

August 9, 2018

**VIA HAND DELIVERY & ELECTRONIC MAIL**

Luly E. Massaro, Commission Clerk  
Rhode Island Public Utilities Commission  
89 Jefferson Boulevard  
Warwick, RI 02888

**RE: Docket 4816 - Gas Long-Range Resource and Requirements Plan for the  
Forecast Period 2017/18 to 2026/27  
Responses to Division Data Requests – Set 1**

Dear Ms. Massaro:

Enclosed please find 10 copies of National Grid's<sup>1</sup> responses to the first set of data requests issued by the Division of Public Utilities and Carriers (Division) in the above-referenced docket.

This filing also contains a Motion for Protective Treatment of Confidential Information in accordance with Rule 1.2(g) of the Public Utilities Commission's (PUC) Rules of Practice and Procedure and R.I. Gen. Laws § 38-2-2(4)(B). National Grid seeks protection from public disclosure of certain confidential and privileged information, which is contained in its responses to Division 1-7 and Division 1-16, as well as in Attachments DIV 1-4-3 and DIV 1-21. In compliance with Rule 1.2(g), National Grid has provided the PUC with one complete, unredacted copy of the confidential materials in a sealed envelope marked "**Contains Privileged and Confidential Materials – Do Not Release**", and has included redacted copies of the materials for the public filing.

Thank you for your attention to this matter. If you have any questions, please contact me at 401-784-7415.

Very truly yours,



Robert J. Humm

Enclosures

cc: Docket 4816 Service List  
Al Mancini, Division  
John Bell, Division  
Leo Wold, Esq.  
Bruce Oliver

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<sup>1</sup> The Narragansett Electric Company d/b/a National Grid (National Grid or the Company).

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
PUBLIC UTILITIES COMMISSION**

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	)	
The Narragansett Electric Company	)	Docket No. 4816
d/b/a National Grid	)	
Gas Long-Range Resource and Requirements Plan	)	
for the Forecast Period 2017/18 to 2026/27	)	
	)	
	)	

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**MOTION OF THE NARRAGANSETT ELECTRIC  
COMPANY D/B/A NATIONAL GRID FOR PROTECTIVE  
TREATMENT OF CONFIDENTIAL INFORMATION**

National Grid<sup>1</sup> hereby requests that the Rhode Island Public Utilities Commission (PUC) grant protection from public disclosure of certain confidential, competitively sensitive, and proprietary information submitted in this proceeding, as permitted by PUC Rule 1.2(g) and R.I. Gen. Laws § 38-2-2(4)(B). National Grid also hereby requests that, pending entry of that finding, the PUC preliminarily grant National Grid’s request for confidential treatment pursuant to Rule 1.2 (g)(2).

**I. BACKGROUND**

On August 9, 2018, National Grid filed responses to the First Set of Data Requests from the Division of Public Utilities and Carriers in this docket (Division Set 1). Division Set 1 includes Data Requests Division 1-4 (seeking, *inter alia*, copies of firm gas transportation agreements), Division 1-7 (seeking, *inter alia*, the Company’s assessment of fixed and variable costs associated with meeting base design year supply and capacity needs), Division 1-16 (seeking, *inter alia*, certain gas supply costs provided to the Company by third-parties), and

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<sup>1</sup> The Narragansett Electric Company d/b/a National Grid (National Grid).

Division 1-21 (seeking the Company's assessment of the timing and costs for alternatives for permanently replacing the peak supply lost after the Cumberland liquefied natural gas (LNG) tank was taken out of service). The Company's response to Division 1-4 includes Attachment DIV 1-4-3, which is a copy of a contract between the Company and Portland Natural Gas Transmission System (Portland) that is confidential by its terms. The Company's responses to Division 1-7(b) and Division 1-16(b) and (d) include confidential gas cost pricing terms, so the Company has provided redacted and un-redacted versions of those responses. Finally, the Company's response to Division 1-21 includes Attachment DIV 1-21, which is the Company's preliminary assessment of the timing, costs, and feasibility of confidential alternatives for permanently replacing the peak supply lost after the Cumberland LNG tank was taken out of service.

Therefore, the Company requests that, pursuant to Rule 1.2(g), the PUC afford confidential treatment to the information contained in the following: (1) Attachment DIV 1-4-3; (2) the Company's response to Division 1-7; (3) the Company's response to Division 1-16; and (4) Attachment DIV 1-21.

## **II. LEGAL STANDARD**

Rule 1.2(g) of the PUC's Rules of Practice and Procedure provides that access to public records shall be granted in accordance with the Access to Public Records Act (APRA), R.I. Gen. Laws § 38-2-1, *et seq.* Under APRA, all documents and materials submitted in connection with the transaction of official business by an agency is deemed to be a "public record," unless the information contained in such documents and materials falls within one of the exceptions specifically identified in R.I. Gen. Laws § 38-2-2(4). To the extent that information provided to the PUC falls within one of the designated exceptions to the public records law, the PUC has the

authority under the terms of APRA to deem such information as confidential and to protect that information from public disclosure.

In that regard, R.I. Gen. Laws § 38-2-2(4)(B) provides that the following types of records shall not be deemed public:

Trade secrets and commercial or financial information obtained from a person, firm, or corporation which is of a privileged or confidential nature.

The Rhode Island Supreme Court has held that this confidential information exemption applies where the disclosure of information would be likely either (1) to impair the government's ability to obtain necessary information in the future; or (2) to cause substantial harm to the competitive position of the person from whom the information was obtained. *Providence Journal Company v. Convention Center Authority*, 774 A.2d 40 (R.I. 2001).

The first prong of the test is satisfied when information is voluntarily provided to the governmental agency and that information is of a kind that would customarily not be released to the public by the person from whom it was obtained. *Providence Journal*, 774 A.2d at 47.

### **III. BASIS FOR CONFIDENTIALITY**

The information contained in the Company's responses to Division 1-7 and Division 1-16 and Attachments DIV 1-4-3 and DIV 1-21 should be protected from public disclosure. By its terms, Attachment DIV 1-4-3 is a confidential contract between the Company and another party. Attachment DIV 1-21 is the Company's preliminary assessment of confidential alternatives to permanently replace lost supply, including confidential cost information. Based on the preliminary nature of the assessment of the confidential alternatives, the assessment is information that the Company would ordinarily not make public. Similarly, the Company's responses to Division 1-7 and Division 1-16 includes confidential gas cost pricing terms. The

pricing information provided is confidential and privileged information of the type that the Company does not ordinarily make public. Public disclosure of the information in Attachment DIV 1-21 and the Company's responses to Division 1-7 and Division 1-16 could impair the Company's ability to obtain advantageous pricing or other terms in the future, thereby causing substantial competitive harm. Accordingly, the Company is providing Attachments DIV 1-4-3 and DIV 1-21 and its responses to Division 1-7 and Division 1-16 to the PUC on a voluntary basis to assist the PUC with its decision-making in this proceeding, but respectfully requests that the PUC provide confidential treatment to the information.

#### **IV. CONCLUSION**

For the foregoing reasons, the Company respectfully requests that the PUC grant its Motion for Protective Treatment of Confidential Information.

Respectfully submitted,

**THE NARRAGANSETT ELECTRIC  
COMPANY d/b/a NATIONAL GRID**

By its attorney,



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Robert J. Humm, Esq. (#7920)

National Grid

280 Melrose Street

Providence, RI 02907

(401) 784-7415

Dated: August 9, 2018

The Narragansett Electric Company  
d/b/a National Grid  
RIPUC Docket No. 4816  
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Division 1-1

Request:

Section ***I. Introduction*** in the Company's March 30, 2018 Long-Range Resource and Requirements Plan (hereinafter National Grid's "Long-Range Plan" or "LRP") states, "*This Long-Range Plan is designed to demonstrate that the Company's gas-resource planning process has resulted in a reliable resource portfolio to meet the combined forecasted needs of the Company's Rhode Island customers at least-cost.*" (Emphasis added.) Regarding that statement, please:

- a. Identify the specific information presented within the Company's March 30, 2018 LRP upon which National Grid relies to demonstrate that the LRP represents a "*least cost*" solution for meeting Rhode Island customers' forecasted needs on a reliable basis.
- b. Provide the workpapers and analyses upon which the Company has relied to assess the costs of plan presented as well as the costs of alternatives to that plan.

Response:

- a. The Company has been using the SENDOUT® model as its primary analytical tool in the portfolio design process. The SENDOUT® model is a linear-programming optimization software tool used that assists in evaluating, selecting, and explaining long-term portfolio strategies. The Company utilizes the SENDOUT® model to determine the best use of a given portfolio of supply, capacity, and storage contracts to meet a specified demand. That is, it can solve for the dispatch of resources that minimizes the cost of serving the specified demand given the existing resource and system-operating constraints. The model dispatches resources based on the lowest variable cost to meet demand, assuming that demand charges are fixed.
- b. Please see Chart IV-C-1 in the Company's Long-Range Plan for the Company's comparison of resources and requirements for least-cost dispatch volumes. For each year of the Long-Range Plan, there is a net need for additional resources. The alternatives to meet this net need are limited, with potential options including citygate delivered supplies, incremental pipeline capacity, and/or incremental winter liquefied natural gas.

Division 1-2

Request:

With respect to Section *III.C. Translation of Retail Forecast into Customer Requirements*, please:

- a. Fully document the “linear regression” analysis the Company has used to assess the relationship between total daily sendout to daily temperature, including but not limited to:
  - i. The data inputs used;
  - ii. The source(s) of the data inputs used, including an adjustments made to the input data prior to running the regression analysis; and
  - iii. The regression statistics generated
- b. Document, explain, and quantify all elements of the estimated sendout volumes used in the referenced regression analyses that are attributable to sources other than firm gas sales service customers.

Response:

- a. As documented in Section III.C. of the Company's filing, the Company uses linear regression equations of total daily wholesale sendout versus daily temperature for the most recent 12 months to calculate a reference-year by division. This serves as the most accurate way for the Company to allocate its monthly demand forecast into its future daily customer requirements.

In Section III.C.1., the Company documents its wholesale volume regression equations that it produces for each of its four divisions: Providence Gas, Westerly Gas, Bristol and Warren Gas, and Valley Gas. These equations allow the Company to allocate its retail forecast to the division level.

In Section III.C.2., the Company documents its wholesale volume regression equations that it produces by end-use at the whole Company level for capacity-eligible Sales and FT-2 customers, capacity-eligible FT-1 customers, capacity-exempt customers, and non-firm sales customers. These equations allow the Company to allocate its daily wholesale volumes to groups of its internal rate codes.

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- a.i. For its regression equations, the Company uses daily wholesale sendout as the dependent variable. For the independent variables, the Company uses daily gas day heating degree day (HDD) data for the T.F. Green Airport weather station, as well as a weekday/weekend dummy variable and the difference between HDD on day  $t$  and mean of the HDD on day  $t-1$  and day  $t-2$ .
- a.ii. Daily wholesale sendout data is obtained from the Company's gas control department. The daily gas day HDD values are provided by its weather services vendor, Weather Services International, using data from the National Weather Services' weather station at T.F. Green Airport. No adjustments are made to either the sendout or the weather data.
- a.iii. Please refer to Attachment DIV 1-2 for the regression statistics generated for the most recent (April 2016 – March 2017) regression equations.
- b. No elements of the estimated sendout volumes used in the referenced regression analyses are attributable to sources other than firm gas sales service customers.

**April 2016 - March 2017 Wholesale Regression Statistics**

**Regression By Division**

Providence

Call:

```
segmented.lm(obj = test2.lm, seg.Z = ~HDD2, psi = 10)
```

Estimated Break-Point(s):

```
Est. St.Err  
6.727 0.375
```

Meaningful coefficients of the linear terms:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	42125.53	865.00	48.700	< 2e-16	***
HDD2	407.55	93.38	4.364	1.67e-05	***
WE2	-2621.64	519.16	-5.050	7.07e-07	***
dT2	-751.93	58.03	-12.958	< 2e-16	***
U1.HDD2	4362.55	104.61	41.702		NA

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7098 on 357 degrees of freedom

Multiple R-Squared: 0.9844, Adjusted R-squared: 0.9841

Convergence attained in 3 iterations with relative change 1.060317e-15

Westerly

Call:

```
segmented.lm(obj = test2.lm, seg.Z = ~HDD2, psi = 10)
```

Estimated Break-Point(s):

```
Est. St.Err  
9.790 0.649
```

Meaningful coefficients of the linear terms:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	1170.344	22.095	52.968	< 2e-16	***
HDD2	15.006	2.350	6.386	5.31e-10	***
WE2	-168.561	16.127	-10.452	< 2e-16	***
dT2	-11.577	1.814	-6.381	5.47e-10	***
U1.HDD2	74.730	2.899	25.777		NA

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 220.6 on 357 degrees of freedom

Multiple R-Squared: 0.9546, Adjusted R-squared: 0.954

Convergence attained in 3 iterations with relative change 2.144993e-16

Bristol and Warren

Call:  
segmented.lm(obj = test2.lm, seg.Z = ~HDD2, psi = 10)

Estimated Break-Point(s):

	Est.	St.Err
	9.240	0.539

Meaningful coefficients of the linear terms:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	1141.536	59.653	19.136	< 2e-16	***
HDD2	25.861	6.344	4.076	5.64e-05	***
WE2	-94.716	43.540	-2.175	0.0303	*
dT2	-55.242	4.898	-11.278	< 2e-16	***
U1.HDD2	240.954	7.827	30.785	NA	

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 595.5 on 357 degrees of freedom  
Multiple R-Squared: 0.9599, Adjusted R-squared: 0.9593

Convergence attained in 4 iterations with relative change -2.354269e-16

### Valley

Call:  
segmented.lm(obj = test2.lm, seg.Z = ~HDD2, psi = 10)

Estimated Break-Point(s):

	Est.	St.Err
	7.601	0.629

Meaningful coefficients of the linear terms:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	9214.16	316.24	29.137	< 2e-16	***
HDD2	62.48	34.22	1.826	0.0687	.
WE2	-944.42	214.32	-4.407	1.39e-05	***
dT2	-156.68	24.20	-6.473	3.17e-10	***
U1.HDD2	1035.08	40.13	25.794	NA	

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2931 on 357 degrees of freedom  
Multiple R-Squared: 0.9478, Adjusted R-squared: 0.947

Convergence attained in 5 iterations with relative change 4.66396e-16

## Regression By End Use

### Sales and FT-2 Customers

Call:  
segmented.lm(obj = test2.lm, seg.Z = ~HDD2, psi = 10)

Estimated Break-Point(s):  
Est. St.Err  
7.624 0.329

Meaningful coefficients of the linear terms:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	30532.31	835.14	36.560	< 2e-16	***
HDD2	492.26	90.37	5.447	9.55e-08	***
WE2	-2039.68	565.99	-3.604	0.000358	***
dT2	-903.97	63.92	-14.142	< 2e-16	***
U1.HDD2	5231.90	105.98	49.369		NA

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 7741 on 357 degrees of freedom  
Multiple R-Squared: 0.9863, Adjusted R-squared: 0.9862

Convergence attained in 4 iterations with relative change -1.783339e-16

### FT-1 Customers

Call:  
segmented.lm(obj = test2.lm, seg.Z = ~HDD2, psi = 10)

Estimated Break-Point(s):  
Est. St.Err  
5.615 0.524

Meaningful coefficients of the linear terms:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	7157.103	65.265	109.662	<2e-16	***
HDD2	66.614	7.051	9.448	<2e-16	***
WE2	-983.017	37.093	-26.502	<2e-16	***
dT2	-40.146	4.158	-9.656	<2e-16	***
U1.HDD2	224.198	7.754	28.913		NA

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 507.2 on 357 degrees of freedom  
Multiple R-Squared: 0.9824, Adjusted R-squared: 0.9821

Convergence attained in 5 iterations with relative change -9.736475e-16

### Capacity-Exempt Customers

Call:  
segmented.lm(obj = test2.lm, seg.Z = ~HDD2, psi = 10)

Estimated Break-Point(s):

Est. St.Err  
2.760 0.464

Meaningful coefficients of the linear terms:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	12188.887	99.922	121.984	< 2e-16	***
HDD2	-29.521	10.588	-2.788	0.00559	**
WE2	-842.462	47.210	-17.845	< 2e-16	***
dT2	-53.367	5.256	-10.153	< 2e-16	***
U1.HDD2	322.920	11.211	28.803	NA	

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 645.7 on 357 degrees of freedom  
Multiple R-Squared: 0.9703, Adjusted R-squared: 0.9699

Convergence attained in 5 iterations with relative change -1.602006e-15

#### Non-Firm Customers

Call:

segmented.lm(obj = test2.lm, seg.Z = ~HDD2, psi = 10)

Estimated Break-Point(s):

Est. St.Err  
31.377 0.991

Meaningful coefficients of the linear terms:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	3881.172	67.152	57.797	< 2e-16	***
HDD2	-1.953	3.457	-0.565	0.572498	
WE2	80.430	64.246	1.252	0.211423	
dT2	25.444	7.240	3.514	0.000497	***
U1.HDD2	-228.485	24.313	-9.397	NA	

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 876.4 on 357 degrees of freedom  
Multiple R-Squared: 0.3778, Adjusted R-squared: 0.3691

Convergence attained in 2 iterations with relative change 6.690853e-05

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Division 1-3

Request:

With respect to Section “*IV.C.8. Pending Portfolio Additions*” in the Company’s March 30, 2018 Long-Range Plan, please:

- a. Please document and explain the status of each of the future projects listed in Section “*IV.C.7. Future Portfolio Resources.*”
- b. Provide an update on any construction schedules and any applicable licensing and siting approvals.
- c. Provide an assessment of the likelihood that the project will be completed on schedule and whether there are any significant risks that the project may not be able to go forward.
- d. Explain whether the Company has any back up plans in the event the project is materially delayed or cancelled.

Response:

- a. & b. (1) Millennium Expansion Project (Millennium Project): The Millennium Project, officially known as the Eastern System Upgrade, will provide the Company with the opportunity to directly secure a cost effective domestically produced source of supply to feed half of the Company’s entitlement on its Algonquin Incremental Market (AIM) capacity. The Millennium Project was originally intended to be in service for the 2017/18 winter; however, unprecedented opposition at both at the state and federal levels, as well as a lack of quorum at the Federal Energy Regulatory Commission (FERC) during the first seven months of 2017, resulted in a delay of Millennium Project receiving all necessary permits and authorizations to commence construction and service. Millennium has now commenced construction on the project, which includes the addition of horsepower at the existing Hancock Compressor Station, the new greenfield compressor station in Highland, NY, meter station work at the Algonquin interconnect at Ramapo, and the various sections of the 7.8 mile looping. At this time, Millennium anticipates that the project facilities should be in-service for November 1, 2018.

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(2) National Grid LNG (NGLNG): The Company previously entered into a precedent agreement for a term of 20 years for liquefaction services at NGLNG's currently-existing storage facilities located in Providence, Rhode Island. On June 25, 2018, FERC issued its Environmental Assessment of the NGLNG project; NGLNG is expected to receive its certificate of public convenience and necessity on or before September 23, 2018, which would allow for the facilities to be in service for the 2021 refill season. The Company will be able to utilize its existing Algonquin capacity to transport volumes to the plant located in Providence, Rhode Island for liquefaction during the off-peak period.

(3) Northeast Energy Center, LLC (Northeast Energy): The Company previously entered into a precedent agreement for up to 2,616 dekatherms per day for a term of 15 years for liquefaction services with Northeast Energy. The Northeast Energy project will be located in central Massachusetts and has an intended in-service date of April 1, 2020. At this time, Northeast Energy has not filed for regulatory approval or authorization to construct or operate the necessary facilities.

c. & d. (1) Millennium Project: In the event the Millennium Project is materially delayed or cancelled, the Company would continue to purchase up to 100% of its AIM maximum daily quantity at Texas Eastern M3 for redelivery to its citygates, as it has since AIM commenced service.

(2) NGLNG: In the event NGLNG is materially delayed or cancelled, the Company would continue to seek liquefied natural gas (LNG) supplies in the marketplace for transportation by truck to the Company's LNG tanks in Rhode Island.

(3) Northeast Energy: In the event Northeast Energy is materially delayed or cancelled, the Company would continue to seek LNG supplies in the marketplace for transportation by truck to the Company's LNG tanks in Rhode Island.

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Division 1-4

Request:

With respect to Section “*IV.C.8. Pending Portfolio Additions*” in the Company’s March 30, 2018 Long-Range Plan, please:

- a. Provide the status of each of the proposed contracts;
- b. For each contract, indicate whether the contract has been executed, and if not, explain when the Company expects to execute the contract. If a contract has, or is expected to have, a “regulatory out clause.” Detail each required regulatory review, the status of each review, and the expected date for completion of each required regulatory review. If the contract has been executed, please provide a copy of the contract.

Response:

- a. In Section IV.C.7. of the Long-Range Plan, Future Portfolio Resources, the Company summarized its November 30, 2017 submission to the Division of Public Utilities and Carriers (Division) to review (1) two long term gas transportation agreements between National Grid and Tennessee to deliver an additional 44,000 Dth per day to existing Rhode Island citygates in Cranston and Lincoln; and (2) one precedent agreement with Portland Natural Gas Transmission System (Portland). Collectively, the Tennessee and Portland agreements are necessary for the Company to secure long term access to gas supplies to replace the lost capacity from the cancellation of the Tennessee Northeast Energy Direct (NED) Project and the decommissioning of the Company’s liquefied natural gas (LNG) tank in Cumberland. Each of the Tennessee and Portland agreements contained a provision that allowed the Company to terminate the agreement without liability if the Company was unable to obtain regulatory support prior to May 31, 2018.

Subsequent to the Company’s November 30, 2017 submission, the Company met with the Division in person on January 24, 2018, and subsequently via teleconference, to review the Company’s commitments under each of the Tennessee and Portland agreements. The Company also provided responses to the Division’s informal data requests made during the January 24 meeting and additional requests that arose as the Division reviewed the agreements. Based upon the feedback the Company received from

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Division 1-4, page 2

the Division, the Company determined that it was in the best interest of its firm gas customers not to exercise its termination right under each of the agreements. Further, the Company is considering acceleration of volumes of the phased in Tennessee agreement having a receipt point of the point of interconnection between Tennessee and Engie at Everett, MA.

- b. See the Company's response to Division 1-4(a) for a discussion of the status of regulatory review. Please see Attachment DIV 1-4-1 and Attachment DIV 1-4-2 for copies of the Tennessee agreements, and confidential Attachment DIV 1-4-3 for a copy of the Portland agreement.

GAS TRANSPORTATION AGREEMENT  
(For Use Under FT-A Rate Schedule)

THIS AGREEMENT is made and entered into as of the 23 day of May, 2017 by and between TENNESSEE GAS PIPELINE COMPANY, L.L.C., a Delaware limited liability company, hereinafter referred to as "Transporter" and The Narragansett Electric Company, d/b/a National Grid, a Rhode Island corporation, hereinafter referred to as "Shipper." Transporter and Shipper shall collectively be referred to herein as the "Parties."

ARTICLE I

DEFINITIONS

- 1.1 TRANSPORTATION QUANTITY - shall mean the maximum daily quantity of gas which Transporter agrees to receive and transport on a firm basis, subject to Article II herein, for the account of Shipper hereunder on each day during the term hereof, as specified on Exhibit A attached hereto. Any limitations on the quantities to be received from each Point of Receipt and/or delivered to each Point of Delivery shall be as specified on Exhibit A attached hereto.
- 1.2 EQUIVALENT QUANTITY - shall be as defined in Article I of the General Terms and Conditions of Transporter's FERC Gas Tariff.

ARTICLE II

TRANSPORTATION

- 2.1 TRANSPORTATION SERVICE - Transporter agrees to accept and receive daily on a firm basis, at the Point(s) of Receipt from Shipper or for Shipper's account such quantity of gas as Shipper makes available up to the Transportation Quantity, and to deliver to or for the account of Shipper to the Point(s) of Delivery an Equivalent Quantity of gas.

ARTICLE III

POINT(S) OF RECEIPT AND DELIVERY

The Primary Point(s) of Receipt and Delivery shall be those points specified on Exhibit A attached hereto.

ARTICLE IV

All facilities are in place to render the service provided for in this Agreement.

ARTICLE V

QUALITY SPECIFICATIONS AND STANDARDS FOR MEASUREMENT

For all gas received, transported and delivered hereunder the Parties agree to the Quality Specifications and Standards for Measurement as specified in the General Terms and Conditions of Transporter's FERC Gas Tariff Volume No. 1. To the extent that no new measurement facilities are installed to provide service hereunder, measurement operations will continue in the manner in which they have previously been handled. In the event that such facilities are not operated by Transporter or a downstream pipeline, then responsibility for operations shall be deemed to be Shipper's.

ARTICLE VI

RATES AND CHARGES FOR GAS TRANSPORTATION

- 6.1 TRANSPORTATION RATES - Commencing upon the effective date hereof, the rates, charges, and surcharges to be paid by Shipper to Transporter for the transportation service provided herein shall be in accordance with Transporter's Rate Schedule FT-A and the General Terms and Conditions of Transporter's FERC Gas Tariff. Except as provided to the contrary in any written or electronic agreement(s) between Transporter and Shipper in effect during the term of this Agreement, Shipper shall pay Transporter the

applicable maximum rate(s) and all other applicable charges and surcharges specified in the Summary of Rates in Transporter's FERC Gas Tariff and in this Rate Schedule. Transporter and Shipper may agree that a specific discounted rate will apply only to certain volumes under the agreement. Transporter and Shipper may agree that a specified discounted rate will apply only to specified volumes (MDQ, TQ, commodity volumes, Extended Receipt and Delivery Service Volumes or Authorized Overrun Volumes) under the Agreement; that a specified discounted rate will apply only if specified volumes are achieved (with the maximum rates applicable to volumes above the specified volumes or to all volumes if the specified volumes are never achieved); that a specified discounted rate will apply only during specified periods of the year or over a specifically defined period of time; that a specified discounted rate will apply only to specified points, zones, markets or other defined geographical area; and/or that a specified discounted rate will apply only to production or reserves committed or dedicated to Transporter. Transporter and Shipper may agree to a specified discounted rate pursuant to the provisions of this Section 6.1 provided that the discounted rate is between the applicable maximum and minimum rates for this service.

In addition, a discount agreement may include a provision that if one rate component which was at or below the applicable Maximum Rate at the time the discount agreement was executed subsequently exceeds the applicable Maximum Rate due to a change in Transporter's Maximum Rates so that such rate component must be adjusted downward to equal the new applicable Maximum Rate, then other rate components may be adjusted upward to achieve the agreed overall rate, as long as none of the resulting rate components exceed the Maximum Rate applicable to that rate component. Such changes to rate components shall be applied prospectively, commencing with the date a Commission Order accepts revised tariff sheet rates. However, nothing contained herein shall be construed to alter a refund obligation under applicable law for any period during which rates that had been charged under a discount agreement exceeded rates which ultimately are found to be just and reasonable.

- 6.2 INCIDENTAL CHARGES - Shipper agrees to reimburse Transporter for any filing or similar fees, which have not been previously paid for by Shipper, which Transporter incurs in rendering service hereunder.
- 6.3 CHANGES IN RATES AND CHARGES - Shipper agrees that Transporter shall have the unilateral right to file with the appropriate regulatory authority and make effective changes in (a) the rates and charges applicable to service pursuant to Transporter's Rate Schedule FT-A, (b) the rate schedule(s) pursuant to which service hereunder is rendered, or (c) any provision of the General Terms and Conditions applicable to those rate schedules. Transporter agrees that Shipper may protest or contest the aforementioned filings, or may seek authorization from duly constituted regulatory authorities for such adjustment of Transporter's existing FERC Gas Tariff as may be found necessary to assure Transporter just and reasonable rates.

## ARTICLE VII

### BILLINGS AND PAYMENTS

Transporter shall bill and Shipper shall pay all rates and charges in accordance with Articles VII and VIII, respectively, of the General Terms and Conditions of the FERC Gas Tariff.

## ARTICLE VIII

### GENERAL TERMS AND CONDITIONS

This Agreement shall be subject to the effective provisions of Transporter's Rate Schedule FT-A and to the General Terms and Conditions incorporated therein, as the same may be changed or superseded from time to time in accordance with the rules and regulations of the FERC.

## ARTICLE IX

### REGULATION

- 9.1 This Agreement shall be subject to all applicable and lawful governmental statutes, orders, rules and regulations and is contingent upon the receipt and continuation of all necessary regulatory approvals or authorizations upon terms acceptable to Transporter. This Agreement shall be void and of no force and effect if any necessary regulatory approval is not so obtained or continued. All Parties hereto shall cooperate to obtain or continue all necessary approvals or authorizations, but no Party shall be liable to any other Party for failure to obtain or continue such approvals or authorizations.

- 9.2 The transportation service described herein shall be provided subject to Subpart G, Part 284 of the FERC Regulations.

#### ARTICLE X

##### RESPONSIBILITY DURING TRANSPORTATION

Except as herein specified, the responsibility for gas during transportation shall be as stated in the General Terms and Conditions of Transporter's FERC Gas Tariff Volume No. 1.

#### ARTICLE XI

##### WARRANTIES

- 11.1 In addition to the warranties set forth in Article XI of the General Terms and Conditions of Transporter's FERC Gas Tariff, Shipper warrants the following:
- (a) Shipper warrants that all upstream and downstream transportation arrangements are in place, or will be in place as of the requested effective date of service, and that it has advised the upstream and downstream transporters of the receipt and delivery points under this Agreement and any quantity limitations for each point as specified on Exhibit "A" attached hereto. Shipper agrees to indemnify and hold Transporter harmless for refusal to transport gas hereunder in the event any upstream or downstream transporter fails to receive or deliver gas as contemplated by this Agreement.
  - (b) Shipper agrees to indemnify and hold Transporter harmless from all suits, actions, debts, accounts, damages, costs, losses and expenses (including reasonable attorney's fees) arising from or out of breach of any warranty by Shipper herein.
- 11.2 Transporter shall not be obligated to provide or continue service hereunder in the event of any breach of warranty.

#### ARTICLE XII

##### TERM

- 12.1 This Agreement shall be effective as of November 1, 2018, and shall remain in force and effect, unless modified as per Exhibit B, until the expiration of twenty (20) years ("Primary Term") and on a month to month basis thereafter unless terminated by either Party upon at least thirty (30) days prior written notice to the other Party; provided, however, that if the Primary Term is less than one year, then notice of termination may be provided via Transporter's Interactive Website; provided further, that if the Primary Term is one year or more, then any rights to Shipper's extension of this Agreement after the Primary Term shall be governed by Article V, Section 4 of the General Terms and Conditions of Transporter's FERC Gas Tariff; and provided further, that if the FERC or other governmental body having jurisdiction over the service rendered pursuant to this Agreement authorizes abandonment of such service, this Agreement shall terminate on the abandonment date permitted by the FERC or such other governmental body.
- 12.2 Any portions of this Agreement necessary to resolve or cash out imbalances under this Agreement as required by the General Terms and Conditions of Transporter's Tariff shall survive the other parts of this Agreement until such time as such balancing has been accomplished; provided, however, that Transporter notifies Shipper of such imbalance not later than twelve months after the termination of this Agreement.
- 12.3 This Agreement will terminate automatically upon written notice from Transporter in the event Shipper fails to pay all of the amount of any bill for service rendered by Transporter hereunder in accord with the terms and conditions of Article VIII of the General Terms and Conditions of Transporter's FERC Gas Tariff.

#### ARTICLE XIII

##### NOTICE

Except as otherwise provided in the General Terms and Conditions applicable to this Agreement, any notice under this Agreement shall be in writing and mailed to the address of the Party intended to receive the same, as follows:

TRANSPORTER: Tennessee Gas Pipeline Company, L.L.C.  
1001 Louisiana Street, Suite 1000

Houston, Texas 77002

Attention: Director, Transportation Services

SHIPPER: The Narragansett Electric Company

NOTICES: 100 East Old Country Road  
Hicksville, NY 11801

Attention: Director of FERC Compliance and Contracting

With a copy to: National Grid  
40 Sylvan Road  
Waltham, MA 02451-1120

Attention: Assistant General Counsel and Director, Commercial

BILLING: The Narragansett Electric Company  
100 East Old Country Road  
Hicksville, NY 11801

Attention: Director of FERC Compliance and Contracting

or to such other address as either Party shall designate by formal written notice to the other.

#### ARTICLE XIV

##### ASSIGNMENTS

- 14.1 Either Party may assign or pledge this Agreement and all rights and obligations hereunder under the provisions of any mortgage, deed of trust, indenture, or other instrument which it has executed or may execute hereafter as security for indebtedness. Either Party may, without relieving itself of its obligation under this Agreement, assign any of its rights hereunder to a company with which it is affiliated. Otherwise, Shipper shall not assign this Agreement or any of its rights hereunder, except in accord with Article VI, Section 1 of the General Terms and Conditions of Transporter's FERC Gas Tariff.
- 14.2 Any person which shall succeed by purchase, merger, or consolidation to the properties, substantially as an entirety, of either Party hereto shall be entitled to the rights and shall be subject to the obligations of its predecessor in interest under this Agreement.

#### ARTICLE XV

##### MISCELLANEOUS

- 15.1 THE INTERPRETATION AND PERFORMANCE OF THIS CONTRACT SHALL BE IN ACCORDANCE WITH AND CONTROLLED BY THE LAWS OF THE STATE OF TEXAS, WITHOUT REGARD TO THE DOCTRINES GOVERNING CHOICE OF LAW.
- 15.2 If any provision of this Agreement is declared null and void, or voidable, by a court of competent jurisdiction, then that provision will be considered severable at either Party's option; and if the severability option is exercised, the remaining provisions of the Agreement shall remain in full force and effect.
- 15.3 Unless otherwise expressly provided in this Agreement or Transporter's Gas Tariff, no modification of or supplement to the terms and provisions stated in this Agreement shall be or become effective until Shipper has submitted a request for change through Transporter's Interactive Website and Shipper has been notified through Transporter's Interactive Website of Transporter's agreement to such change.
- 15.4 Exhibits "A" and "B" attached hereto are incorporated herein by reference and made a part hereof for all purposes.

#### ARTICLE XVI

##### TRANSPORTER CONDITIONS PRECEDENT

- 16.1 If Shipper does not provide written notice to Transporter on or before **July 15, 2017** that Shipper has obtained all necessary approvals from its executive management and/or board of directors for the execution of this Agreement (the "**Shipper Approvals**"), then Transporter shall have the right, to be exercised by written notice no later than **July 31, 2017**, to terminate this Agreement without liability to Shipper.
- 16.2 If Shipper does not provide notice to Transporter by **June 15, 2018**, that Shipper has obtained any and all necessary authorizations, including any input, guidance and/or informal or formal approvals and orders or other authorizations or consents as determined to be acceptable by Shipper in its commercially reasonable discretion from the Rhode Island Public Utilities Commission or the Rhode Island Division of Public Utilities and Carriers (collectively, "**Regulator**"), and any other federal, state or local authorities having jurisdiction (collectively, "**Shipper Authorizations**"), to proceed under this Agreement and to recover the costs incurred hereunder, then Transporter shall have the right, to be exercised by written notice by **June 29, 2018**, to terminate this Agreement without liability to Shipper.

#### ARTICLE XVII

##### SHIPPER CONDITIONS PRECEDENT

- 17.1 If Shipper is unable to obtain the Shipper Approvals by **July 1, 2017**, then Shipper shall have the right, to be exercised by written notice no later than **July 15, 2017**, to terminate this Agreement without liability to Transporter.
- 17.2 If Shipper is unable to obtain the necessary Shipper Authorizations by **May 31, 2018**, then Shipper shall have the right, to be exercised by written notice no later than **June 15, 2018**, to terminate this Agreement without liability to Transporter.

#### ARTICLE XVIII

##### ELIMINATION OF NON-CONFORMING PROVISIONS

Upon the satisfaction or waiver of any Condition Precedent to this Agreement, or the completion of any action which causes provisions of this Agreement to be no longer relevant, Transporter and Shipper shall execute an amendment to this Agreement [or a replacement Agreement] with each of such conditions and/or provisions omitted, but with all other terms of this Agreement unchanged.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be duly executed as of the date first hereinabove written.

*Only  
MGS*

TENNESSEE GAS PIPELINE COMPANY, L.L.C.

BY:

*[Handwritten Signature]*  
\_\_\_\_\_  
Agent and Attorney-in-Fact

THE NARRAGANSETT ELECTRIC COMPANY d/b/a NATIONAL GRID

BY:

*[Handwritten Signature]*  
\_\_\_\_\_  
John V. Vaughn  
Authorized Signatory

*arc  
for*

TITLE:

\_\_\_\_\_

DATE:

05/23/2017

GAS TRANSPORTATION AGREEMENT  
(For Use Under FT-A Rate Schedule)

EXHIBIT A  
AMENDMENT NO. 0  
TO GAS TRANSPORTATION AGREEMENT  
DATED November 1, 2018  
BETWEEN  
TENNESSEE GAS PIPELINE COMPANY, L.L.C.  
AND

THE NARRAGANSETT ELECTRIC COMPANY

Amendment Effective Date: November 1, 2018

Service Package: \_\_\_\_\_

Service Package TQ: 20,000 Dth

Beginning Date	Ending Date	TQ
11/1/2018	10/31/2019	5,000
11/1/2019	10/31/2023	10,000
11/1/2023	10/31/2038	20,000

BEGINNING DATE	ENDING DATE	METER	METER NAME	INTERCONNECT PARTY NAME	COUNTY	ST	ZONE	R/D	LEG	METER-TQ
Beginning Date	Ending Date	Meter	Meter Name	Interconnect Party Name	County	ST	Zone	R/D	Leg	Meter-TQ
11/1/2018	10/31/2019	412513	Distrigas	Distrigas	Middlesex	MA	06	R	200	5,000
11/1/2018	10/31/2019	420750	Cranston Sales	Narragansett	Providence	RI	06	D	200	5,000

Total Receipt TQ: 5,000  
Total Delivery TQ: 5,000

Number of Receipt Points: 1  
Number of Delivery Points: 1

Beginning Date	Ending Date	Meter	Meter Name	Interconnect Party Name	County	ST	Zone	R/D	Leg	Meter-TQ
11/1/2019	10/31/2023	412513	Distrigas	Distrigas	Middlesex	MA	06	R	200	10,000
11/1/2019	10/31/2023	420750	Cranston Sales	Narragansett	Providence	RI	06	D	200	10,000

Total Receipt TQ: 10,000  
Total Delivery TQ: 10,000

Number of Receipt Points: 1  
Number of Delivery Points: 1

Beginning Date	Ending Date	Meter	Meter Name	Interconnect Party Name	County	ST	Zone	R/D	Leg	Meter-TQ
11/1/2023	10/31/2038	412513	Distrigas	Distrigas	Middlesex	MA	06	R	200	20,000
11/1/2023	10/31/2038	420750	Cranston Sales	Narragansett	Providence	RI	06	D	200	20,000

Total Receipt TQ: 20,000  
Total Delivery TQ: 20,000

Number of Receipt Points: 1  
Number of Delivery Points: 1

Other Provisions Permitted By Tariff Under the Applicable Rate Schedule and/or General Terms and Conditions and Pursuant to Article XXXVI of the General Terms and Conditions of Tennessee's FERC Gas Tariff:

Note: Exhibit A is a reflection of the contract and all amendments as of the amendment effective date.

GAS TRANSPORTATION AGREEMENT  
(For Use Under FT-A Rate Schedule)  
EXHIBIT B  
TO GAS TRANSPORTATION AGREEMENT  
DATED November 1, 2018  
BETWEEN  
TENNESSEE GAS PIPELINE COMPANY, L.L.C.  
AND

THE NARRAGANSETT ELECTRIC COMPANY

REVENUE REDUCTION OPTION PROVISIONS\*

SERVICE PACKAGE:

OPTION PERIOD(S)                      Not applicable

OPTION DESCRIPTION                      Not applicable

OPTION CONSIDERATION                      Not applicable

ANY LIMITATIONS ON  
THE EXERCISE OF THE  
REVENUE REDUCTION  
OPTION AS BID BY  
THE SHIPPER:                      Not applicable

\* NOTICE MUST BE GIVEN AS PROVIDED FOR IN THE NET PRESENT VALUE STANDARD OF THE GENERAL TERMS AND CONDITIONS.

GAS TRANSPORTATION AGREEMENT  
(For Use Under FT-A Rate Schedule)

THIS AGREEMENT is made and entered into as of the 23 day of May, 2017, by and between TENNESSEE GAS PIPELINE COMPANY, L.L.C., a Delaware limited liability company, hereinafter referred to as "Transporter" and The Narragansett Electric Company, d/b/a National Grid, a Rhode Island corporation, hereinafter referred to as "Shipper." Transporter and Shipper shall collectively be referred to herein as the "Parties."

ARTICLE I

DEFINITIONS

- 1.1 TRANSPORTATION QUANTITY - shall mean the maximum daily quantity of gas which Transporter agrees to receive and transport on a firm basis, subject to Article II herein, for the account of Shipper hereunder on each day during the term hereof, as specified on Exhibit A attached hereto. Any limitations on the quantities to be received from each Point of Receipt and/or delivered to each Point of Delivery shall be as specified on Exhibit A attached hereto.
- 1.2 EQUIVALENT QUANTITY - shall be as defined in Article I of the General Terms and Conditions of Transporter's FERC Gas Tariff.

ARTICLE II

TRANSPORTATION

- 2.1 TRANSPORTATION SERVICE - Transporter agrees to accept and receive daily on a firm basis, at the Point(s) of Receipt from Shipper or for Shipper's account such quantity of gas as Shipper makes available up to the Transportation Quantity, and to deliver to or for the account of Shipper to the Point(s) of Delivery an Equivalent Quantity of gas.

ARTICLE III

POINT(S) OF RECEIPT AND DELIVERY

The Primary Point(s) of Receipt and Delivery shall be those points specified on Exhibit A attached hereto.

ARTICLE IV

All facilities are in place to render the service provided for in this Agreement.

ARTICLE V

QUALITY SPECIFICATIONS AND STANDARDS FOR MEASUREMENT

For all gas received, transported and delivered hereunder the Parties agree to the Quality Specifications and Standards for Measurement as specified in the General Terms and Conditions of Transporter's FERC Gas Tariff Volume No. 1. To the extent that no new measurement facilities are installed to provide service hereunder, measurement operations will continue in the manner in which they have previously been handled. In the event that such facilities are not operated by Transporter or a downstream pipeline, then responsibility for operations shall be deemed to be Shipper's.

ARTICLE VI

RATES AND CHARGES FOR GAS TRANSPORTATION

- 6.1 TRANSPORTATION RATES - Commencing upon the effective date hereof, the rates, charges, and surcharges to be paid by Shipper to Transporter for the transportation service provided herein shall be in accordance with Transporter's Rate Schedule FT-A and the General Terms and Conditions of Transporter's FERC Gas Tariff. Except as provided to the contrary in any written or electronic agreement(s) between Transporter and Shipper in effect during the term of this Agreement, Shipper shall pay Transporter the

applicable maximum rate(s) and all other applicable charges and surcharges specified in the Summary of Rates in Transporter's FERC Gas Tariff and in this Rate Schedule. Transporter and Shipper may agree that a specific discounted rate will apply only to certain volumes under the agreement. Transporter and Shipper may agree that a specified discounted rate will apply only to specified volumes (MDQ, TQ, commodity volumes, Extended Receipt and Delivery Service Volumes or Authorized Overrun volumes) under the Agreement; that a specified discounted rate will apply only if specified volumes are achieved (with the maximum rates applicable to volumes above the specified volumes or to all volumes if the specified volumes are never achieved); that a specified discounted rate will apply only during specified periods of the year or over a specifically defined period of time; that a specified discounted rate will apply only to specified points, zones, markets or other defined geographical area; and/or that a specified discounted rate will apply only to production or reserves committed or dedicated to Transporter. Transporter and Shipper may agree to a specified discounted rate pursuant to the provisions of this Section 6.1 provided that the discounted rate is between the applicable maximum and minimum rates for this service.

In addition, a discount agreement may include a provision that if one rate component which was at or below the applicable Maximum Rate at the time the discount agreement was executed subsequently exceeds the applicable Maximum Rate due to a change in Transporter's Maximum Rates so that such rate component must be adjusted downward to equal the new applicable Maximum Rate, then other rate components may be adjusted upward to achieve the agreed overall rate, as long as none of the resulting rate components exceed the Maximum Rate applicable to that rate component. Such changes to rate components shall be applied prospectively, commencing with the date a Commission Order accepts revised tariff sheet rates. However, nothing contained herein shall be construed to alter a refund obligation under applicable law for any period during which rates that had been charged under a discount agreement exceeded rates which ultimately are found to be just and reasonable.

- 6.2 **INCIDENTAL CHARGES** - Shipper agrees to reimburse Transporter for any filing or similar fees, which have not been previously paid for by Shipper, which Transporter incurs in rendering service hereunder.
- 6.3 **CHANGES IN RATES AND CHARGES** - Shipper agrees that Transporter shall have the unilateral right to file with the appropriate regulatory authority and make effective changes in (a) the rates and charges applicable to service pursuant to Transporter's Rate Schedule FT-A, (b) the rate schedule(s) pursuant to which service hereunder is rendered, or (c) any provision of the General Terms and Conditions applicable to those rate schedules. Transporter agrees that Shipper may protest or contest the aforementioned filings, or may seek authorization from duly constituted regulatory authorities for such adjustment of Transporter's existing FERC Gas Tariff as may be found necessary to assure Transporter just and reasonable rates.

#### ARTICLE VII

##### BILLINGS AND PAYMENTS

Transporter shall bill and Shipper shall pay all rates and charges in accordance with Articles VII and VIII, respectively, of the General Terms and Conditions of the FERC Gas Tariff.

#### ARTICLE VIII

##### GENERAL TERMS AND CONDITIONS

This Agreement shall be subject to the effective provisions of Transporter's Rate Schedule FT-A and to the General Terms and Conditions incorporated therein, as the same may be changed or superseded from time to time in accordance with the rules and regulations of the FERC.

#### ARTICLE IX

##### REGULATION

- 9.1 This Agreement shall be subject to all applicable and lawful governmental statutes, orders, rules and regulations and is contingent upon the receipt and continuation of all necessary regulatory approvals or authorizations upon terms acceptable to Transporter. This Agreement shall be void and of no force and effect if any necessary regulatory approval is not so obtained or continued. All Parties hereto shall cooperate to obtain or continue all necessary approvals or authorizations, but no Party shall be liable to any other Party for failure to obtain or continue such approvals or authorizations.

- 9.2 The transportation service described herein shall be provided subject to Subpart G, Part 284 of the FERC Regulations.

#### ARTICLE X

##### RESPONSIBILITY DURING TRANSPORTATION

Except as herein specified, the responsibility for gas during transportation shall be as stated in the General Terms and Conditions of Transporter's FERC Gas Tariff Volume No. 1.

#### ARTICLE XI

##### WARRANTIES

- 11.1 In addition to the warranties set forth in Article XI of the General Terms and Conditions of Transporter's FERC Gas Tariff, Shipper warrants the following:
- (a) Shipper warrants that all upstream and downstream transportation arrangements are in place, or will be in place as of the requested effective date of service, and that it has advised the upstream and downstream transporters of the receipt and delivery points under this Agreement and any quantity limitations for each point as specified on Exhibit "A" attached hereto. Shipper agrees to indemnify and hold Transporter harmless for refusal to transport gas hereunder in the event any upstream or downstream transporter fails to receive or deliver gas as contemplated by this Agreement.
  - (b) Shipper agrees to indemnify and hold Transporter harmless from all suits, actions, debts, accounts, damages, costs, losses and expenses (including reasonable attorney's fees) arising from or out of breach of any warranty by Shipper herein.
- 11.2 Transporter shall not be obligated to provide or continue service hereunder in the event of any breach of warranty.

#### ARTICLE XII

##### TERM

- 12.1 This Agreement shall be effective as of November 1, 2018, and shall remain in force and effect, unless modified as per Exhibit B, until the expiration of twenty (20) years ("Primary Term") and on a month to month basis thereafter unless terminated by either Party upon at least thirty (30) days prior written notice to the other Party; provided, however, that if the Primary Term is less than one year, then notice of termination may be provided via Transporter's Interactive Website; provided further, that if the Primary Term is one year or more, then any rights to Shipper's extension of this Agreement after the Primary Term shall be governed by Article V, Section 4 of the General Terms and Conditions of Transporter's FERC Gas Tariff; and provided further, that if the FERC or other governmental body having jurisdiction over the service rendered pursuant to this Agreement authorizes abandonment of such service, this Agreement shall terminate on the abandonment date permitted by the FERC or such other governmental body.
- 12.2 Any portions of this Agreement necessary to resolve or cash out imbalances under this Agreement as required by the General Terms and Conditions of Transporter's Tariff shall survive the other parts of this Agreement until such time as such balancing has been accomplished; provided, however, that Transporter notifies Shipper of such imbalance not later than twelve months after the termination of this Agreement.
- 12.3 This Agreement will terminate automatically upon written notice from Transporter in the event Shipper fails to pay all of the amount of any bill for service rendered by Transporter hereunder in accord with the terms and conditions of Article VIII of the General Terms and Conditions of Transporter's FERC Gas Tariff.

#### ARTICLE XIII

##### NOTICE

Except as otherwise provided in the General Terms and Conditions applicable to this Agreement, any notice under this Agreement shall be in writing and mailed to the address of the Party intended to receive the same, as follows:

TRANSPORTER: Tennessee Gas Pipeline Company, L.L.C.  
1001 Louisiana Street, Suite 1000

Houston, Texas 77002

Attention: Director, Transportation Services

SHIPPER: The Narragansett Electric Company

NOTICES: 100 East Old Country Road  
Hicksville, NY 11801

Attention: Director of FERC Compliance and Contracting

With a copy to: National Grid  
40 Sylvan Road  
Waltham, MA 02451-1120

Attention: Assistant General Counsel and Director, Commercial

BILLING: The Narragansett Electric Company  
100 East Old Country Road  
Hicksville, NY 11801

Attention: Director of FERC Compliance and Contracting

or to such other address as either Party shall designate by formal written notice to the other.

#### ARTICLE XIV

##### ASSIGNMENTS

- 14.1 Either Party may assign or pledge this Agreement and all rights and obligations hereunder under the provisions of any mortgage, deed of trust, indenture, or other instrument which it has executed or may execute hereafter as security for indebtedness. Either Party may, without relieving itself of its obligation under this Agreement, assign any of its rights hereunder to a company with which it is affiliated. Otherwise, Shipper shall not assign this Agreement or any of its rights hereunder, except in accord with Article VI, Section 1 of the General Terms and Conditions of Transporter's FERC Gas Tariff.
- 14.2 Any person which shall succeed by purchase, merger, or consolidation to the properties, substantially as an entirety, of either Party hereto shall be entitled to the rights and shall be subject to the obligations of its predecessor in interest under this Agreement.

#### ARTICLE XV

##### MISCELLANEOUS

- 15.1 THE INTERPRETATION AND PERFORMANCE OF THIS CONTRACT SHALL BE IN ACCORDANCE WITH AND CONTROLLED BY THE LAWS OF THE STATE OF TEXAS, WITHOUT REGARD TO THE DOCTRINES GOVERNING CHOICE OF LAW.
- 15.2 If any provision of this Agreement is declared null and void, or voidable, by a court of competent jurisdiction, then that provision will be considered severable at either Party's option; and if the severability option is exercised, the remaining provisions of the Agreement shall remain in full force and effect.
- 15.3 Unless otherwise expressly provided in this Agreement or Transporter's Gas Tariff, no modification of or supplement to the terms and provisions stated in this Agreement shall be or become effective until Shipper has submitted a request for change through Transporter's Interactive Website and Shipper has been notified through Transporter's Interactive Website of Transporter's agreement to such change.
- 15.4 Exhibits "A" and "B" attached hereto are incorporated herein by reference and made a part hereof for all purposes.

#### ARTICLE XVI

##### TRANSPORTER CONDITIONS PRECEDENT

- 16.1 If Shipper does not provide written notice to Transporter on or before **July 15, 2017** that Shipper has obtained all necessary approvals from its executive management and/or board of directors for the execution of this Agreement (the "**Shipper Approvals**"), then Transporter shall have the right, to be exercised by written notice no later than **July 31, 2017**, to terminate this Agreement without liability to Shipper.
- 16.2 If Shipper does not provide notice to Transporter by **June 15, 2018**, that Shipper has obtained any and all necessary authorizations, including any input, guidance and/or informal or formal approvals and orders or other authorizations or consents as determined to be acceptable by Shipper in its commercially reasonable discretion from the Rhode Island Public Utilities Commission or the Rhode Island Division of Public Utilities and Carriers (collectively, "**Regulator**"), and any other federal, state or local authorities having jurisdiction (collectively, "**Shipper Authorizations**"), to proceed under this Agreement and to recover the costs incurred hereunder, then Transporter shall have the right, to be exercised by written notice by **June 29, 2018**, to terminate this Agreement without liability to Shipper.

#### ARTICLE XVII

##### SHIPPER CONDITIONS PRECEDENT

- 17.1 If Shipper is unable to obtain the Shipper Approvals by **July 1, 2017**, then Shipper shall have the right, to be exercised by written notice no later than **July 15, 2017**, to terminate this Agreement without liability to Transporter.
- 17.2 If Shipper is unable to obtain the necessary Shipper Authorizations by **May 31, 2018**, then Shipper shall have the right, to be exercised by written notice no later than **June 15, 2018**, to terminate this Agreement without liability to Transporter.

#### ARTICLE XVIII

##### ELIMINATION OF NON-CONFORMING PROVISIONS

Upon the satisfaction or waiver of any Condition Precedent to this Agreement, or the completion of any action which causes provisions of this Agreement to be no longer relevant, Transporter and Shipper shall execute an amendment to this Agreement [or a replacement Agreement] with each of such conditions and/or provisions omitted, but with all other terms of this Agreement unchanged.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be duly executed as of the date first hereinabove written.

TENNESSEE GAS PIPELINE COMPANY, L.L.C.

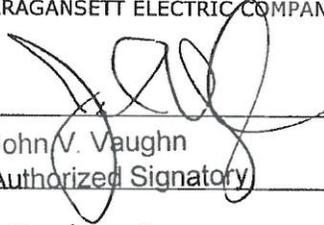
REJ  
M65

BY:

  
\_\_\_\_\_  
Agent and Attorney-in-Fact

THE NARRAGANSETT ELECTRIC COMPANY d/b/a NATIONAL GRID

BY:

  
\_\_\_\_\_  
John V. Vaughn

ccc  
or

TITLE: Authorized Signatory

DATE: 05/23/2017

GAS TRANSPORTATION AGREEMENT  
(For Use Under FT-A Rate Schedule)

EXHIBIT A  
AMENDMENT NO. 0  
TO GAS TRANSPORTATION AGREEMENT  
DATED November 1, 2018  
BETWEEN  
TENNESSEE GAS PIPELINE COMPANY, L.L.C.  
AND

THE NARRAGANSETT ELECTRIC COMPANY

Amendment Effective Date: November 1, 2018

Service Package: \_\_\_\_\_

Service Package TQ: 24,000 Dth

Beginning Date	Ending Date	TQ
11/1/2018	10/31/2038	24,000

BEGINNING DATE	ENDING DATE	METER	METER NAME	INTERCONNECT PARTY NAME	COUNTY	ST	ZONE	R/D	LEG	METER-TQ
11/1/2018	10/31/2038	412538	Dracut	Maritimes	Middlesex	MA	06	R	200	14,000
11/1/2018	10/31/2038	412513	Distrigas	Distrigas	Middlesex	MA	06	R	200	10,000
11/1/2018	10/31/2038	420758	Lincoln	Narragansett	Providence	RI	06	D	200	24,000

Total Receipt TQ: 24,000  
Total Delivery TQ: 24,000

Number of Receipt Points: 2

Number of Delivery Points: 1

Other Provisions Permitted By Tariff Under the Applicable Rate Schedule and/or General Terms and Conditions and Pursuant to Article XXXVI of the General Terms and Conditions of Tennessee's FERC Gas Tariff:

Note: Exhibit A is a reflection of the contract and all amendments as of the amendment effective date.

GAS TRANSPORTATION AGREEMENT  
(For Use Under FT-A Rate Schedule)  
EXHIBIT B  
TO GAS TRANSPORTATION AGREEMENT  
DATED November 1, 2018  
BETWEEN  
TENNESSEE GAS PIPELINE COMPANY, L.L.C.  
AND  
THE NARRAGANSETT ELECTRIC COMPANY

REVENUE REDUCTION OPTION PROVISIONS\*

SERVICE PACKAGE:

OPTION PERIOD(S) Not applicable

OPTION DESCRIPTION Not applicable

OPTION CONSIDERATION Not applicable

ANY LIMITATIONS ON  
THE EXERCISE OF THE  
REVENUE REDUCTION  
OPTION AS BID BY  
THE SHIPPER:

Not applicable

\* NOTICE MUST BE GIVEN AS PROVIDED FOR IN THE NET PRESENT VALUE STANDARD OF THE GENERAL TERMS AND CONDITIONS.

The Narragansett Electric Company  
d/b/a National Grid  
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Attachment DIV 1-4-3

**REDACTED**

The Narragansett Electric Company  
d/b/a National Grid  
RIPUC Docket No. 4816  
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For the Forecast Period 2017/18 to 2026/27  
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Division 1-5

Request:

With respect to Section *IV.C.10. Long-Term Cumberland Solution* in the Company's March 30, 2018 Long-Range Plan, please detail the status of the Company's efforts to pursue each of the options described in Section *IV.C.10. Long-Term Cumberland Solution*.

Response:

As of August 8, 2018, the Company is still working on the plans for a permanent solution to address the capacity needs in Northern Rhode Island. The Company has identified several potential options to replace the output previously provided by the liquefied natural gas (LNG) tank in Cumberland. Although rebuilding the LNG tank is improbable (see the Company's response to Division 1-20), this is one of the options currently being developed for cost comparison purposes. The other potential options require a combination of on-system project work and upstream pipeline project work. The Company has had discussions for these options with Tennessee Gas Pipeline Company, L.L.C. (Tennessee) and Enbridge Energy (see the Company's response to Division 1-21 for more details).

On November 30, 2017, the Company submitted to the Division of Public Utilities and Carriers (Division) the following firm gas transportation agreements for review and support prior to May 31, 2018: (1) two long term gas transportation agreements between National Grid and Tennessee to deliver an additional 44,000 dekatherms (Dth) per day to existing into Rhode Island citygates in Cranston and Lincoln; and (2) one precedent agreement with Portland Natural Gas Transmission System (Portland). Collectively, the Tennessee and Portland agreements are necessary for the Company to secure long term access to gas supplies to replace the lost capacity from the cancellation of the Tennessee Northeast Energy Direct (NED) Project and the decommissioning of the Company's Cumberland LNG tank. Specifically, one of the agreements between the Company and Tennessee, with capacity of 24,000 Dth per day, represents a continuation of the existing 24,000 Dth per day of capacity that the Company originally contracted for in November 2016 after the Company took the Cumberland LNG tank out of service.

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In the summer of 2016, the Company secured an incremental 24,000 Dth per day of pipeline capacity from Tennessee for the period of November 1, 2016 through October 31, 2017 from Dracut to its citygate in Lincoln. Because such capacity was, at that time, reserved as part of the NED Project, the Company negotiated the term of the capacity for one year, but maintained a "right of first refusal" on the capacity for an additional year. The Company exercised its right of first refusal for the period of November 1, 2017 through October 31, 2018. Now, Tennessee has offered the Company to acquire such capacity for a 20-year term beginning November 1, 2018, with primary receipts allocated between Dracut (14,000 Dth per day) and Everett (10,000 Dth per day) and primary delivery to the Lincoln citygate. This capacity of 24,000 Dth per day represents part of the long-term solution, in combination with the future options discussed in more detail in the Company's response to Division 1-21.

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Division 1-6

Request:

With respect to Section *IV.C.10. Long-Term Cumberland Solution* in the Company's March 30, 2018 Long-Range Plan, please:

- a. Provide the status of the referenced analysis of the effects of the Customer Choice Program on distribution system reliability, and
- b. Explain and document the basis for any conclusions, preliminary or otherwise, the Company has reached regarding the effects of the Customer Choice on distribution system reliability in its Rhode Island service territory?

Response:

- a. In the spring of 2018, following the cold winter of 2017/18, the Company formed a Rhode Island Supply Needs Working Group with representatives from various departments (Customer Choice, Gas Control, Gas Asset Management and Gas Supply Planning) to conduct a review of the effect of the Customer Choice Program on distribution system reliability. The working group met to review distribution system operations and gas flows during periods of high demand. Specifically, the working group reviewed take station capacities and gas deliveries (both Company and marketer) versus gas demand (both modeled and actual). The Company wants to ensure that Customer Choice releases are appropriate to their load and that deliveries are geographically-appropriate. In addition, the Company is also reviewing the impact of capacity exempt customers. Preliminary findings are that there are certain areas of the distribution system where deliveries are not properly matched to the loads in those areas.
- b. Please refer to part (a) above regarding the Company's preliminary findings. After the working group completes its review, the Company will provide its conclusions regarding the effects of the Customer Program on distribution reliability.

**Redacted**  
Division 1-7

Request:

Section “*IV.D.1. The Base Design Year Forecast*” contains the following statement: “Over the Base Case design heating season shown in Chart IV-C-1 (page 2 of 18), the Company’s forecasted customer requirements over and above its transportation, underground storage, and LNG resource deliverability to the Company’s citygate ranges between 1,243 BBtu in 2018/19 and 762 BBtu in 2026/27 per year, which needs to be met by incremental capacity, citygate delivered purchases, and/or incremental LNG resources.” (underline added for emphasis) With respect to that statement regarding the Company’s Base Design Year Forecast, please:

- a. Detail the Company’s plan for meeting these Base Design Year supply and capacity needs for each year of the LRP through:
  - i. Incremental capacity,
  - ii. Citygate delivered purchases,
  - iii. Incremental LNG resources.
- b. For each year of the LRP, document through the provision of workpapers (including electronic spreadsheet files with all cell formulas intact) the Company’s assessment of the Fixed and Variable costs associated with the meeting the identified Base Design Year supply and capacity needs through:
  - i. Incremental capacity,
  - ii. Citygate delivered purchases,
  - iii. Incremental LNG resources.

Response:

- a.
  - i. The Company is looking into potential future pipeline projects that would provide incremental deliveries to the Company’s Rhode Island citygates from both Tennessee Gas Pipeline (Tennessee) and Algonquin Gas Transmission Company (Algonquin). The discussions are quite preliminary. In addition, the Company is determining whether or not the acceleration of volumes under the upcoming Tennessee contract with a receipt point at Everett, MA is a viable option.

**Redacted**  
Division 1-7, page 2

- ii. The Company issued a Request for Proposals (RFP) for a winter (December 2018 – March 2019) citygate supply. Bids were due back on August 3, 2018, and the Company is currently reviewing the bids.
  - iii. The Company will be seeking a winter liquefied natural gas (LNG) refill contract for 2018-19. In addition, should the acceleration of the Tennessee contract go forward, the Company would need to arrange for a call on additional LNG volumes at Everett, MA.
- b. The Company does not have a forecast for costs for these projects. The costs below are based on historical rates.
- i. The Company's most recent pipeline capacity agreements, which commence on November 1, 2018, include the Portland Natural Gas Transmission (Portland) and Tennessee agreements. The estimated reservation rate of \$[REDACTED] per dekatherm to the citygate includes the entire pipeline path; Union, TransCanada, and Tennessee.
  - ii. Last winter (2017-18), the Company did not have a need for a citygate delivered supply prior to the start of the peak season. However, based on transactions entered into by the Company's Massachusetts affiliate last winter, the reservation charge per dekatherm ranges from \$[REDACTED] and \$[REDACTED]. The commodity price is typically a Gas Daily Index at Tennessee Zone 6 or Algonquin Citygate.
  - iii. Prior to the start of last winter, The Narragansett Electric Company did have a winter LNG refill agreement. The reservation charge is per dekatherm. The Company also has a [REDACTED] year peak season supply agreement with ENGIE at Everett, MA. The reservation charge ranges from \$[REDACTED] to \$[REDACTED] per dekatherm.

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Division 1-8

Request:

Section “***IV.D.2. Cold Snap Analysis***” contains the following statement: “For the cold snap heating season shown in Chart IV-C-1 (page 15 of 18), the Company’s forecasted customer requirements over and above its transportation, underground storage, and LNG resource deliverability to the Company’s citygate ranges between 1,226 BBtu in 2018/19 and 825 BBtu in 2026/27 per year, which needs to be met by incremental capacity, citygate delivered purchases, and/or incremental LNG resources.” (underline added for emphasis) With respect to that statement regarding the Company’s Cold Snap Analysis, please:

- a. Detail the Company’s plan for meeting the identified supply and capacity needs for each year of the LRP through:
  - i. Incremental capacity,
  - ii. Citygate delivered purchases,
  - iii. Incremental LNG resources.
  
- b. For each year of the LRP, document through the provision of workpapers (including electronic spreadsheet files with all cell formulas intact) the Company’s assessment of the Fixed and Variable costs associated with the meeting the identified Cold Snap supply and capacity needs through:
  - i. Incremental capacity,
  - ii. Citygate delivered purchases,
  - iii. Incremental LNG resources.

Response:

Please see the Company’s response to Division 1-7.

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Division 1-9

Request:

Section “*IV.D.2. Cold Snap* Analysis” contains the following statement: “For the cold snap heating season shown in Chart IV-C-1 (page 15 of 18), the Company’s forecasted customer requirements over and above its transportation, underground storage, and LNG resource deliverability to the Company’s citygate ranges between 1,226 BBtu in 2018/19 and 825 BBtu in 2026/27 per year, which needs to be met by incremental capacity, citygate delivered purchases, and/or incremental LNG resources.” (underline added for emphasis) Does the Company have a concrete plan for meeting this need through the incremental capacity, citygate delivered purchases, and/or incremental LNG resources? If so, please describe. If not, please explain why not.

Response:

Please see the Company’s response to Division 1-7.

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Division 1-10

Request:

Referring to Commission Docket 4755 and the proposal for the addition of a Combined Heat and Power generation facility at the Navy site in Newport, please:

- a. Explain the extent to which the CHP project as proposed would affect any of the material conclusions in the Long-Range Plan, including without limitation the impact on the forecasted need for incremental capacity, citygate purchases, and/or incremental LNG resources for the Base Case design heating season and the cold snap heating season.
- b. Provide the Company's forecasted Peak Day demands for the Portsmouth Gate Station, Newport, and the Aquidneck Island area with and without the addition of the proposed Navy CHP project.
- c. Provide the Company's assessment of the impacts of the Navy CHP project on forecasted Peak Day natural gas capacity and supply requirements for the Portsmouth Gate Station, Newport, and the Aquidneck Island area.
- d. Provide the Company's assessment of the costs of incremental peak day supply for the Portsmouth Gate Station, Newport, and the Aquidneck Island area.
- e. Provide the Company's assessment of the costs of incremental pipeline capacity for the Portsmouth Gate Station, Newport, and the Aquidneck Island area.
- f. Indicate whether the Company still maintains the ability to utilize trucked LNG to Newport on peak days, and if not, provide the Company's best estimates of the costs of re-establishing such capabilities.

Response:

- a. The Company does not anticipate that the Combined Heat and Power (CHP) project at the Navy site in Newport would affect any of the material conclusions in the Long-Range Plan, so long as the Navy agrees to cease CHP equipment operation on days on which weather conditions are colder than 52 heating degree days (HDD) (an average of 3.4 days per year). The Company currently is negotiating with the Navy and is optimistic that it will agree to this requirement. If the Navy and the Company are not able to reach agreement on this requirement, then the Navy and the Company will explore other options for the project, but in no event will the Company procure additional interstate

Division 1-10, page 2

pipeline capacity, citygate purchases, and/or liquefied natural gas (LNG) resources for the project. As such, the Company does not estimate any impact on the material conclusions in the Long-Range Plan as a result of the Navy CHP project.

- b. The Company does not anticipate a change in the forecasted peak day demands for the Portsmouth Gate Station, Newport, and the Aquidneck Island area, so long as the Navy agrees to cease CHP equipment operation on days on which weather conditions are colder than 52 HDD. The Company currently is negotiating with the Navy and is optimistic that it will agree to this requirement. If the Navy and the Company are not able to reach agreement on this requirement, then the Navy and the Company will explore other options for the project, but in no event will the Company procure additional peak day supplies to the Portsmouth Gate Station, Newport, and the Aquidneck Island area for the project. As such, the Company does not estimate any change in the forecasted peak day demands for the Portsmouth Gate Station, Newport, and the Aquidneck Island area as a result of the Navy CHP project..
- c. The Company does not anticipate an impact of the Navy CHP project on forecasted peak day natural gas capacity and supply requirements for the Portsmouth Gate Station, Newport, and the Aquidneck Island area, so long as the Navy agrees to cease CHP equipment operation on days on which weather conditions are colder than 52 HDD. The Company currently is negotiating with the Navy and is optimistic that it will agree to this requirement. If the Navy and the Company are not able to reach agreement on this requirement, then they Navy and the Company will explore other options for the project, but in no event will the Company procure additional peak day supplies to the Portsmouth Gate Station, Newport, and the Aquidneck Island area for the project. As such, the Company does not estimate any impact on forecasted peak day natural gas capacity and supply requirements for the Portsmouth Gate Station, Newport, and Aquidneck Island area as a result of the Navy CHP project.

Division 1-10, page 3

- d. The Company does not anticipate the need to procure incremental peak day supplies to the Portsmouth Gate Station, Newport, and the Aquidneck Island area so long as the Navy agrees to cease CHP equipment operation on days on which weather conditions are colder than 52 HDD. The Company currently is negotiating with the Navy and is optimistic that it will agree to this requirement. If the Navy and the Company are not able to reach agreement on this requirement, then the Navy and the Company will explore other options for the project, but in no event will the Company procure additional peak day supplies to the Portsmouth Gate Station, Newport, and the Aquidneck Island area for the project. As such, the Company does not estimate any associated costs as a result of the Navy CHP project.
- e. The Company does not anticipate the need to procure incremental pipeline capacity to the Portsmouth Gate Station, Newport, and the Aquidneck Island area so long as the Navy agrees to cease CHP equipment operation on days on which weather conditions are colder than 52 HDD. The Company currently is negotiating with the Navy and is optimistic that it will agree to this requirement. If the Navy and the Company are not able to reach agreement on this requirement, then the Navy and the Company will explore other options for the project, but in no event will the Company procure additional pipeline capacity to the Portsmouth Gate Station, Newport, and the Aquidneck Island area for the project. As such, the Company does not estimate any associated costs as a result of the Navy CHP project.
- f. The existing LNG equipment at the Naval Base is not operational due to the condition of the equipment. As a result of concerns over the ability to access the Naval Base to utilize to the LNG equipment when needed (e.g., change in Naval Base security level, special events on the Naval Base), the Company has started the process of establishing a permanent portable LNG site at the Old Mill Lane Gate Station in Portsmouth. The portable LNG site in Portsmouth is anticipated to be capable of operating during the winter of 2018/19, but it will take two to three years to make the site permanent.

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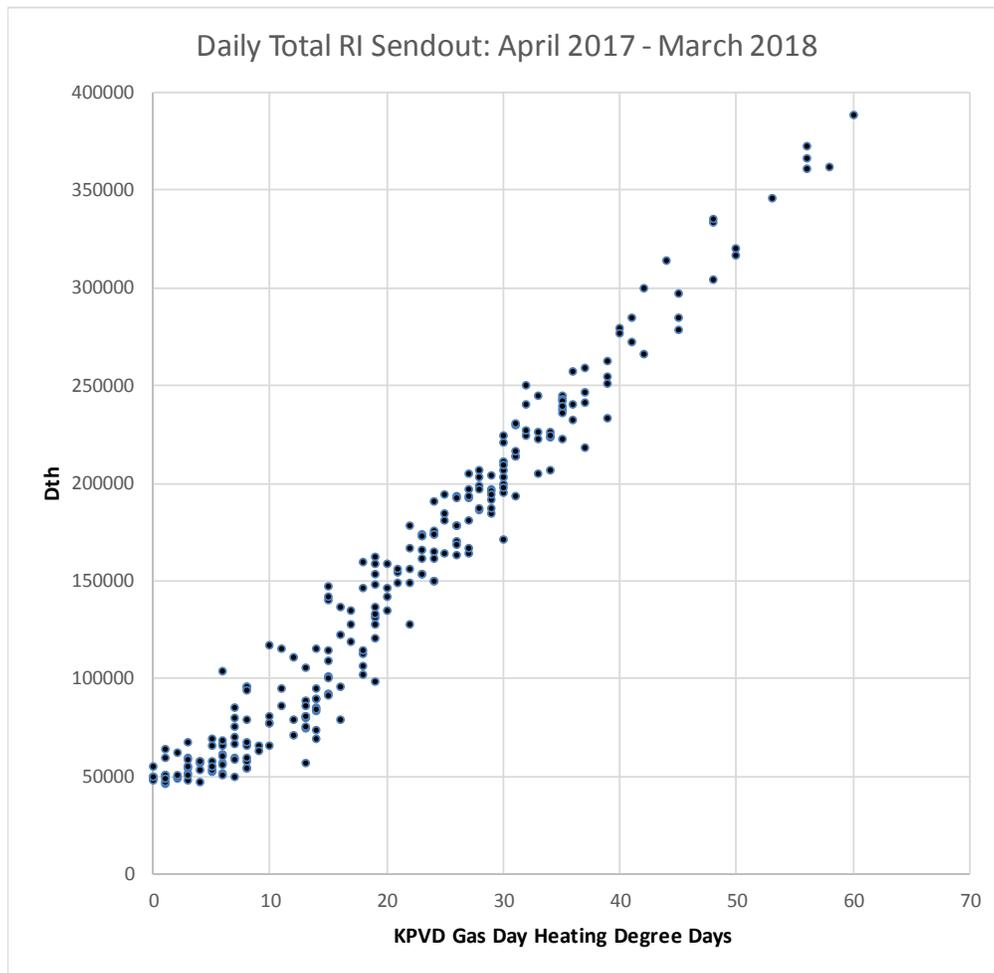
Division 1-11

Request:

With respect to Chart II-C-1 in the March 30, 2018 LRP, please provide a comparable graph for the Company's fiscal year ended March 30, 2018.

Response:

The April 2017 through March 2018 chart comparable to Chart III-C-1 in the Company's March 30, 2018 filing is shown below.



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Division 1-12

Request:

With respect to Chart III-E-1 in the March 30, 2018 LRP, please:

- a. Provide the workpapers, data, analyses, and assumptions upon which the Company has relied to assess the “Cumulative Probability of Occurrence (p)” for each HDD level shown.
- b. If the Company assumes that HDDs are normally distributed around the computed mean value, provide the workpapers, data, analyses, and assumptions upon which the Company has relied to assess the distribution of actual Peak Day HDD measures have the characteristics of a normally distributed variable.
- c. Given that the Company’s planning is based on being able to meet its Design Peak Day requirements, please document and explain the analyses and rationales upon which the Company relies to measure the probability of a shortage on its Mean Peak Day.
- d. Identify each historical year (on a planning year basis) for which the Company actually experienced a shortfall of supply on its Annual Peak Day, provide:
  - i. Provide the HDDs associated with the Annual Peak Day for each year identified;
  - ii. Provide the magnitude of the MMBtu shortfall experienced.
- e. Identify each historical year (on a planning year basis) for which the Company actually experienced a weather-related supply shortfall on a day for which its record degree days were below its Design Peak Day HDDs.
  - i. Provide the HDDs associated for each day on which such a supply shortfall was experience;
  - ii. Provide the magnitude of the MMBtu shortfall for each day on which such a supply shortfall was reported.

Response:

- a. In Chart III-E-1 in the Company’s Long-Range Plan filing, the column labeled “Cumulative Probability of Occurrence (p)” contains the Excel NORMDIST function for calculating the probability of the peak day being at or less than the “HDD [heating

Prepared by or under the supervision of: Theodore E. Poe, Jr. and Elizabeth D. Arangio

Division 1-12, page 2

degree day] Level" value based on the mean peak day and standard deviation of peak day listed in the chart, assuming normal distribution.

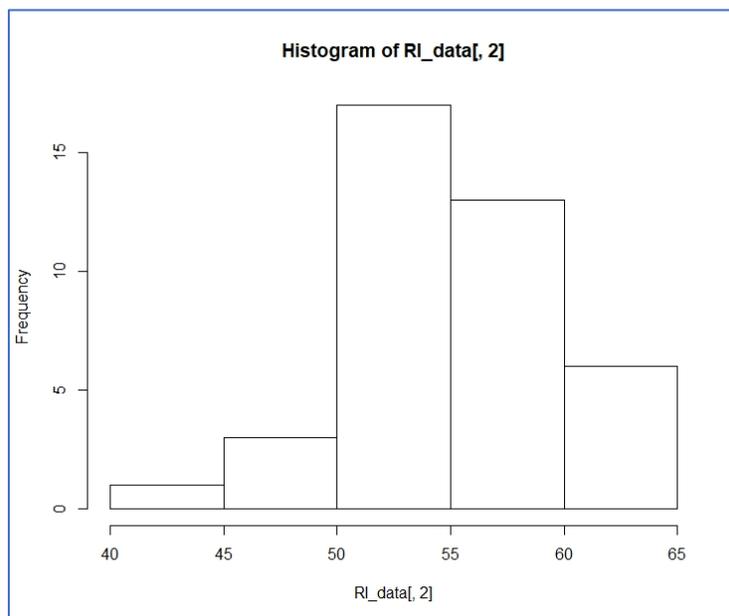
- b. In previous Long-Range Plan filings, the Company had used the coldest day in each of the most recent 40 years to determine the mean and standard deviation statistics for its design day distribution. In reviewing the data for the current filing, the Company noted that the distribution was considered normally-distributed based on the Shapiro-Wilk test ( $p\text{-value} > 0.05$ ):

Shapiro-Wilk normality test

```
data: RI_data[, 2]
```

```
W = 0.96664, p-value = 0.2803
```

However, the data was becoming more skewed, as seen in the histogram in Figure 1 below and the normal Q-Q plot in Figure 2 below.



Division 1-12, page 3

Figure 1

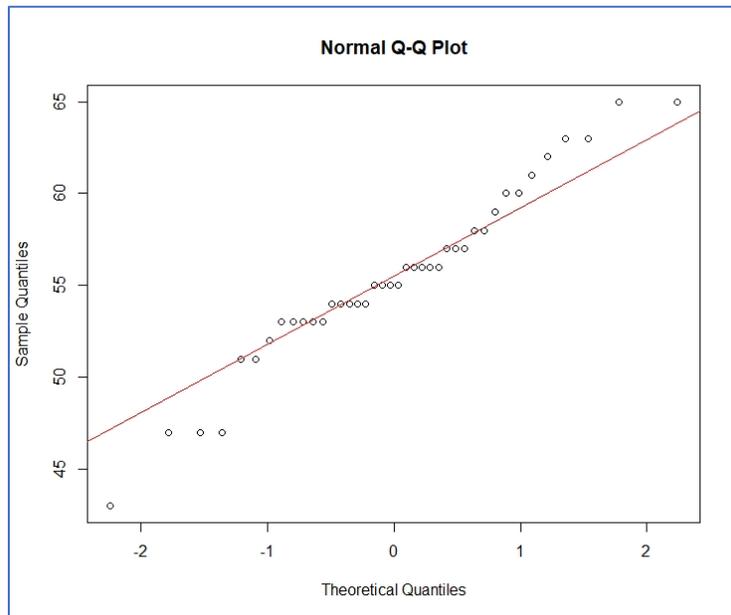


Figure 2

As noted in the Company's Long-Range Plan filing, the Company used recorded daily HDD values based on 6,040 observations at the T.F. Green weather site for the November through March periods of 1977/78 through 2016/17. Using its new methodology, the Company found that the 6,040 data points had a mean of 55.00 HDD and a standard deviation of 6.13 HDD.

The Shapiro-Wilk test for normality cannot be used for data sets with more than 5,000 observations because, for large amounts of data, even very small deviations from normality can be detected, leading to rejection of the null hypothesis even though for practical purposes the data is essentially normal. The Company did use the Kolmogorov-Smirnov test on its data and found that it also rejected normality:

Division 1-12, page 4

```
One-sample Kolmogorov-Smirnov test  
data: RI_data[, 4]  
D = 0.99897, p-value < 2.2e-16  
alternative hypothesis: two-sided
```

Examining the normal Q-Q plot (Figure 3 below), the Company accepted the data as normally distributed.

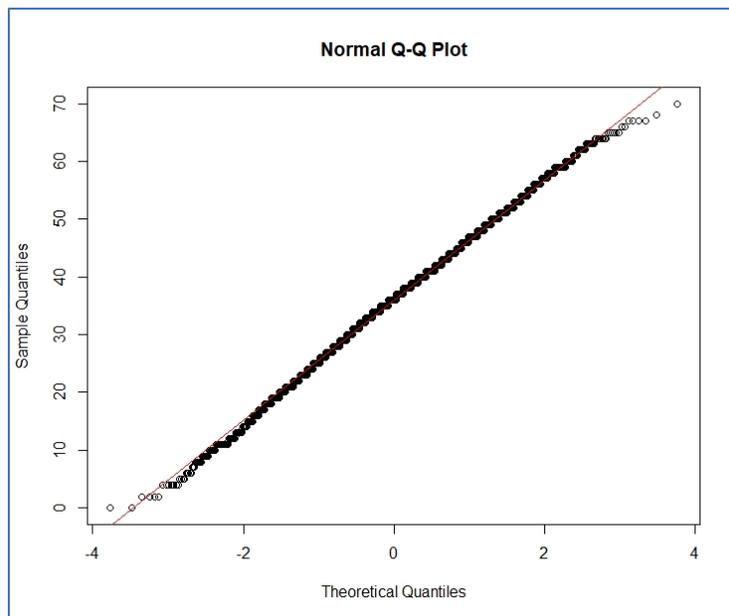


Figure 3

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- c. The Company's analyses and methodology for measuring the probability of a supply resource shortfall on a design day are documented in Section III.E.2.a. of the Company's Long-Range Plan filing. The Company's cost/benefit analysis of its design day standard measures the cost of holding a basket of resource capacity to meet its customers' one-day resource needs with the benefit of avoiding the probability-weighted economic damages that would ensue. The Company assumes that, given it is a one-day event, there would be insufficient time to arrange for additional citygate resources or that such additional resources would not be available.
- d. The Company has not experienced a shortfall of supply resources on its annual peak day.
- e. The Company has not experienced a weather-related supply shortfall on a day for which its actual degree days were below its design peak day HDDs.

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Division 1-13

Request:

With respect to Chart III-E-2 in the March 30, 2018 LRP, please:

- a. Provide the workpapers, data, analyses, assumptions (as well as source documents) upon which the Company has relied to estimate “**Relight Costs**” per customer, and if the source data is not based on actual Rhode Island experience document the Company’s efforts to verify the applicability to Rhode Island of the data used, as well as any and all adjustments to data from another jurisdiction or other jurisdictions upon which the Company has relied.
- b. Provide the workpapers, data, analyses, assumptions (as well as source documents) upon which the Company has relied to estimate “**Freeze-Up Damages**” per customer. Also:
  - i. Explain why (as noted Section III.E.2.a of the March 30, 2018 LRP) the Company has chosen to rely on a **ten year old** estimate from Marsh & McLennan basis for its “**Freeze-Up Damages**” cost estimate.
  - ii. Provide the analyses upon which the Company has relied to assess the representativeness of that Marsh & McLennan estimate to reflect current remodeling costs for Rhode Island customers.
  - iii. Document and explain the composition of the data base from which the 2008 Marsh & McLennan average was derived with particular sensitivity to the region of the U.S. from which Marsh & McLennan derived the data base from which the 2008 value was computed.
- c. Explain why the Company’s estimate of “**Relight Costs**” per customer in 2016 dollars of \$1,069.00 in its March 30, 2018 LRP is identical to the “**Relight Costs**” per customer in 2014 dollars assumed in Chart II-E-2 in the Company’s 2016 LRP.
- d. Provide the workpapers, data, analyses, and assumptions upon which the Company has relied to adjust its estimate of “**Freeze-Up Damages**” per customer from \$41,794.39 in 2014 dollars in the Company’s 2016 LRP, Chart III-E-2, to \$44,785.05 per customer in 2016 dollars in its March 30, 2018 LRP.

Division 1-13, page 2

Response:

- a. The Company's estimate of relight costs per customer is part of the Company's capital sanctioning analysis related to its fiscal year (FY) 2019 Gas System Reinforcement Program in Rhode Island. Please refer to Attachment DIV 1-13-1 for a copy of the Company's analysis of its estimated relight costs per customer. In particular, the relight cost estimate is derived from two outages Rhode Island (Tiverton and Westerly), as well as two outages in geographically-close areas of Long Island (Glen Cove and Cutchogue).
- b.i. The Company uses its Marsh & McLennan study as the basis for its "Freeze-Up Damages" cost estimate and adjusts its results with the most recent (2014) U.S. Construction Price Deflator. The Marsh & McLennan study is the Company's most recent study of freeze-up damages associated with loss of supply to customers' homes and facilities.
- b.ii. Because loss of supply to customers' homes and facilities and the associated freeze-up damages occurs so infrequently, the Company had requested Marsh & McLennan to include structures within the Company's New England service territories.
- b.iii. The Company does not have information on the Marsh & McLennan database from which Marsh & McLennan's data was derived.
- c. The Company's estimate of relight costs has not changed in current dollars.
- d. The "Freeze-Up Damages" per customer of \$41,794.39 in 2014 dollars in the Company's 2016 Gas Long-Range Resource and Requirements Plan (Long-Range Plan) for 2015/16 to 2024/25, Chart III-E-2, and \$44,785.05 per customer in 2016 dollars in its March 30, 2018 Long-Range Plan are both derived from the Marsh & McLennan baseline of \$20,000 per customer in 2007 dollars. In both cases, the Company inflated the Marsh & McLennan figure using the most recent (2014) U.S. Construction Price Deflator. Each value was set as the 50 percent midline figure for expected freeze-up damages. As described in Section III.E.2.a., the values quoted in Chart III-E-2 of both the Company's 2016 and the 2018 Long-Range Plans are two times the 50 percent midline figure. The U.S. Construction Price Deflator table used in the 2018 Long-Range Plan is provided as Attachment DIV 1-13-2.

## **Short Form Sanction Paper**

### **Appendix 2 – Outage Restoration Costs**

Estimates for relighting customers and recovering from a system outage have been prepared to quantify the impact of outages related to insufficient system capacity during periods of peak demand and severe winter cold.

Actual relight costs have been captured from recent incidents to quantify Company expenses related to restoring service. These were all related to outages that occurred for reasons other than insufficient system capacity and operations were conducted under benign weather conditions. It is likely that during severe winter weather conditions, costs would increase.

Claims related to frozen buildings, burst pipes and equipment damage due to a lack of heat during severe cold weather were captured from the only recent incident the Company experienced the outage in Hull, Massachusetts during the peak day of January 16, 2004.

#### **Relight Costs**

Tiverton, RI (2008): 900 customer outage with relight costs of \$322,839 for an average relight cost of \$358.71 per customer.

Cutchogue, NY (2003): 1,800 customer outage with relight costs of \$2,367,401 for an average relight cost of \$1,315.22 per customer.

Glen Cove, NY (2008): 1,016 customer outage with relight costs of \$275,000 for an average relight cost of \$270.67 per customer.

Westerly, RI (2011): 1,686 customer outage with relight costs of \$2,811,455 for an average relight cost of \$1,667.53 per customer.

Average cost to relight for combined instances above equals \$1,069 per customer.

#### **Claims**

Hull, MA (2004): 297 customers affected with claims totaling \$206,336 for an average claim of \$694.73 per customer.

#### **Combined cost of relight and claims**

The combined cost of relighting customers and resolving claims averages out to \$1,764 per customer.

Recognizing the amount of variability in different incidents, such as weather conditions, different types of neighborhoods, variable labor costs, economies of scale, etc., for purposes of evaluating the benefits of reinforcement projects, an average value of service restoration costs and claims of \$1,000 per customer is used.

## Constant Quality (Laspeyres) Price Index of New Single-Family Houses Under Construction

[2005 = 100.0. Index based on kinds of houses sold in 2005]

Year	Annual		Monthly											
	Annual index	Percent change	January	February	March	April	May	June	July	August	September	October	November	December
1964	12.4	(X)	12.2	12.1	12.0	12.2	12.3	12.4	12.4	12.3	12.3	12.6	12.7	12.8
1965	12.8	3.2%	12.7	12.6	12.6	12.6	12.6	12.8	12.6	12.6	12.6	13.0	13.2	13.3
1966	13.4	4.7%	13.0	12.8	12.8	13.3	13.6	13.6	13.4	13.4	13.3	13.6	13.7	13.9
1967	13.8	3.0%	13.7	13.6	13.6	13.6	13.7	13.7	13.7	13.8	13.9	13.9	14.1	14.2
1968	14.6	5.8%	14.3	14.3	14.3	14.4	14.5	14.5	14.3	14.4	14.5	14.8	15.1	15.4
1969	15.5	6.2%	15.2	15.2	15.4	15.4	15.6	15.4	15.5	15.4	15.4	15.6	15.7	15.8
1970	15.9	2.6%	15.6	15.6	15.7	16.1	16.3	16.7	16.0	15.6	15.5	15.6	15.8	16.0
1971	16.8	5.7%	15.9	16.4	16.5	16.6	16.6	16.7	16.7	17.2	17.1	17.2	17.3	17.5
1972	18.0	7.1%	17.6	17.6	17.6	17.6	17.6	17.7	17.9	18.0	18.2	18.5	18.7	18.9
1973	19.8	10.0%	18.9	18.9	19.1	19.3	19.5	19.6	19.9	20.2	20.4	20.5	20.6	20.6
1974	21.8	10.1%	20.8	20.9	21.4	21.1	21.3	21.8	22.0	22.0	22.1	22.4	22.6	22.8
1975	23.7	8.7%	23.1	23.1	23.1	23.3	23.7	23.8	23.8	23.7	23.9	24.0	24.2	24.4
1976	25.2	6.3%	24.2	24.2	24.3	24.6	25.1	25.4	25.5	25.5	25.5	25.7	25.9	26.1
1977	28.2	11.9%	26.6	26.8	27.0	27.2	27.6	27.9	28.3	28.5	28.7	29.0	29.3	29.7
1978	31.7	12.4%	30.0	30.3	30.5	30.8	31.2	31.3	31.6	32.0	32.5	32.9	33.3	33.6
1979	35.7	12.6%	33.9	34.2	34.4	34.8	35.2	35.7	36.2	36.5	36.8	37.0	37.3	37.6
1980	39.8	11.5%	38.1	38.4	38.6	39.0	39.2	39.6	40.1	40.3	40.5	40.7	41.0	41.3
1981	42.6	7.0%	41.6	41.9	42.0	42.3	42.6	42.7	42.7	42.8	43.0	43.2	43.5	43.5
1982	43.4	1.9%	43.4	43.4	43.5	43.6	43.5	43.4	43.2	43.4	43.6	43.5	43.7	43.7
1983	44.7	3.0%	44.0	44.1	44.0	44.0	44.3	44.4	44.6	44.7	44.9	45.2	45.4	45.6
1984	46.7	4.5%	45.8	46.0	46.1	46.1	46.2	46.5	46.5	46.9	47.3	47.5	47.6	47.5
1985	47.9	2.6%	47.7	47.5	47.6	47.5	47.4	47.5	47.6	47.8	48.0	48.2	48.4	48.8
1986	50.4	5.2%	49.1	49.2	49.3	49.5	49.8	50.2	50.4	50.6	50.8	51.1	51.5	51.8
1987	52.7	4.6%	52.1	52.1	52.2	52.4	52.4	52.6	52.7	52.8	52.8	53.0	53.3	53.7
1988	54.5	3.4%	54.1	54.3	54.1	54.1	54.3	54.3	54.3	54.5	54.8	54.9	55.2	55.2
1989	56.4	3.5%	55.4	55.6	55.8	56.1	56.3	56.3	56.5	56.6	56.8	56.8	56.8	57.0
1990	58.0	2.8%	57.2	57.4	57.5	57.6	57.6	57.9	58.2	58.2	58.2	58.1	58.5	58.5
1991	58.2	0.3%	58.5	58.4	58.0	57.9	58.0	58.3	58.4	58.5	58.6	58.3	58.2	58.1
1992	58.9	1.2%	58.4	58.4	58.4	58.5	58.4	58.5	58.5	58.7	58.9	59.4	59.7	60.0
1993	61.8	4.9%	60.4	60.7	60.8	60.9	61.1	61.4	61.8	61.9	62.1	62.5	63.0	63.2
1994	64.6	4.5%	63.3	63.5	63.5	63.5	63.8	64.2	64.4	64.7	65.1	65.5	66.0	66.7
1995	67.3	4.2%	67.0	67.0	67.0	67.0	67.2	67.3	67.2	67.4	67.6	67.7	67.6	67.6
1996	68.6	1.9%	67.9	67.9	67.9	67.7	67.9	68.3	68.8	69.0	69.0	69.2	69.3	69.4
1997	70.6	2.9%	69.8	69.8	69.8	70.0	70.1	70.3	70.6	70.7	71.2	71.4	71.6	71.6
1998	72.5	2.7%	71.6	71.4	71.4	71.7	71.8	72.4	72.7	72.7	72.7	73.0	73.5	74.0
1999	72.7	0.3%	71.3	71.4	71.7	72.0	72.4	72.7	73.0	73.2	73.2	73.4	73.5	73.8
2000	75.9	4.4%	74.7	75.0	75.2	75.3	75.5	75.9	76.0	76.1	76.4	76.5	76.7	77.1
2001	79.7	5.0%	77.7	78.0	78.2	78.6	79.2	79.6	80.0	80.8	81.0	81.5	81.5	81.2
2002	81.7	2.5%	80.6	80.9	81.2	81.4	81.7	81.9	81.7	81.4	81.8	82.3	81.9	82.6
2003	85.9	5.1%	83.7	84.5	85.0	85.3	85.2	85.3	85.1	85.9	86.5	87.1	87.8	88.4
2004	93.1	8.4%	88.9	89.4	90.5	91.4	92.5	93.0	93.6	94.1	94.5	95.1	95.7	96.5
2005	100.0	7.4%	96.7	96.4	96.9	97.1	98.3	99.3	100.7	100.8	101.2	101.8	102.8	104.0
2006	106.0	6.0%	104.4	104.7	105.6	105.7	105.9	105.8	105.4	105.9	106.9	107.3	107.5	107.8
2007	107.0	0.9%	107.9	108.1	108.4	108.0	106.8	106.3	106.4	106.6	106.7	106.7	106.2	105.8
2008	103.3	-3.5%	105.1	104.9	104.5	103.8	104.1	103.0	103.3	102.7	101.8	101.4	101.6	102.0
2009	98.1	-5.0%	101.7	100.8	100.5	99.2	97.7	96.9	96.7	96.6	96.9	97.2	97.5	97.9
2010	96.4	-1.7%	97.8	97.2	96.4	95.7	95.6	95.9	96.4	96.4	96.0	96.6	96.7	97.0
2011	97.4	1.0%	97.0	96.6	96.8	97.5	97.4	97.3	97.2	97.9	97.4	97.8	97.8	97.8
2012	98.4	1.0%	96.8	96.2	96.9	97.4	97.4	97.4	98.4	99.3	99.5	99.4	99.5	99.9
2013	104.8	6.5%	100.9	101.9	102.8	103.5	103.8	103.9	104.0	104.5	105.8	107.5	108.4	108.9
2014	111.2	6.1%	109.9	110.7	111.0	109.8	109.6	108.8	111.3	112.8	113.1	111.5	112.3	112.8
2015	114.0	2.5%	113.2	113.8	114.1	113.8	113.9	114.1	114.1	113.8	113.8	114.4	114.0	114.7
2016	119.8	5.1%	114.9	115.0	116.6	117.3	118.1	118.3	119.8	121.3	122.3	123.4	124.0	124.0
2017			124.5	124.4	124.8	124.9	124.6	125.5	126.2	126.9	127.3 <sup>r</sup>	127.9 <sup>r</sup>	127.6 <sup>p</sup>	

(X) Not applicable

<sup>p</sup> Preliminary<sup>r</sup> Revised

## Price Deflator (Fisher) Index of New Single-Family Houses Under Construction

[2005 = 100.0. Index based on kinds of houses sold in 2005]

Year	Annual		Monthly											
	Annual index	Percent change	January	February	March	April	May	June	July	August	September	October	November	December
1964	12.0	(X)	11.8	11.7	11.6	11.8	12.0	12.0	12.0	12.0	11.9	12.1	12.3	12.3
1965	12.4	3.3%	12.3	12.2	12.1	12.2	12.3	12.3	12.3	12.2	12.2	12.4	12.8	12.8
1966	13.0	4.8%	12.6	12.4	12.4	12.8	13.2	13.2	13.0	12.9	12.8	13.1	13.2	13.4
1967	13.4	3.1%	13.2	13.2	13.2	13.2	13.2	13.2	13.3	13.3	13.4	13.5	13.6	13.8
1968	14.1	5.2%	13.8	13.9	13.9	13.9	14.0	14.0	13.9	13.9	14.0	14.3	14.6	14.9
1969	15.0	6.4%	14.7	14.7	14.9	14.9	15.0	14.9	15.0	14.9	14.9	15.1	15.2	15.3
1970	15.4	2.7%	15.1	15.0	15.2	15.6	15.8	16.1	15.5	15.1	15.0	15.1	15.3	15.5
1971	16.3	5.8%	15.4	15.8	15.9	15.9	16.0	16.1	16.2	16.5	16.5	16.6	16.7	16.9
1972	17.5	7.4%	16.9	17.0	17.1	17.1	17.1	17.1	17.3	17.5	17.5	17.9	18.0	18.3
1973	19.1	9.1%	18.3	18.3	18.3	18.7	18.7	18.9	19.2	19.5	19.7	19.8	19.9	19.9
1974	21.1	10.5%	20.0	20.2	20.7	20.3	20.5	21.1	21.2	21.2	21.3	21.5	21.9	21.9
1975	22.9	8.5%	22.3	22.3	22.3	22.6	22.9	23.1	23.1	22.9	23.1	23.2	23.4	23.6
1976	24.4	6.6%	23.4	23.4	23.5	23.9	24.3	24.5	24.7	24.6	24.6	24.8	25.0	25.2
1977	27.0	10.7%	25.6	25.7	25.8	26.0	26.4	26.9	27.2	27.6	27.8	28.0	28.2	28.5
1978	30.6	13.3%	28.9	29.2	29.6	30.0	30.2	30.6	30.9	31.2	31.4	31.7	32.0	32.2
1979	34.3	12.1%	32.4	32.5	32.8	33.2	33.8	34.4	34.8	35.2	35.4	35.6	35.8	36.1
1980	37.9	10.5%	36.5	36.7	37.0	37.3	37.4	37.7	38.0	38.1	38.5	38.9	39.3	39.5
1981	40.5	6.9%	39.8	40.1	40.1	40.3	40.4	40.5	40.7	40.7	40.8	40.9	41.1	41.0
1982	41.7	3.0%	41.3	41.3	41.5	41.5	41.7	41.7	41.7	42.0	42.3	42.1	42.1	42.2
1983	42.9	2.9%	42.5	42.7	42.8	42.6	42.5	42.6	42.7	42.8	42.9	43.3	43.3	43.4
1984	44.5	3.7%	43.8	44.1	44.2	44.1	44.1	44.2	44.4	44.8	45.0	45.0	45.0	45.0
1985	45.4	2.0%	45.2	45.3	45.5	45.2	45.0	45.0	45.0	45.2	45.4	45.7	45.9	46.1
1986	47.4	4.4%	46.5	46.6	46.7	46.8	47.0	47.3	47.6	47.6	47.8	48.2	48.6	48.8
1987	49.6	4.6%	49.2	49.2	49.2	49.3	49.4	49.5	49.7	49.8	49.8	50.0	50.2	50.6
1988	51.6	4.0%	51.2	51.4	51.4	51.3	51.4	51.4	51.4	51.6	51.8	51.9	52.2	52.3
1989	53.7	4.1%	52.6	53.0	53.0	53.4	53.7	53.7	53.9	53.8	53.9	54.1	54.1	54.5
1990	55.4	3.2%	55.0	55.0	55.1	55.1	55.1	55.4	55.8	55.8	55.7	55.7	55.8	55.7
1991	55.9	0.9%	55.8	55.7	55.4	55.4	55.5	55.8	56.0	56.2	56.3	56.2	56.1	56.1
1992	57.0	2.0%	56.4	56.5	56.5	56.6	56.5	56.7	56.9	57.0	57.2	57.7	58.0	58.3
1993	59.8	4.9%	58.7	58.9	59.0	59.1	59.3	59.7	59.9	60.1	60.3	60.5	60.9	61.1
1994	62.5	4.5%	61.3	61.5	61.5	61.5	61.7	62.1	62.3	62.7	63.1	63.4	63.8	64.4
1995	65.2	4.3%	64.6	64.8	64.8	64.9	65.0	65.2	65.1	65.4	65.6	65.6	65.6	65.6
1996	66.4	1.8%	65.6	65.8	65.7	65.6	65.8	66.2	66.6	66.8	66.8	67.0	67.1	67.3
1997	68.4	3.0%	67.6	67.6	67.6	67.8	67.8	68.1	68.4	68.6	69.0	69.2	69.3	69.3
1998	70.2	2.6%	69.4	69.2	69.2	69.4	69.5	70.0	70.3	70.4	70.4	70.8	71.2	71.6
1999	73.3	4.4%	72.0	72.1	72.3	72.7	73.0	73.3	73.6	73.6	73.7	73.9	74.3	74.6
2000	76.7	4.6%	75.5	75.8	76.0	76.2	76.4	76.7	76.9	76.9	77.1	77.2	77.3	77.7
2001	80.2	4.6%	78.2	78.4	78.6	79.1	79.7	80.2	80.8	81.6	81.6	82.1	82.1	81.8
2002	82.1	2.4%	81.2	81.4	81.7	81.8	82.1	82.2	82.1	81.8	82.3	82.9	82.6	83.2
2003	86.1	4.9%	84.1	84.6	85.1	85.3	85.3	85.4	85.4	86.1	86.8	87.4	88.1	88.5
2004	93.0	8.0%	89.1	89.4	90.3	91.1	92.2	92.8	93.4	93.9	94.4	94.9	95.6	96.3
2005	100.0	7.5%	96.5	96.3	96.9	97.2	98.3	99.3	100.7	100.8	101.3	101.9	102.8	104.1
2006	106.2	6.2%	104.5	104.7	105.7	105.9	106.1	106.1	105.6	105.9	107.0	107.4	107.5	107.8
2007	107.2	0.9%	107.8	107.9	108.2	107.9	106.9	106.5	106.7	107.0	107.2	107.2	106.7	106.4
2008	104.1	-2.9%	105.8	105.5	105.2	104.8	105.2	104.0	104.1	103.4	102.6	102.2	102.2	102.6
2009	99.5	-4.4%	102.4	101.8	101.8	100.8	99.3	98.4	98.0	97.9	98.3	98.6	99.0	99.5
2010	98.0	-1.5%	99.5	98.8	98.0	97.3	97.1	97.4	97.8	97.7	97.5	98.1	98.4	98.8
2011	98.7	0.7%	98.7	98.2	98.5	98.6	98.5	98.4	98.4	99.0	98.8	99.1	99.2	99.4
2012	99.7	1.0%	98.6	98.1	98.9	99.1	98.8	98.7	99.4	100.2	100.3	100.4	100.7	101.0
2013	105.2	5.5%	101.9	102.7	103.4	104.0	104.2	104.2	104.5	105.0	106.0	107.4	108.2	109.1
2014	112.3	6.7%	110.2	111.0	111.5	110.7	110.9	110.4	112.9	114.0	114.4	112.9	113.7	114.1
2015	115.1	2.5%	114.5	114.8	114.9	114.4	114.4	114.8	115.0	115.0	115.3	115.9	115.6	116.2
2016	120.2	4.4%	116.5	116.4	117.9	118.2	118.9	119.1	120.1	121.1	122.0	122.9	123.3	123.5
2017			123.8	123.6	124.4	124.8	124.9	125.7	126.1	125.7	125.9 <sup>r</sup>	126.4 <sup>r</sup>	126.8 <sup>p</sup>	

(X) Not applicable

<sup>p</sup> Preliminary<sup>r</sup> Revised

The Narragansett Electric Company  
d/b/a National Grid  
RIPUC Docket No. 4816  
In Re: Long-Range Resource and Requirements Plan  
For the Forecast Period 2017/18 to 2026/27  
Responses to the Division's First Set of Data Requests  
Issued on July 19, 2018

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Division 1-14

Request:

With respect to Chart III-E-2 in the March 30, 2018 LRP, please:

- a. Provide the workpapers, data, analyses, and assumptions on which the Company relies to assess that Residential and Commercial/Industrial customers would be impacted by a supply shortfall in a proportional manner.
- b. Document all steps the Company would take to curtail gas use by non-essential users before curtailing gas service to Residential customers or essential gas uses.

Response:

- a. As mentioned in the Company's response to date request Division 1-12(c), in its design day cost/benefit analysis, the Company assumes that it is a one-day event and that there would be insufficient time to arrange for additional citygate resources or that such additional resources would not be available. Therefore, the Company would have insufficient time to implement its curtailment plan that prioritizes how supply would be rationed.
- b. In the event of an actual supply shortfall, the Company relies on its curtailment plan for the sequence of curtailment of less-essential customers prior to Residential or other essential customers. The curtailment plan sets forth the actions to be considered and implemented before the highly unlikely event of reducing load by shutting off gas to specific controlled areas. These actions would be intended to protect the greater gas distribution systems and the customers they serve. The curtailment plan not only offers a load shedding contingency, but it also provides guidance to minimize the scope and duration of unavoidable adverse effects to some customers.

Division 1-15

Request:

Please document the analyses performed by the Company to assess the potential for:

- a. Expanded use of **Interruptible (Non-Firm) Service** to reduce the potential for, and impacts of, peak supply shortfalls;
- b. **Gas Demand-Side Management** programs to reduce the potential for, and impacts of, peak supply shortfalls.

Response:

- a. The Company does not include load for Interruptible (Non-Firm) Service in its design day planning. These customers are expected to be off line on the design day. It is under the control of the Company to ensure reliability.
- b. The Company held discussions on the potential for gas demand-side management programs with the Rhode Island Energy Efficiency Collaborative during the development of its 2018-2020 Three-Year Energy Efficiency Procurement Plan. The context of the discussion was whether the implementation of a gas demand response program would help alleviate natural gas pipeline constraints to mitigate winter electricity price spikes.

After examining the barriers to implementing a gas demand response program, the Company determined the best near-term approach was to continue its support of electric and gas energy efficiency measures that help reduce consumption during winter peak. Energy efficiency has shown to be a proven resource in combating winter electricity price spikes. The Acadia Center determined that without savings from electric efficiency programs during the winter of 2014, region-wide electric demand would have been 13.7% higher, wholesale electricity prices would have been 24% higher, and Rhode Island's electricity costs would have been \$98 million higher.<sup>1</sup> Electric measures – such as lighting, controls, and heat pumps and weatherization for electric resistance heat, and gas measures like pipe insulation, boiler tune-ups, and weatherization – have demonstrated success in lowering both summer and winter peak.

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<sup>1</sup> [http://acadiacenter.org/wp-content/uploads/2015/04/AcadiaCenter\\_Efficiency-Retrospective-Analysis\\_041615\\_Final.pdf](http://acadiacenter.org/wp-content/uploads/2015/04/AcadiaCenter_Efficiency-Retrospective-Analysis_041615_Final.pdf).

The Narragansett Electric Company  
d/b/a National Grid  
RIPUC Docket No. 4816  
In Re: Long-Range Resource and Requirements Plan  
For the Forecast Period 2017/18 to 2026/27  
Responses to the Division's First Set of Data Requests  
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Additionally, the Company has been assessing a gas demand response pilot for commercial customers and plans to propose a pilot to test gas demand response in Rhode Island. The Company has an existing gas demand response pilot in downstate New York and draws upon the insight gained through a study of gas demand response potential in Massachusetts that is being run in partnership with Fraunhofer Center for Sustainable Energy. Through this pilot, the Company is hoping to understand demand response impacts on the gas system. The intended outcome would be to learn if local distribution system constraints can be alleviated. This could be useful for securing geotargeted demand reduction if needed by the system.

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**Redacted**  
Division 1-16

Request:

With respect to Chart III-E-4 in the March 30, 2018 LRP, please:

- a. Provide the workpapers, data, analyses, and assumptions upon which the Company has relied to estimate its cost of Incremental LNG Vaporization in 2016 dollars at \$71.44 per MMBtu;
- b. Compare the estimated cost of Incremental LNG Vaporization in 2016 dollars with the actual costs that the Company incurred during the winter of 2017-18 for LNG Vaporization at Cumberland.
- c. Provide the workpapers, data, analyses, and assumptions upon which the Company has relied to estimate its cost of New Pipeline Capacity in 2016 dollars at \$510.90 per MMBtu; and indicate whether the \$510.90 estimate represents a cost per MMBtu of daily pipeline capacity under for deliverability throughout the year or on a seasonal basis.
- d. Compare the Company's estimated cost for New Pipeline Capacity with the costs of new pipeline capacity added or for which contracts were negotiated within the last three years.

Response:

- a. For its estimated low-cost capacity cost in its design day cost/benefit analysis, the Company relied on the 2008 cost it had solicited for adding an incremental liquefied natural gas (LNG) vaporizer in one of its Massachusetts service territories. The cost was estimated to be \$1.8 million for 28,800 dekatherms (Dth) per day, or \$62.50 per Dth of vaporization capacity in 2007 dollars. The Company inflated this figure to \$71.44 per Dth in 2016 dollars using the U.S. National Income and Product Accounts (NIPA) Gross Domestic Product (GDP) Deflator.
- b. The final estimated cost for the 2017-18 winter season for the Cumberland LNG replacement was [REDACTED]. This cost represented the cost of trucking LNG supply to the vaporization site plus the portable vaporization units. Combined, these vaporizers were rated for 18,000 Dth per day. Hence, the unit cost (excluding supply costs) was \$ [REDACTED] per Dth for one season.

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The Company's estimate of Incremental LNG Vaporization, which would be a permanent installation, is \$71.44 per Dth in 2016 dollars, or 4.15 times the one-season leasing cost.

- c. For its estimated high-cost capacity cost in its design day cost/benefit analysis, the Company relied on the 2014 Algonquin Gas Transmission Federal Energy Regulatory Commission (FERC) certificate filing (CP 14-96) for its Algonquin Incremental Market (AIM) project of \$42.575 per Dth per month (or, multiplied by 12, \$510.90 per Dth per year). The high-cost capacity cost is meant to represent 365-day service to a supply basin or liquid pooling point for supply.
- d. In its response to Data Request Division 1-7(b)(i), the Company provided the cost of its most recent pipeline capacity agreements, which commence on November 1, 2018 and include the Portland Natural Gas Transmission and Tennessee Gas Pipeline (Tennessee) agreements. The estimated reservation rate is presently \$ [REDACTED] per Dth (or, multiplied by 12, \$ [REDACTED] per Dth per year) to the citygate, which includes the entire pipeline path of Union, TransCanada, and Tennessee.

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Division 1-17

Request:

With respect to Charts III-E-8 and III-E-9 in the March 30, 2018 LRP, please:

- a. Explain the Company's rationale for using "Mean Annual HDD" as the base for measuring "HDD Excess" and "Days of Interruption" when the Company purportedly plans its system to have sufficient resources to reliably meet Design Year conditions.
- b. Document and provide workpapers to support the Company's determination of "Delta Supply (MMBtu)" for each EDD Level for:
  - i. Pipeline
  - ii. Storage
  - iii. Supplementals
- c. It is assumed that Charts III-E-8 and III-E-9 use the acronyms EDD and HDD interchangeably. If that is not correct, please document and explain the differences between EDD and HDD measures as they are used in the referenced charts.

Response:

- a. The purpose of the Company's design day cost/benefit analysis is to ensure that the Company has sufficient capacity and supply resources to meet its customers' predicted requirements up to the design day and design year weather conditions.
- b. The Company uses the mean coldest day as the starting point for its design day analysis and it uses the mean annual heating degree day (HDD) as the starting point for its design year analysis. Each of these choices begins the cost/benefit "what if" analysis, meaning what if the Company only planned for the average peak day or annual HDD and it experienced harsher weather conditions. Harsher weather conditions would require the cost of additional capacity and supply and receive the benefits of avoiding the damages that could be incurred. The Company uses these analyses to ensure that it has sufficient capacity to meet its customers' requirements without holding a significant amount of excess capacity.

Please refer to Attachment DIV 1-17-1 for the model of daily sendout at different annual HDD levels. The results are then individually copied into Attachment DIV 1-17-2, where they are compared to the total pipeline, storage, and supplemental

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- resource capacities. In Attachment DIV 1-17-2, for each annual HDD level, the Company uses a daily dispatch model to determine the shortfall in each of the three resource types relative to the resources used in the reference case of the 40-year mean annual HDD. This result is provided on a monthly basis in Chart III-E-7 and annually in Chart III-E-8.
- c. Charts III-E-8 and III-E-9 incorrectly reference EDD (effective degree days). The EDD references in Charts III-E-8 and III-E-9 should be "HDD". The Company does not use EDD in its design standards or its forecasting in its Rhode Island service territories.

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Division 1-18

Request:

With respect to Chart III-E-9 in the March 30, 2018 LRP, please:

- a. Identify all resources that the Company includes in "Supplementals" for the purposes of the analysis presented in Chart III-E-9.
- b. Verify that the "*Peak Period Supply Cost*" of \$3.189 per MMBtu is the "Supply Cost" that is referenced in the parenthetical comment below the column in Chart III-E-9 labeled "Long-Haul Supply Cost."
- c. Document with workpapers, supporting analyses, and studies the Company's derivation of the referenced "*Peak Period Supply Cost*."
- d. Document and explain the manner in which the Company expects that its "Peak Period Supply Cost" will vary over the 2017/18 to 2026/27 forecast period as the Company's customer requirements and mix of available resources changes.

Response:

- a. The analysis in Chart III-E-9 considers the probability-weighted benefit of avoiding a resource shortfall to the cost of maintaining the level of seasonal resource required at each heating degree day (HDD) level. At the time of preparing this filing, only one resource was available to the Company: incremental pipeline capacity akin to the Algonquin Gas Transmission Algonquin Incremental Market (AIM) project with supply priced based on NYMEX.
- b. The column labeled "Long-Haul Supply Cost" consists of the following elements:
  - The annual "Long-Haul Capacity Cost" multiplied by the "Required Incremental Capacity", plus
  - The "Peak Period Supply Cost" multiplied by the "Required Incremental Winter Volume".

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- c. For this filing, the “Peak Period Supply Cost” is the average of the five monthly values for NYMEX from November 2016 through March 2017. See Figure 1 below.

**Figure 1**

<b>NYMEX Settlement Prices (\$/MMBtu)</b>												
<b>(strip as of 1/23/2018)</b>												
Source: <a href="https://business.directenergy.com/market-insights/nymex-settlement-history">https://business.directenergy.com/market-insights/nymex-settlement-history</a>												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002	-	-	-	-	-	-	-	2.976	3.288	3.686	4.126	4.140
2003	4.988	5.660	9.133	5.146	5.123	5.945	5.291	4.693	4.927	4.430	4.459	4.860
2004	6.150	5.775	5.150	5.365	5.935	6.680	6.141	6.048	5.082	5.723	7.626	7.976
2005	6.213	6.288	6.304	7.323	6.748	6.123	6.976	7.647	10.847	13.907	13.832	11.180
2006	11.431	8.400	7.112	7.233	7.198	5.925	5.887	7.042	6.816	4.201	7.153	8.318
2007	5.838	6.917	7.547	7.558	7.508	7.591	6.929	6.110	5.430	6.423	7.269	7.203
2008	7.172	7.996	8.930	9.578	11.280	11.916	13.105	9.217	8.394	7.472	6.469	6.888
2009	6.136	4.476	4.056	3.631	3.321	3.538	3.949	3.379	2.843	3.730	4.289	4.486
2010	5.814	5.274	4.816	3.842	4.271	4.155	4.717	4.774	3.651	3.837	3.292	4.267
2011	4.216	4.316	3.793	4.240	4.377	4.326	4.357	4.370	3.857	3.759	3.524	3.364
2012	3.084	2.678	2.446	2.191	2.036	2.429	2.774	3.010	2.634	3.023	3.471	3.696
2013	3.354	3.226	3.427	3.976	4.152	4.148	3.707	3.459	3.567	3.498	3.497	3.818
2014	4.407	5.557	4.855	4.584	4.795	4.619	4.400	3.808	3.957	3.984	3.728	4.282
2015	3.189	2.866	2.894	2.590	2.517	2.815	2.773	2.886	2.638	2.563	2.033	2.206
2016	2.327	2.189	1.711	1.903	1.995	1.963	2.917	2.672	2.853	2.952	2.764	3.232
2017	3.930	3.391	2.627	3.175	3.142	3.236	3.067	2.969	2.961	2.974	2.752	3.074
2018	2.738	-	-	-	-	-	-	-	-	-	-	-

- d. The Company expects that its “Peak Period Supply Cost” will vary over the 2017/18 to 2026/27 forecast period in conjunction with its NYMEX forecast. The need for the capacity and volume amounts reflect the dynamics of customers’ requirements at the time of preparation of this filing so as to set the Company’s design year standard. This standard, as well as the Company’s design day standard, are revisited every two years. In its design year standard analysis, the Company has, in the past, selected a high and a low cost alternative to reflect the mix of resources available to establish a reasonable range of solutions. In the current filing, only one alternative was available to the Company, so the Company only modeled the long-haul capacity contract with supply.

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Division 1-19

Request:

With respect to the data presented in the pages of Chart IV-C-1. Most of scenarios presented in the pages of Chart IV-C-1 show "Unserved" volumes in multiple years between 2018/19 and 2026/27. For each scenario (i.e, each page of Chart IV-E-8), please:

- a. Document and explain how the identified "Unserved" volume requirement will be met;
- b. Identify the specific resources from which volumes will be obtained to meet identified "Unserved" requirements; and
- c. Document the Company's assessment of the incremental costs National Grid will incur to satisfy the identified "Unserved" requirements.

Response:

Please see the Company's response to Division 1-7.

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Division 1-20

Request:

Please provide the Company's assessments (including supporting workpapers, data, and assumptions) of the costs and feasibility of building a new LNG storage tank to serve the Cumberland area.

Response:

Table 1 below provides an estimate to construct a new liquefied natural gas (LNG) storage tank at the Cumberland site. The estimate is based on a similar estimate in 2013 for another site and modified to update to current dollars and exclude a liquefaction system.

The cost estimate is based on the following assumptions:

- The new storage tank would be a full containment tank;
- Federal and state regulatory requirements would be based on current National Fire Protection Association (NFPA) 59A and 49 C.F.R. § 193 requirements;
- The design would meet and be approved by the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA) and Rhode Island Energy Facility Siting Board (EFSB);
- Local permits would be granted following public hearings;
- The new storage tank would not require a bund wall;
- The new storage tank would be sited where the previous tank was sited; and
- The existing truck fill station and vaporizers would be re-purposed and utilized.

However, many of the foregoing assumptions present challenges to the feasibility of building a new LNG storage tank, including obtaining PHMSA approval, obtaining EFSB approval, local permitting issues, and the likelihood of strong public opposition. Please refer to Attachment DIV 1-21 for additional information regarding the Company's assessment of building a new LNG storage tank.

As shown in Table 1 below, the direct cost to construct a 200 million standard cubic feet (MMSCF) LNG storage tank to serve the Cumberland area would be approximately \$63 million. This estimate does not include LNG supply costs to fill the new tank.

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**Table 1**

<b>CH-IV International</b>		
<b>Engineering Study for Installing an LNG Production and Storage Facility</b>		
<b>Engineering, Procurement &amp; Construction (EPC) - Turnkey</b>	<b>Conceptual Estimate 01/28/2013 (\$1,000)</b>	<b>Cumberland Conceptual Estimate, 02/09/2018 (\$1,000)</b>
Engineering Package	\$10,670	\$5,000
Site Work	\$456	\$2,000
Admin Building	\$1,500	\$0
Maintenance Bldg / Warehouse	\$862	\$0
Control Building	\$595	\$0
Compressor Building	\$528	\$528
Booster Compressor	\$0	\$0
Plant Feed & Sendout/Metering	\$1,147	\$1,147
Feed Gas Treatment	\$6,002	\$0
Liquefaction	\$20,577	\$0
Cooling Fans/Towers	\$706	\$0
Boil Off Gas Vapor Handling -	\$560	\$560
LNG Tank(s)	\$12,223	\$12,223
LNG Pumps	\$555	\$500
Truck Loading Station	\$1,250	\$0
Instruments and Control System	\$1,879	\$1,000
Safety/Fire Protect	\$465	\$500
Security	\$563	\$563
Field Electrical Equipment	\$1,501	\$500
Switchgear/Power	\$2,079	\$500
Power Generation	\$0	\$0
Emergency Power Generation	\$1,450	\$1,000
Mechanical/Structural/Piping	\$4,061	\$1,000
Balance of Plant Civil/Structural	\$1,410	\$1,000
Insulation	\$188	\$200
Painting	\$169	\$200
Balance of Plant Miscellaneous	\$9,109	\$1,000
Maintenance Equipment & Spares	\$1,214	\$500
Chemical/Initial Media Charges	\$88	\$0
Project/Construction Management	\$5,404	\$2,000
Start-Up	\$3,201	\$1,000
<b>EPC Subtotal</b>	<b>\$90,412</b>	<b>\$32,921</b>
<b>Other Costs</b>		
Land	\$0	\$0
Permitting Studies and Costs	\$1,000	\$1,000
Owner Cost	\$2,260	\$2,260
Contingency	\$9,041	\$3,292
<b>Subtotal Other Costs</b>	<b>\$12,301</b>	<b>\$6,552</b>
<b>SUBTOTAL PROJECT COST</b>	<b>\$102,713</b>	<b>\$39,473</b>
<b>Overhead Cost</b>		
Escalator at 2% per year		\$3,947
Overhead	\$51,357	\$19,737
<b>Subtotal Overhead Cost</b>	<b>\$51,357</b>	<b>\$23,684</b>
<b>Total Project Conceptual Estimate</b>	<b>\$154,070</b>	<b>\$63,157</b>

Prepared by or under the supervision of: Stephen P. Greco

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Division 1-21

Request:

Please document and provide workpapers to support the Company's assessment of the timing and costs for alternatives for permanently replacing the peak supply lost when the Cumberland LNG Tank was taken out of service.

Response:

Please refer to confidential Attachment DIV 1-21 for the Company's preliminary assessment regarding the requested information. Since the Company's preliminary assessment, the Company has been negotiating with Tennessee Gas Pipeline Company, L.L.C. (Tennessee) and other companies regarding a combination of on-system project work and upstream pipeline project work. As of August 8, 2018, the Company is working on contract terms for a permanent solution to address the capacity needs in Northern Rhode Island. The Company anticipates having the pricing finalized and a precedent agreement in place by November 30, 2018, with an estimated in-service date of late-2019. The Company will supplement this response within seven days after entering into a precedent agreement to provide a more specific timeline for when the Company expects the permanent solution will be in place.

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Attachment DIV 1-21

**REDACTED**