Figure A34-26 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-27 and Figure A34-28 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A34-29 and Figure A34-30 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-31 and Figure A34-32 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A34-33 and Figure A34-34 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-35 and Figure A34-36 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-37 and Figure A34-38 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-39 and Figure A34-40 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A34-41 and Figure A34-42 relative to the capacity of the segment.

RGDS Roll-Up Summer 2018

Figure A33-4 summarizes the affected generation during the Summer 2018 peak hour by PPA.

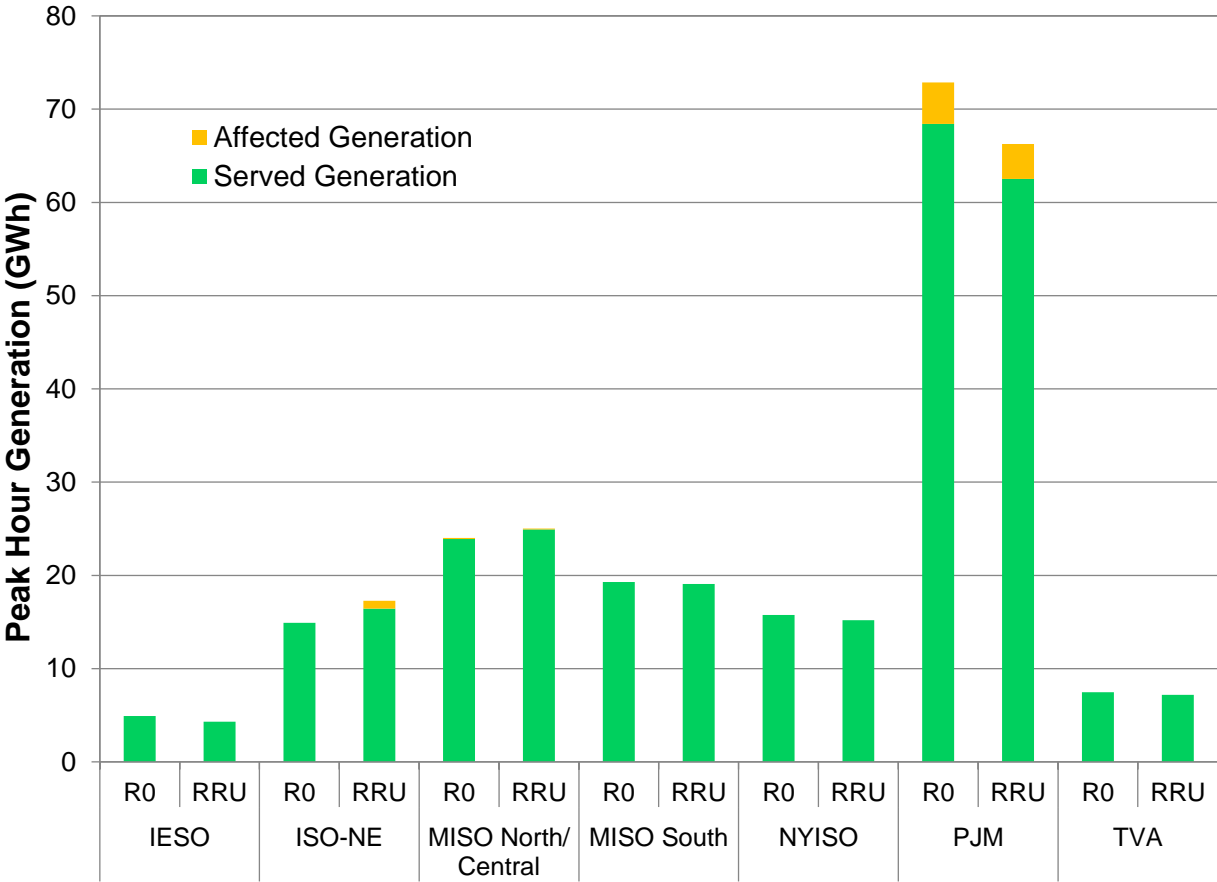


Figure A33-4. RGDS Roll-Up Summer 2018: Peak Hour Affected Generation

Figure A33-5 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A33-3.

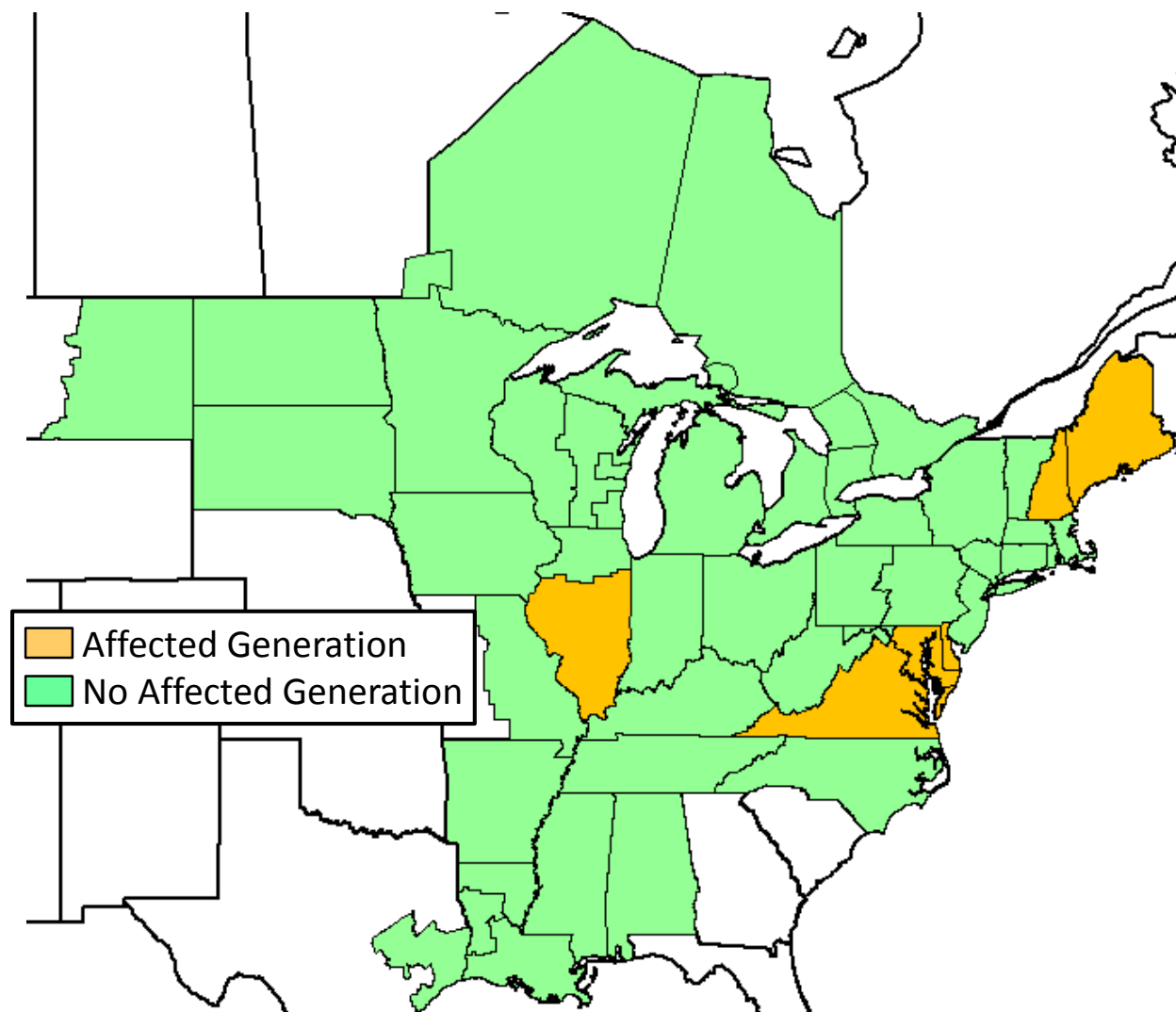


Figure A33-5. RGDS Roll-Up Summer 2018: Locations with Peak Hour Affected Generation

Table A33-3. RGDS Roll-Up Summer 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	4.4	532
Illinois Southern	1.0	110
Maine	3.2	457
Maryland Eastern	15.9	2,256
New Hampshire	2.9	383
Virginia	8.4	936

Figure A33-6 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A33-4 during the Summer 2018 peak hour.

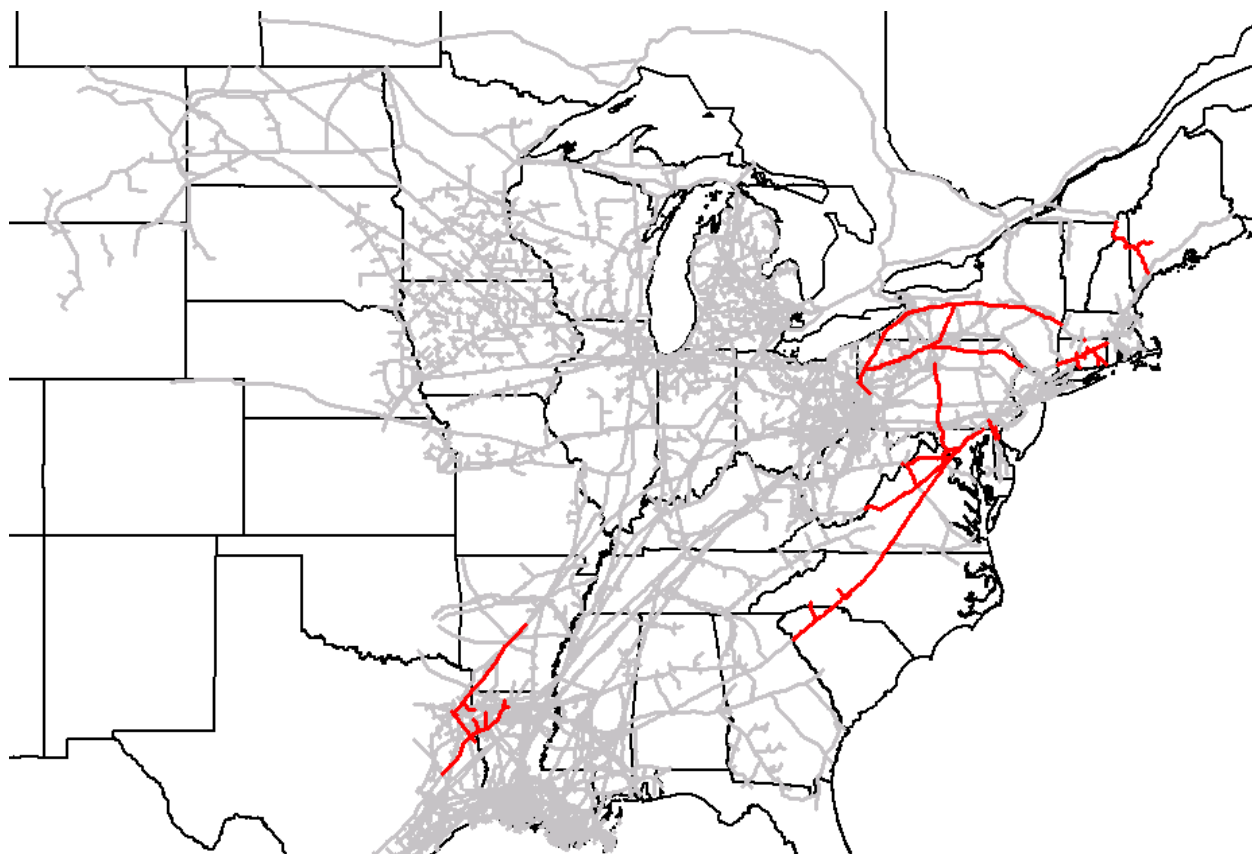


Figure A33-6. RGDS Roll-Up Summer 2018: Peak Hour Constraints

Table A33-4 summarizes the results of the frequency and duration analysis.

Table A33-4. RGDS Roll-Up Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	2	1	2	3
Columbia Gas VA/MD	2	1	1	2
Dominion Southeast	5	1	3	8
Eastern Shore	3	1	2	5
Iroquois Z1 → Z2	8	2	10	39
NB/NS Supply	5	1	3	7
PNGTS N of Westbrook	9	1	20	68
Tennessee Z4 PA	1	1	1	1
Tennessee Z5 NY	5	2	61	85
Texas Eastern ETX	6	1	6	14
Transco Z5	9	1	6	20

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-43 and Figure A34-44 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-45 and Figure A34-46 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-47 and Figure A34-48 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A34-49 and Figure A34-50 relative to the capacity of the segments.

Iroquois Zone 1 to Zone 2

The 100% peak hour utilization of the link between Iroquois Zone 1 and Iroquois Zone 1, which is modeled with a capacity of 855 MDth/d, potentially affects generators directly connected to Iroquois in New York and Connecticut, and generators behind LDCs served by Iroquois in New York and Connecticut. The locations of these generators are shown in Figure A17-16.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-51 and Figure A34-52 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 283 MDth/d in 2023. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A34-53 and Figure A34-54 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-55 and Figure A34-56 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC. The locations of these generators are shown in Figure 9-91 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-57 and Figure A34-58 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-59 and Figure A34-60 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-61 and Figure A34-62 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-63 and Figure A34-64 relative to the capacity of the segment.

RGDS Roll-Up Winter 2023

Figure A33-7 summarizes the affected generation during the Winter 2023 peak hour by PPA.

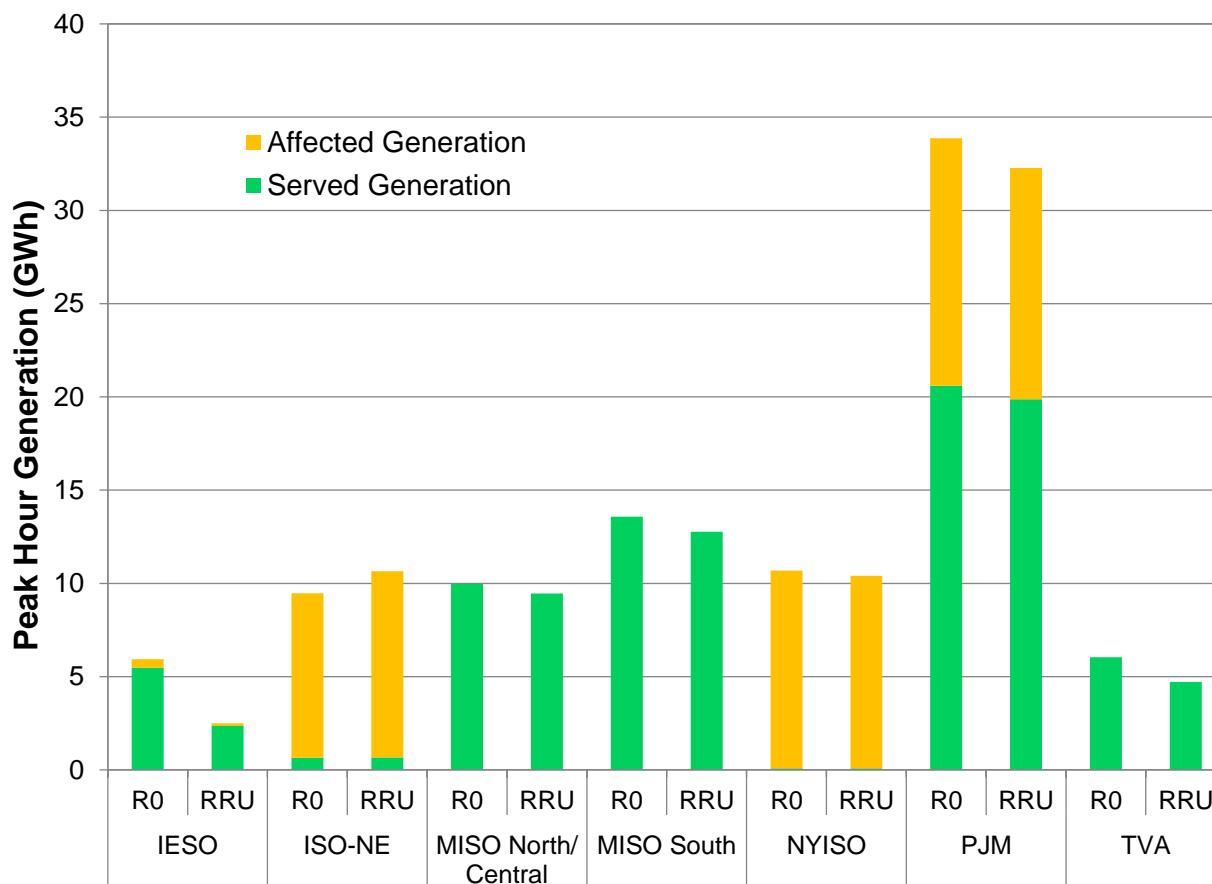


Figure A33-7. RGDS Roll-Up Winter 2023: Peak Hour Affected Generation

Figure A33-8 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A33-5.

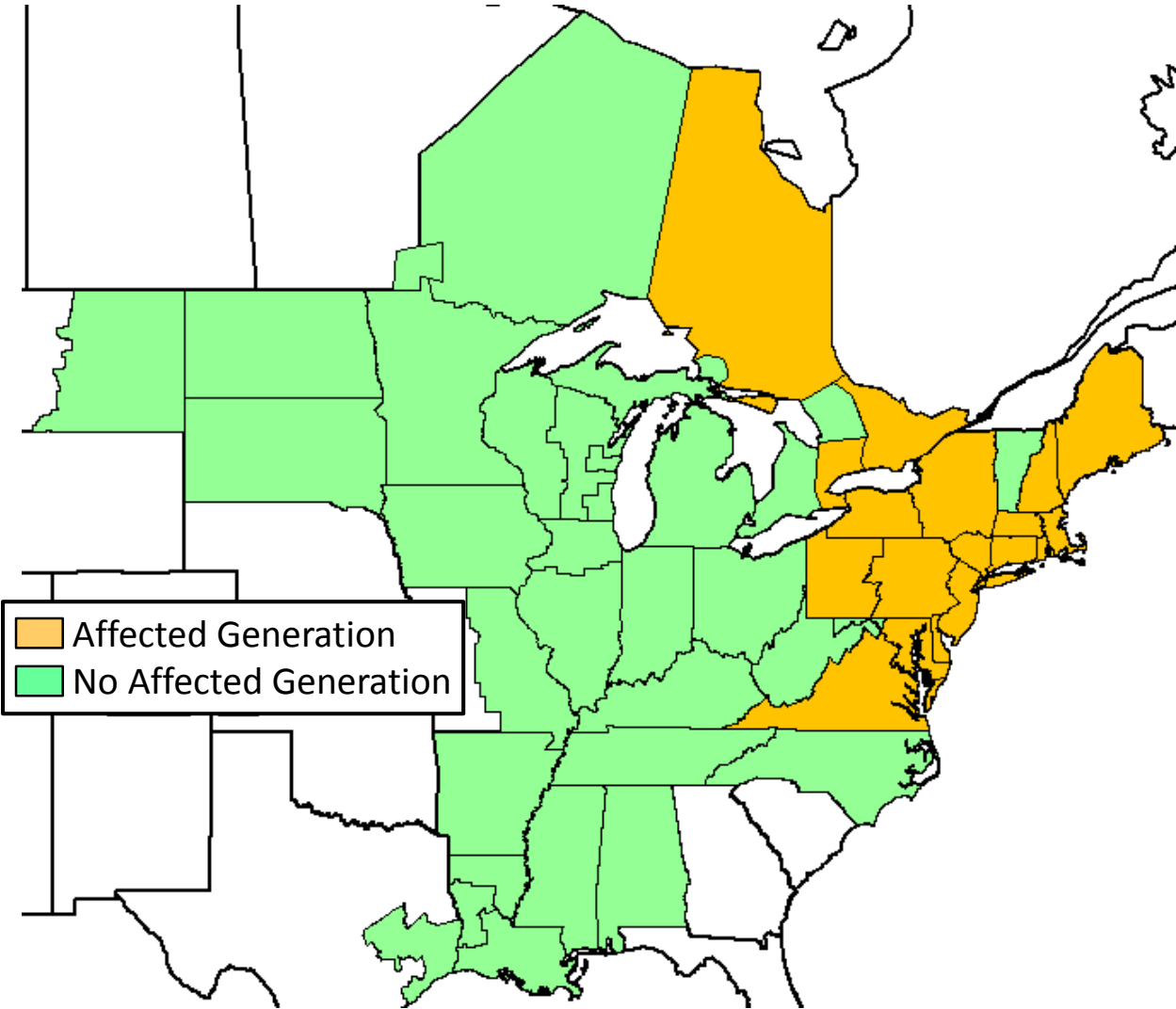


Figure A33-8. RGDS Roll-Up Winter 2023: Locations with Peak Hour Affected Generation

Table A33-5. RGDS Roll-Up Winter 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	18.2	2,496
Delaware	1.8	220
Maine	10.3	1,386
Maryland Eastern	5.0	539
Massachusetts Eastern	11.1	1,526
Massachusetts Western	14.0	1,931
New Hampshire	9.7	1,288
New Jersey	26.5	3,279
New York Central Northern	39.6	4,697
New York City	17.3	2,298
New York Long Island	10.9	1,139
New York Southern	13.8	1,503
New York Western	2.2	247
Ontario (CDA)	0.2	28
Ontario (EDA)	0.1	7
Ontario (NDA)	0.8	114
Pennsylvania Eastern	26.0	3,499
Pennsylvania Western	6.7	961
Rhode Island	10.3	1,358
Virginia	36.1	4,331

Figure A33-9 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A33-7 during the Winter 2023 peak hour.

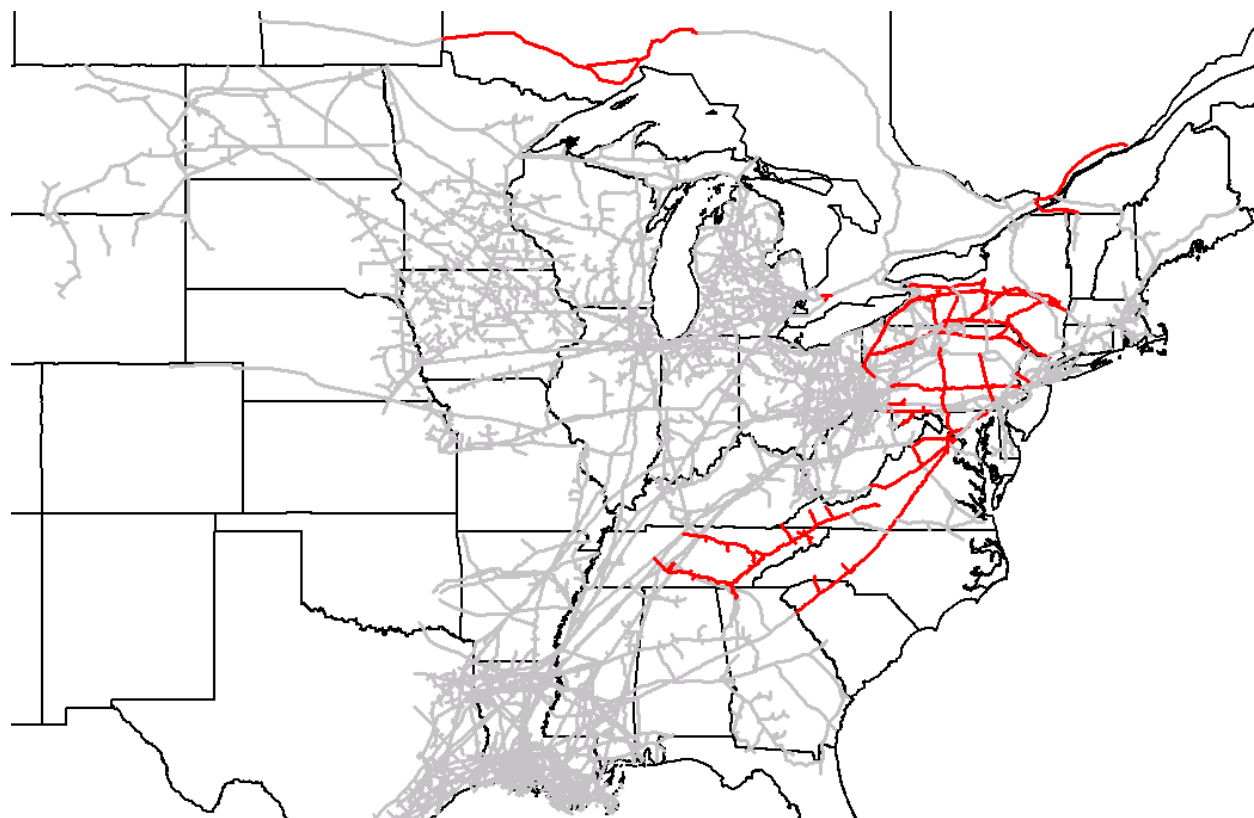


Figure A33-9. RGDS Roll-Up Winter 2023: Peak Hour Constraints

Table A33-6 summarizes the results of the frequency and duration analysis.

Table A33-6. RGDS Roll-Up Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	5	1	52	82
Columbia Gas W PA/NY	13	1	4	22
Constitution	2	31	59	90
Dominion Eastern NY	7	1	16	60
Dominion Western NY	1	5	5	5
Dominion Southeast	6	1	32	73
East Tennessee Mainline	3	1	3	6
Eastern Shore	11	1	16	63
Empire Mainline	6	1	44	56
Millennium	7	1	38	69
NB/NS Supply	2	31	59	90
Tennessee Z4 PA	10	1	15	42
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	7	1	17	59
Texas Eastern M3 North	12	1	10	46
TransCanada Ontario West	1	2	2	2
TransCanada Quebec	8	1	14	29
Transco Leidy Atlantic	7	1	27	58
Transco Z5	6	1	2	7
Transco Z6 Leidy to 210	5	1	48	87
Union Gas Dawn	1	2	2	2

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-65 and Figure A34-66 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-67 and Figure A34-68 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-69 and Figure A34-70 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-71 and Figure A34-72 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-73 and Figure A34-74 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-75 and Figure A34-76 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East

Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-77 and Figure A34-78 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A34-79 and Figure A34-80 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-81 and Figure A34-82 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-83 and Figure A34-84 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A34-85 and Figure A34-86 relative to the total production

capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-87 and Figure A34-88 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-89 and Figure A34-90 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-91 and Figure A34-92 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A34-93 and Figure A34-94 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-95 and Figure A34-96 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A34-97 and Figure A34-98 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-99 and Figure A34-100 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-101 and Figure A34-102 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-103 and Figure A34-104 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A34-105 and Figure A34-106 relative to the capacity of the segment.

RGDS Roll-Up Summer 2023

Figure A33-10 summarizes the affected generation during the Summer 2023 peak hour by PPA.

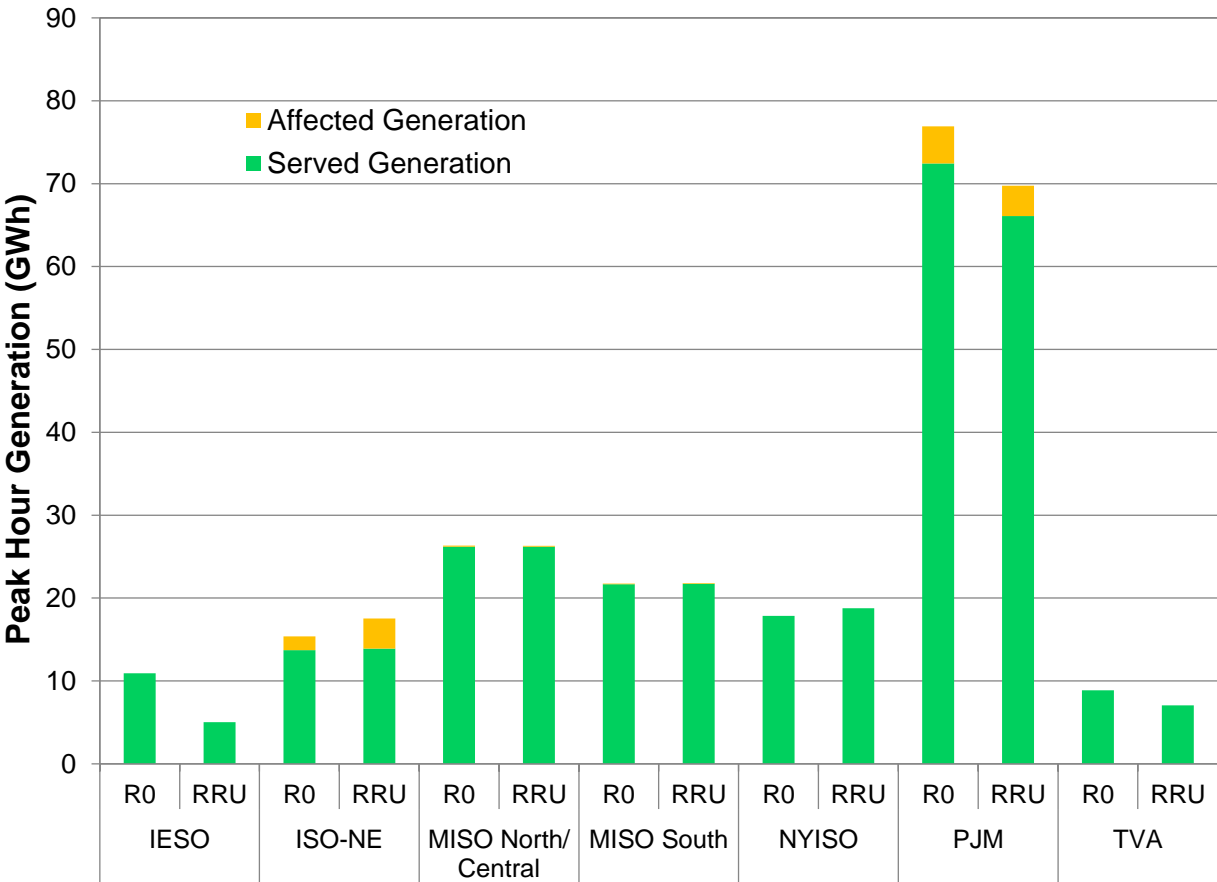


Figure A33-10. RGDS Roll-Up Summer 2023: Peak Hour Affected Generation

Figure A33-11 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A33-7.

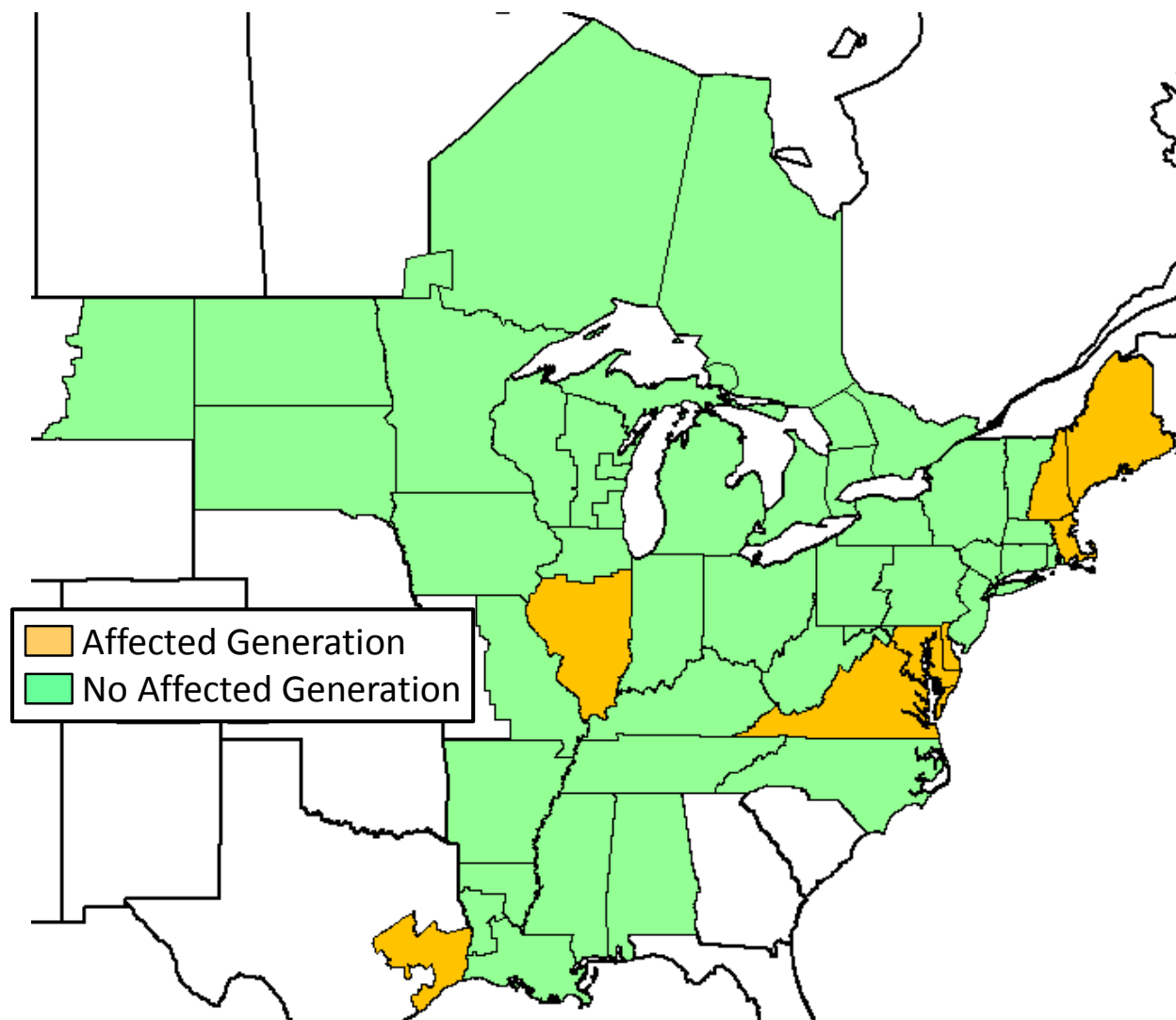


Figure A33-11. RGDS Roll-Up Summer 2023: Locations with Peak Hour Affected Generation

Table A33-7. RGDS Roll-Up Summer 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	3.7	467
Illinois Southern	1.0	112
Maine	11.9	1,523
Maryland Eastern	15.9	2,256
Massachusetts Eastern	5.0	549
New Hampshire	12.8	1,540
Texas East (SERC)	0.6	81
Virginia	8.4	936

Figure A33-12 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A33-10 during the Summer 2018 peak hour.

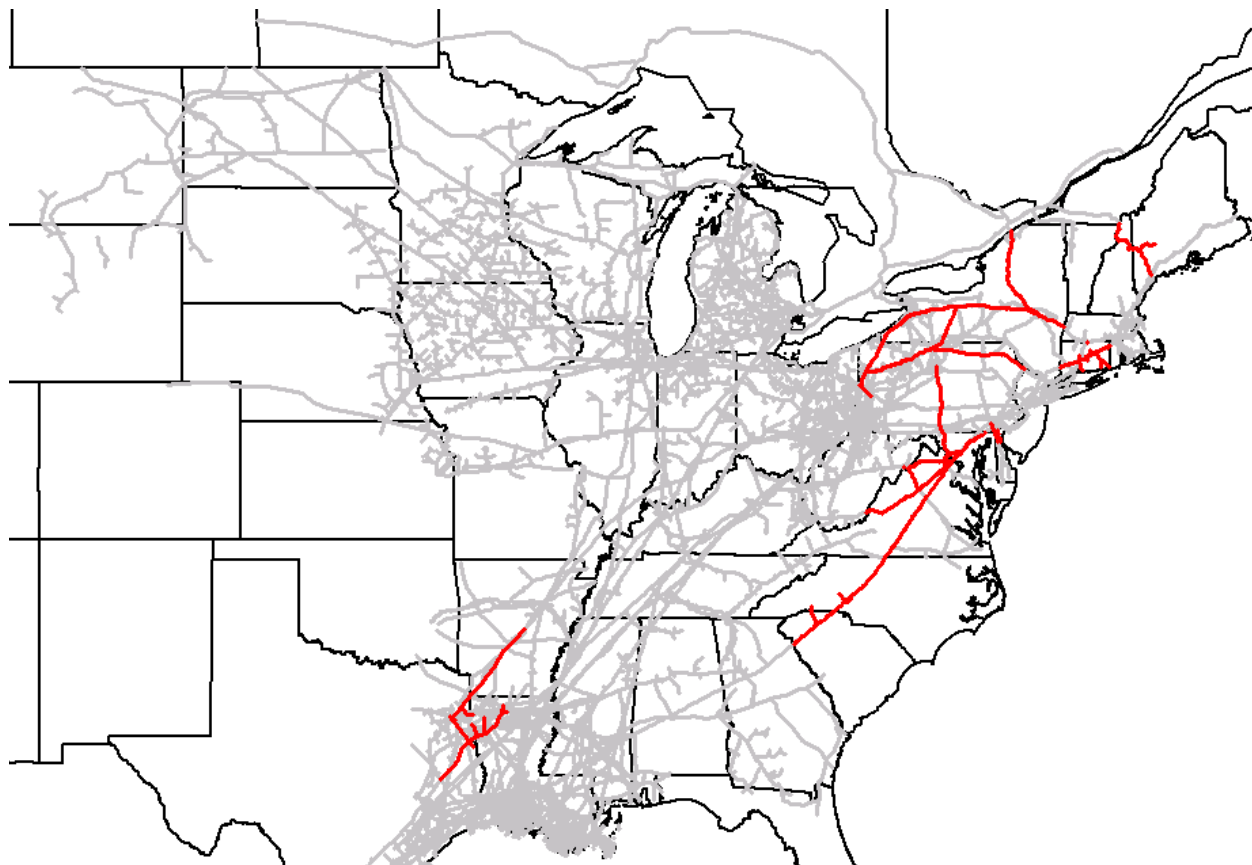


Figure A33-12. RGDS Roll-Up Summer 2023: Peak Hour Constraints

Table A33-8 summarizes the results of the frequency and duration analysis.

Table A33-8. RGDS Roll-Up Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	11	1	5	27
Columbia Gas VA/MD	2	1	1	2
Dominion Southeast	12	1	8	24
Eastern Shore	8	1	3	14
Iroquois Z1	11	1	10	43
NB/NS Supply	3	1	81	84
PNGTS N of Westbrook	9	1	19	73
Tennessee Z4 PA	2	1	2	3
Tennessee Z5 NY	13	1	2	34
Texas Eastern ETX	7	1	10	20
Transco Z5	7	1	7	19

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-107 and Figure A34-108 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,867 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-109 and Figure A34-110 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-111 and Figure A34-112 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A34-113 and Figure A34-114 relative to the capacity of the segments.

Iroquois Zone 1

The 100% peak hour utilization on Iroquois's Zone 1, which is modeled with a capacity of 1,195 MDth/d, potentially affects generators directly connected to Iroquois and generators behind LDCs served by Iroquois. The locations of these generators are shown in Figure A17-10.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-115 and Figure A34-116 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 283 MDth/d in 2023. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A34-117 and Figure A34-118 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-119 and Figure A34-120 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC. The locations of these generators are shown in Figure 9-91 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-121 and Figure A34-122 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-123 and Figure A34-124 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-125 and Figure A34-126 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-127 and Figure A34-128 relative to the capacity of the segment.

HGDS Roll-Up

HGDS Roll-Up Winter 2018

Figure A33-13 summarizes the affected generation during the Winter 2018 peak hour by PPA.

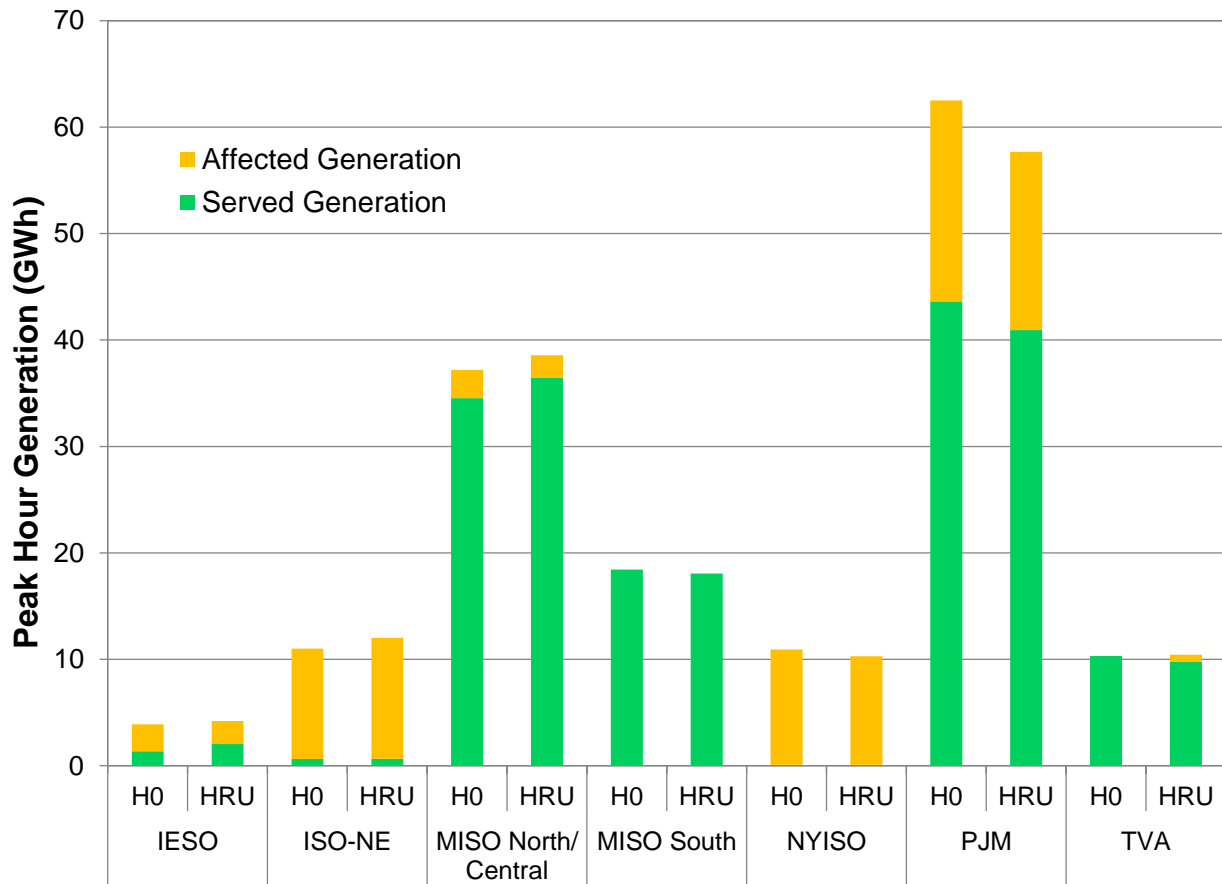


Figure A33-13. HGDS Roll-Up Winter 2018: Peak Hour Affected Generation

Figure A33-14 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A33-9.

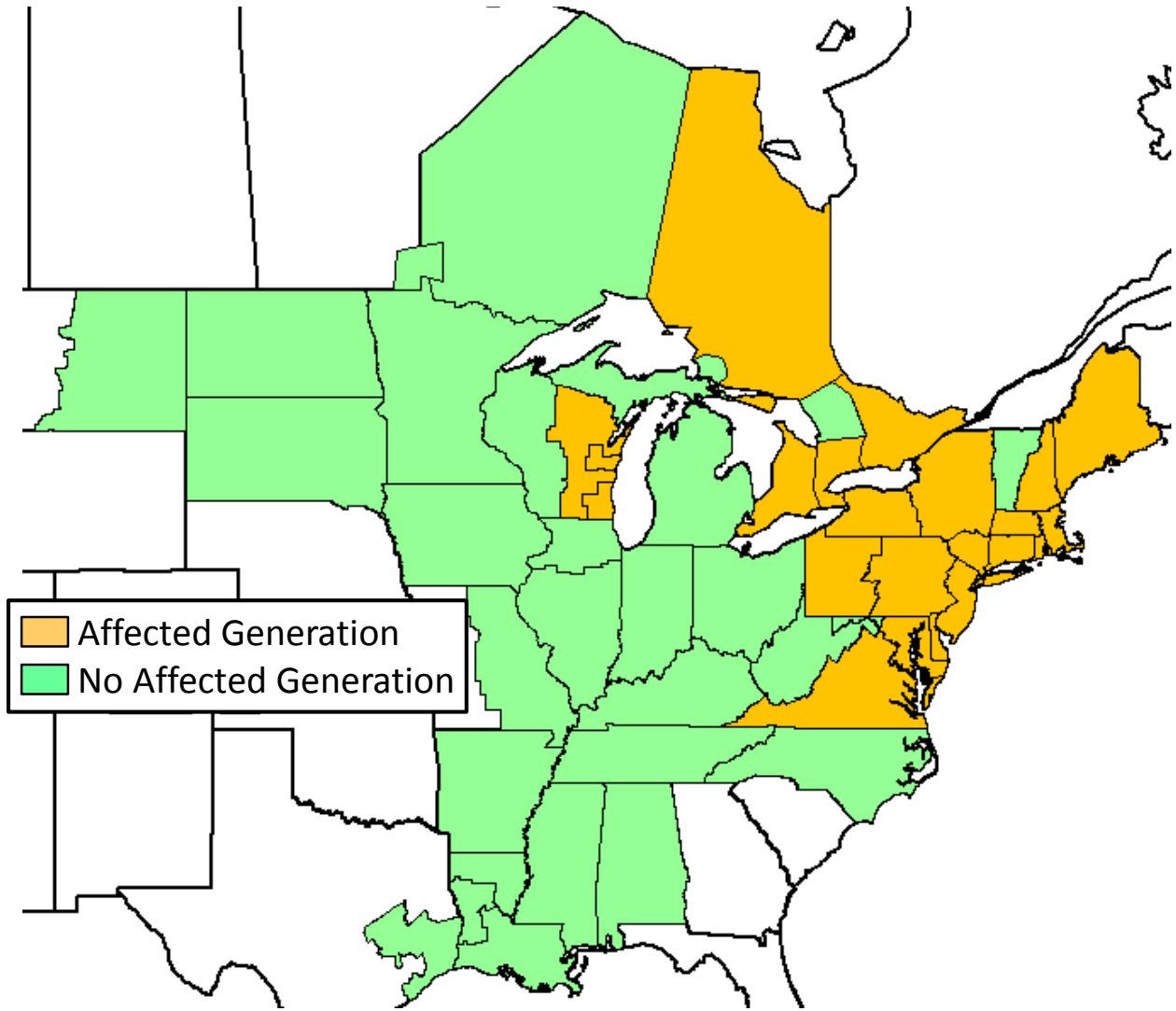


Figure A33-14. HGDS Roll-Up Winter 2018: Locations with Peak Hour Affected Generation

Table A33-9. HGDS Roll-Up Winter 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	23.5	3,157
Delaware	1.6	205
Maine	9.5	1,292
Maryland Eastern	5.0	539
Massachusetts Eastern	14.6	2,036
Massachusetts Western	7.8	1,059
New Hampshire	13.0	1,764
New Jersey	23.7	3,101
New York Central Northern	38.4	4,939
New York City	20.8	2,601
New York Long Island	6.8	729
New York Southern	10.9	1,312
New York Western	5.3	716
Ontario (CDA)	1.6	181
Ontario (EDA)	12.2	1,247
Ontario (NDA)	1.5	186
Ontario (StClair)	7.0	950
Pennsylvania Eastern	66.5	9,027
Pennsylvania Western	11.0	1,574
Rhode Island	9.2	1,194
Virginia	33.5	4,456
Wisconsin Eastern (RFC)	14.8	1,814
Wisconsin Western (MROE)	6.8	838

Figure A33-15 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A33-13 during the Winter 2018 peak hour.

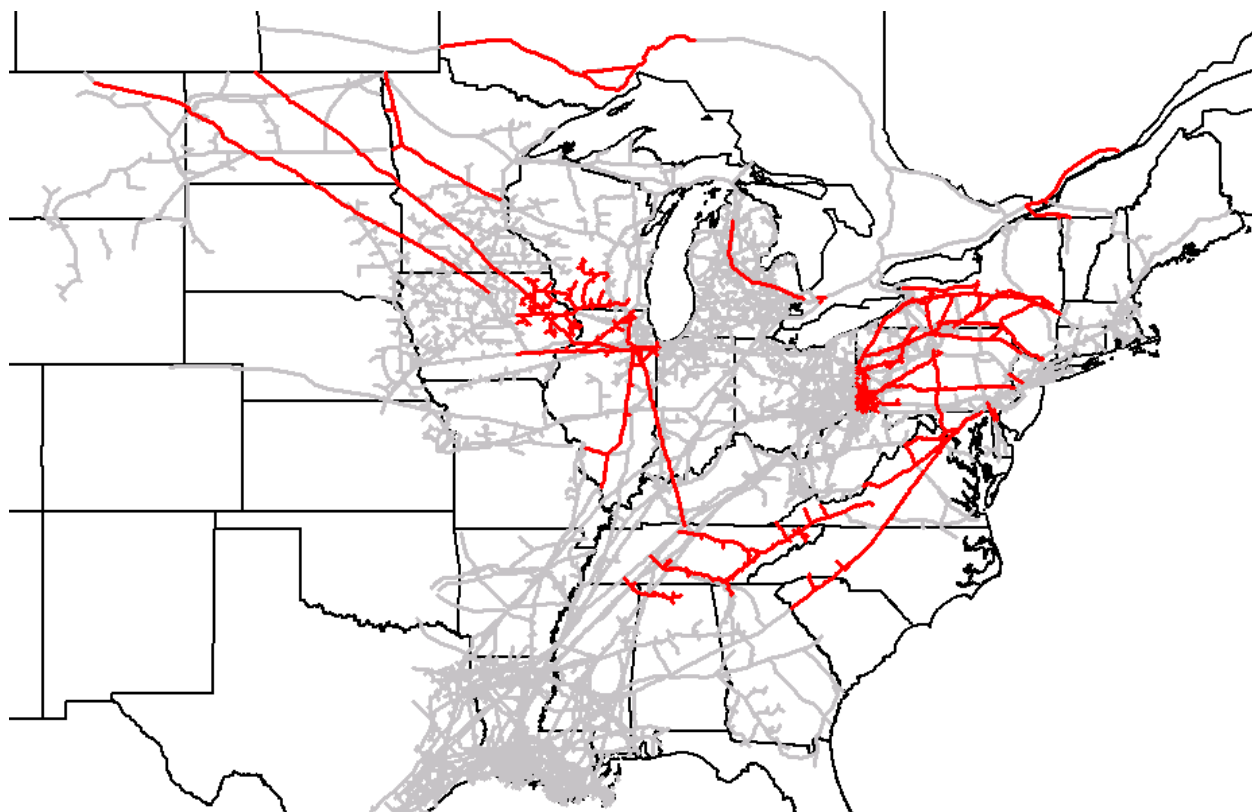


Figure A33-15. HGDS Roll-Up Winter 2018: Peak Hour Constraints

Table A33-10 summarizes the results of the frequency and duration analysis.

Table A33-10. HGDS Roll-Up Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
AlaTenn	2	31	59	90
Alliance	4	1	6	10
ANR Northern Illinois	9	1	35	59
Columbia Gas VA/MD	11	2	14	59
Columbia Gas W PA/NY	7	1	3	12
Constitution	2	31	59	90
Dominion Eastern NY	10	1	5	19
Dominion Western NY	6	1	15	34
Dominion Southeast	12	1	14	36
East Tennessee Mainline	6	2	8	26
Eastern Shore	11	1	31	63
Empire Mainline	8	1	7	30
Great Lakes East	11	1	30	66
Midwestern	17	1	12	60
Millennium	7	1	32	63
NB/NS Supply	14	1	20	68
NGPL IA/IL North	9	1	28	58
NGPL IA/IL South	11	1	11	50
Northern Border Chicago	12	1	10	46
Northern Natural D	4	1	4	7
Tennessee Z4 PA	10	1	14	37
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	2	31	59	90
Texas Eastern M3 North	3	1	59	86
TransCanada Ontario West	6	1	8	14
TransCanada Quebec	8	1	13	26
Transco Leidy Atlantic	2	31	59	90
Transco Z5	8	1	12	24
Transco Z6 Leidy to 210	2	31	59	90
Union Gas Dawn	3	1	3	7
Viking Z1	10	1	9	21

AlaTenn

The 100% peak hour utilization on AlaTenn's mainline, which is modeled with a capacity of 197 MDth/d, potentially affects generators served by AlaTenn in Alabama. The locations of these generators are shown in Figure A30-16.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-129 and Figure A34-130 relative to the capacity of the segment.

Alliance

The 100% peak hour utilization on Alliance's mainline, which is modeled with a capacity of 1,800 MDth/d, potentially affects generators behind LDCs served by Alliance and generators behind LDCs served by Guardian. The locations of these generators are shown in Figure A17-1.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-131 and Figure A34-132 relative to the capacity of the segment.

ANR Northern Illinois

The 100% peak hour utilization on ANR's Northern Illinois segment, which is modeled with a capacity of 1,337 MDth/d, potentially affects generators directly connected to ANR in Illinois and Wisconsin and generators behind LDCs served by ANR in Illinois and Wisconsin. The locations of these generators are shown in Figure A17-2.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-133 and Figure A34-134 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-135 and Figure A34-136 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland, and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-137 and Figure A34-138 relative to the capacity of the segment

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-139 and Figure A34-140 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-141 and Figure A34-142 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-143 and Figure A34-144 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-145 and Figure A34-146 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-147 and Figure A34-148 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A34-149 and Figure A34-150 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-151 and Figure A34-152 relative to the capacity of the segment.

Great Lakes East

The 100% peak hour utilization on Great Lakes Gas's East segment, which is modeled with a capacity of 1,164 MDth/d, potentially affects generators directly connected to Great Lakes in Michigan, generators behind LDCs served by Great Lakes in Michigan, generators directly connected to Vector, and generators behind Union Gas. The locations of these generators are shown in Figure A17-3.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-153 and Figure A34-154 relative to the capacity of the segment.

Midwestern

The 100% peak hour utilization on Midwestern's mainline segment, which is modeled with a capacity of 635 MDth/d, potentially affects generators that are directly connected to Midwestern

in Indiana and Indiana, generators behind LDCs served by Midwestern in Indiana and Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-4.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-155 and Figure A34-156 relative to the capacity of the segment.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-157 and Figure A34-158 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A34-159 and Figure A34-160 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

NGPL Iowa/Illinois North

The 100% peak hour utilization on NGPL's Iowa/Illinois North segment, which is modeled with a capacity of 1,677 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Iowa, Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-5.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-161 and Figure A34-162 relative to the capacity of the segment.

NGPL Iowa/Illinois South

The 100% peak hour utilization on NGPL's Iowa/Illinois South segment, which is modeled with a capacity of 1,624 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-6.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-163 and Figure A34-164 relative to the capacity of the segment.

Northern Border Chicago

The 100% peak hour utilization on Northern Border's mainline, which is modeled with a capacity of 987 MDth/d, potentially affects generators directly connected to Northern Border in Illinois, generators behind LDCs served by Northern Border in Illinois and Indiana, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-7.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-165 and Figure A34-166 relative to the capacity of the segment.

Northern Natural Zone D

The 100% peak hour utilization on Northern Natural's Zone D segment, which is modeled with a capacity of 800 MDth/d, potentially affects generators directly connected to Northern Natural in Wisconsin, generators behind LDCs served by Northern Natural in Illinois and Wisconsin, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-8.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-167 and Figure A34-168 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-169 and Figure A34-170 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-171 and Figure A34-172 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-173 and Figure A34-174 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A34-175 and Figure A34-176 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-177 and Figure A34-178 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A34-179 and Figure A34-180 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-181 and Figure A34-182 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-183 and Figure A34-184 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in

New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-185 and Figure A34-186 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A34-187 and Figure A34-188 relative to the capacity of the segment.

Viking Zone 1

The 100% peak hour utilization on Viking's Zone 1 segment, which is modeled with a capacity of 543 MDth/d, potentially affects generators directly connected to Viking, generators behind LDCs served by Viking, generators directly connected to ANR, and generators behind LDCs served by ANR. The locations of these generators are shown in Figure A17-9.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-189 and Figure A34-190 relative to the capacity of the segment.

HGDS Roll-Up Summer 2018

Figure A33-16 summarizes the affected generation during the Summer 2018 peak hour by PPA.

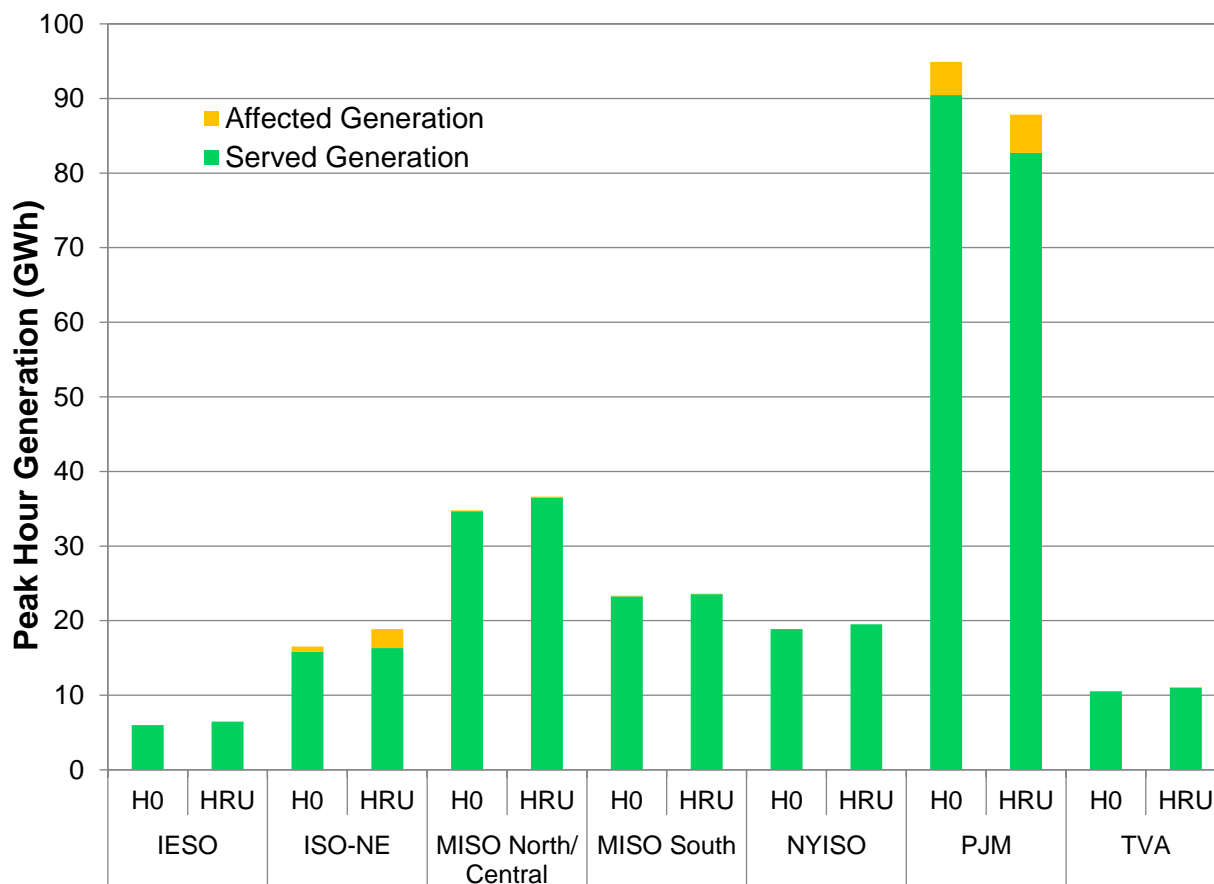


Figure A33-16. HGDS Roll-Up Summer 2018: Peak Hour Affected Generation

Figure A33-17 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A33-11.

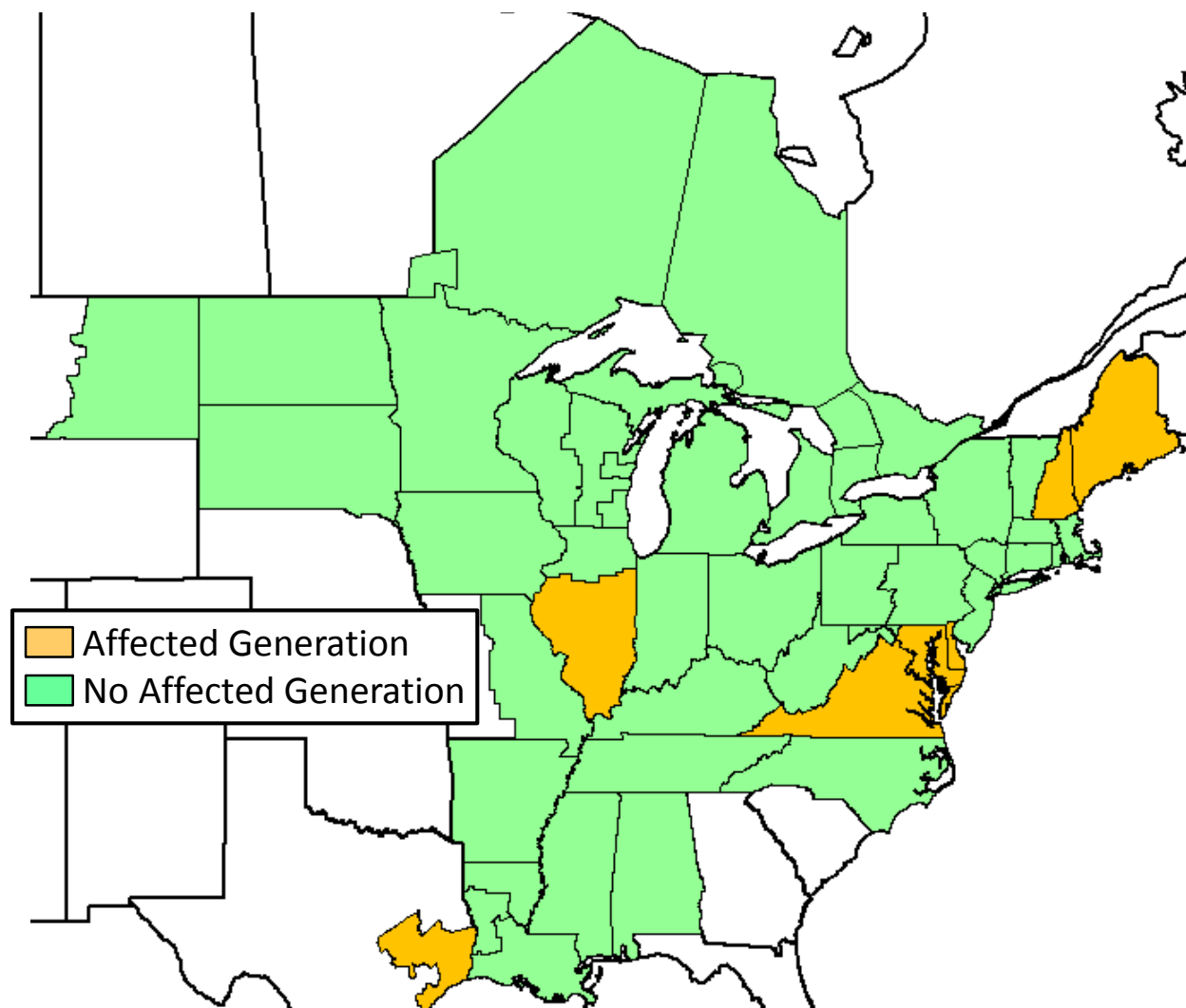


Figure A33-17. HGDS Roll-Up Summer 2018: Locations with Peak Hour Affected Generation

Table A33-11. HGDS Roll-Up Summer 2018: Peak Hour Unserved Generation Demand and Affected Generation

Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.4	1,162
Illinois Southern	1.0	112
Maine	4.0	540
Maryland Eastern	16.7	2,361
New Hampshire	1.4	163
Texas East (SERC)	0.5	70
Virginia	8.4	936

Figure A33-18 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A33-16 during the Summer 2018 peak hour.

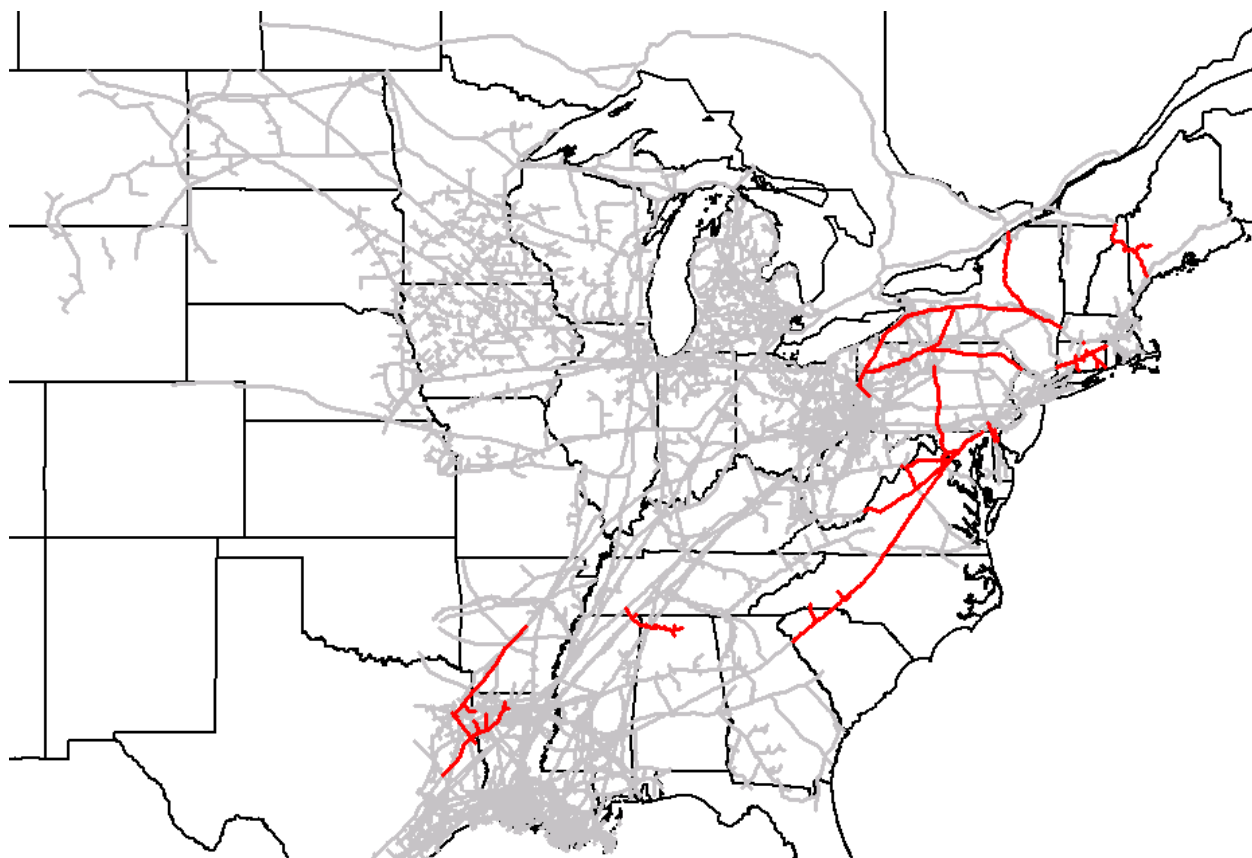


Figure A33-18. HGDS Roll-Up Summer 2018: Peak Hour Constraints

Table A33-12 summarizes the results of the frequency and duration analysis.

Table A33-12. HGDS Roll-Up Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
AlaTenn	4	5	37	89
Algonquin Connecticut	4	1	3	9
Columbia Gas VA/MD	9	1	13	40
Dominion Southeast	5	1	33	83
Eastern Shore	7	1	6	24
Iroquois Z1	8	1	26	54
NB/NS Supply	3	1	75	81
PNGTS N of Westbrook	4	1	75	87
Tennessee Z4 PA	3	1	3	6
Tennessee Z5 NY	9	1	10	37
Texas Eastern Zone ETX	9	1	9	24
Transco Z5	6	2	43	76

AlaTenn

The 100% peak hour utilization on AlaTenn's mainline, which is modeled with a capacity of 197 MDth/d, potentially affects generators served by AlaTenn in Alabama. The locations of these generators are shown in Figure A30-16.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-191 and Figure A34-192 relative to the capacity of the segment.

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report..

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-193 and Figure A34-194 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-195 and Figure A34-196 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-197 and Figure A34-198 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A34-199 and Figure A34-200 relative to the capacity of the segments.

Iroquois Zone 1

The 100% peak hour utilization on Iroquois's Zone 1, which is modeled with a capacity of 1,195 MDth/d, potentially affects generators directly connected to Iroquois and generators behind LDCs served by Iroquois. The locations of these generators are shown in Figure A17-10.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-201 and Figure A34-202 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 623 MDth/d in 2018. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A34-203 and Figure A34-204 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-205 and Figure A34-206 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-207 and Figure A34-208 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-209 and Figure A34-210 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-211 and Figure A34-212 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-213 and Figure A34-214 relative to the capacity of the segment.

HGDS Roll-Up Winter 2023

Figure A33-19 summarizes the affected generation during the Winter 2023 peak hour by PPA.

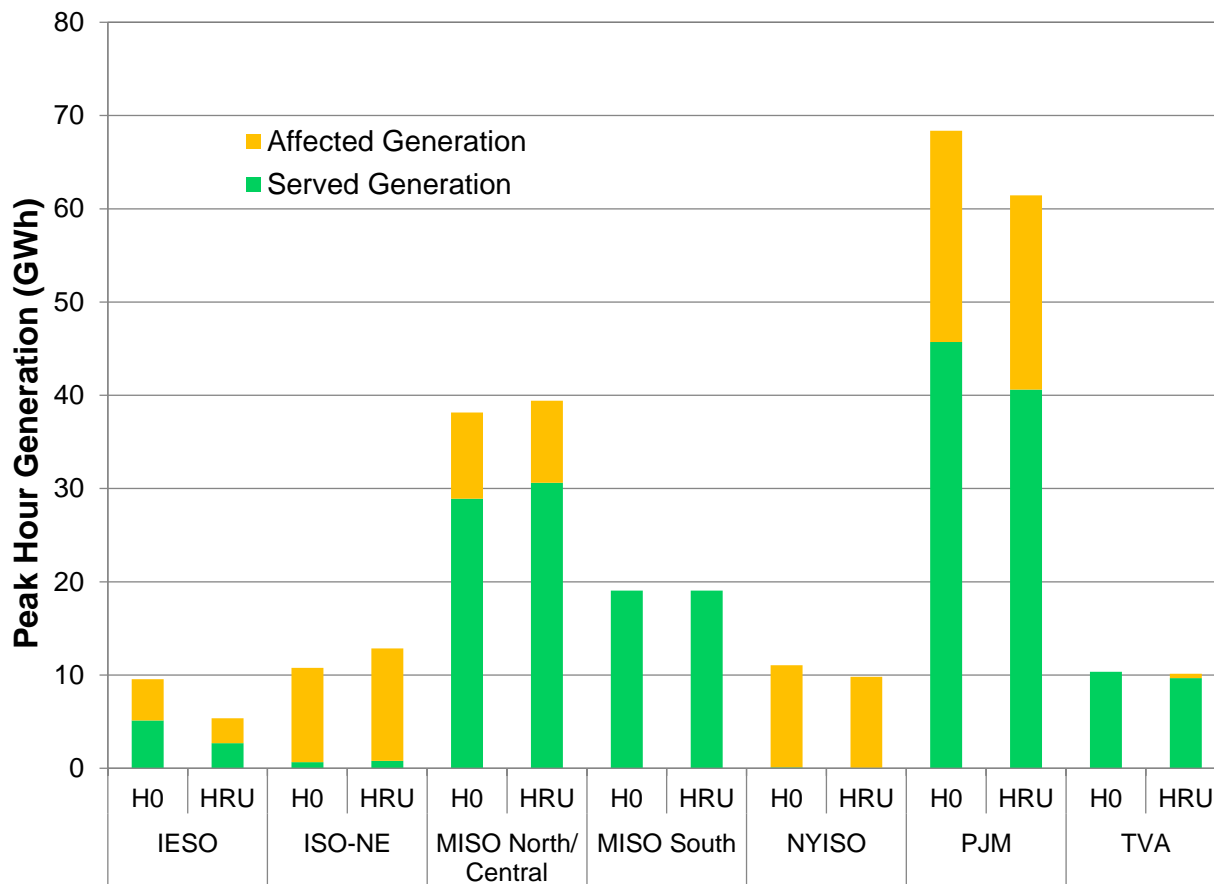


Figure A33-19. HGDS Roll-Up Winter 2023: Peak Hour Affected Generation

Figure A33-20 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A33-13.

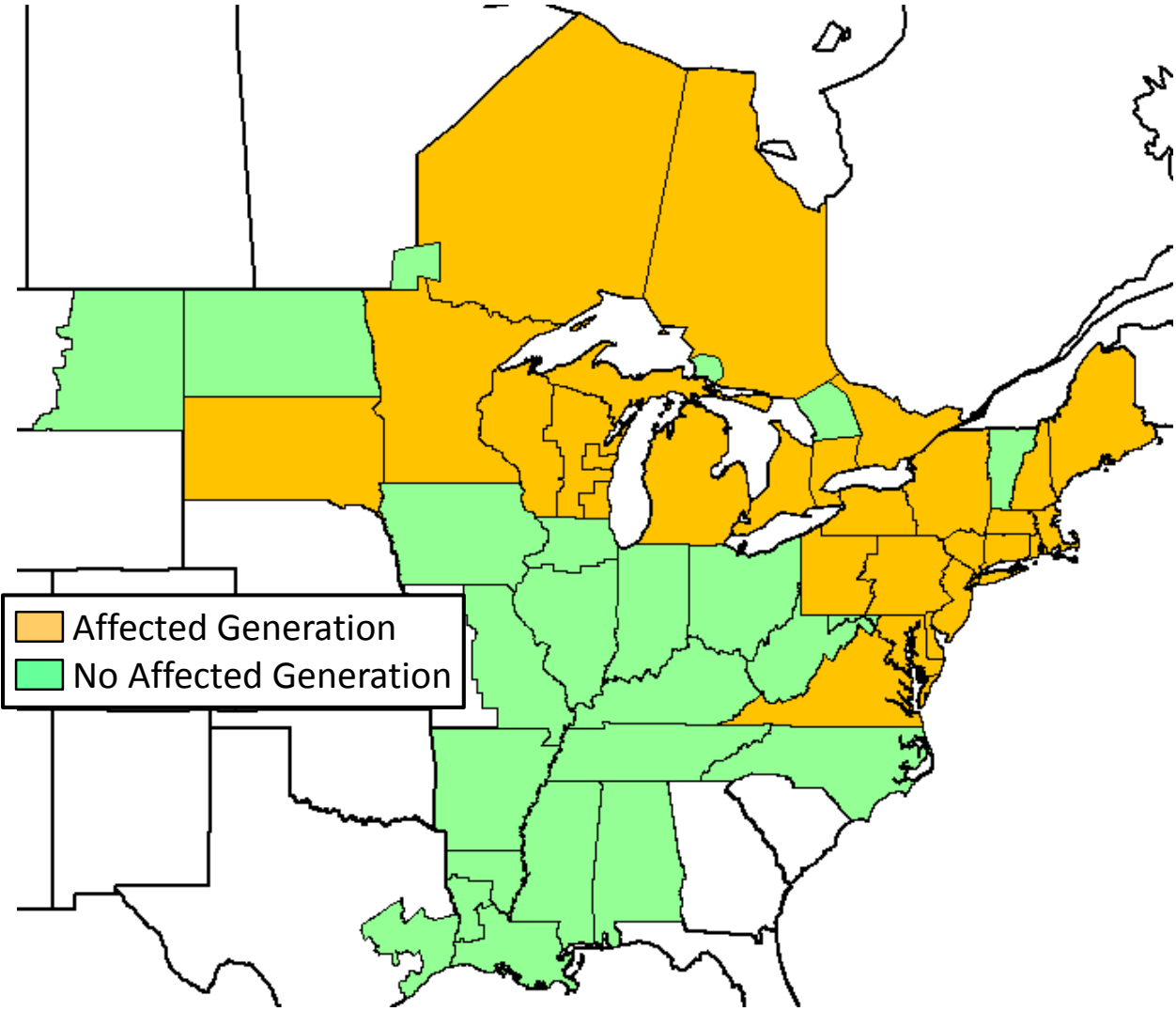


Figure A33-20. HGDS Roll-Up Winter 2023: Locations with Peak Hour Affected Generation

Table A33-13. HGDS Roll-Up Winter 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	19.0	2,652
Delaware	1.3	173
Maine	12.7	1,799
Maryland Eastern	6.3	662
Massachusetts Eastern	14.8	2,068
Massachusetts Western	7.8	1,059
Michigan Lower Peninsula	0.1	11
Michigan Upper Peninsula	3.6	520
Minnesota	15.7	1,977
New Hampshire	16.7	2,284
New Jersey	22.7	3,133
New York Central Northern	30.1	4,146
New York City	22.3	2,893
New York Long Island	13.7	1,248
New York Southern	10.9	1,312
New York Western	5.2	699
Ontario (CDA)	1.6	181
Ontario (EDA)	12.2	1,653
Ontario (NDA)	1.2	155
Ontario (StClair)	17.2	2,410
Ontario (WDA)	0.4	38
Pennsylvania Eastern	85.4	11,894
Pennsylvania Western	11.0	1,574
Rhode Island	6.3	838
South Dakota	1.0	136
Virginia	35.9	4,742
Wisconsin Eastern (RFC)	30.3	3,921
Wisconsin Western (MROE)	20.2	2,467
Wisconsin Western (MROW)	2.2	223

Figure A33-21 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A33-19 during the Winter 2023 peak hour.

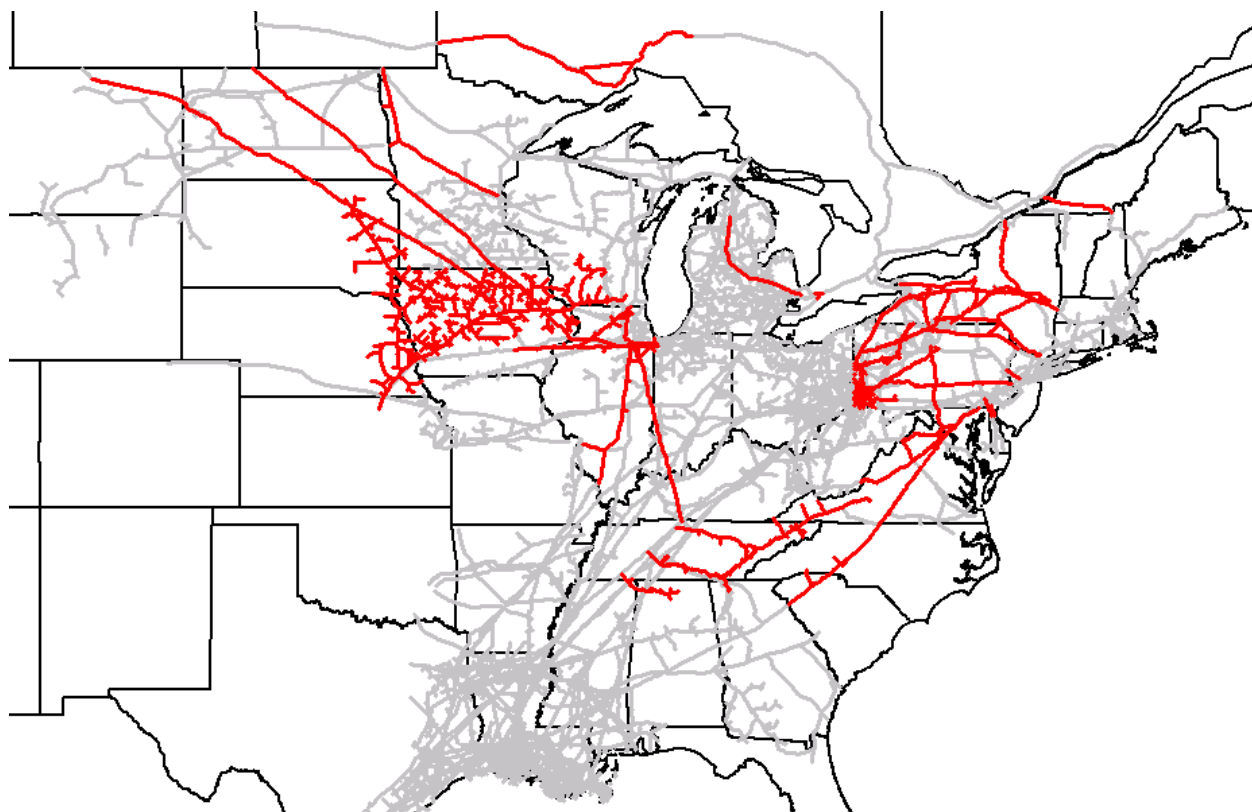


Figure A33-21. HGDS Roll-Up Winter 2023: Peak Hour Constraints

Table A33-14 summarizes the results of the frequency and duration analysis.

Table A33-14. HGDS Roll-Up Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
AlaTenn	2	31	58	89
Alliance	4	1	7	10
ANR Northern Illinois	12	1	16	54
Columbia Gas VA/MD	5	2	52	82
Columbia Gas W PA/NY	10	2	11	66
Constitution	2	31	59	90
Dominion Eastern NY	7	1	14	41
Dominion Western NY	7	1	15	37
Dominion Southeast	4	1	54	87
East Tennessee Mainline	6	2	8	26
Eastern Shore	5	1	3	7
Empire Mainline	7	1	16	42
Great Lakes East	7	1	31	81
Iroquois Z1	2	31	59	90
Midwestern	21	1	9	56
Millennium	2	31	59	90
NB/NS Supply	2	31	59	90
NGPL IA/IL North	11	1	19	58
NGPL IA/IL South	11	1	11	42
Northern Border Mainline	2	1	2	3
Northern Natural ABC	11	1	33	52
Northern Natural D	9	1	15	32
Tennessee Z4 PA	8	1	32	60
Tennessee Z5 NY	2	31	59	90
Texas Eastern M2 PA South	2	31	59	90
Texas Eastern M3 North	3	1	58	86
TransCanada Ontario West	2	2	2	4
TransCanada Quebec to PNGTS	2	31	59	90
Transco Leidy Atlantic	6	1	27	85
Transco Z5	7	1	14	32
Transco Z6 Leidy to 210	2	31	59	90
Union Gas Dawn	2	1	2	3
Vector Z1	2	1	2	3
Viking Z1	12	1	17	59

AlaTenn

The 100% peak hour utilization on AlaTenn's mainline, which is modeled with a capacity of 197 MDth/d, potentially affects generators served by AlaTenn in Alabama. The locations of these generators are shown in Figure A30-16.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-215 and Figure A34-216 relative to the capacity of the segment.

Alliance

The 100% peak hour utilization on Alliance's mainline, which is modeled with a capacity of 1,800 MDth/d, potentially affects generators behind LDCs served by Alliance and generators behind LDCs served by Guardian. The locations of these generators are shown in Figure A17-1.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-217 and Figure A34-218 relative to the capacity of the segment.

ANR Northern Illinois

The 100% peak hour utilization on ANR's Northern Illinois segment, which is modeled with a capacity of 1,337 MDth/d, potentially affects generators directly connected to ANR, generators behind LDCs served by ANR. The locations of these generators are shown in Figure A17-2.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-219 and Figure A34-220 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,867 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-221 and Figure A34-222 relative to the capacity of the segment.

Columbia Gas Western Pennsylvania / New York

The 100% peak hour utilization on Columbia Gas's Western Pennsylvania / New York segment, which is modeled with a capacity of 1,131 MDth/d, potentially affects generators directly connected to Columbia in Pennsylvania, New Jersey, Virginia and Maryland and generators behind LDCs served by Columbia Gas in Pennsylvania, New Jersey, Delaware, Maryland and Virginia. The locations of these generators are shown in Figure 9-81 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-223 and Figure A34-224 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-225 and Figure A34-226 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-227 and Figure A34-228 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-229 and Figure A34-230 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-231 and Figure A34-232 relative to the capacity of the segment.

East Tennessee Mainline

The East Tennessee mainline is modeled with a capacity of 800 MDth/d. The 100% peak hour utilization on East Tennessee's mainline potentially affects generators directly connected to East

Tennessee and generators behind LDCs served by East Tennessee. The locations of these generators are shown in Figure 9-86 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-233 and Figure A34-234 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A34-235 and Figure A34-236 relative to the capacity of the segments.

Empire Mainline

The Empire mainline is modeled with a capacity of 525 MDth/d. The 100% peak hour utilization on the Empire mainline across upstate New York potentially affects generators on the Niagara Mohawk LDC system. The locations of these generators are shown in Figure 9-88 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-237 and Figure A34-238 relative to the capacity of the segment.

Great Lakes East

The 100% peak hour utilization on Great Lakes Gas's East segment, which is modeled with a capacity of 1,164 MDth/d, potentially affects generators directly connected to Great Lakes in Michigan, generators behind LDCs served by Great Lakes in Michigan, generators directly connected to Vector, and generators behind Union Gas. The locations of these generators are shown in Figure A17-3.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-239 and Figure A34-240 relative to the capacity of the segment.

Iroquois Zone 1

The 100% peak hour utilization on Iroquois's Zone 1, which is modeled with a capacity of 1,195 MDth/d, potentially affects generators directly connected to Iroquois and generators behind LDCs served by Iroquois. The locations of these generators are shown in Figure A17-10.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-241 and Figure A34-242 relative to the capacity of the segment.

Midwestern

The 100% peak hour utilization on Midwestern's mainline segment, which is modeled with a capacity of 635 MDth/d, potentially affects generators behind LDCs served by Midwestern and behind LDCs served by Guardian downstream of the Joliet Hub. The locations of these generators are shown in Figure A17-4.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-243 and Figure A34-244 relative to the capacity of the segment

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, in particular, in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-245 and Figure A34-246 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 283 MDth/d in 2023. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A34-247 and Figure A34-248 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

NGPL Iowa/Illinois North

The 100% peak hour utilization on NGPL's Iowa/Illinois North segment, which is modeled with a capacity of 1,677 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Iowa, Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-5.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-249 and Figure A34-250 relative to the capacity of the segment.

NGPL Iowa/Illinois South

The 100% peak hour utilization on NGPL's Iowa/Illinois South segment, which is modeled with a capacity of 1,624 MDth/d, potentially affects generators directly connected to NGPL in Illinois, generators behind LDCs served by NGPL in Illinois and Indiana, generators directly connected to Horizon in Illinois, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-6.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-251 and Figure A34-252 relative to the capacity of the segment.

Northern Border Mainline

The 100% peak hour utilization on Northern Border's mainline, which is modeled with a capacity of 2,311 MDth/d, potentially affects generators directly connected to Northern Border in Minnesota and Illinois, generators behind LDCs served by Northern Border in Minnesota, Iowa, Illinois and Indiana, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-11.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-253 and Figure A34-254 relative to the capacity of the segment.

Northern Natural Zone ABC

The 100% peak hour utilization on Northern Natural's Zone ABC segment, which is modeled with a capacity of 2,138 MDth/d, potentially affects generators directly connected to Northern Natural in Iowa, South Dakota, Wisconsin and Minnesota, generators behind LDCs served by Northern Natural in Iowa, Wisconsin and Minnesota, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-12.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-255 and Figure A34-256 relative to the capacity of the segment.

Northern Natural Zone D

The 100% peak hour utilization on Northern Natural's Zone D segment, which is modeled with a capacity of 800 MDth/d, potentially affects generators directly connected to Northern Natural in Wisconsin, generators behind LDCs served by Northern Natural in Illinois and Wisconsin, and generators behind LDCs served by Guardian in Wisconsin. The locations of these generators are shown in Figure A17-8.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-257 and Figure A34-258 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC. The locations of these generators are shown in Figure 9-91 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-259 and Figure A34-260 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,404 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-261 and Figure A34-262 relative to the capacity of the segment.

Texas Eastern M2 Pennsylvania – Southern Branch

The Texas Eastern M2 Pennsylvania – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York that are served by Texas Eastern, and generators that are served by Algonquin and Eastern Shore, either directly or behind an LDC. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-263 and Figure A34-264 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 3,357 MDth/d. The 100% peak hour utilization on Texas Eastern's Zone M3 northern line through Pennsylvania potentially

affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, and generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-265 and Figure A34-266 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,508 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-267 and Figure A34-268 relative to the capacity of the segment.

TransCanada Quebec to PNGTS

TransCanada's Quebec to PNGTS segment is modeled with a capacity of 270 MDth/d. The 100% peak hour utilization on this segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure A17-13.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-269 and Figure A34-270 relative to the capacity of the segment.

Transco Leidy Atlantic

The Transco Leidy Atlantic segment is modeled with a capacity of 1,700 MDth/d. The 100% peak hour utilization on Transco's Leidy Atlantic segment potentially affects generators directly connected to Transco in New Jersey, Maryland, Pennsylvania and Virginia and generators behind LDCs served by Transco in Delaware, New Jersey, Pennsylvania, Maryland, Virginia and North Carolina. The locations of these generators are shown in Figure 9-97 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-271 and Figure A34-272 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 4,117 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and

Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-273 and Figure A34-274 relative to the capacity of the segment. The electric demand data set in these figures includes only gas demand at generators in the Study Region.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station segment is modeled with a capacity of 3,430 MDth/d. The 100% peak hour utilization on Transco's Leidy Line to Station 210 segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania and both New York City and Long Island. Locations of these generators are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-275 and Figure A34-276 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-277 and Figure A34-278 relative to the capacity of the segment.

Vector Zone 1

The 100% peak hour utilization on Vector's Zone 1 segment, which is modeled with a capacity of 1,600 MDth/d, potentially affects generators directly connected to Vector in Illinois, Indiana, Michigan and Ontario and generators behind LDCs served by Vector in Indiana and Michigan. The locations of these generators are shown in Figure A17-14.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-279 and Figure A34-280 relative to the capacity of the segment.

Viking Zone 1

The 100% peak hour utilization on Viking's Zone 1 segment, which is modeled with a capacity of 543 MDth/d, potentially affects generators directly connected to Viking, generators behind

LDCs served by Viking, generators directly connected to ANR, and generators behind LDCs served by ANR. The locations of these generators are shown in Figure A17-9.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-281 and Figure A34-282 relative to the capacity of the segment.

HGDS Roll-Up Summer 2023

Figure A33-22 summarizes the affected generation during the Summer 2023 peak hour by PPA.

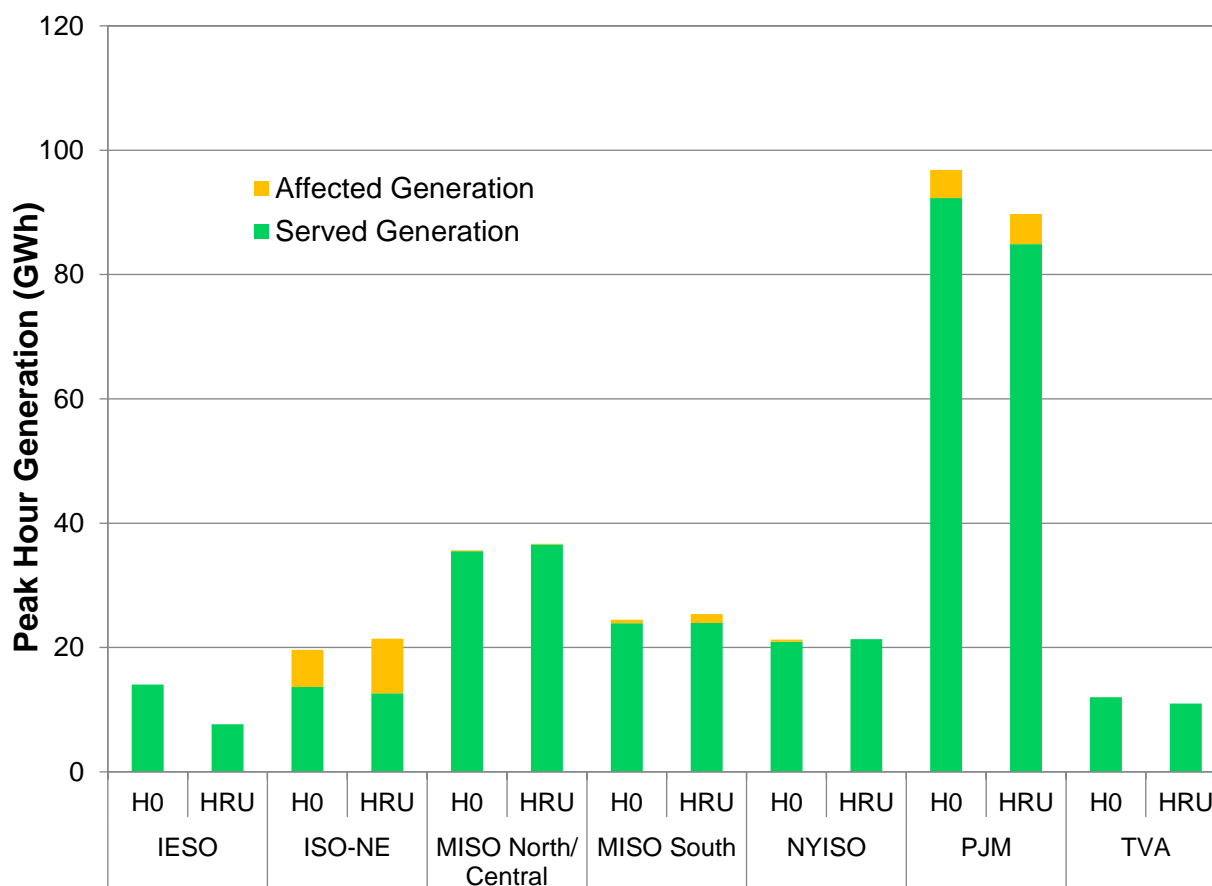


Figure A33-22. HGDS Roll-Up Summer 2023: Peak Hour Affected Generation

Figure A33-23 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A33-15.

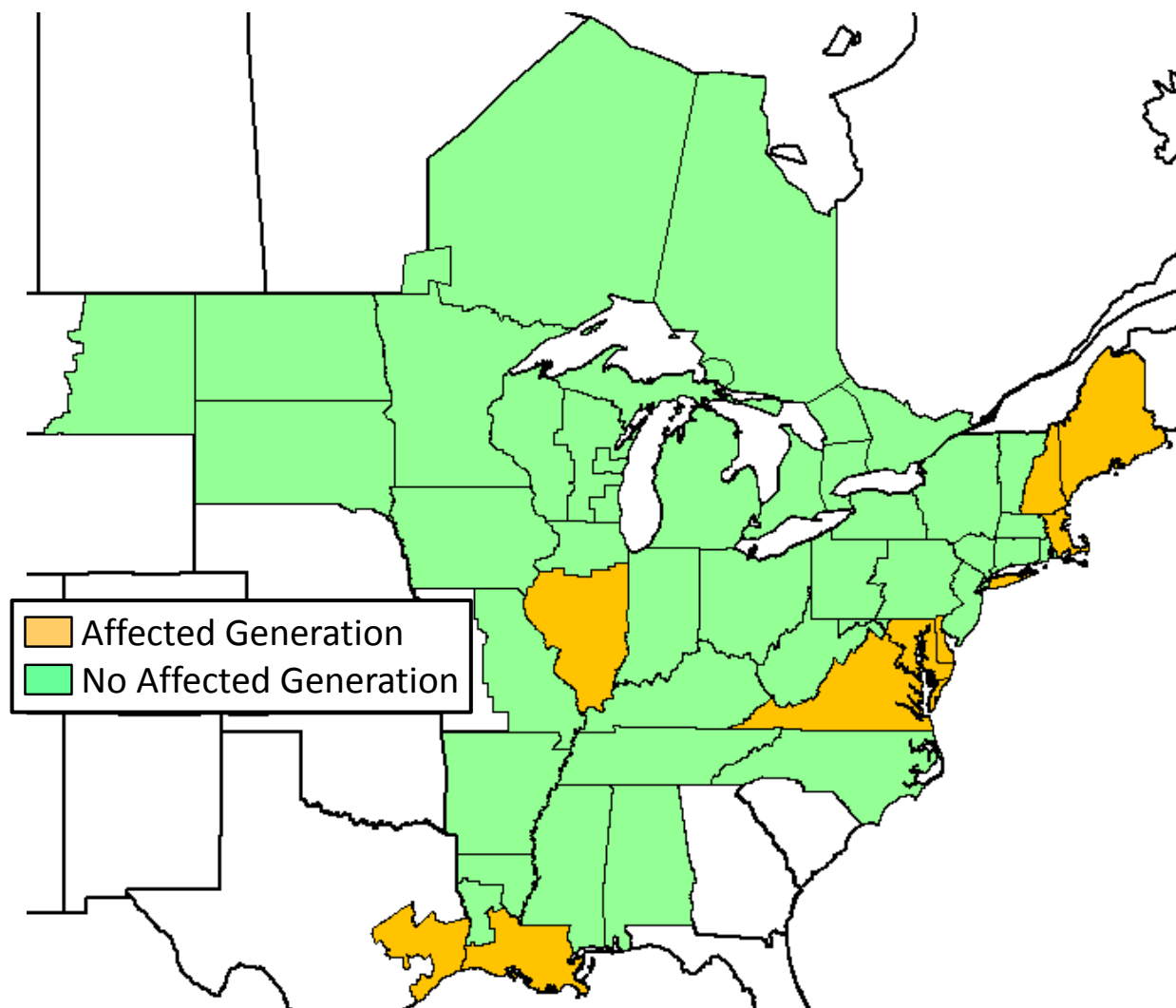


Figure A33-23. HGDS Roll-Up Summer 2023: Locations with Peak Hour Affected Generation

Table A33-15. HGDS Roll-Up Summer 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	8.6	1,188.2
Illinois Southern	1.0	112
Louisiana Southern	3.1	331
Maine	17.3	2,335
Maryland Eastern	16.7	2,361
Massachusetts Eastern	17.4	2,337
New Hampshire	7.2	980
New York Long Island	3.5	342
Texas East (SERC)	1.5	209
Virginia	8.4	936

Figure A33-24 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A33-22 during the Summer 2018 peak hour.

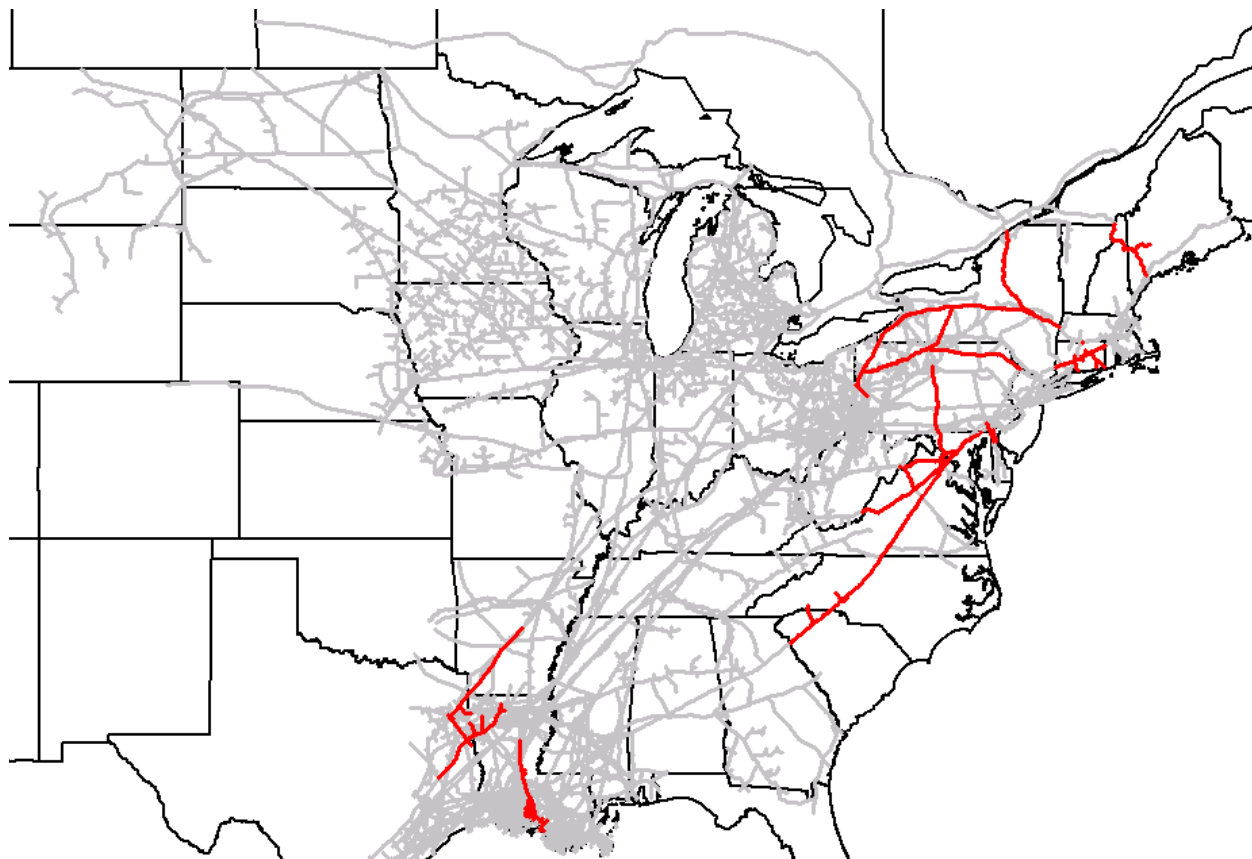


Figure A33-24. HGDS Roll-Up Summer 2023: Peak Hour Constraints

Table A33-16 summarizes the results of the frequency and duration analysis.

Table A33-16. HGDS Roll-Up Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	10	1	23	60
Columbia Gas VA/MD	2	1	5	6
Dominion Southeast	6	1	32	80
Eastern Shore	9	1	7	30
Gulf South Zone 2 HH	8	1	7	26
Iroquois Z1	10	1	11	39
NB/NS Supply	5	1	60	78
PNGT N of Westbrook	6	1	33	83
Tenn Z4 Pennsylvania	3	1	3	7
Tenn Z5 New York	2	92	92	92
Texas Eastern Zone ETX	11	1	17	41
Transco Z5	9	1	15	41

Algonquin Connecticut

The 100% peak hour utilization on Algonquin's Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-283 and Figure A34-284 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,867 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-285 and Figure A34-286 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 Mdt/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators

directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-287 and Figure A34-288 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 208 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A34-289 and Figure A34-290 relative to the capacity of the segments.

Gulf South Zone 2 Henry Hub

The 100% peak hour utilization on the Henry Hub segment of Gulf South Zone 2, which is modeled with a capacity of 700 MDth/d, potentially affects generators directly connected to Gulf South in Louisiana, and generators behind LDCs served by Gulf South in Louisiana. The locations of these generators are shown in Figure A17-15.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-291 and Figure A34-292 relative to the capacity of the segment.

Iroquois Zone 1

The 100% peak hour utilization on Iroquois's Zone 1, which is modeled with a capacity of 1,195 MDth/d, potentially affects generators directly connected to Iroquois and generators behind LDCs served by Iroquois. The locations of these generators are shown in Figure A17-10.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-293 and Figure A34-294 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Total supplies from New Brunswick and Nova Scotia Offshore are capped at approximately 283 MDth/d in 2023. This limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes would also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A34-295 and Figure A34-296 relative to the total production capacity. The electric demand data set in these figures includes only gas demand at generators in the Study Region, demand from non-Study Region generators is not accounted for.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-297 and Figure A34-298 relative to the capacity of the segment.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-299 and Figure A34-300 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-301 and Figure A34-302 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in

Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-303 and Figure A34-304 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-305 and Figure A34-306 relative to the capacity of the segment.

LGDS Roll-Up

LGDS Roll-Up Winter 2018

Figure A33-25 summarizes the affected generation during the Winter 2018 peak hour by PPA.

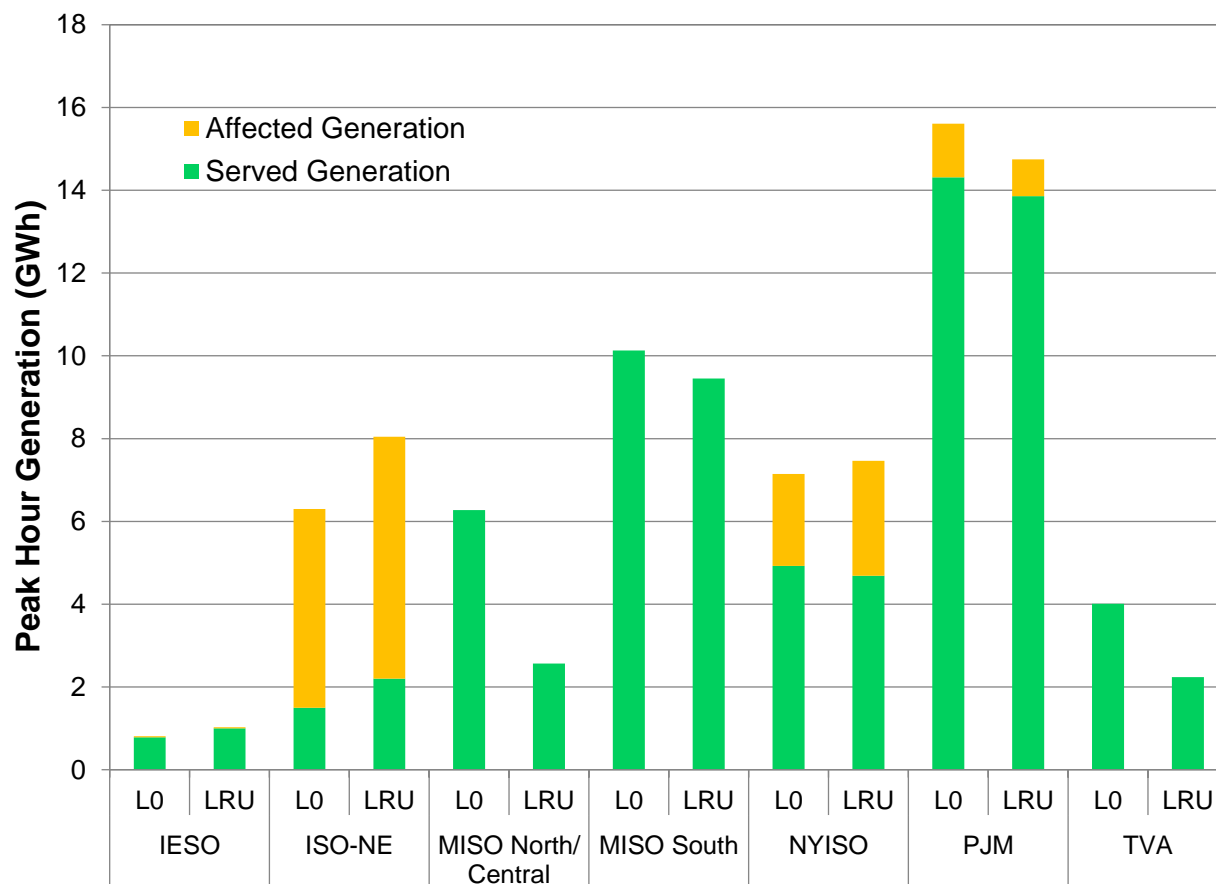


Figure A33-25. LGDS Roll-Up Winter 2018: Peak Hour Affected Generation

Figure A33-26 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A33-17.

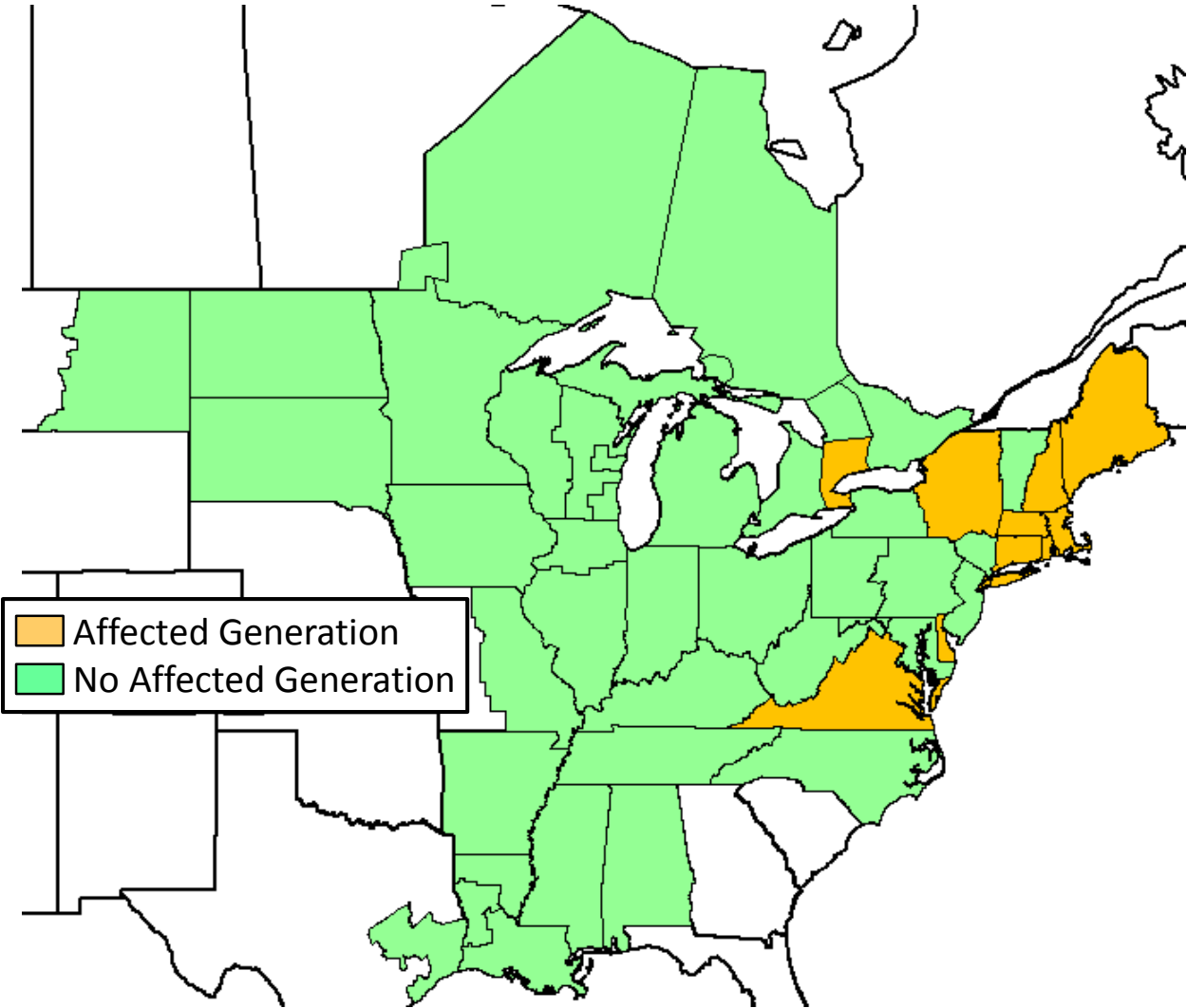


Figure A33-26. LGDS Roll-Up Winter 2018: Locations with Peak Hour Affected Generation

Table A33-17. LGDS Roll-Up Winter 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	12.2	1,666
Delaware	1.1	151
Maine	6.2	848
Massachusetts Eastern	7.9	1,060
Massachusetts Western	0.4	56
New Hampshire	9.7	1,288
New York Central Northern	0.6	71
New York City	13.5	1,818
New York Long Island	9.4	889
Ontario (CDA)	0.2	28
Rhode Island	7.0	927
Virginia	5.4	739

Figure A33-27 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A33-25 during the Winter 2018 peak hour.

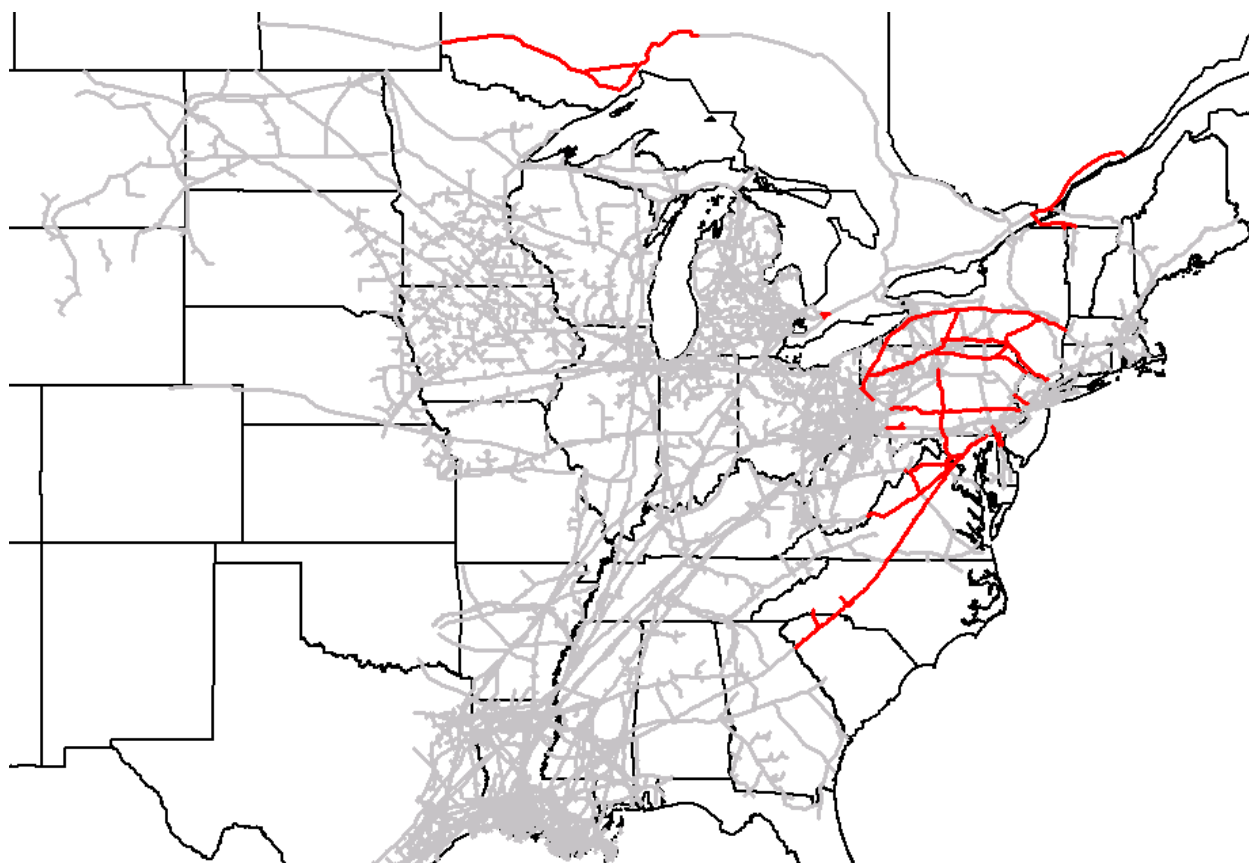
**Figure A33-27. LGDS Roll-Up Winter 2018: Peak Hour Constraints**

Table A33-18 summarizes the results of the frequency and duration analysis.

Table A33-18. LGDS Roll-Up Winter 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	8	1	2	10
Constitution	2	31	59	90
Eastern Shore	8	1	6	16
Millennium	2	2	3	5
NB/NS Supply	13	1	18	46
Tennessee Z4 PA	1	1	1	1
Tennessee Z5 NY	12	1	18	46
Texas Eastern M2 PA South	8	1	3	13
Texas Eastern M3 North	8	1	5	17
TransCanada Ontario West	2	1	2	3
TransCanada Quebec	8	1	5	17
Transco Z6 Leidy to 210	10	1	14	40
Union Gas Dawn	2	1	2	3

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia; generators behind LDCs served by Columbia Gas in Maryland and Virginia; and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-307 and Figure A34-308 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-309 and Figure A34-310 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A34-311 and Figure A34-312 relative to the capacity of the segments.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-313 and Figure A34-314 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 24 MDth/d in New Brunswick and approximately 599 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A34-315 and Figure A34-316 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-317 and Figure A34-318 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-319 and Figure A34-320 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-321 and Figure A34-322 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A34-323 and Figure A34-324 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union

local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-325 and Figure A34-326 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A34-327 and Figure A34-328 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-329 and Figure A34-330 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas's Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A34-331 and Figure A34-332 relative to the capacity of the segment.

LGDS Roll-Up Summer 2018

Figure A33-28 summarizes the affected generation during the Summer 2018 peak hour by PPA.

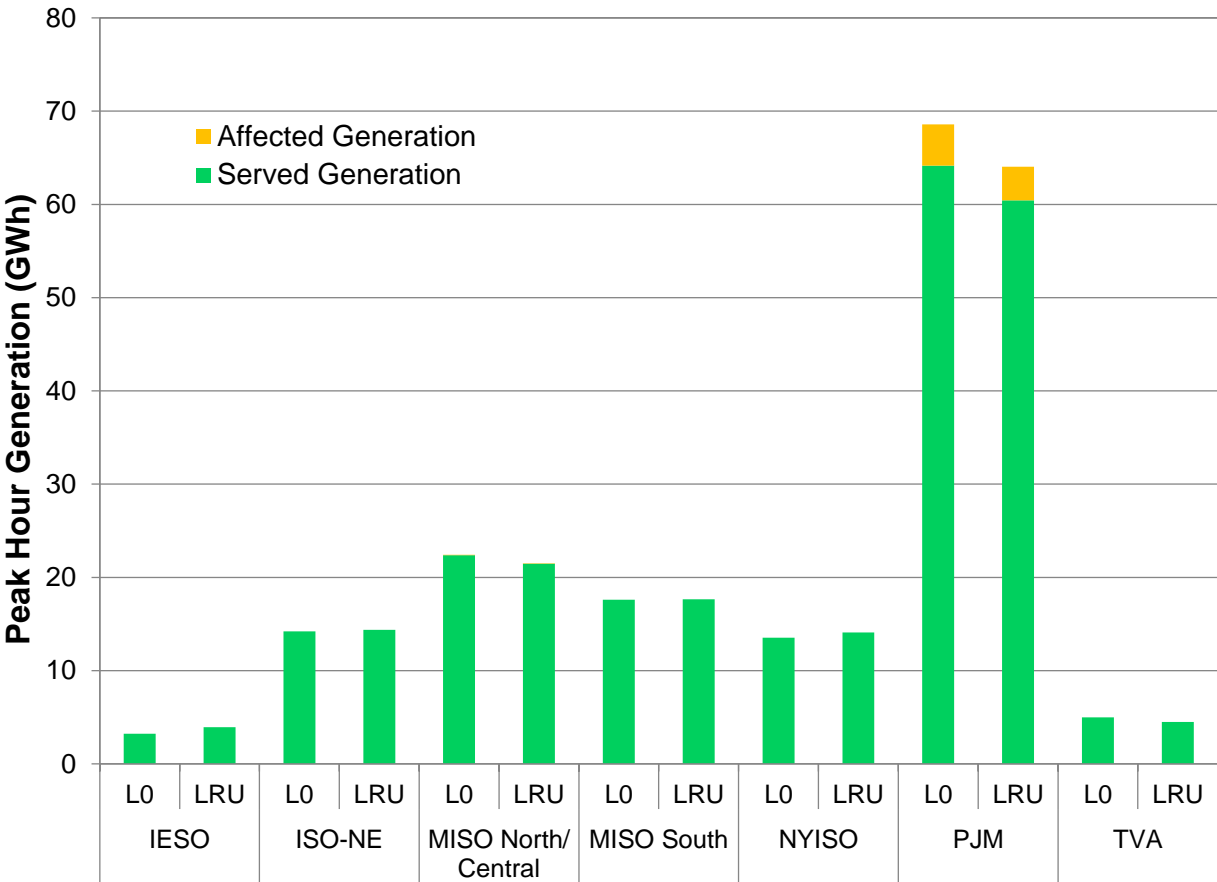


Figure A33-28. LGDS Roll-Up Summer 2018: Peak Hour Affected Generation

Figure A33-29 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A33-19.

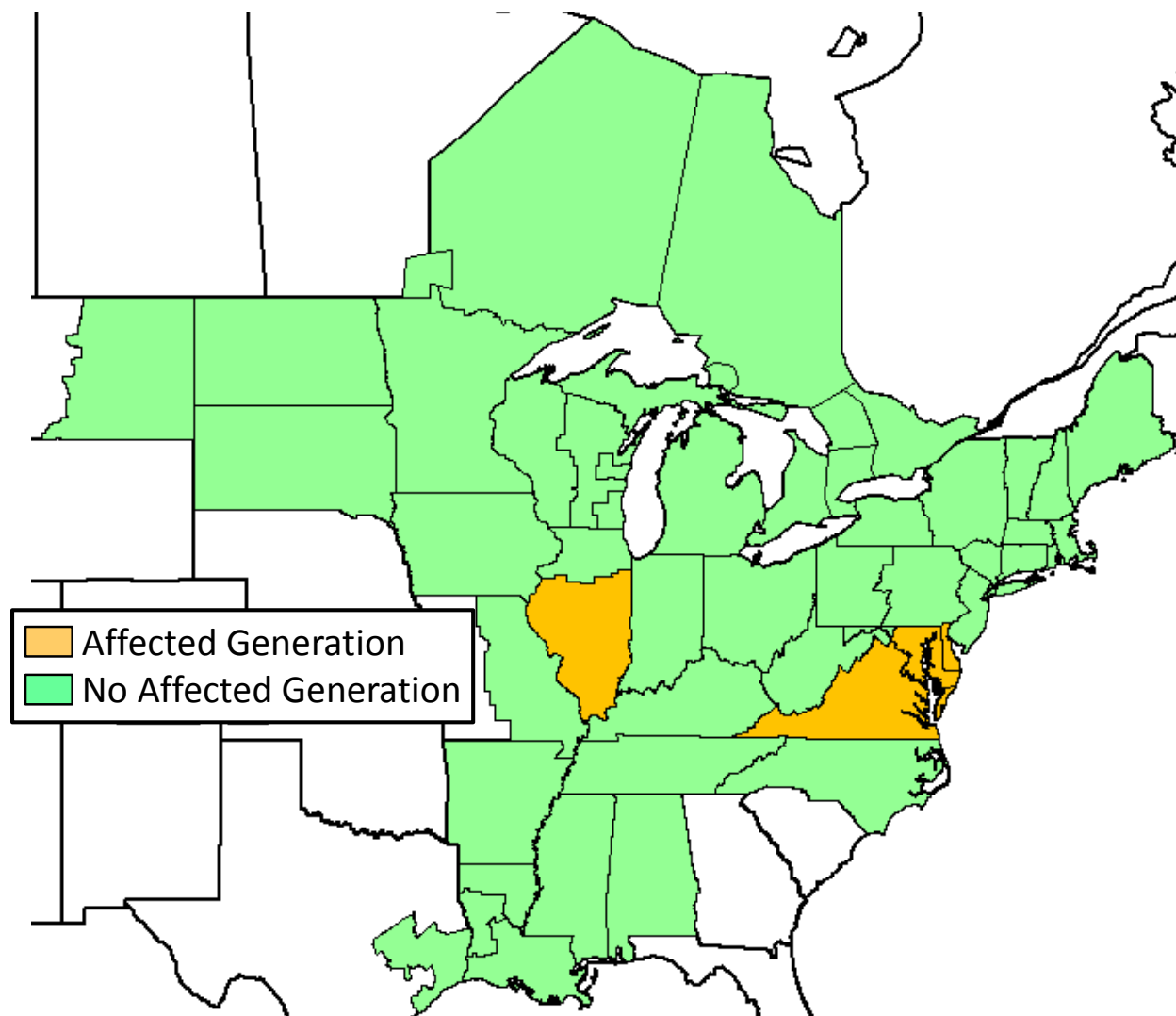


Figure A33-29. LGDS Roll-Up Summer 2018: Locations with Peak Hour Affected Generation

Table A33-19. LGDS Roll-Up Summer 2018: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	3.1	407
Illinois Southern	0.5	50
Maryland Eastern	15.9	2,256
Virginia	8.4	936

Figure A33-30 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A33-28 during the Summer 2018 peak hour.

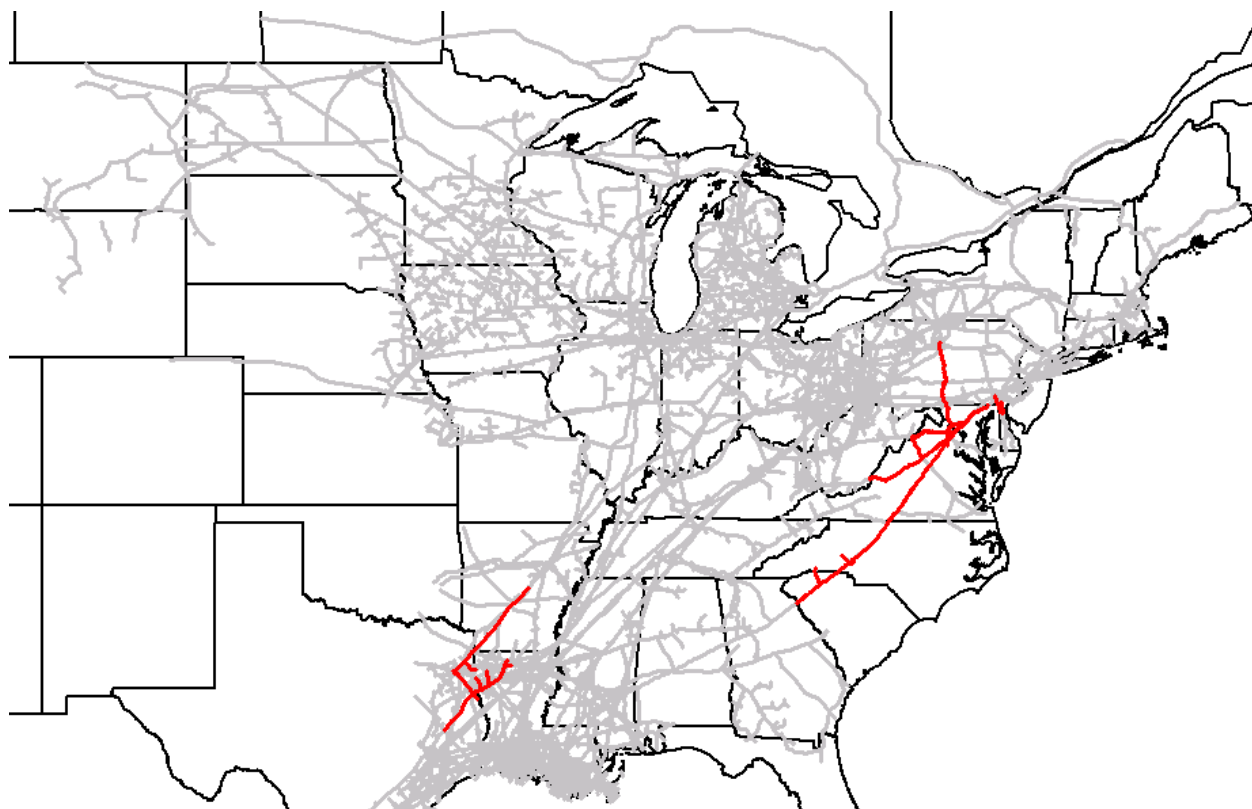


Figure A33-30. LGDS Roll-Up Summer 2018: Peak Hour Constraints

Table A33-20 summarizes the results of the frequency and duration analysis.

Table A33-20. LGDS Roll-Up Summer 2018: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Columbia Gas VA/MD	2	1	1	2
Dominion Southeast	1	1	1	1
Eastern Shore	3	1	2	5
Texas Eastern ETX	6	1	6	14
Transco Z5	4	1	3	7

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment, which is modeled with a capacity of 2,477 MDth/d, potentially affects generators directly connected to Columbia in Maryland and Virginia, generators behind LDCs served by Columbia Gas in Maryland and Virginia, and generators served by Dominion Cove Point and PPL Interstate downstream of interconnections with Columbia Gas. The locations of these generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-333 and Figure A34-334 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 540 MDth/d. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-335 and Figure A34-336 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A34-337 and Figure A34-338 relative to the capacity of the segments.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment, which is modeled with a capacity of 623 MDth/d, potentially affects generators directly connected to Texas Eastern in Texas, Arkansas and Illinois. The locations of these generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-339 and Figure A34-340 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-341 and Figure A34-342 relative to the capacity of the segment.

LGDS Roll-Up Winter 2023

Figure A33-31 summarizes the affected generation during the Winter 2023 peak hour by PPA.

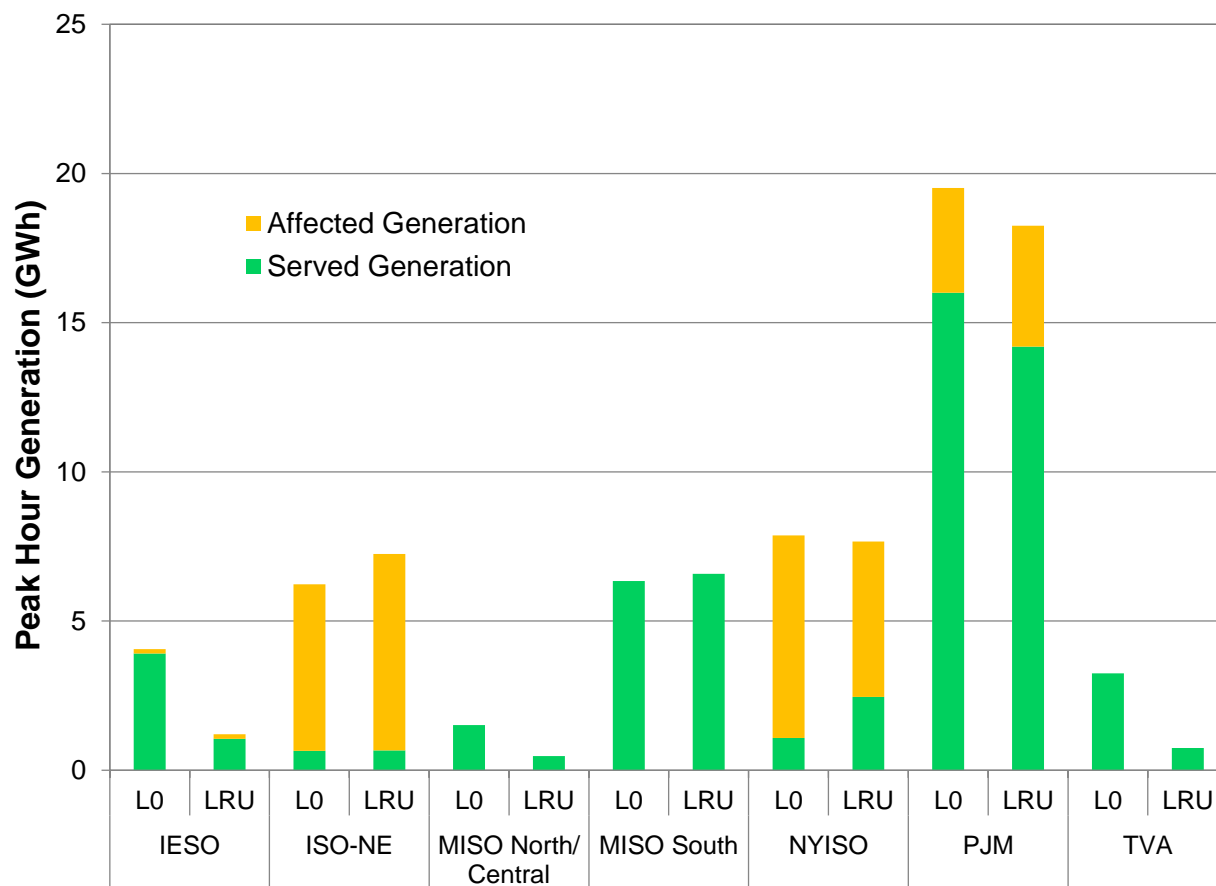


Figure A33-31. LGDS Roll-Up Winter 2023: Peak Hour Affected Generation

Figure A33-32 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A33-21.

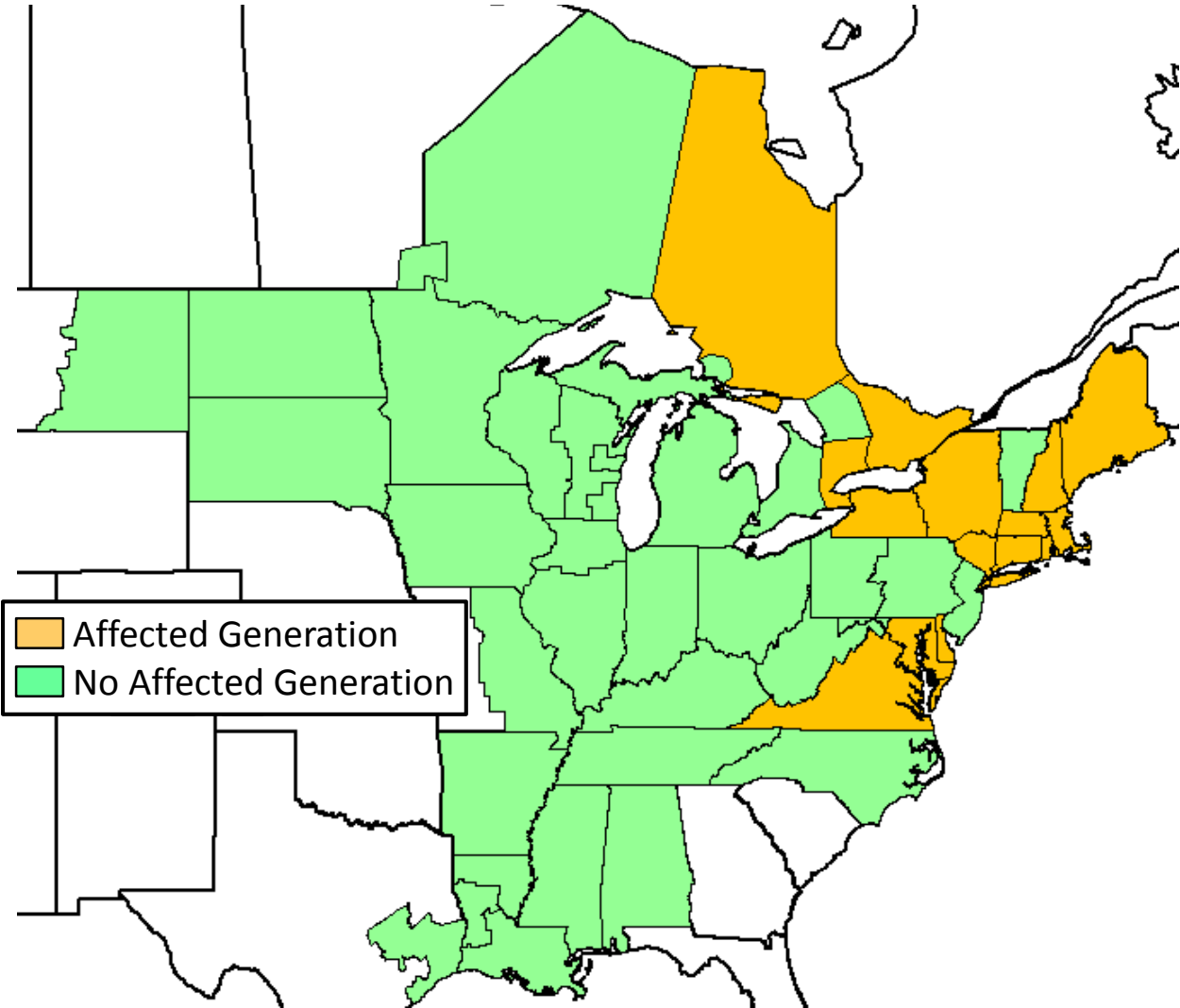


Figure A33-32. LGDS Roll-Up Winter 2023: Locations with Peak Hour Affected Generation

Table A33-21. LGDS Roll-Up Winter 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Connecticut	10.2	1,390
Delaware	1.6	199
Maine	6.2	848
Maryland Eastern	5.0	539
Massachusetts Eastern	8.0	1,063
Massachusetts Western	11.5	1,564
New Hampshire	5.7	755
New York Central Northern	9.3	1,343
New York City	19.9	2,479
New York Long Island	11.5	1,092
New York Southern	1.6	158
New York Western	1.3	143
Ontario (CDA)	0.2	28
Ontario (EDA)	0.1	7
Ontario (NDA)	0.8	114
Rhode Island	7.4	968
Virginia	25.9	3,314

Figure A33-33 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A33-31 during the Winter 2023 peak hour.

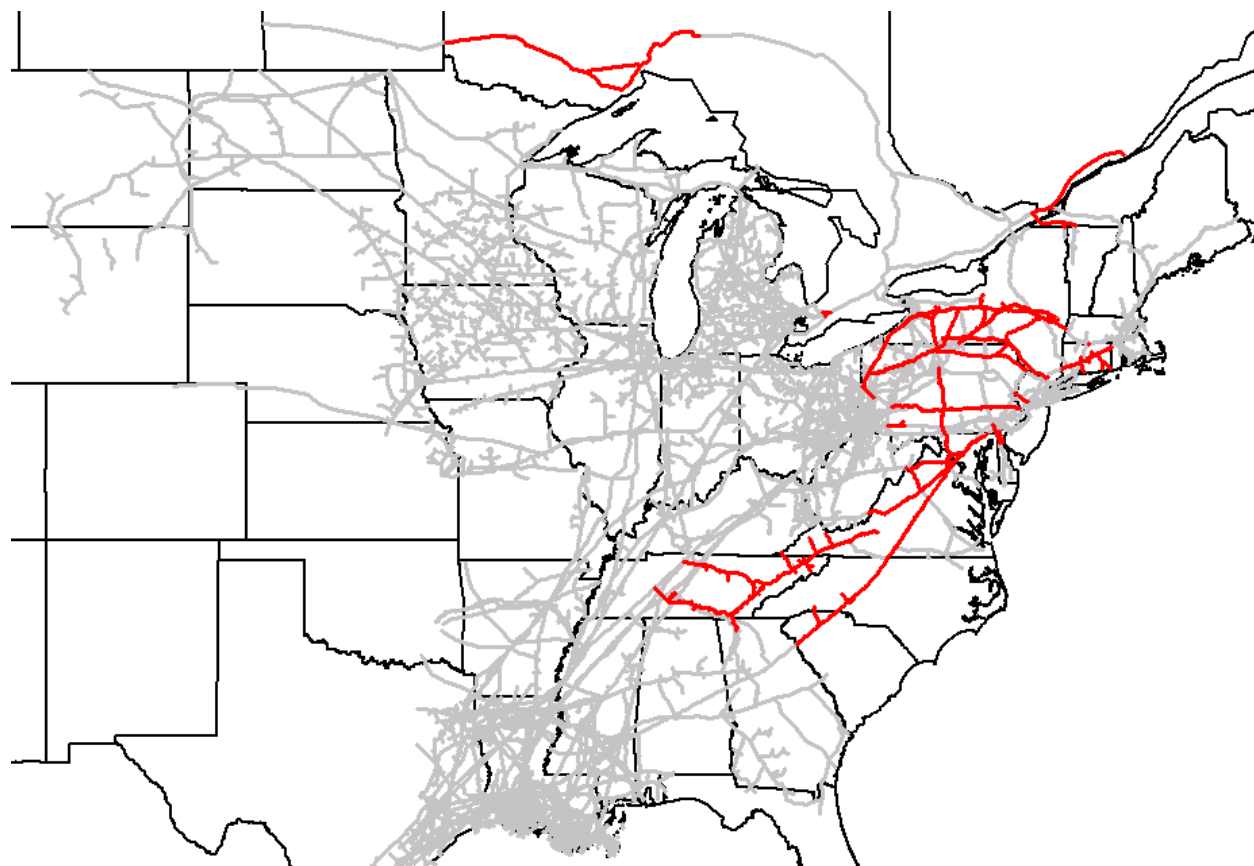


Figure A33-33. LGDS Roll-Up Winter 2023: Peak Hour Constraints

Table A33-22 summarizes the results of the frequency and duration analysis.

Table A33-22. LGDS Roll-Up Winter 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin CT	12	1	15	40
Columbia Gas VA/MD	7	1	52	76
Constitution	2	31	59	90
Dominion Eastern NY	3	2	3	7
Dominion Western NY	3	1	1	3
Dominion Southeast	7	1	16	34
Eastern Shore	13	1	9	38
Millennium	4	3	59	86
NB/NS Supply	3	2	56	89
Tennessee Z4 PA	4	1	4	8
Tennessee Z5 NY	7	1	41	83
Texas Eastern M2 PA South	3	1	2	4
Texas Eastern M3 North	3	1	2	5
TransCanada Ontario West	1	2	2	2
TransCanada Quebec	6	1	6	20
Transco Z5	5	1	2	6
Transco Z6 Leidy to 210	6	1	3	10
Union Gas Dawn	1	2	2	2

Algonquin Connecticut

The 100% peak hour utilization on Algonquin’s Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-343 and Figure A34-344 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas’s Virginia/Maryland segment, which is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d over the 2018 capacity. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-345 and Figure A34-346 relative to the capacity of the segment.

Constitution Pipeline

Constitution's proposed delivery capacity is 650 MDth/d. The 100% peak hour utilization on Constitution potentially affects generators served by Iroquois both directly and behind LDCs in New York and Connecticut. The locations of these generators are shown in Figure 9-82 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-347 and Figure A34-348 relative to the capacity of the segment.

Dominion Eastern New York

Dominion's Eastern New York segment is modeled with a capacity of 907 MDth/d. The 100% peak hour utilization on Dominion's Eastern New York segment potentially affects generators directly connected to Dominion and behind LDCs served by Dominion. The locations of these generators are shown in Figure 9-83 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-349 and Figure A34-350 relative to the capacity of the segment.

Dominion Western New York

Dominion Western New York is modeled with a capacity of 557 MDth/d. The 100% utilization on Dominion's Western New York segment potentially affects generators directly served by Dominion and behind LDCs served by Dominion. The locations of the plants in each category are shown in Figure 9-84 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-351 and Figure A34-352 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase of 15 MDth/d over 2018. The 100% peak hour utilization on Dominion's Southeast segment serving Virginia and Maryland potentially affects generators directly served by Dominion, generators behind LDCs served by Dominion, and generators served by Dominion Cove Point via interconnect. The locations of these generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-353 and Figure A34-354 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d. The 100% peak hour utilization rate on Eastern Shore's Receipt Zone 1 and Delivery Zone 2 potentially affects generators on the Delmarva Peninsula that are served by Eastern Shore. The locations of these generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A34-355 and Figure A34-356 relative to the capacity of the segments.

Millennium

Millennium is modeled with a capacity of 784 MDth/d. The 100% peak hour utilization on Millennium's mainline potentially affects generators directly connected to Millennium, generators behind LDCs served by Millennium, and generators served by Algonquin, particularly in southern New England. The locations of these generators are shown in Figure 9-89 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-357 and Figure A34-358 relative to the capacity of the segment.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A34-359 and Figure A34-360 relative to the total production capacity. The generator gas demand in these figures only reflects generators located in the Study Region.

Tennessee Zone 4 Pennsylvania

Tennessee Zone 4 Pennsylvania is modeled with a capacity of 1,887 MDth/d. The 100% peak hour utilization on Tennessee's Zone 4 segment in Pennsylvania potentially affects generators directly connected to Tennessee in Pennsylvania and New Jersey; generators behind LDCs served by Tennessee in Pennsylvania, New Jersey, downstate New York and Connecticut; and generators served by Algonquin either directly or via LDC in New England. The locations of these generators are shown in Figure 9-91 of the report.

The peak hour demand forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-361 and Figure A34-362 relative to the capacity of the segment.

Tennessee Zone 5 New York

Tennessee Zone 5 New York is modeled with a capacity of 1,189 MDth/d. The 100% peak hour utilization on Tennessee's Z5 New York segment potentially affects generators directly connected to Tennessee in upstate New York, Massachusetts, Rhode Island and New Hampshire; generators behind LDCs served by Tennessee in upstate New York, Massachusetts, Connecticut and Rhode Island; and generators served by Iroquois, Granite State and PNGTS either directly or behind an LDC. The locations of these generators are shown in Figure 9-92 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-363 and Figure A34-364 relative to the capacity of the segment.

Texas Eastern M2 PA – Southern Branch

The Texas Eastern M2 PA – Southern Branch is modeled with a capacity of 2,068 MDth/d. The 100% peak hour utilization on the southern branch of Texas Eastern's Zone M2 segment through Pennsylvania potentially affects generators directly connected to Texas Eastern in Pennsylvania, generators behind LDCs in Pennsylvania, Delaware and downstate New York. Generators that are served by Algonquin and Eastern Shore either directly or behind an LDC would also potentially be affected. The locations of these generators are shown in Figure 9-93 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-365 and Figure A34-366 relative to the capacity of the segment.

Texas Eastern M3 – Northern Line

The Texas Eastern M3 Northern Line is modeled with a capacity of 2,987 MDth/d. The 100% peak hour utilization on the Northern line through Pennsylvania potentially affects generators directly connected to Texas Eastern in New Jersey and Pennsylvania, generators behind LDCs served by Texas Eastern in New Jersey, Pennsylvania and downstate New York, as well as generators served by Algonquin both directly and behind LDCs. The locations of these generators are shown in Figure 9-94 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A34-367 and Figure A34-368 relative to the capacity of the segment.

TransCanada Ontario West

TransCanada's Western Ontario segment is modeled with a capacity of 3,148 MDth/d. The 100% peak hour utilization on TransCanada's Western Ontario segment potentially affects generators directly connected to TransCanada and generators behind the Enbridge and Union

local distribution systems. The locations of these generators are shown in Figure 9-95 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-369 and Figure A34-370 relative to the capacity of the segment.

TransCanada Quebec

TransCanada Quebec is modeled with a capacity of 1,320 MDth/d. The 100% peak hour utilization on TransCanada's Quebec segment potentially affects generators served by PNGTS, North Country and Vermont Gas. The locations of these generators are shown in Figure 9-96 of the report. Limitations for customers in Quebec could arise from this constraint, but such limitations have not been included in the results reported below.

The seasonal daily forecasts of RCI and generator peak hour demand downstream of the constrained segment are shown in Figure A34-371 and Figure A34-372 relative to the capacity of the segment. The generator gas demand in these figures includes only gas demand at generators in the Study Region. Gas demand from non-Study Region generators is not included in the tabulation of results.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d. The 100% peak hour utilization on Transco's Zone 5 segment potentially affects Study Region generators directly connected to Transco in Virginia and generators behind LDCs served by Transco in North Carolina and Virginia. The locations of these generators are shown in Figure 9-98 of the report. Non-Study Region generators in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-373 and Figure A34-374 relative to the capacity of the segment.

Transco Zone 6 Leidy Line to Station 210

The Transco Zone 6 Leidy to Station 210 segment is modeled with a capacity of 3,310 MDth/d. The 100% peak hour utilization on this segment potentially affects generators directly connected to Transco in New Jersey and Pennsylvania and generators behind LDCs served by Transco in New Jersey, Pennsylvania, New York City and Long Island. The locations of generators served along this Transco segment are shown in Figure 9-99 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-375 and Figure A34-376 relative to the capacity of the segment.

Union Gas Dawn

The 100% peak hour utilization on Union Gas’s Dawn segment, which is modeled with a capacity of 5,000 MDth/d, potentially affects generators directly connected to Union, generators directly connected to TransCanada, and generators served by the Union Gas and Enbridge distribution systems. The locations of these generators are shown in Figure 9-100 of the report.

The seasonal daily forecasts of RCI and generator peak hour gas demand downstream of the constrained segment are shown in Figure A34-377 and Figure A34-378 relative to the capacity of the segment.

LGDS Roll-Up Summer 2023

Figure A33-34 summarizes the affected generation during the Summer 2023 peak hour by PPA.

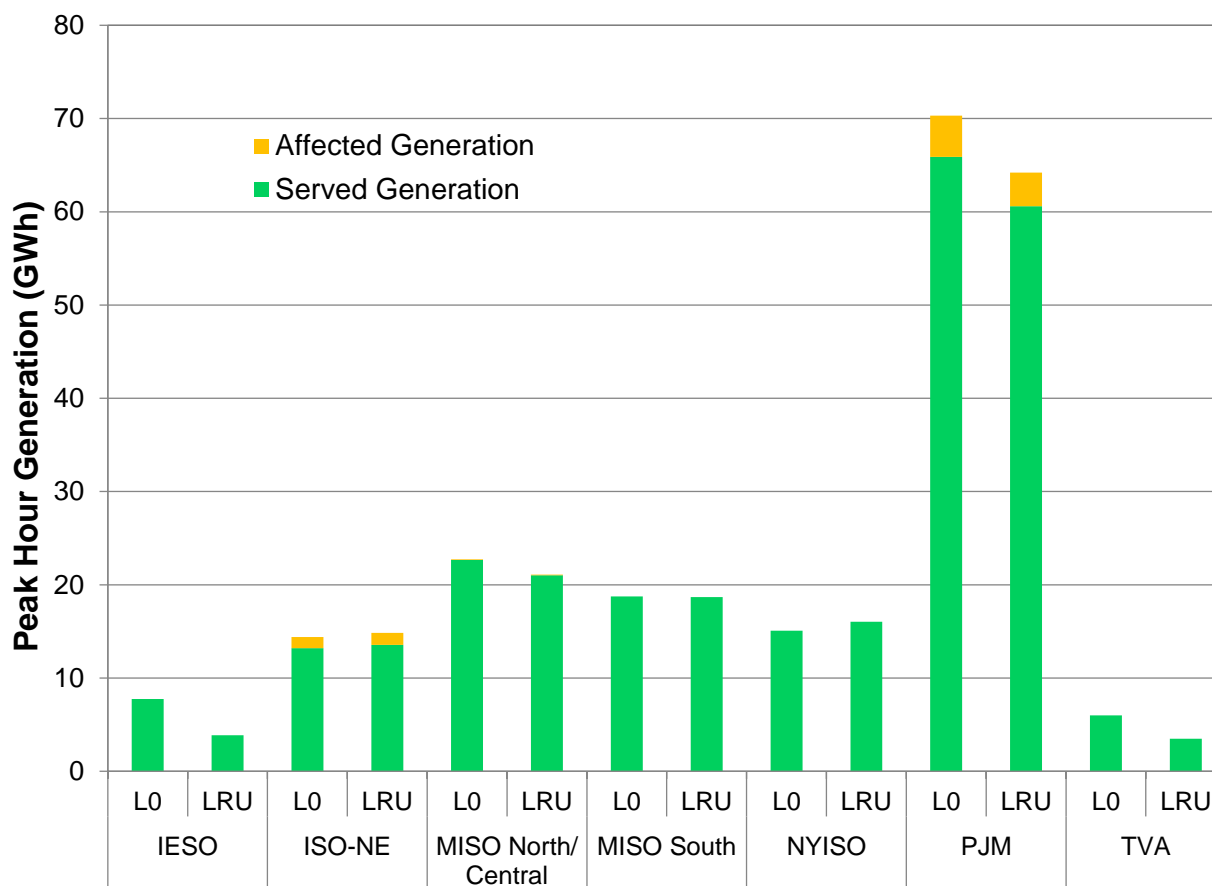


Figure A33-34. LGDS Roll-Up Summer 2023: Peak Hour Affected Generation

Figure A33-35 summarizes the unserved demand by GPCM location. The unserved demand and affected generation by location are quantified in Table A33-23.

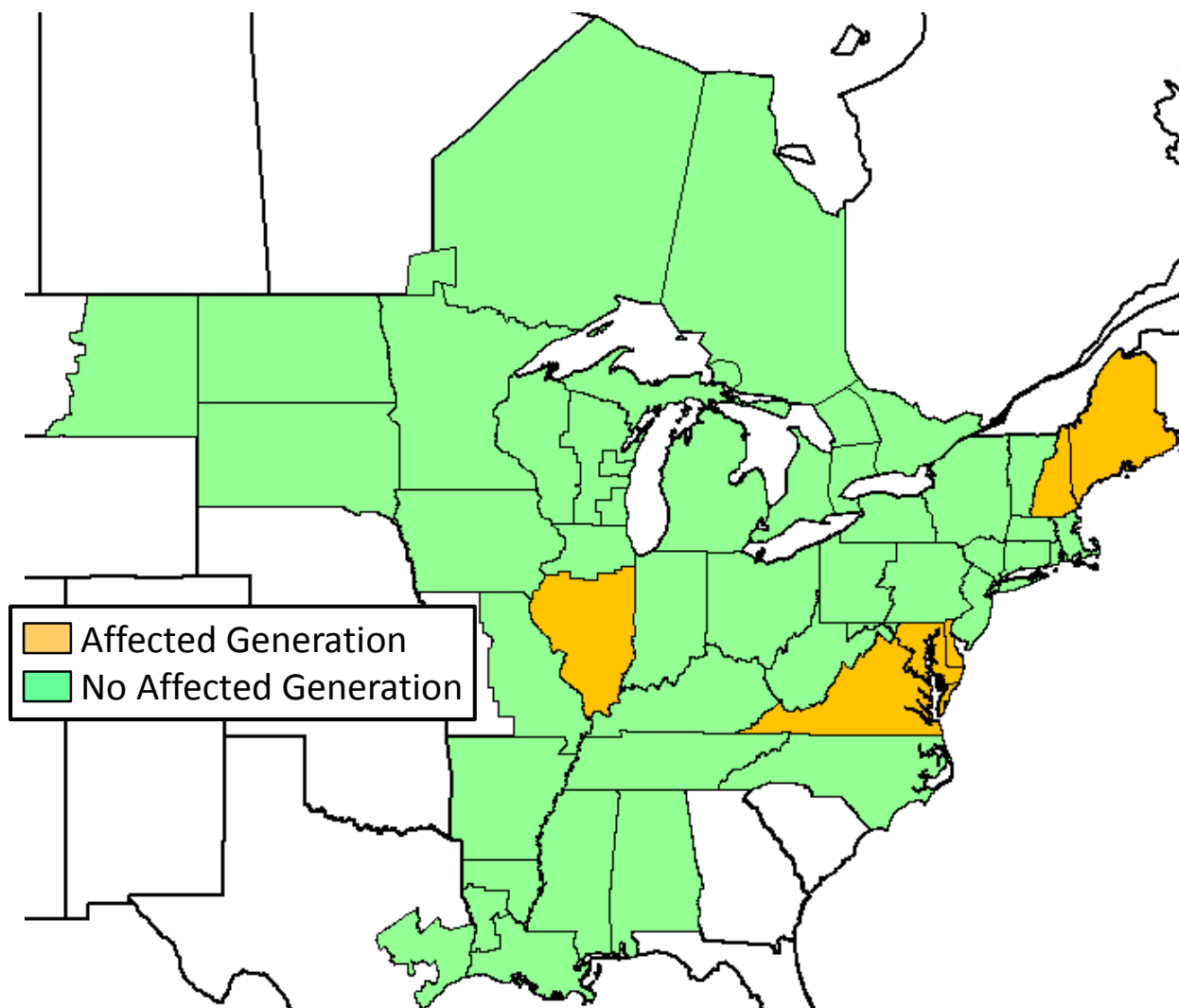


Figure A33-35. LGDS Roll-Up Summer 2023: Locations with Peak Hour Affected Generation

Table A33-23. LGDS Roll-Up Summer 2023: Peak Hour Unserved Generation Demand and Affected Generation

GPCM Location	Unserved Generation Gas Demand (MDth)	Affected Generation (MWh)
Delaware	3.1	407
Illinois Southern	0.6	67
Maine	5.4	700
Maryland Eastern	15.9	2,256
New Hampshire	5.1	575
Virginia	8.4	936

Figure A33-36 shows the constrained pipeline segments, in red, that result in the affected generation shown in Figure A33-34 during the Summer 2023 peak hour.

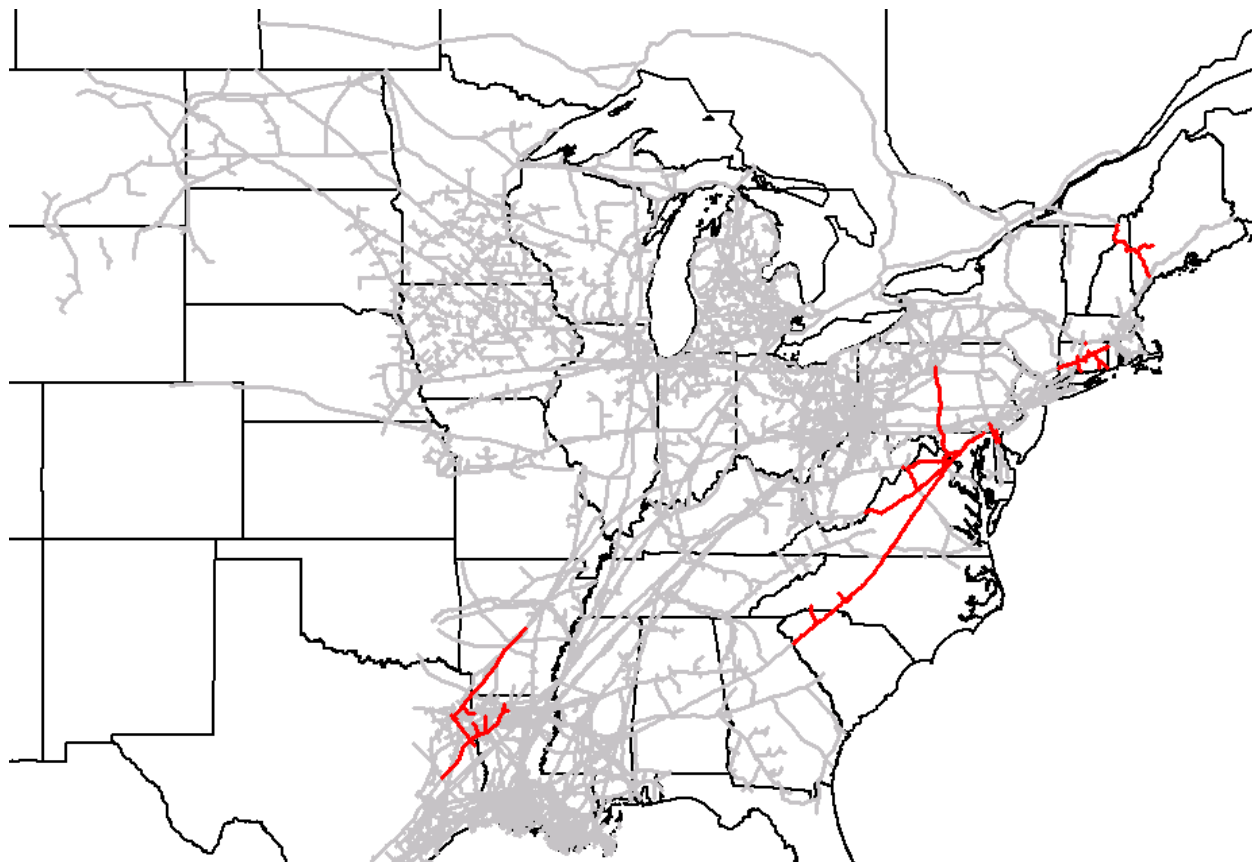


Figure A33-36. LGDS Roll-Up Summer 2023: Peak Hour Constraints

Table A33-24 summarizes the results of the frequency and duration analysis.

Table A33-24. LGDS Roll-Up Summer 2023: Frequency and Duration of Constraints

Constraint	# of Events	Min. Duration (Days)	Max. Duration (Days)	Total # of Days
Algonquin Connecticut	3	1	3	5
Columbia Gas VA/MD	1	1	1	1
Dominion Southeast	2	2	3	5
Eastern Shore	2	1	1	2
NB/NS Supply	7	1	26	66
PNGTS N of Westbrook	6	1	3	10
Texas Eastern ETX	5	1	6	13
Transco Z5	4	12	3	8

Algonquin Connecticut

The 100% peak hour utilization on Algonquin’s Connecticut segment, which is modeled with a capacity of 1,827 MDth/d, potentially affects generators directly connected to Algonquin in Connecticut, Massachusetts and Rhode Island, generators directly connected to M&N in Maine

and New Hampshire, and generators served by LDCs connected to Algonquin and M&N. The locations of these generators are shown in Figure 9-111 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-379 and Figure A34-380 relative to the capacity of the segment.

Columbia Gas Virginia / Maryland

The 100% peak hour utilization on Columbia Gas's Virginia/Maryland segment is modeled with a capacity of 2,679 MDth/d, an increase of 202 MDth/d for 2023 as compared with 2018. The locations of the potentially affected generators are shown in Figure 9-80 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-381 and Figure A34-382 relative to the capacity of the segment.

Dominion Southeast

Dominion Southeast is modeled with a capacity of 555 MDth/d, an increase over the capacity modeled for the summer 2018 of 15 MDth/d. The locations of the potentially affected generators are shown in Figure 9-85 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-383 and Figure A34-384 relative to the capacity of the segment.

Eastern Shore

Eastern Shore is modeled with a capacity of 203 MDth/d, the same as the capacity modeled for the summer of 2018. The locations of the potentially affected generators are shown in Figure 9-87 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segments are shown in Figure A34-385 and Figure A34-386 relative to the capacity of the segments.

New Brunswick Supply / Nova Scotia Offshore Supply

Production from Atlantic Canada is capped at approximately 40 MDth/d in New Brunswick and approximately 243 MDth/d for Nova Scotia Offshore. This supply limitation potentially affects generators directly connected to M&N in Maine and New Hampshire as well as generators located behind LDCs served by M&N in Maine. The locations of these generators are shown in Figure 9-90 of the report. Generators located in the Canadian Maritimes could also be affected by this supply constraint, but have not been included in the summary results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the supply limitation are shown in Figure A34-387 and Figure A34-388 relative to the total production capacity.

PNGTS North of Westbrook

The 100% peak hour utilization on PNGTS's North of Westbrook segment, which is modeled with a capacity of 223 MDth/d, potentially affects generators directly connected to PNGTS in New Hampshire in Maine, generators served by LDCs connected to PNGTS, and generators served by M&N either directly or via LDC. The locations of these generators are shown in Figure 9-112 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-389 and Figure A34-390 relative to the capacity of the segment.

Texas Eastern Zone ETX

The 100% peak hour utilization on Texas Eastern's East Texas segment is modeled with a capacity of 623 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-104 of the report.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-391 and Figure A34-392 relative to the capacity of the segment.

Transco Zone 5

Transco Zone 5 is modeled with a capacity of 3,967 MDth/d, the same capacity as modeled for 2018. The locations of the potentially affected generators are shown in Figure 9-98 of the report. Generators located in outside the Study Region in North Carolina and South Carolina could also be affected, but are not included in the results.

The seasonal daily forecasts of RCI and generator gas demand downstream of the constrained segment are shown in Figure A34-393 and Figure A34-394 relative to the capacity of the segment.

Appendix 34

Roll-up Scenarios Chronological and Descending Demand Figures

(Contains CEII – Not included in this Volume)