PRE-FILED DIRECT TESTIMONY

OF

TYLER OLNEY

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I. Introduction

Q. Please state your name and business address.

A. My name is Tyler Olney. My business address is 685 Third Avenue, New York, New York 10017.

Q. By whom are you employed and in what position?

A. I am employed by Guidehouse as a Managing Consultant. Guidehouse is a specialized, global professional services firm that serves public and commercial clients across a range of fields including the energy industry. Guidehouse's global Energy, Sustainability, and Infrastructure segment employs more than 700 consultants who provide advisory services to a diverse range of energy industry clients, including electric and gas utilities.

Q. What are your responsibilities as a Managing Consultant at Guidehouse?

A. As a Managing Consultant, I lead analyses performed as part of projects for energy industry clients.

Q. Please describe your education, training, and experience.

A. I graduated from Tufts University with a bachelor's degree in Mechanical Engineering with minors in Computer Science and Entrepreneurial Leadership Studies. I have worked with Guidehouse for five years and in that time have provided technical support on a range of energy industry projects, including preparing greenhouse gas ("GHG") emissions analyses for several large utilities across the United States.

Q. Have you previously filed testimony or testified before the Rhode Island Public Utilities Commission ("PUC" or the "Commission") or other public utility commissions?

A. Although I have not previously filed testimony or testified before the PUC, I have provided expert testimony before the Connecticut Public Utilities Regulatory Authority under Docket Nos. 17-12-03RE03, No. 21-08-02, and No. 22-08-05. I have also presented before the New York Public Service Commission as part of a joint proceeding under Cases 19-G-0309, 19-G-0310, 20-E-0380, and 20-G-0381.

Q. Are you familiar with the Aquidneck Island Gas Reliability Project (the "Project")?

A. Yes. The Project involves the use of portable equipment on property owned by the Company at Old Mill Lane in Portsmouth for the vaporization and storage of liquified natural gas ("LNG") to provide back-up supply of natural gas to the Company's gas distribution system on Aquidneck Island.

Q. What is your role specific to the Project?

A, I am the lead technical analyst responsible for performing the Aquidneck Island Gas Reliability Project GHG analysis originally presented in the Project's Siting Report submitted to the Rhode Island Energy Facility Siting Board (the "Siting Board") in April 2022 with updates presented and discussed herein.

Q. Are you familiar with the Application and Siting Report dated April 2022 ("Siting Report") that were submitted to the Siting Board?

A. Yes. I prepared the original GHG analysis that is included as Section 4.10 (Greenhouse Gas Analysis) of the Siting Report.

II. Purpose and Structure of Testimony

Q. What is the purpose of your testimony in this proceeding?

A. In my testimony, I will provide an overview of the GHG analysis included in the Siting Report and address recent updates made to that analysis and presented herein.

Q. How is your testimony structured?

A. Section I is the Introduction. Section II presents the purpose and structure of my testimony. Section III presents a description of the GHG analysis. Section IV is the Conclusion.

III. Description of Greenhouse Gas Analysis

Q. Please describe the GHG analysis included in the Siting Report.

A. The GHG analysis included in Section 4.10 of the Siting Report compared the relative attributed GHG emissions savings through winter 2034-35 of potential Project alternatives. Note that the Project itself, as defined above as the use of portable LNG to provide backup supply, is a component of all analyzed alternatives. Contingency events requiring this backup supply are not forecasted to occur in this analysis, and therefore the Project itself is assumed to not emit GHG directly during the analysis timeframe. This GHG analysis compares the relative emissions from the natural gas distribution system on Aquidneck Island driven by the state of each Project alternative.

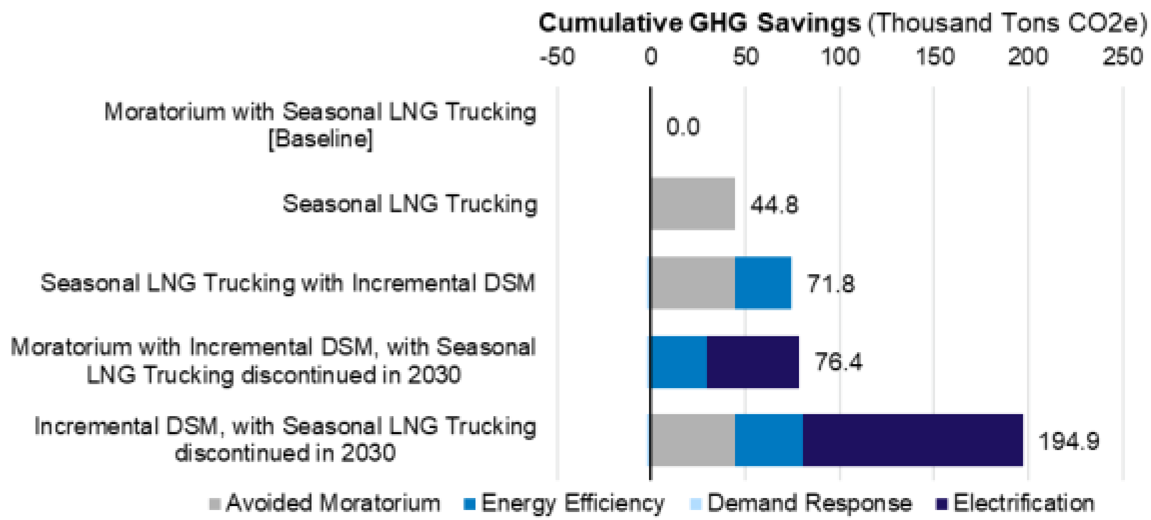
Results were presented as savings relative to a baseline scenario where the Project remains in operation through 2034-35 to serve existing customers and a moratorium is placed on new gas connections that would be served by the Portsmouth take station and the Project. For the purpose of this analysis, it was assumed that such a moratorium would prevent any growth in gas customer load served by the Portsmouth take station and the Project through 2034-35. Remaining customer load is then assumed to remain flat.

The four Project alternatives considered included: (1) the Project remaining in place through winter 2034-35 without a moratorium and assuming the baseline demand side management ("DSM") approved by the PUC in Docket No. 5189 is achieved (i.e., the "proposed solution"); (2) the Project remaining in place through winter 2034-35 without a moratorium but with additional energy efficiency ("EE"), electrification of heat ("EH"), and demand response ("DR") incremental to baseline DSM approved by the PUC in

Docket No. 5189; (3) the Project remaining in place until winter 2030-31 with a moratorium and with additional DSM needed to decommission the Project on that schedule; and (4) the Project remaining in place until winter 2030-31 without a moratorium and with additional DSM sufficient, beyond what is assumed in alternative (3), to decommission the Project on that schedule.

The original analysis presented in the Siting Report found that the Project without a moratorium (i.e., the proposed solution described as alternative (1) above) would save approximately 44,800 tons of carbon dioxide (CO_2)-equivalent GHG emissions through winter 2034-35 compared to the baseline scenario where the Project is combined with a moratorium. As for the other Project alternatives, the Project combined with additional DSM (alternative (2)) would save approximately 71,800 tons of CO_2-equivalent GHG emissions, an immediate moratorium with the Project supplanted in 2030 by additional DSM (alternative (3)) would save approximately 76,400 tons of CO_2-equivalent GHG emissions, and the Project supplanted in 2030 by additional DSM without a moratorium (alternative (4)) would save approximately 194,900 tons of CO_2-equivalent GHG emissions, all compared to the baseline scenario involving the Project and a moratorium and representing cumulative GHG emission savings through 2034-35. The results are presented in Figure 1, which was presented as Graphic 4 in the Siting Report.

Figure 1. Cumulative GHG Savings from Original Analysis



Note again that for all alternatives there are no emissions impact directly from the Project (i.e., Portable LNG operations). Even in the alternatives in which the Project is discontinued in 2030, there are no additional GHG savings from avoided Project operation. Again, that is because the Project is not expected to be utilized in normal operation, because it is only utilized in the event of an upstream system disruption that would have otherwise caused system shutoffs. The additional GHG savings in those scenarios are solely from increased DSM used to match the level of contingency that the Project provides. That same level of DSM could be done elsewhere in Rhode Island and provide the same level of GHG benefit.

Q. What assumptions were made in the original analysis?

A. The original analysis was predicated on several key assumptions. These assumptions can be categorized as first involving the definition of the Project alternatives as described above and as second involving the GHG emissions factors and methodology used to calculate relative GHG emissions savings.

The first step in calculating emissions impact is estimating the difference in energy consumed in each Project alternative. That is, the difference in fuel oil, natural gas, and electricity consumed when compared to the defined baseline. In both the baseline scenario and each alternative scenario, the solution was sized to meet the same capacity and contingency needs on Aquidneck Island as identified in the June 2021 demand forecast. In the case of a moratorium, the otherwise projected growth in customer demand relative to 2023 levels on Aquidneck Island was assumed to be met with fuel oil-powered equipment. This assumption was made at the time because absent substantial subsidies or mandates, electrification was not a cost-effective heating option,[1] and according to U.S. Census data more households in southeast Rhode Island currently use fuel oil than any other heating source.[2] Fuel oil-powered equipment was assumed to be 11 percent less efficient than natural gas-powered equipment at converting a unit of fuel

[1] See, e.g., Rhode Island Strategic Electrification Study accessible here: https://ripuc.ri.gov/sites/g/files/xkgbur841/files/eventsactions/docket/5.-Rhode-Island-Strategic-Electrification-Study.pdf. Note that this analysis was performed prior to the announcement of Rhode Island's High-Efficiency Heat Pump Program and the passing of the federal Inflation Reduction Act.

[2] US Census 2019 and 2021 American Community Survey Public Use Microdata, see: https://data.census.gov/mdat/#/search?ds=ACSPUMS1Y2019&rv=ucgid,HFL&wt=WGTP&g=7950000US4400300

to heat energy.[3] Each DSM measure avoids some amount of natural gas usage each year based on the amount of design day DSM savings identified for each Project alternative involving incremental DSM. For EH and DR, there was analogously some increased electricity and fuel oil usage, respectively, assumed based on the relative efficiencies of the alternatives.

After estimating the differences in energy usage by energy source among Project alternatives, GHG emissions impacts are estimated based on assumed emissions rates for each GHG converted into a CO_2-equivalent measure based on each GHG's global warming potential ("GWP") factor. Those resulting values are then combined to determine the CO_2-equivalent GHG emission intensity for each energy source. The original analysis assumed emissions rates for pipeline gas, fuel oil, and electricity for CO_2, nitrous oxides (N_2O), and methane (CH_4), as identified in Table 4-3 of the Siting Report. These various GHGs are then converted to CO_2-equivalents using the 20-year GWP factors found in the Intergovernmental Panel on Climate Change's ("IPCC") Fifth Assessment Report ("AR5"), as identified in Table 4-2 of the Siting Report. Combining the emission rates of all GHGs and converting them into a CO_2-equivalent basis resulted in GHG emissions intensities of roughly 119 pounds of CO_2-equivalent per million

[3] Assuming 85 percent Annual Fuel Utilization Efficiency ("AFUE") for oil-fired equipment, based on U.S. Department of Energy ("DOE") appliance standards for oil-fired boilers found at 10 CFR 430.32(e)(2)(iii)(A), and assuming 95 percent AFUE for gas-fired equipment, based on a Massachusetts study of Heating, Air-conditioning, & Refrigeration Distributors International ("HARDI") data from HVAC distributors, available at https://ma-eeac.org/wp-content/uploads/TXC65_HARDI_Data_Memo_Final_2019.11.15.pdf.

British thermal unit ("MMBtu") of natural gas, 171 pounds of CO_2-equivalent per MMBtu of fuel oil, and 638 pounds CO_2-equivalent per megawatt-hour (MWh) of electricity in 2020 declining to zero emissions in 2030 in a straight-line.

For more information on the assumptions used in the original analysis, see Section 4.10.3 of the Siting Report.

Q. Have you recently updated the analysis?

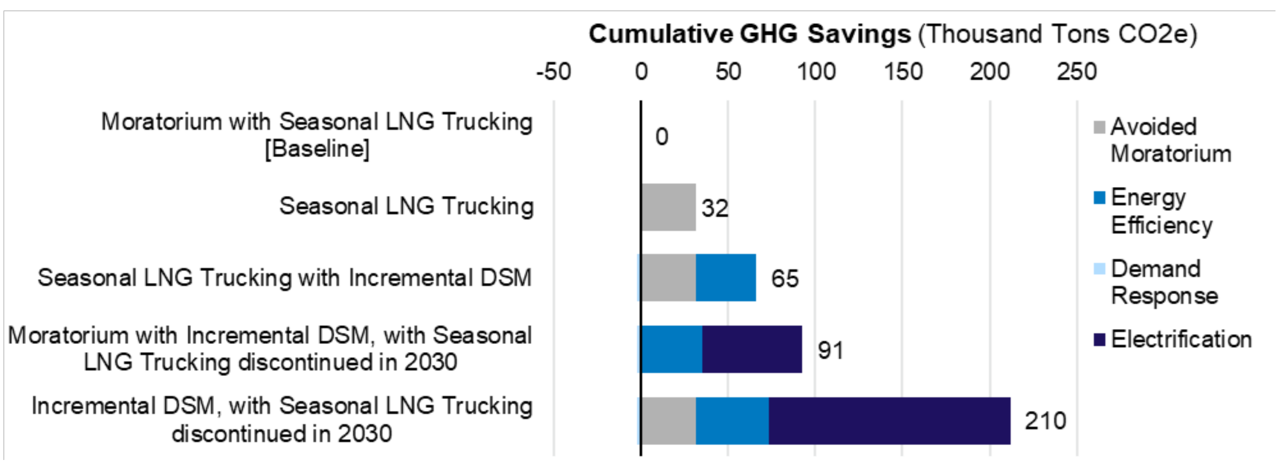
A. Yes. In response to stakeholder feedback, Guidehouse reviewed the emissions rate assumptions included in the analysis found in the Siting Report to determine if any changes in those assumptions are warranted.

Q. Please summarize the results of your update.

A. Guidehouse updated the original analysis to estimate the impact of changing the emission rate assumptions included in the original analysis. This updated analysis is based on revisions to the assumed emission rates for each energy source (i.e., natural gas, fuel oil, and electricity). Each of these revisions is presented as a sensitivity to show the change in results attributed to that specific revision. The results of these revisions are then combined to show updated results for GHG emission savings for each alternative.

The first revision uses recent Company data on Rhode Island-wide methane losses to derive an upper estimate of methane emission rates from natural gas distribution on Aquidneck Island that could be avoided through a moratorium or DSM.[4] This change decreases the effective GHG emission savings from avoiding a moratorium in alternatives (1), (2), and (4) as defined above, and increases the effective GHG emission savings from DSM in alternatives (2), (3), and (4) as defined above. In total, the GHG emissions savings from alternatives (1) and (2) decrease relative to the Siting Report to roughly 32,000 and 65,000 tons of CO_2-equivalent, respectively, and increase for alternatives (3) and (4) to roughly 91,000 and 210,000 tons of CO_2-equivalent. Figure 2, below, presents the results of this sensitivity for comparison to Figure 1.

Figure 2. Cumulative GHG Savings with Higher Natural Gas Methane Emissions Rate



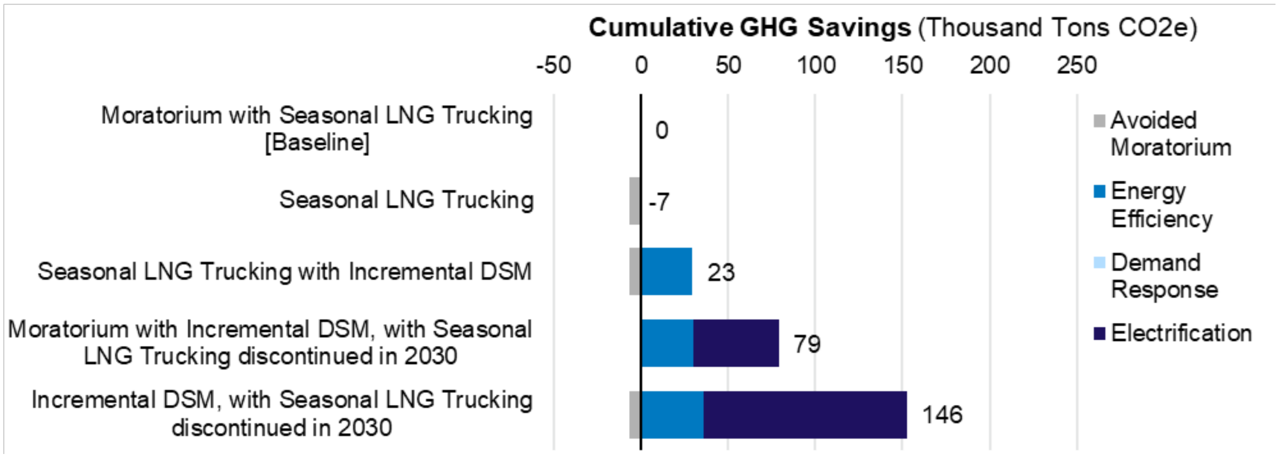
The second revision adjusts the emissions rate for fuel oil to account for recently enacted

[4] See response to next question for rationale behind this upper bound estimate.

Rhode Island state law related to biodiesel products, which requires that heating fuel oil sold in Rhode Island meet certain biofuel percentages over time (i.e., 10 percent biofuels by 2023, 20 percent by 2025, and 50 percent by 2030).[5] This lowers the effective GHG emissions intensity of fuel oil over time in the analysis relative to the original analysis in the Siting Report by the relative biofuel percentages (e.g., 50 percent less emitting by winter 2030-31), as the original analysis assumed 0 percent biofuel use. This revision decreases the effective GHG emission savings from avoiding a moratorium in alternatives (1), (2), and (4) as defined above, and increases the effective GHG emission savings from DR in alternatives (2), (3), and (4) as defined above. In total, the GHG emissions savings from alternatives (1), (2), and (4) decreases relative to the Siting Report to roughly -7,000, 23,000, and 146,000 tons of CO_2-equivalent, respectively, and increases for alternative (3) to roughly 79,000 tons of CO_2-equivalent. A negative GHG emissions savings value (i.e., the -7,000 value) means a net increase in GHG emissions compared to the baseline scenario. Figure 3, below, presents the results of this sensitivity for comparison to Figure 1.

[5] See R.I. Gen. Laws §§ 23-23.7-1, *et seq.*; see also State of Rhode Island General Assembly Press Release titled "New law to increase use of cleaner-burning biodiesel in home heating oil", accessible at: https://www.rilegislature.gov/pressrelease/_layouts/RIL.PressRelease.ListStructure/Forms/DisplayForm.aspx?List=c8baae31-3c10-431c-8dcd-9dbbe21ce3e9&ID=372028.

Figure 3. Cumulative GHG Savings with Lower Fuel Oil Emissions Rate

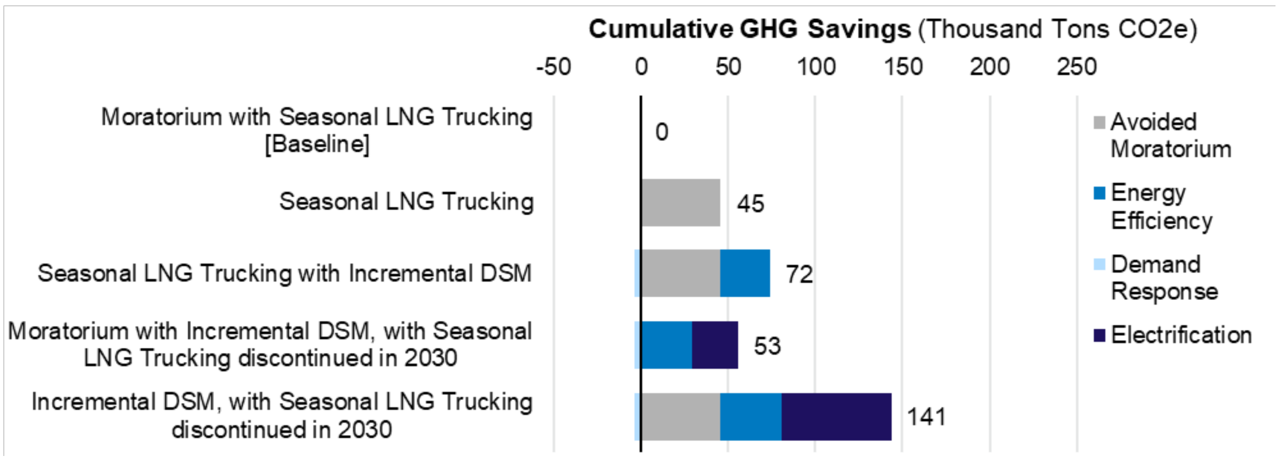


The third revision considers: (1) the merit of using marginal emissions rates by season for the electricity system, and (2) the impact on electricity emission rates attributed to the recently enacted amendments to the Renewable Energy Standard for Rhode Island,[6] which aims to achieve 100 percent of electricity being offset by renewable energy by 2033 compared to our original assumption of achieving that goal by 2030. The updated analysis applies marginal seasonal emissions rates for the New England Independent System Operator ("ISO-NE") rather than the simple annual average emission rate in recognition that EH primarily affects electric demand in the winter heating season. This change results in a higher GHG emissions rate for electricity than assumed in the original analysis for the siting report (see "Effective 2021 AESC" line in Figure 6, compared to

[6] See R.I. Gen. Laws §§ 39-26-4 and 39-26-6; see also Governor Daniel McKee press released titled "Governor McKee Signs Historic Legislation Requiring 100% of Rhode Island's Electricity to be Offset by Renewable Energy by 2033," accessible at: https://governor.ri.gov/press-releases/governor-mckee-signs-historic-legislation-requiring-100-rhode-islands-electricity-be.

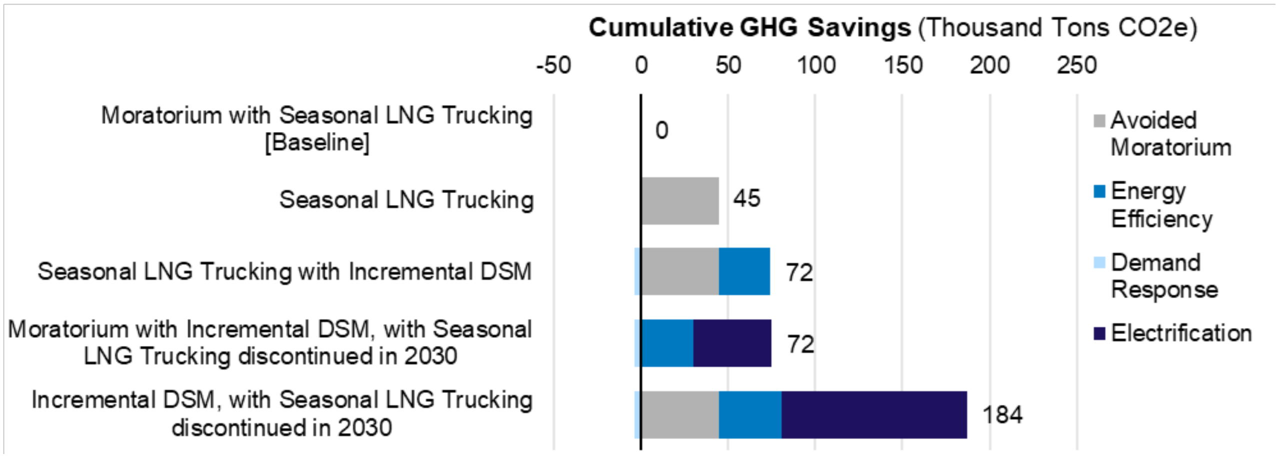
"Siting Report" line). The impact of this change on the emissions analysis alone is shown below in Figure 4.

Figure 4. Cumulative GHG Savings with Higher Electric Grid Emissions, without RES



The updated analysis also includes a sensitivity to a decline in the marginal emission rates over time to account for renewable energy offsets in line with Rhode Island's Renewable Energy Standard. The combined impact of this change along with the seasonal marginal emission rate is a higher GHG emissions rate for electricity than assumed in the original analysis for the siting report (see "Effective 2021 AESC w/ Renewable Energy Standard" line in Figure 6, compared to "Siting Report" line). This change decreases the effective GHG emission savings from EH in alternatives (3) and (4) as defined above. The emissions savings from alternatives (3) and (4) then decrease relative to the Siting Report to roughly 72,000 and 184,000 tons of CO_2-equivalent, respectively. Figure 5, below, presents the results of this total sensitivity for comparison to Figure 1.

Figure 5. Cumulative GHG Savings with Higher Electric Grid Emissions Rate, with RES



Q. What is the combined impact of these revisions?

A. The combined impact of these revisions on the estimated cumulative GHG savings of each Project alternative relative to the assumed baseline is shown in Table 1, below. Under the combined sensitivities, the relative ranking of Project alternatives in terms of GHG savings is consistent with the original analysis from the Siting Report, although the Project without a moratorium (i.e., the proposed solution described as alternative (1)) now leads to relatively more GHG emissions than the baseline of the Project with a moratorium.

Table 1. Cumulative GHG Savings, by Sensitivity (Thousand Tons CO_2-equivalent)

Project Alternative	Siting Report	Natural Gas	Fuel Oil	Electric Grid	Combined Sensitivity
Moratorium with Seasonal LNG Trucking [Baseline]	0	0	0	0	0
(1) Seasonal LNG Trucking	45	32 to 45	-7	45	-19 to -7
(2) Seasonal LNG Trucking with Incremental DSM	72	65 to 72	23	72	17 to 23
(3) Moratorium with Incremental DSM, with Seasonal LNG Trucking discontinued in 2030	77	77 to 91	79	53 to 72	58 to 89
(4) Incremental DSM, with Seasonal LNG Trucking discontinued in 2030	195	195 to 210	146	141 to 184	94 to 151

Q. What assumptions and/or information changed with the update?

A. As noted above, the updated analysis presents sensitivities for the GHG analysis results based on updated emissions rates assumptions for natural gas, fuel oil, and electricity. This results in revised GHG emissions intensity values for each energy source.

As noted above, the updated estimated natural gas methane emissions rate reflects assumptions around an upper bound methane leakage rate. It assumes a volumetric leakage rate of 0.74 percent, based on the Company's information about annual leakage in Rhode Island.[7] Note that utilizing this value implicitly assumes that Aquidneck Island has a similar proportion of leak prone pipe as Rhode Island has in total, and that natural gas savings from a moratorium and/or DSM yield proportional savings in methane leakage. According to the Company, relatively less of the gas distribution network on Aquidneck Island is comprised of leak prone pipe than the Rhode Island gas distribution network in total. That implies the leakage rate on Aquidneck Island is likely lower than Rhode Island in general. In addition, to the extent that a moratorium and/or DSM do not significantly change the pressure at which leak prone pipe on Aquidneck Island is operated, gas savings from those resources would yield less methane leakage savings than the system leakage rate. Together, this likely means that this assumed leakage rate represents an upper bound on the avoided methane leakage rate of natural gas savings from a moratorium and/or DSM. With that said, applying that 0.74 percent leakage rate and assuming a methane content of gas of 90 percent by volume and heat content of natural gas of 1.037 MMBtu per Mcf, that yields a methane emissions rate of distributed pipeline gas of 0.266 pounds per MMBtu. Utilizing that value increases the GHG emissions intensity of natural gas to roughly 138 pounds CO_2-equivalant per MMBtu.

The updated fuel oil emissions rate assumes biodiesel percentages found in Rhode Island's biodiesel products state law. As noted above, this law requires that heating fuel

[7] Company data estimates average annual leaks over the past three years to be 290 million cubic feet (MMcf) a year. U.S. Energy Information Administration ("EIA")-176 data reports average annual gas delivery in Rhode Island between 2019 and 2020 of 39,416 MMcf. This results in a methane leakage rate in Rhode Island of 0.74 percent (i.e., 290 divided by 39,416).

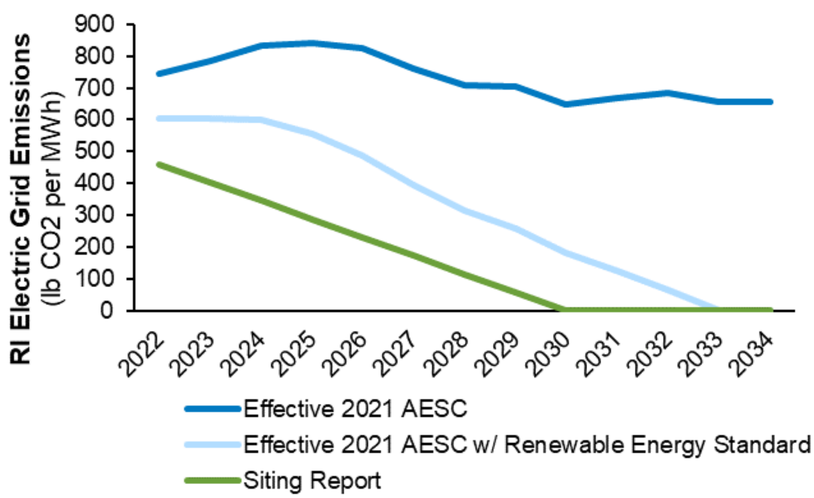
oil sold in Rhode Island meet a standard of B5 by July 1, 2021, B10 by July 1, 2023, B20 by July 1, 2025, and B50 by July 1, 2030 (where the number after "B" refers to the part out of 100 of emission-free biodiesel in the sold fuel oil). The percent biofuel in interim years is interpolated linearly. I assume that biodiesel is zero emissions, so the effective emissions rate of fuel oil is effectively discounted by the portion of biodiesel achieved over time.

The updated electric emissions rate incorporates both the seasonality of ISO-NE electric marginal emissions rates and Rhode Island's Renewable Energy Standard. The ISO-NE electric system marginal emissions rates are estimated in the Avoided Energy Supply Components in New England: 2021 Report ("AESC"), led by Synapse Energy Economics, listed in Table 80 of the May 14, 2021 release.[8] Those seasonal emissions rates are multiplied by assumed load shapes for heat pumps to yield annual electric emissions. The AESC estimate of emissions does not include an assumed impact from renewable energy credits ("RECs"). To account for RECs, I have included an alternative estimate of the marginal emission rate that assumes a reduction in the marginal emission rate equivalent to each year's Renewable Energy Standard value found in recently amended Rhode Island law (e.g., 23 percent by 2023, 48 percent by 2027, and 100

[8] Synapse Energy Economics, Resource Insight, Les Deman Consulting, North Side Energy, and Sustainable Energy Advantage. Avoided Energy Supply Components in New England: 2021 Report. Prepared for AESC Study Group. Released March 15, 2021, Amended May 14, 2021. Accessible at: https://www.puc.nh.gov/electric/Monitoring%20and%20Evaluation%20Reports/avoided-energy-supply-components-2021-report.pdf.

percent by 2033).[9] The effect of these changes in assumptions on the electric emissions rate under two alternative approaches (i.e., marginal emissions rate with and without an adjustment to account for the Renewable Energy Standard), as compared to the assumed electric emission rate found in the original analysis for the Siting Report, is depicted in Figure 6 below.

Figure 6. Assumed Effective Marginal Emissions Rate of Increased Electrification of Heat



Q. Does your analysis follow the GHG emissions accounting methodology established by the Rhode Island Executive Climate Change Coordinating Council ("EC4")?

A. This analysis is consistent with the tenets of emissions accounting that the EC4 used in

[9] *See* R.I. Gen. Laws § 39-26-4.

their greenhouse gas emissions inventory.[10] Specifically, it includes emissions associated with direct combustion of natural gas and fuel oil at the end user site, as well as natural gas distribution emissions from fugitive losses. It also utilizes the consumption-based approach to accounting for electric grid emissions; I multiply electric consumption by ISO-NE marginal emissions rates consistent with a consumption-based approach, rather than quantifying changes in Rhode Island-based electric generation emissions attributed to the Project and its alternatives as would be done under a production-based approach.

Lastly, consistent with recent developments in EC4 accounting practices[11], this analysis accounts for Rhode Island's Renewable Energy Standard in increasing renewable energy credit purchases to reach net zero electric consumption by 2033. An alternative approach, represented by Figure 4, could exclude the impact of the Renewable Energy Standard, instead assuming electric emissions rates aligned with the "Effective 2021 AESC" line in Figure 6. This approach reflects a broader societal perspective that assumes renewable energy credit purchases only shift the credit for emissions reductions to Rhode Island and do not lead to actual reductions in global GHG emissions.

Q. Did you follow a different emissions accounting model?

[10] The latest EC4 greenhouse gas emissions inventory is available at: https://dem.ri.gov/environmental-protection-bureau/air-resources/greenhouse-gas-emissions-inventory.

[11] 2019 Rhode Island Greenhouse Gas Emissions Inventory. Updates to Electricity Sector GHG Accounting. Accessible at: https://dem.ri.gov/sites/g/files/xkgbur861/files/2022-11/Updates%20to%20Electricity%20Sector%20GHG%20Accounting.pdf.

A. No.

Q. Please summarize the differences between your methodology and EC4's methodology.

A. Our methodology and EC4's methodology differ insofar as EC4's emissions inventory serves a different purpose than this analysis. EC4 performs a bottom-up quantification of all emissions and does so on a historic basis. This analysis performs a net emissions comparison of Project alternatives compared to a common baseline with projections of GHG emissions savings forward in time. Therefore, my methodology does not calculate emissions from several categories that the EC4 emissions inventory does, because they do not differ among Project alternatives. My methodology also does not deploy many of the tools that the EC4 emissions inventory does because historic electric system emissions are not necessarily indicative of future emissions rates. With that said, the key tenets of the EC4 emissions accounting are followed, as described above.

Q. Do you have any additional updates to your GHG analysis?

A. No.

IV. Conclusion

Q. Does this complete your testimony?

A. Yes, it does.