Commonwealth of Massachusetts
Department of Public Utilities

Petition of Boston Gas Co. d/b/a National Grid for Approval of a Fourteen-Year Firm Transportation Agreement with Algonquin Gas Transmission Co., LLC, Pursuant to G.L. c.164, §94A	No. 19-132

REVISED PREFILED TESTIMONY OF ELIZABETH A. STANTON, PhD

Submitted in Support of the Intervenor Town of Weymouth

EXHIBIT WEY-ES-1

February 21, 2020 (Redactions Revised March 6, 2020)

TABLE OF CONTENTS

I. INTRODUCTION

Q. Please state your name, business address, and job title.

A. My name is Elizabeth A. Stanton, Ph.D. I am the Director and Senior Economist of the Applied Economics Clinic, 1012 Massachusetts Avenue, Arlington MA 02476.

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of the Town of Weymouth, Massachusetts.

Q. Dr. Stanton, what is your education and professional background.

A. I am the founder and Director of the Applied Economics Clinic, a non-profit consulting group. The Applied Economics Clinic ("the Clinic") provides expert testimony, analysis, modeling, policy briefs, and reports for municipalities and other public interest groups on the topics of energy, environment, consumer protection, and equity. The Clinic also provides training to the next generation of expert technical witnesses and analysts through applied, on-the-job experience for graduate students in related fields and works proactively to support diversity among both student workers and professional staff.

I am a researcher and analyst with more than 19 years of professional experience as a political and environmental economist. I have authored more than 140 reports, policy studies, white papers, journal articles, and book chapters as well as more than 40 expert comments and oral and written testimony in public proceedings on topics related to energy, the economy, the environment, and equity. My articles have been published in *Ecological Economics, Climatic Change, Environmental and Resource Economics, Environmental Science & Technology*, and other journals. I have also published books, including *Climate Change and Global Equity* (Anthem Press, 2014) and *Climate Economics: The State of the Art* (Routledge,

2013), which I co-wrote with Frank Ackerman. I am also co-author of *Environment for the People* (Political Economy Research Institute, 2005, with James K. Boyce) and co-editor of *Reclaiming Nature: Worldwide Strategies for Building Natural Assets* (Anthem Press, 2007, with Boyce and Sunita Narain).

My recent work includes Integrated Resource Plan (IRP) and Demand-Side Management (DSM) planning review, analysis and testimony of state climate laws as they relate to proposed capacity additions, and other issues related to consumer and environmental protection in the electric and gas sectors.

In my previous position as a Principal Economist at Synapse Energy Economics, I provided expert testimony in electric and gas sector dockets, and led studies examining environmental regulation, cost-benefit analyses, and the economics of energy efficiency and renewable energy. Prior to joining Synapse, I was a Senior Economist with the Stockholm Environment Institute's (SEI) Climate Economics Group, where I was responsible for leading the organization's work on the Consumption-Based Emissions Inventory (CBEI) model and on water issues and climate change in the western United States. While at SEI, I led domestic and international studies commissioned by the United Nations Development Programme, Friends of the Earth-U.K., and Environmental Defense Fund, among others.

I earned my Ph.D. in economics at the University of Massachusetts-Amherst, and have taught economics at Tufts University, the University of Massachusetts-Amherst, and the College of New Rochelle, among other colleges and universities. My curriculum vitae is attached to this testimony as WEY-ES-2.

Q. Have you previously testified in any formal hearing before regulatory bodies?

A. Yes. I have submitted expert testimony and comments in dockets in Florida, Illinois, Indiana, Louisiana, Massachusetts, Minnesota, New Hampshire, New York, and Vermont as well as several federal dockets. In Massachusetts, I have testified in a number of proceedings before the Department of Public Utilities, including DPU 14-86 (2014), DPU 15-181 (2016), DPU 16-05 (2016), DPU 17-145 (2018), DPU 17-172 (2018), DPU 17-174 (2018), DPU 17-175 (2018), DPU 18-110 through DPU 18-119 (2018), and DPU 18-150 (2019) as well as in OADR 2011-025 & 026 before the Department of Environmental Protection.

II. PURPOSE OF TESTIMONY

Q. Are you familiar with DPU Docket No. 19-132, the Petition of Boston Gas Company d/b/a National Grid for Approval of Supply Agreement with Algonquin Gas Transmission, LLC (the "Petition")?

A. Yes.

Q. Are you testifying in connection with that Petition?

A. Yes. The Town of Weymouth, Massachusetts has retained me to offer my expert opinions with respect to that Petition. Those opinions and my reasons supporting those opinions are set forth in this testimony.

Q. Did you review any materials when reaching your opinions?

A. Yes. I have reviewed National Grid's initial filing—composed of the Petition and supporting exhibits—as well as requests for information and responses to those requests filed in this proceeding as of the date of this testimony. In addition, I have also reviewed and relied on the following documents:

- The initial filing documents submitted by Boston Gas Company and Colonial Gas Company in DPU 16-181 and DPU 18-148;
- Data from U.S. Energy Information Administration's 2020 Annual Energy Outlook;[1]
- Massachusetts Joint Statewide Electric and Gas Three Year Energy Efficiency Plan: 2019-2021;[2]
- Consolidated Edison Company of New York, Inc.'s "Gas Demand Response Pilot Implementation Plan, 2018-2021;"[3]
- Applied Economics Clinic's "An Analysis of the Need for the Atlantic Coast Pipeline Extension to Hampton Roads, Virginia" (2019);[4]
- Applied Economics Clinic's "Home Heat Pumps in Massachusetts" (2019);[5]

Q. Would you please provide a summary of the expert opinions that are set forth in this testimony?

---

[1] https://www.eia.gov/outlooks/aeo/

[2] http://ma-eeac.org/wordpress/wp-content/uploads/Exh.-1-Final-Plan-10-31-18-With-Appendices-no-bulk.pdf.

[3] https://www.coned.com/-/media/files/coned/documents/save-energy-money/rebates-incentives-tax-credits/smart-usage-rewards/gas-demand-response-implementation-plan.pdf

[4] https://aeclinic.org/publicationpages/09-2019/an-analysis-of-the-need-for-the-atlantic-coast-pipeline-extension-to-hampton-roads-virginia

[5] https://aeclinic.org/publicationpages/2019/5/29/home-heat-pumps-in-massachusetts

A. In this testimony, I examine whether National Grid's Atlantic Bridge Agreement meets the following criteria: (1) the public need for this capacity based on forecasted demand and available alternatives, (2) the public need for this capacity based on price, and (3) consideration of evidence relevant to the Global Warming Solutions Act ("GWSA"). In my examination of these three questions, I found that:

- National Grid fails to appropriately assess the availability of alternative supply- and demand-side resources.
- National Grid does not provide a realistic forecast of customer demand or adequately examine the uncertainty of future customer demand.
- National Grid does not provide any comparison of costs between the proposed Agreement and potential alternative scenarios.
- National Grid incorrectly claims that it has appropriately weighed and valued GWSA considerations with respect to the proposed Agreement.

III. NATIONAL GRID HAS FAILED TO ESTABLISH SUFFICIENT FUTURE CUSTOMER DEMAND TO SUPPORT A PUBLIC NEED FOR THIS AGREEMENT

Q. What should gas utilities consider when determining the necessity of a gas supply agreement?

A. From a business and economics standpoint, when determining the necessity of a gas supply agreement, gas distribution companies should consider (1) the availability of alternative supply and demand resources and (2) customer demand requirements.

Q. Why are alternatives relevant to determine the public need for a proposed agreement?

A. The necessity of any supply option can only be understood in the context of its available alternatives. Different resources may have different costs, risks, and legal implications that could influence their viability and favorability over other options. Utilities must adequately evaluate all of the potential alternatives to procuring a new gas contract in order to fully weigh their options to provide service to ratepayers with reasonable, least-cost options.

Q. What types of alternatives should gas utilities consider when determining the necessity of a gas supply agreement?

A. Gas utilities should look at a wide range of potential alternatives including both gas and non-gas resources, on both the supply- and demand-side.

Q. Beginning with supply-side gas resources, what kind of supply contracts could gas utilities consider as alternatives?

A. Gas utilities can consider a number of different supply arrangements as alternatives to a specific gas supply agreement, such as: (1) gas pipeline contracts of different lengths from various origins, (2) liquified natural gas (LNG) storage contracts, and (3) LNG truck delivery contracts, among others.

Q. Does National Grid discuss an analysis of gas alternatives to the proposed Atlantic Bridge Agreement in DPU 19-132?

A. No. Based on my review of the initial filing of DPU 19-132 and its supporting documents, National Grid National Grid did not compare the price, risk, and emission characteristics of the Atlantic Bridge Agreement to any gas or supply-side alternatives.

Q. Let's move to demand-side resources. Why is customer demand an important element for utilities to consider when determining the necessity of a gas supply agreement?

A. Put simply, the "public need" for gas is based in large measure on the public's demand for that gas. Gas utilities secure supply resources sufficient to meet expected customer demand adjusted for demand-side resources like energy efficiency and demand response.

Q. How does one measure the "public need" or demand for gas in the future?

A. Forecasts of customer demand are critical to any assessment of whether a supply resource is necessary.

Q. What aspects of customer demand should gas utilities consider when determining the public need for a gas supply agreement?

A. When determining the public need for a gas supply agreement, gas distribution companies should consider (1) forecasted customer demand and load growth and (2) the impact of weather and climate on customer demand.

Q. Does National Grid describe its methodology of forecasting customer demand?

A. National Grid does not describe its methodology of forecasting customer demand in this docket but does provide a description in DPU 16-181 and DPU 18-148.

Q. What methodology does National Grid use to forecast customer demand?

A. National Grid used the methodology approved in DPU 16-181 to develop their customer demand forecast, which involves:

"(1) determining the annual retail demand expected for residential heating, residential non-heating and commercial/industrial heating and commercial/industrial non-heating markets over the forecast period for both sales and transportation services using a series of econometric models at the monthly level;"

"(2) reducing the forecasted retail demand by the impact expected to be achieved through the implementation of its Energy Efficiency programs, because these reductions are exogenous to the demand forecast generated by the econometric models;"

"(3) converting the monthly retail demand forecast to a normalized forecast of daily customer requirements;"

"(4) determining the design-day and design-year planning standards through the use of a cost/benefit analysis; and"

"(5) specifying the forecasted daily customer requirements under design weather conditions." (Exhibit NGRID-TEP-1 at 6-7)

Q. Did you review National Grid's methodology from DPU 16-181 and DPU 18-148?

A. Yes.

Q. Did your review of DPU 16-181 and DPU 18-148 raise any concerns regarding National Grid's methodology for forecasting customer demand?

A. Yes. I am concerned about (1) the high rate of growth that the Company predicts for its customers' gas usage and also (2) the Company's failure to adequately examine uncertainty regarding future customer demand for gas.

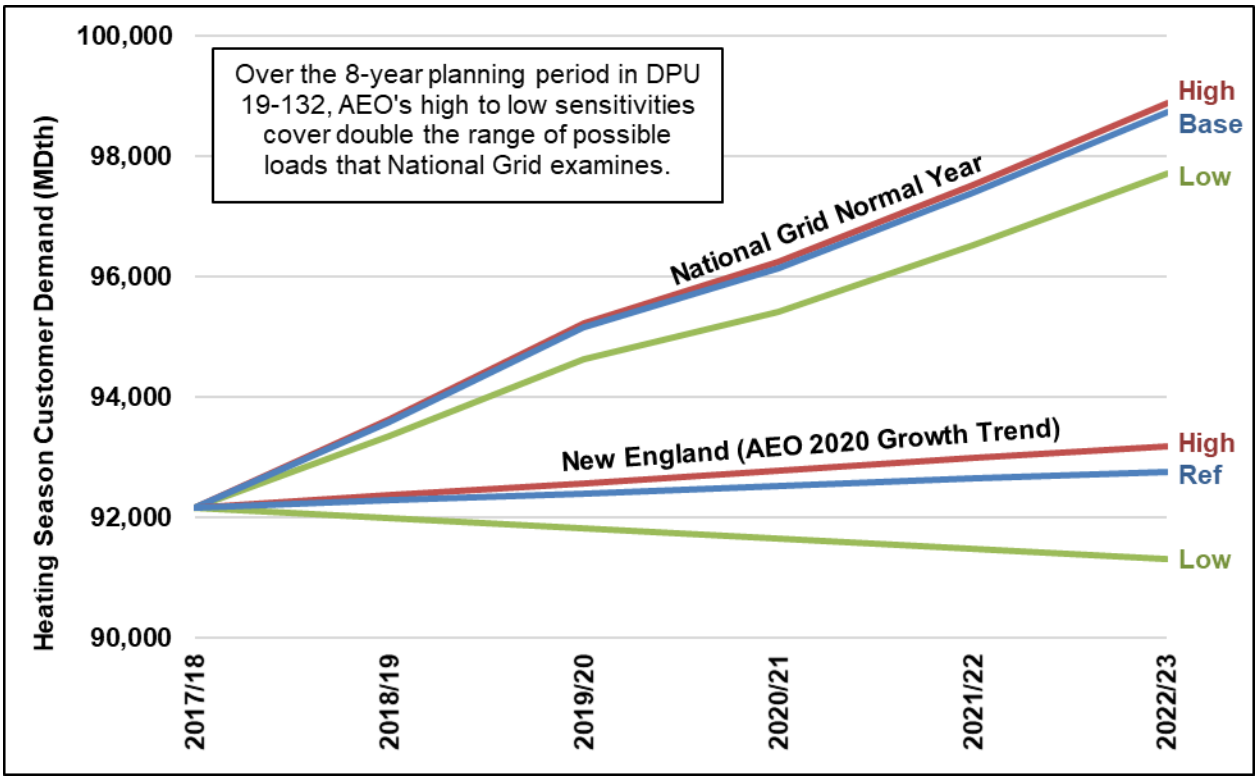
Q. Let's take those in turn, starting with the high rate of growth predicted by the Company: How does National Grid forecast of its customers' gas usage compare to other forecasts?

A. National Grid's forecast of its customers' gas usage is atypically high compared to other forecasts. Figure 1, below, compares National Grid's forecast of future gas customer use to the growth rate forecasts in the U.S. Energy Information Administration's 2020 Annual Energy Outlook (AEO) for the New England region.[6] Using AEO's reference case growth rate for 2020 to 2028, the Company's 2028 gas requirement would be 93,242 BBtu for the heating season under a normal year scenario, compared to the estimated 103,651 BBtu using National Grid's growth rate for its base case in DPU 18-148, a difference of 11 percent or an excess of 10,000 BBtus. Using AEO's reference case growth rate for 2020 to 2050, the Company's 2050 gas requirement would be 101,099 BBtu for the heating season under a normal year scenario, compared to the estimated 135,307 BBtu using National Grid base case growth rate, a difference of 34 percent or an excess of 34,000 BBtus.[7]

[6] U.S. Energy Information Administration. January 2020. "Annual Energy Outlook 2020." Available at: https://www.eia.gov/outlooks/aeo/

[7] See WEY-ES-3 for calculations.

Figure 1. National Grid annual growth rate comparison for heating season customer demand under normal year scenario



See WEY-ES-3 for calculations.

Q. Are you aware of any analyses or other materials that would support National Grid's atypically high forecasts?

A. No.

Q. What effect would too high of a prediction of customer usage have on gas planning?

A. If predicted gas usage is unrealistically high, gas distributors will secure too much supply, causing unnecessary customer costs.

Q. Now let's turn to the uncertainty piece of the framework. Can future gas usage be predicted with certainty?

A. No, future gas usage is uncertain: it depends on customer choices, equipment and fuel prices, regulatory impacts, and actions taken by the company.

Q. How should a gas utility examine uncertainty in its load forecast?

A. Gas utilities should examine uncertainty in their load forecast by evaluating multiple scenarios that explore a full range of possibilities for both the expected number of customers and expected gas use per customer.

Q. What range of uncertainty in future gas demand is typically examined?

A. Uncertainty exists in both the number of customers served by a gas distribution company and the amount of gas that those customers will use. EIA's AEO 2020, for example, explores a 3.3 percentage point range of possible gas usage outcomes in 2028 and a 12 percentage point range of outcomes in 2050.[8] Figure 1 compare's AEO's range of possible gas usage forecasts to that of National Grid.

Q. Does National Grid examine uncertainty in the number of future customers?

A. No. National Grid presents Base, High, and Low scenarios of future customer demand for gas, but the number of future customers is identical in each of these three scenarios. It does not discuss or explain this assumption; nor does it address the fact that the number of future customers could be subject to change for any number of reasons, such as electrification.

[8] See WEY-ES-3 for calculations.

Q. Does National Grid examine uncertainty in the use of gas per customer?

A. Yes, National Grid does explore uncertainty in the use of gas per customer, but it does so at a much smaller range of uncertainty than that represented in EIA's AEO 2020. As shown in Figure 1, while AEO's sensitivities examine a 3.3 percentage point range of possible gas usage in 2028, National Grid's sensitivities examine only a 1.5 percentage point range.[9]

Q. What information does National Grid omit by failing to include an appropriate examination of uncertainty in gas supply planning and applications for approval of new supply contracts?

A. In National Grid's analysis, future customer demand for gas is an unknown, and may vary from a "Base" or most expected case, which does not take into account electrification or customers switching from oil to gas. Without examining a true range of possible future gas demand, a utility cannot adequately consider the consequences of either more or less demand.

Q. How does the failure to include an appropriate examination of uncertainty impact on gas utility planning?

A. Without an examination of the true range of possible future gas demand, planning may be inaccurate. If the gas demand forecast a gas company relies upon is too high, utilities may over-procure gas, raising costs for customers. If the gas demand forecast is too low, utilities may fail to invest in inexpensive gas demand reduction measures such as energy efficiency, gas demand response, and electrification. Only a full consideration of all possible levels of

[9] See WEY-ES-3 for calculations.

future demand allows a utility to make as accurate a forecast as possible and implement least-cost plans for its customers given this key uncertainty.

Q. Are there other aspects to customer demand that are relevant to this proceeding?

A. Yes. Forecasting customer demand for "design year" standards is also important. "Design years" are worst case scenarios projecting how much supply will be necessary in particularly cold or high-gas-demand years. In gas supply planning, forecasting demand for "design years" should supplement—but not supplant—analysis of customer demand for normal years.

Q. How does National Grid define its "normal year"?

A. In its two most recent Long-Range Resource and Requirements Plans, National Grid defines a "normal year" as a "Typical Meteorological Year" (DPU 16-181, Initial Filing at 117; DPU 18-148, Initial Filing at 74). A typical meteorological year is constructed using historical effective degree day ("EDD") data to define normal weather conditions for a given geographic region. An effective degree day indicates how far a day's average temperature departs from 65 degrees Fahrenheit—taking into account wind speed—in determining how cold the weather actually feels, as opposed to just the temperature on the thermometer. National Grid defined its normal year scenario as 6,216 EDD in the initial filing of DPU 16-181 at 119 and updated it as 6,160 EDD in the initial filing of DPU 18-148 at 74.

Q. How does National Grid define its "design year" standard?

A. National Grid "defines its design year standard as 7,120 EDD with a probability of occurrence of once in 34.40 years, as a result of its on-going review of planning standards." For planning purposes, National Grid examines a design year standard to identify the gas

supply required to provide continuous service under all reasonable weather conditions. (DPU 16-181, Initial Filing at 121).

Q. How does National Grid expect customer demand to differ between normal years and design years?

A. As shown in Table 1 and Figure 2 below, National Grid expects customer demand to be 12 percent greater in design years than in normal years for the heating season and 6 percent greater in the non-heating season (see Table 1 and Figure 2) (DPU 18-148 Initial Filing, Table G-5 (A)).[10]

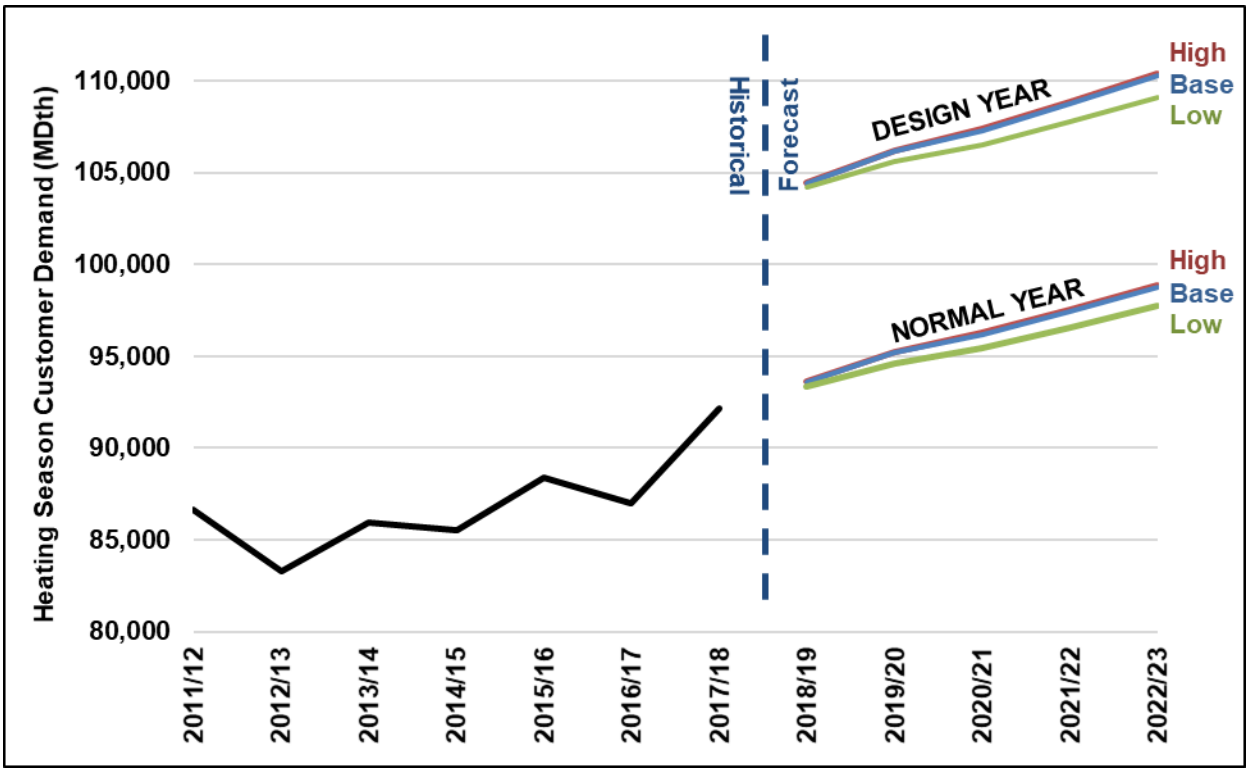
Table 1. Customer demand comparison between normal and design years

Customer Demand (BBtu)		2018/19	2019/20	2020/21	2021/22	2022/23
Heating Season	Normal Year	93,604	95,164	96,152	97,404	98,748
	Design Year	104,417	106,152	107,312	108,730	110,258
	Percent Difference (%)	**12%**	**12%**	**12%**	**12%**	**12%**
Non-Heating Season	Normal Year	51,670	52,572	52,688	53,209	53,739
	Design Year	54,942	55,897	56,065	56,636	57,221
	Percent Difference (%)	**6%**	**6%**	**6%**	**6%**	**6%**

See WEY-ES-3 for calculations.

[10] See WEY-ES-3 for calculations.

Figure 2. National Grid heating season customer demand (MDth)



See WEY-ES-3 for calculations.

Q. Does National Grid provide any modeling results for its resources and requirements in DPU 19-132?

A. Yes. National Grid provides its modeling results for its resources and requirements over the planning horizon from 2020/2021 to 2027/2028 in Exhibit NGRID-DMW. National Grid organized these results in its "G Tables" as follows:

- Table G23-D: Design Year – Design Peak Day (Without Atlantic Bridge)
- Table G22-D: Design Year – Heating Season (Nov-Mar) (Without Atlantic Bridge)
- Table G22-D: Design Year – Non-Heating Season (Apr-Oct) (Without Atlantic Bridge)
- Table G22-D: Design Year – Annual (Without Atlantic Bridge)

- Table G23-D: Design Year – Design Peak Day (WITH Atlantic Bridge)
- Table G22-D: Design Year – Heating Season (Nov-Mar) (WITH Atlantic Bridge)
- Table G22-D: Design Year – Non-Heating Season (Apr-Oct) (WITH Atlantic Bridge)
- Table G22-D: Design Year – Annual (WITH Atlantic Bridge)

Q. What methodology did National Grid use to model its resources and requirements in DPU 19-132?

A. "The Company has relied on the methodology approved in D.P.U. 16-181 to prepare the updated forecast associated with this filing. At the time the proposed Agreement was executed, the forecast and supply plan approved in D.P.U. 16-181 was the Company's most recently approved forecast and supply plan." (Exhibit NGRID-TEP-1 at 6).

Q. Has National Grid updated the modeling results for its resources and requirements since the Company's initial filing of DPU 19-132?

A. Yes. National Grid updated the modeling results for its resources and requirements in response to Information Request DPU 1-1, where the Massachusetts Department of Public Utilities requested that the Company provide updated projections and supporting documentation based on the methodology approved in DPU 18-148. National Grid provided its updated resources and requirements using the Base Design Forecast from the Company's most recent forecast as filed and approved in DPU 18-148 in Attachment DPU 1-1.

Q. Do those updates address your concerns about atypically high forecasts for customer demand?

A. No.

Q. Does National Grid conclude that the proposed Atlantic Bridge Agreement in DPU 19-132 is necessary based on the modeling results provided in Revised Exhibit NGRID-EDA/DMW/SAJ-1?

A. Yes. After modeling its current resource portfolio as well as the portfolio with the proposed Atlantic Bridge Agreement included, National Grid argues that it continues "to need long-term, incremental supply in order to meet customer sendout requirements on a reliable basis." (Revised Exhibit NGRID-EDA/DMW/SAJ-1 at 17).

Q. Does National Grid conclude that the proposed Atlantic Bridge Agreement in DPU 19-132 continues to be necessary based on the updated modeling results provided in Attachment DPU 1-1?

A. Yes. National Grid claims that the proposed Atlantic Bridge Agreement is still needed even with the updated modeling results provided in Attachment DPU 1-1 and notes that "Even with the addition of Atlantic Bridge capacity, the Company has annual unserved volumes." (Information Request DPU 1-1). However, National Grid only forecasts unserved demand under the 1-in-34-year design year scenario and not under the normal year scenario. According to National Grid, actual demand was less than predicted normal demand in four out of the seven years between 2011/12 and 2017/18, and in the remaining three years it was 2 to 6 percent greater than the predicted normal year demand (DPU 18-148 Initial Filing, Table G-5 (A)). A design year is assumed to have winter demand that is 12 percent higher than a normal year. In many and even most years, National Grid's forecasts indicate that there will be no unserved demand.

Q. That covers design years. What about gas planning for normal years? Does National Grid provide any modeling results for its resources and requirements under a normal year scenario in DPU 19-132?

A. No. National Grid only provides modeling results for its resources and requirements under a design year scenario in DPU 19-132.

Q. Has National Grid provided any modeling results for its resources and requirements under a normal year scenario in either DPU 16-181 or DPU 18-148?

A. Yes. National Grid provides modeling results for its resources and requirements under a normal year scenario in its G22-N Tables in both DPU 16-181 and DPU 18-148.

Q. According to its modeling results for its resources and requirements provided in DPU 16-181 and DPU 18-148, does National Grid have any unserved need under a normal year scenario?

A. No. According to the modeling results in both DPU 16-181 and DPU 18-148, National Grid does not have any unserved need under a normal year scenario.

Q. What implications does that have in this proceeding (19-132)?

A. It is an important omission. According to the information presented in both DPU 16-181 and DPU 18-148 National Grid needs no additional supply resources in a normal year. Accordingly, the agreement National Grid seeks to have approved in this proceeding provides supply that is unnecessary in normal years.

Q. Let's turn now to the implications of a design year and "unserved" needs: In National Grid's design year modeling without Atlantic Bridge supply, is any amount of customer demand "unserved"?

A. Yes. National Grid's design year modeling resulted in "unserved" customer demand in each year of the 8-year planning period (see Table 2) (Attachment DPU 1-1).

Table 2. National Grid "unserved" customer demand without Atlantic Bridge (BBtu)

Do. 19-132 Annual without Atlantic Bridge (BBtu)	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28
Total Requirements	176,499	178,230	180,584	184,301	185,315	187,374	189,740	193,327
Total Resources	176,217	177,476	178,221	180,986	181,574	183,061	184,717	187,254
"Unserved"	**282**	**754**	**2,363**	**3,315**	**3,741**	**4,313**	**5,023**	**6,073**

Q. One of the non-price factors the Department must consider is reliability. Does "unserved" customer demand in National Grid's design year mean that the Company's customers will not receive reliable supply that is adequate to their demand for gas?

A. No. "Unserved" customer demand does not mean that National Grid's customers will not receive enough gas supply to meet their demand.

Q. How is "unserved" customer demand supplied?

A. National Grid supplies any unserved demand that occurs with gas purchased with short term contracts or in the spot market: "When the forecast indicates the need for the Company to contract for city-gate delivered supplies to meet customer requirements during the peak season (i.e., customer requirements exceed the resources available in the portfolio), the Company will issue a request for proposals for firm deliveries at various interconnects into the Company's distribution system where there are load requirements." (Revised Exhibit NGRID-EDA/DMW/SAJ-1 at 23).

Q. In terms of reliable supply, does National Grid provide any analysis or support for the conclusion that its projected "unserved" customer demand would translate into actual unplanned supply curtailment in the future?

A. No. National Grid does not provide an analysis of the risk that projected unserved demand will result in actual curtailment. To be clear, "unserved" demand is not the same as customers left wanting for gas. Even accepting National Grid's demand projections—which I believe are flawed—it does not follow that the Company's customers will go without gas during an uncommon design year event. Actual unplanned curtailment of gas due to insufficient supply is a very rare occurrence in Massachusetts.

Q. In your opinion, is the Atlantic Bridge Agreement necessary in a design year?

A. No. National Grid may argue that the Atlantic Bridge contract has other attractive qualities, but it cannot be said to be necessary. In years with very high gas demands, National Grid's customers could be served by procurement of short-term contracts, spot market purchases, and investment in the non-gas alternatives that National Grid fails to discuss in its filing: gas energy efficiency, gas demand response, and electrification.

Q. Has National Grid demonstrated that the Atlantic Bridge Agreement is necessary?

A. No. National Grid has provided insufficient information for an informed decision regarding whether or not the Atlantic Bridge Agreement is necessary. Specifically, National Grid failed to include: (1) a comparison of the proposed Agreement to alternative supply- and demand-side resources, (2) an appropriate examination of uncertainty in the future number of customers and customer requirements, and (3) an assessment of a reasonably complete set of future weather and climate scenarios.

Q. When you started your testimony on the topic of customer demand, you also said that utilities should consider non-gas alternatives. What non-gas alternatives could gas utilities consider?

A. Gas utilities could consider gas energy efficiency, gas demand response, and electrification as non-gas alternatives to a gas supply agreement.

Q. What is gas energy efficiency and how does it function as an alternative to a gas supply agreement?

A. Gas energy efficiency is a demand-side measure that serves as an alternative to gas supply arrangements by reducing customer demand and, therefore, reducing any potential shortfall, or deficiency, between supply and demand. Energy efficiency programs reduce the amount of gas needed to provide the same level of energy and heating and are a cheap and effective way to reduce peak demand. Energy efficiency programs that are specifically targeted at peak usage increase the potential to shave gas system peaks.

Q. What is gas demand response and how does it function as an alternative to a gas supply agreement?

A. Gas demand response programs are demand-side measures that provide incentives to customers to reduce their energy usage during times of peak gas usage, thereby reducing aggregate peak demand. Demand response programs can shave or shift peak demand and reduce potential supply shortfalls.

Q. What is electrification and how does it function as an alternative to a gas supply agreement?

A. Electrification usually involves the replacement of fossil fuel-powered space and water heating systems with modern electric heat pumps. Switching from gas heating to electric heat pumps reduces the total amount of gas needed for heating (including gas used to produce the electricity that runs heat pumps). Electrification efforts can shave peak demand for gas, reducing potential supply shortfalls. This is important because it represents a growing trend that would remove customers from National Grid's gas service and impact the Company's customer growth projections as more and more New Englanders turn away from gas as a heating source. This, in turn, has a material impact on a utility's gas forecast. National Grid made no mention of this trend in its analysis of the necessity of this contract.

Q. Does National Grid discuss an analysis of non-gas or demand-side alternatives to the proposed Atlantic Bridge Agreement in DPU 19-132?

A. No. Based on my review of the initial filing in DPU 19-132 and its supporting documents, National Grid did not compare the price, risk, and emission characteristics of the Atlantic Bridge Agreement to any non-gas or demand-side alternatives. Specifically, National Grid did not compare the Atlantic Bridge Agreement to gas energy efficiency, gas demand response, or electrification.

IV. NATIONAL GRID HAS FAILED TO ESTABLISH THAT IT HAS SECURED A PRICE FOR THIS AGREEMENT THAT IS IN THE PUBLIC INTEREST

Q. You initially identified three topics you wished to cover in this testimony, and you have addressed the first. Let's move to the second: cost effectiveness and price. The Department must consider price attributes for this proposed agreement. What should the Department consider when determining whether a gas supply agreement is cost effective?

A. Gas utilities should determine the cost effectiveness of a gas supply agreement by comparing its costs to: (1) the costs of potential gas alternatives, (2) the cost of potential non-gas alternatives, and (3) the costs associated with doing nothing (not executing the gas supply agreement or any alternative agreement).

Q. Has National Grid compared the cost of the Atlantic Bridge Agreement to gas alternatives in DPU 19-132?

A. No. National Grid failed to compare the cost of the Atlantic Bridge Agreement to gas alternatives in this filing.

Q. Is a comparison to the cost of gas alternatives and provision of this comparison to intervenors a fundamental best practice in gas supply contract approval cases?

A. Absolutely. In the absence of critical information like alternative gas and LNG contract terms it is impossible for intervenors and their third-party experts to provide the review and critique necessary to the successful functioning of this public approval process.

Q. Has National Grid compared the cost of the Atlantic Bridge Agreement to non-gas alternatives?

A. No. National Grid has not compared the cost of the Atlantic Bridge Agreement to non-gas alternatives.

Q. How do the prices of non-gas alternatives compare to gas supplied via pipeline?

A. The costs of non-gas alternatives compare favorably to gas supplied via pipeline: Massachusetts gas energy efficiency has a negative cost: it provides more benefits than it costs to deliver, with benefits valued at 50 to 350 percent higher than costs.[11,12]

Gas demand response incentive programs are uncommon. A pilot program in New York City provides incentives for participating customers in the range of $30-$50 per therm-day per winter season (i.e., five-month period from November 1 to March 31).[13] A therm-day is the use of a therms-worth of capacity in a pipeline for one day. Incentive payments are disbursed at the end of the season based on net 24-hour therm reductions below each customer's baseline load during event days—this is denoted as a therm-day.

Further, electrified heading systems cost $1.62 per Dth during times of peak demand, based on an Applied Economics Clinic analysis of Massachusetts.[14,15]

---

[11] Massachusetts Department of Public Utilities. Docket No. 18-118. *Three Year Energy Efficiency Plan for 2019 through 2021*. October 31, 2018. "Massachusetts Joint Statewide Electric and Gas Three Year Energy Efficiency Plan: 2019-2021." Available at: http://ma-eeac.org/wordpress/wp-content/uploads/Exh.-1-Final-Plan-10-31-18-With-Appendices-no-bulk.pdf

[12] National Grid. 2019. "Exhibit 4 – 2019-2021 Plan Data Tables 2-19-19 National Grid Gas." Available at: http://ma-eeac.org/wordpress/wp-content/uploads/Exhibit-4-2019-2021-Plan-Data-Tables-2-19-19-National-Grid-Gas.xlsx

[13] Consolidated Edison Company of New York, Inc. July 2019. "Gas Demand Response Pilot Implementation Plan, 2018-2021." Available at: https://www.coned.com/-/media/files/coned/documents/save-energy-money/rebates-incentives-tax-credits/smart-usage-rewards/gas-demand-response-implementation-plan.pdf

[14] Stanton, E.A. and E. Tavares. 2019. *An Analysis of the Need for the Atlantic Coast Pipeline Extension to Hampton Roads, Virginia*. Applied Economics Clinic. Prepared for Mothers Out Front. Available at: https://aeclinic.org/publicationpages/09-2019/an-analysis-of-the-need-for-the-atlantic-coast-pipeline-extension-to-hampton-roads-virginia

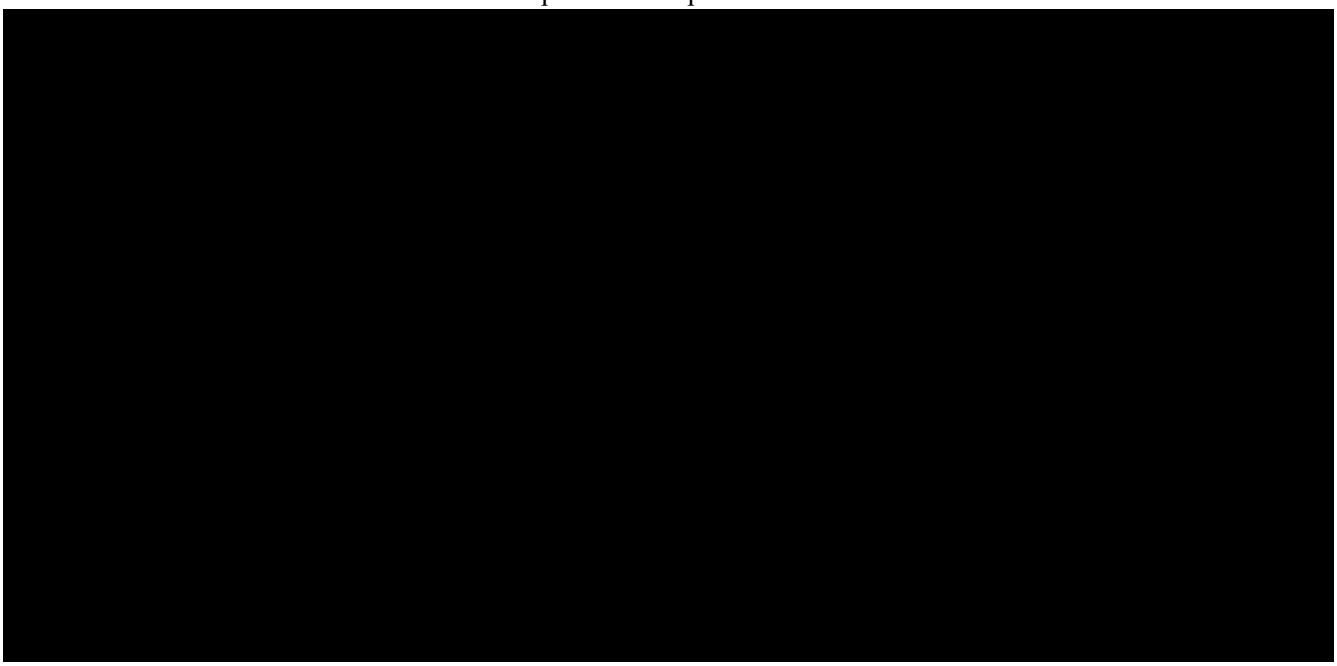
[15] Lopez, R., T. Comings, E.A. Stanton, and E. Tavares. 2019. *Home Heat Pumps in Massachusetts*. Applied Economics Clinic. Prepared for Green Energy Consumers Alliance. Available at: https://aeclinic.org/publicationpages/2019/5/29/home-heat-pumps-in-massachusetts

Q. Is a comparison to the cost of gas alternatives—and provision of this comparison to intervenors—a fundamental best practice in gas supply contract approval cases?

A. Absolutely. Not only are non-gas alternatives cost-effective, critical resources necessary to provide customers with least-cost supply, non-gas alternatives like gas energy efficiency, gas demand response, and electrification are also zero-carbon necessary to meet the greenhouse gas emission reduction requirements of the Massachusetts *Global Warming Solutions Act*, *M.G.L.* c.21n.

Q. Has National Grid compared the cost of the Atlantic Bridge Agreement to the cost of buying the gas needed using shorter-term supply arrangements, such as short-term contracts or spot market purchases?

A. No. National Grid has not provided a comparison of the cost of the Atlantic Bridge Agreement to the cost of buying the gas needed using shorter-term supply arrangements, such as short-term contracts or spot market purchases.



[redacted] Natural Gas Intelligence's ForwardLook data[16] [redacted] My analysis makes the conservative assumption that a 1-in-34-year design year will occur once within National Grid's eight-year planning period, during 2027/28.

Table 3. Cost comparison

Atlantic Bridge Agreement	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	[redacted]
Gas Supply (BBtu)	884	916	930	1,014	1,051	1,094	1,154	1,257	
[redacted]									

See WEY-ES-3 for calculations.

[redacted]

[16] Natural Gas Intelligence. April 2019. *ForwardLook Sample Data*. Available at: http://www.naturalgasintel.com/ext/resources/Marketing/FL20190423.xls

[redacted]

Q. Does National Grid provide another reason for procuring the Atlantic Bridge contract other than the avoidance of high spot market prices?

A. Yes. National Grid prefers to hold firm pipeline capacity by procuring the Atlantic Bridge contract due to liquidity and reliability concerns with respect to city-gate delivered supplies: "Based on the scarcity of primary firm supplies to the Company's city-gates, the Company does not want to forego this opportunity to meet the forecasted need of its customers by contracting directly with Algonquin for this available capacity." (Revised Exhibit NGRID-EDA/DMW/SAJ-1 at 24-25).

Q. The Department considers both liquidity and reliability as non-price attributes when reviewing a proposed agreement such as this one. Do you share National Grid's concern?

A. As I testified already, periods of high gas demand in Massachusetts have resulted in high gas prices, not in curtailment of customer supply. With even more gas supply being made available in New England, National Grid customers are unlikely to face curtailment—even if the Company does not contract with Atlantic Bridge. Reliability of winter heating supply is critical but is more appropriately and economically supplied with non-gas resources (energy efficiency, gas demand response, and electrification) and, if necessary, LNG storage.

Q. Has National Grid determined whether or not the Atlantic Bridge Agreement is cost effective?

A. No. National Grid has provided insufficient information for an informed decision regarding whether or not the Atlantic Bridge Agreement is cost-efficient. Specifically, National Grid failed to compare the costs of the proposed Agreement with the potential costs associated with any alternative scenario, including: (1) gas or supply-side resources, (2) non-gas or demand-side resources, and (3) not executing the gas supply agreement or any alternative agreement.

V. GWSA PUBLIC INTEREST CONSIDERATIONS WEIGH AGAINST NATIONAL GRID'S PROPOSED AGREEMENT

Q. What is the GWSA?

A. The Massachusetts' Global Warming Solutions Act, *M.G.L.* c.21N (GWSA) was signed into law in August 2008. GWSA sets economy-wide greenhouse gas emission reduction targets

for Massachusetts in order to achieve 80 percent reduction below statewide 1990 greenhouse gas emission levels by 2050.

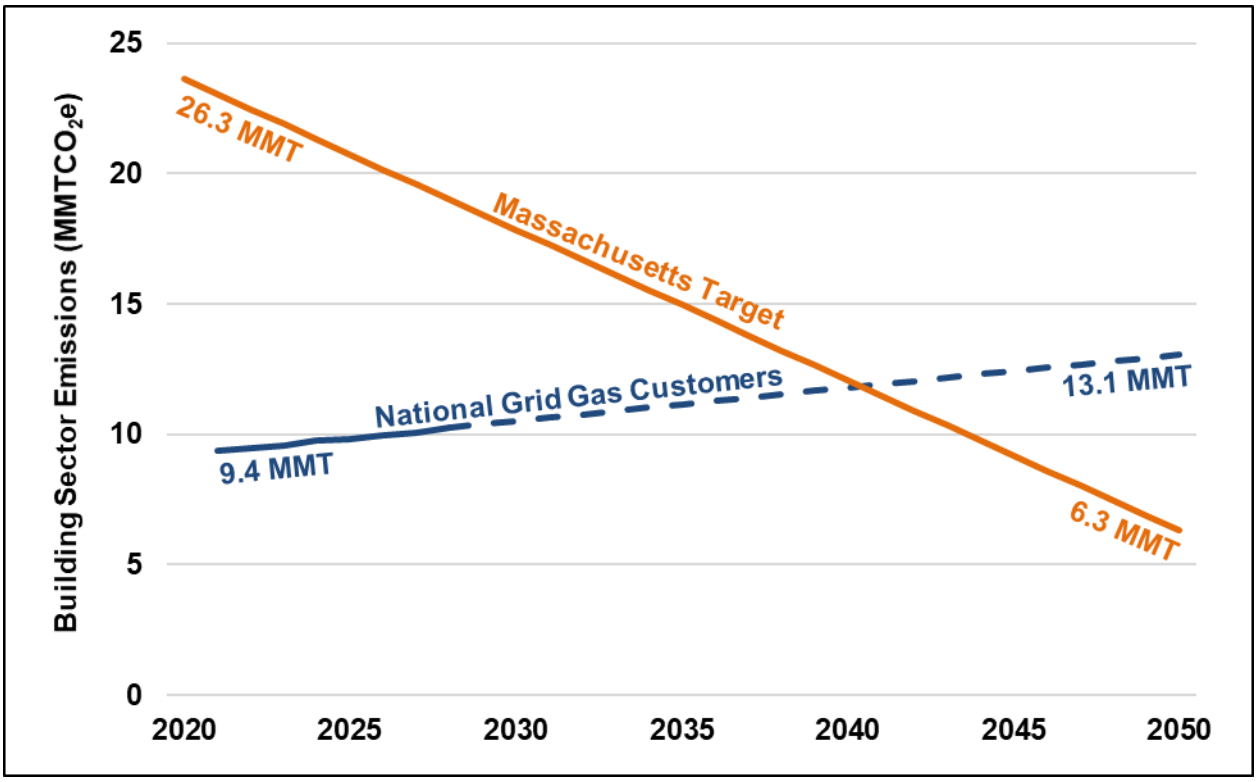
Q. Does National Grid claim that the Atlantic Bridge Agreement is consistent with GWSA?

A. Yes. National Grid claims that the Atlantic Bridge Agreement is consistent with GWSA compliance since "the additional gas supply provided under the proposed Agreement will be, in part, to serve new customers converting from oil heating to natural gas." (Revised Exhibit NGRID-EDA/DMW/SAJ-1 at 31). National Grid asserts that the reduction in greenhouse gas emissions as a result of customers switching from oil heating to natural gas constitutes is a relative emission reduction (in comparison to oil heating) and therefore is consistent with the GWSA: "Therefore, the Company expects that the acquisition of gas supply under the proposed Agreement will reduce greenhouse gas emissions and contribute toward the GWSA." (Exhibit NGRID-EDA/DMW/SAJ-1 at 31).

Q. Based on National Grid's planned customer gas demand in this docket and DPU 18-148, will National Grid's CO_2 emissions increase or decrease over the planning period?

A. As shown in Figure 3, National Grid's emissions will increase throughout the planning period.

Figure 3. Comparison of buildings sector emissions (MMT)



See WEY-ES-3 for calculations.

Q. Is National Grid's expected customer demand for gas consistent with GWSA objectives?

A. No. Today, National Grid's gas distribution by itself results in 9.4 MMT, and the Company expects this to grow to 10.3 MMT by 2028 and 13.1 MMT by 2050 (see Figure 3).[17] The math here is clear: National Grid cannot emit 13.1 MMT when the Commonwealth's limit for the buildings sector is 6.3 MMT. National Grid's gas deliveries and resultant emissions must shrink not grow.

[17] See WEY-ES-3 for calculations.

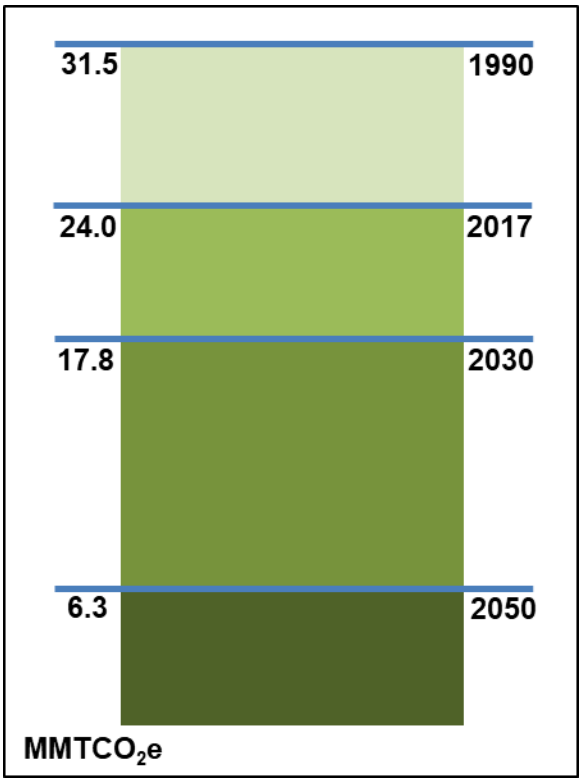
Q. Do you agree that National Grid has presented sufficient evidence to conclude that the proposed agreement is consistent with the GWSA?

A. No. National Grid has provided insufficient information for an informed decision regarding whether or not the Atlantic Bridge Agreement is consistent with the GWSA. Specifically, National Grid failed to include: (1) emissions results for their planning portfolio, (2) emissions specifically related to the proposed agreement, and (3) an analysis of emissions as they relate to GWSA.

Q. Why is providing such evidence important when considering a proposed agreement's consistency with the GWSA?

A. Without limitations on gas used in homes and businesses, Massachusetts cannot achieve GWSA targets. Between 1990 and 2017, Massachusetts' building sector (i.e., residential, commercial, and industrial, including gas system leakage but not electric generation) reduced overall emissions from 31.5 to 24.0 million metric tons (MMT) of carbon dioxide equivalents, with the requirement to reach 6.3 MMT by 2050 to achieve consistency with GWSA targets (see Figure 3). The main driver of the observed emission reduction in this sector is the switch from oil to gas as a primary fuel: emissions from gas used in homes and businesses have increased from 1990 and 2017, but total building sector emissions have fallen. While gas may be a lower-emitting fuel source, it is not carbon neutral. Transitioning away from gas used in homes and businesses is essential to meeting the GWSA's emissions targets. A gas distributor, then, is obligated to consider this trend when evaluating the consistency of its actions with GWSA.

Figure 3. Massachusetts' building sector emissions (MMT)



See WEY-ES-3 for calculations.

Q. What is the type of information that gas utilities should consider when determining whether a proposed agreement is consistent with the GWSA?

A. Gas distribution companies should consider whether or not the gas usage in their planned customer requirements is consistent with statewide GWSA targets—that is, does it help or hinder the state's greenhouse gas emissions reductions efforts. At the same time, gas distribution companies should consider whether or not their forecasted customer usage is consistent with the Commonwealth's planned emission reductions: Will planning supply for a growing gas load result in the lowest costs for customers if the state is planning emission reductions that will require zero-carbon heating solutions, such as modern electric heat pumps powered by renewably sourced electricity?

VI. CONCLUSION

Q. Does this conclude your direct testimony?

A. Yes, but I reserve the right to supplement this testimony if any additional information becomes available due to later-filed discovery responses or other materials.

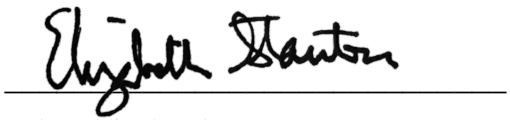
Commonwealth of Massachusetts
Department of Public Utilities

Petition of Boston Gas Co. d/b/a National Grid for Approval of a Fourteen-Year Firm Transportation Agreement with Algonquin Gas Transmission Co., LLC, Pursuant to G.L. c.164, §94A	No. 19-132

AFFIDAVIT OF ELIZABETH A. STANTON, PHD

I, Elizabeth Stanton, certify that the preceding Prefiled Testimony and subsequent exhibits that bear my name were prepared by me or under my supervision and are true and correct to the best of my knowledge and belief as of the date I sign this Affidavit.

Signed under the pains and penalties of perjury as of this 21 day of February, 2020.



Elizabeth Stanton