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Rhode Island Energy™
a PPL company

February 16, 2023

VIA ELECTRONIC MAIL

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

RE: Docket No. 22-53-EL - Rhode Island Energy's Proposed FY 2024 Electric Infrastructure, Safety, and Reliability Plan
Responses to Data Requests – PUC Set 2 (Complete Set)

Dear Ms. Massaro:

On behalf of The Narragansett Electric Company d/b/a Rhode Island Energy (the "Company"), enclosed please find the Company's complete set of responses to the Public Utilities Commission's Second Set of Data Requests in the above referenced docket.

This transmittal contains the Company's responses to data requests PUC 2-11 through PUC 2-16, which completes the Company's responses to PUC Set 2.

Thank you for your attention to this transmittal. If you have any questions or concerns, please do not hesitate to contact me at 401-784-4263.

Sincerely,

Andrew S. Marcaccio

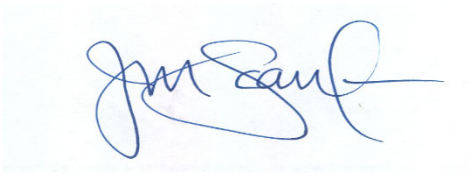
Enclosures

cc: Docket No. 22-53-EL Service List
John Bell, Division

Certificate of Service

I hereby certify that a copy of the cover letter and any materials accompanying this certificate was electronically transmitted to the individuals listed below.

The paper copies of this filing are being hand delivered to the Rhode Island Public Utilities Commission and to the Rhode Island Division of Public Utilities and Carriers.



Joanne M. Scanlon

February 16, 2023
Date

Docket No. 22-53-EL – RI Energy's Electric ISR Plan FY 2024
Service List as of 2/8/2023

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PUC 2-1
Forecast of DER Penetration in GMP

Request:

The testimony filed in Docket No. 22-56-EL states on Bates page 13 the following:

> "The Company proposes that grid modernization investments described and discussed in the GMP will be proposed for approval through the Company's electric ISR. The GMP will be a companion document that the PUC and other stakeholders can refer to and rely upon to understand the nature of the specific proposed investments and how they fit into the Company's overall grid modernization strategy." (emphasis added)

Referring to Section 5 of the referenced Grid Modernization Plan (GMP), numerous places emphasize that Grid Modernization investments are needed to address expected DER penetration on the system (for example, see Bates page 2, and Bates page 7). Please provide a schedule reflecting both the current capacity of existing DER and the Company's forecast of the annual growth of DER penetration on the distribution system that was used by the Company to develop the Grid Modernization plan. In the schedule, please provide:

(a) The number of megawatts of renewable generation by technology that (i) currently interconnected on the Company's electric distribution system;(ii) interconnected directly to the Company's transmission system in Rhode Island and; (iii) is being forecasted to interconnect annually to the Company's distribution system (i.e., MW of onshore wind and MW of solar PV). Please also include the Company's assumed annual delivery of MWHs from these facilities.

(b) Please break down further both the current and forecasted MW of solar PV which are from (i) behind-the-meter, and (ii) large-scale solar PV stand-alone projects with no significant on-site consumption. Of the existing large-scale solar PV in the second category above, please also identify the MW of projects that interconnect through dedicated distribution or transmission lines to a substation.

(c) Please also break down both the current and forecasted MW of solar PV which are (i) rooftop and (ii) ground-mounted and the associated annual MWHs delivered.

Prepared by or under the supervision of: Ryan Constable

PUC 2-1, page 2
Forecast of DER Penetration in GMP

Response:

(a) Item (i)

Technology	MW AC
Battery Add-On	0.10
Biogas	0.24
Hydro	6.50
Other	0.43
Solar	464
Wind	49.7

Item (ii) – "[megawatts of renewable generation] interconnected directly to the Company's transmission system in Rhode Island" is not directly tracked or managed by Rhode Island Energy but the information can be found at an ISO-NE website: https://www.iso-ne.com/about/key-stats/resource-mix/

For off-shore wind generation, there are 30 megawatts interconnected to the transmission system. Solar interconnections are predominantly interconnected to the distribution system and ISO-NE states: "Solar power ranks third in the ISO Interconnection Request Queue, with nearly 4,000 MW proposed. Most solar power in New England, though, is connected to local distribution utilities or "behind the meter" directly at retail customer sites. Because such projects do not follow the ISO interconnection process, they aren't reflected in the Interconnection Request Queue numbers. The ISO must still track solar power's growth in the region for forecasting and planning purposes, however, since it reduces demand on the grid. The region had about 270,000 solar power installations as of August 2022 with a combined nameplate generating capability of approximately 5,000 MW."

Item (iii) - Attachment PUC 2-1 contains a forecast which includes the number of megawatts by technology that is being forecasted to interconnect annually to the Company's distribution system (i.e., MW of onshore wind and MW of solar PV). Also see the Company's response to Division 1-15.

(b) Attachment PUC 2-1 contains an approximation of the breakdown of the current and forecasted MW of solar PV which are from (i) behind-the-meter, and (ii) large-scale solar PV stand-alone projects with no significant on-site consumption. Behind-the-meter is

represented as "Small DERs in Service" and large-scale solar PV stand-alone projects is represented as "Large DERs in Service".

There are approximately 38.4 MW of solar generation interconnected through dedicated distribution to a substation.

(c) The Company does not track or forecast (i) rooftop and (ii) ground-mounted solar sites. A fair approximation is use of values provided in (b) where the small PV can be considered rooftop sites and large-scale PV considered ground mounted sites. Columns showing the MWHs are included in Attachment PUC 2-1.

Year	Large DERs in Service (MW)	Small DERs in Service (MW)	Estimated Actual MW for 2022	Approximate Large DERs in Service (MWH)	Approximate Small DERs in Service (MWH)	Total GWh: All DERs	All DERs: Mwh/MW
2022	340.6	127.4	468.0	545,944	204,230	750.2	1,603.08
2023	407.9	217.7	625.6	653,825	348,998	1,002.8	
2024	475.2	275.3	750.5	761,706	441,374	1,203.1	
2025	542.4	333.0	875.4	869,587	533,750	1,403.3	
2026	609.7	390.6	1000.3	977,468	626,125	1,603.6	
2027	677.0	448.2	1125.2	1,085,349	718,501	1,803.8	
2028	738.2	511.9	1250.2	1,183,422	820,684	2,004.1	
2029	799.4	575.7	1375.1	1,281,496	922,867	2,204.4	
2030	860.6	639.4	1500.0	1,379,570	1,025,050	2,404.6	
2031	921.8	768.2	1690.0	1,477,643	1,231,562	2,709.2	
2032	982.9	897.1	1880.0	1,575,717	1,438,073	3,013.8	
2033	1040.0	1030.0	2070.0	1,667,253	1,651,123	3,318.4	
2034	1097.1	1162.9	2260.0	1,758,788	1,864,173	3,623.0	
2035	1154.2	1295.8	2450.0	1,850,323	2,077,223	3,927.5	
2036	1211.3	1428.7	2640.0	1,941,859	2,290,272	4,232.1	
2037	1266.4	1563.6	2830.0	2,030,125	2,506,591	4,536.7	
2038	1321.5	1698.5	3020.0	2,118,392	2,722,910	4,841.3	
2039	1376.5	1833.5	3210.0	2,206,658	2,939,229	5,145.9	
2040	1431.6	1968.4	3400.0	2,294,924	3,155,548	5,450.5	
2041	1486.6	2073.4	3560.0	2,383,191	3,323,774	5,707.0	
2042	1541.7	2178.3	3720.0	2,471,457	3,492,001	5,963.5	

PUC 2-2
Forecast of DER Penetration in GMP

Request:

Referring to Bates page 84 which contains the following statement: "The numbers and megawatts of DER resources were developed using emissions data from the 2019 EIA report for Rhode Island assuming the State's Climate Mandates will be achieved through adoption of a combination of solar generation, wind energy production, EV, and EHP conversion," please respond to the following:

(a) When the Company used emissions information to develop its forecast, did the Company take into account how the State will actually be measuring its emissions targets, including how the acquisition of generation certificates from renewable and/or zero-emissions generators in the region (whether inside or outside of Rhode Island borders) will be treated in the emissions calculations? If so, please explain how the forecast took this into account.

(b) Does the Company assume that meeting the emissions reduction targets must necessarily include a substantial expansion of solar generation in the state? If yes, please explain why it is necessary.

(c) Is the Company's forecast based on an assumption that a substantial growth in solar generation within Rhode Island is necessary in order to meet the States' 100% renewables requirement under the Renewable Energy Standard (RES)? If so, please explain why the Company believes that is a reasonable assumption.

(d) Does the Company's analysis assume net metering generators will sell their generation certificates to entities obligated to comply with the Rhode Island Renewable Energy Standard? If so, please explain why the Company believes that is a reasonable assumption.

Response:

(a) The Company recognizes that generation certificates from renewable and/or zero-emissions generators in the region (whether inside or outside of Rhode Island borders) can be considered in emissions calculations, but Rhode Island Energy did not use economic methods to address Act on Climate needs within the Grid Modernization Plan ("GMP"). The Company does not believe economic solutions will be sufficient to address the physical and electrical needs that will be driven by the State's Climate Mandates, specifically, the time disparity across the many hours of the year between renewable generation and load and the need to maintain a generation to load balance at any point in time. The Rhode Island Office of Energy Resources' ("OER") "Road to 100% Renewable

PUC 2-2, page 2
Forecast of DER Penetration in GMP

Electricity by 2030"[1] report describes the importance of renewable energy certificates ("REC") for Renewable Energy Standard ("RES") compliance but also notes certain limitations. Specifically, the RES (using RECs) in isolation "is unlikely to drive sufficient investment in incremental renewable energy generation. It should be paired with programs and policies to ensure there will be sufficient renewable energy generation available to meet the 100% goal." Furthermore as aligned with the GMP, the report states "in time, additional mechanisms will likely be needed to better match the timing of renewable energy generation with real-time demand. Analytical insights suggest this consideration is not critical to address until the regional electric grid approaches a higher penetration of renewable electricity."

(b) The Company assumes that meeting the emissions reduction targets will include substantial additional amounts of solar and wind generation in the state. Rhode Island Energy recognizes that the exact amounts of solar and wind generation can ultimately vary to meet the emission reduction targets, but note the following on Bates 79 of the GMP:

> "One of the major purposes of the Distribution Study is to ensure the future improvements are prudent and viable given the range of uncertainties with load and generation. The goal is to ensure the grid modernization investments can handle a variety of possible future state scenarios at the lowest cost and with the greatest benefits. All variables could not be iterated because of the magnitude of the analysis that would be required; however, each variable was set to reasonably consider customer and load densities, sufficiently test the electric distribution system, and not to disadvantage the alternative without grid modernization."

The Company considered substantial amounts of solar generation for three reasons: 1) to meet the emission reduction targets; 2) to sufficiently test the electric system; and 3) to locate the generation close to the load. While there can be scenarios where the amounts of off-shore wind generation can be increased and solar decreased as compared to the Company's GMP scenario, this will exacerbate the localized load related issues from heat and transportation electrification. These scenarios will result in incremental traditional transmission and distribution investments to those identified in the No Grid Modernization

[1] www.energy.ri.gov/100percent

PUC 2-2, page 3
Forecast of DER Penetration in GMP

Alternative and still have challenges with time disparity across many hours of the year between renewable generation and load which, as identified in the GMP, are best managed with the Grid Modernization solutions.

(c) The Company believes that a substantial growth in solar generation within Rhode Island is not strictly necessary in order to meet the State's 100% renewables requirement under the RES. This standard can be met using economic methods, including the purchase of renewable energy certificates.

(d) The Company's GMP analysis does not assume any economic transaction related to the Rhode Island RES.

PUC 2-3
Forecast of DER Penetration in GMP

Request:

Referring to Figure 5.1 – Variables and Study Rationale on Bates page 78 of the Grid Modernization Plan, there is a study assumption which states: "DG distributed as 100 kW sites located proportionately to load. Rural locations weighed higher than urban locations." Please provide a more complete explanation of this assumption, including an explanation of what is meant by "distributed as 100kW sites," and why this assumption was used.

Response:

The Company allocated 100 kW solar sites in the Grid Modernization Plan ("GMP") model as a reasonable approximation and fair method considering the grid modernization and no grid modernization alternatives. Figure 5.3.15 on Bates page 99 of the GMP shows an example allocation. There are a range of methods to allocate solar sites with boundaries set in the table below:

Table PUC 2-3-1 – Possible Allocation Breakdown for 5000 MW Total Solar

Allocation Method	kW / Site	# Sites	Approximate Sites / Feeder	Notes
Smallest	5	1,000,000	2,500	Maximizes existing system hosting capacity. Substantially more complex data processing.
GMP	100	50,000	125	Balances use of existing system capacity with data processing requirements. Emphasizes use of existing system.
Largest	10,000	500	1.25	Does not maximize use of existing system hosting capacity. Simplest data processing.

As can be seen in the table above, the Company recognized that smaller sites provide the best use of the existing system capacity. Conversely, using very large sites can create acute system issues that are more readily solved by grid modernization solutions. The Company also considered the data processing burden of any allocation method. The GMP allocation method achieved a balance of testing the utilization of existing system capacity with the ability to process the data points to complete the analysis. Table PUC 2-3-2 illustrates the range of data point needs of the possible allocation methods.

PUC 2-3, page 2

Forecast of DER Penetration in GMP

Table PUC 2-3-2 – Data Point Requirements For Solar Allocation

# Sites	Variables Per Test	# Test Years	# Cases	4 Period Analysis	8760 Hour Analysis
1,000,000	8	3	2	192,000,000	420,480,000,000
50,000*	8	3	2	9,600,000	21,024,000,000
500	8	3	2	96,000	210,240,000

*GMP allocation method

As can be seen from the table above, Rhode Island Energy pushed the data processing limits to the furthest extent possible using today's planning tools to maximize existing system use.

Actual development of generation varies, and large sites can and do create acute localized issues. The GMP is not an attempt to perfectly predict the future; it is a plan with assumptions and methods to test the electric system sufficiently and fairly. When such localized issues do happen, the grid modernization alternative would provide superior performance over the no grid modernization alternative.

PUC 2-4
Onshore and Offshore Wind Forecast

Request:

Referring to Bates page 100 of the Grid Modernization Plan, there is the following statement: "The forecasted onshore wind generation was manually added to the distribution supply lines."

(a) Please explain further what the quoted statement means.

(b) Please clarify whether this assumption means that each MW of onshore wind included in the forecast is assumed to interconnect to feeders that also have distribution service connections to customers who are taking distribution service, as opposed to having an interconnection which is dedicated solely to the wind resource to reach a substation.

(c) Please explain the basis for the Company's conclusion that it is likely that there will be 100 MW more of onshore wind in Rhode Island connected to the distribution system by 2030.

(d) Please provide the current wind capacity that is net metering in Rhode Island on the distribution system, including the MWHs assumed delivered by these facilities annually.

(e) Please provide the current wind capacity and MWHs delivered annually from facilities in the Renewable Energy Growth program or with long-term contracts, broken out by onshore and offshore.

Response:

(a) Forecasted onshore wind generation was modest in megawatts as compared to forecasted solar generation. Because of this, the Company allocated the solar generation across the distribution and sub-transmission system models first. Then the Company manually placed the wind generation on the sub-transmission system model where existing capacity remained. The Company manually assigned approximately 100 megawatts of onshore wind generation in the model in 2030 as twenty eight 3.5 megawatt sites. The Company also allocated three 5 megawatt sites in the model in 2040, and six 5 megawatt sites in 2050. With this manual method, the Company placed the wind generation in the existing system as optimally as possible.

(b) The Company assigned the wind generation to existing sub-transmission lines that serve other substations or other load. The load may not be directly connected to the sub-transmission line. The Company did not include any wind generation dedicated lines during this modeling allocation step. However, after issue identification, dedicated lines

PUC 2-4, page 2
Onshore and Offshore Wind Forecast

might have been necessary to resolve the system issues, particularly for the no grid modernization case.

(c) The Company recognized the need to consider some amount of onshore wind in the Grid Modernization Plan ("GMP") to sufficiently test the electric system. Based on past experience and the significant existing interconnection levels of solar versus wind generation, the Company assigned 10% of the total amount of wind generation to onshore wind and 90% to offshore wind.

(d) There are currently 27 megawatts of onshore wind interconnected to the distribution system in the net metering program. The yearly energy provided is approximately 57,000 MWH.

(e) There are currently 23 megawatts of onshore wind interconnected to the distribution system in the Renewable Energy Growth program. The yearly energy provided is approximately 47,000 MWH.

The Company has three onshore wind projects under long-term contracts. The capacity of those three projects totals 100.15 MW. The annual assumed delivery of those three projects totals 200,174.8 MWh.

There are currently 30 megawatts of offshore wind interconnected to the transmission system that is provided under long-term contracts. The yearly energy provided is approximately 110,000 MWH.

PUC 2-5
Onshore and Offshore Wind Forecast

Request:

On Bates page 99, the Company states: "To meet the State's Climate Mandates, the onshore and offshore wind will need to respectively increase to 100/900 MW by 2030; 115/1,035 MW by 2040; and 145/1,300 MW by 2050."

(a) What is the basis for concluding that onshore and offshore wind will need to reach these specific MW levels?

(b) Given the fact that the Company already has 400 MW of offshore wind under contract and has an RFP pending for at least an additional 600 MW, why is the Company assuming that there will be only 35 MW of additional offshore wind by 2040, and less than a 300 MW increase by 2050?

(c) What is the basis for the Company's belief that the State of Rhode Island would choose a long-term plan to acquire 3,400 MW of solar PV by 2040 to meet the Climate Mandates (compared to only 1,035 MW of offshore wind by that date) when solar produces far fewer kWh than offshore wind per MW of capacity?

Response:

(a) The basis for concluding that onshore and offshore wind generation plus solar generation will need to reach their respective levels is explained in the emission analysis conducted within the Grid Modernization Plan ("GMP"), Section 5, Bates pages 82 to 88.

(b) The 400 MW of offshore wind under contract was considered in the evaluation. The forecast inputs in the GMP are not a prediction of the future deployment of any resource. They are a forecast that has a direct relationship to the state's CO2 emissions and sufficiently tests the electric system to compare grid modernization and no grid modernization alternatives. Higher levels of offshore wind could occur resulting in less need for localized solar; however grid modernization would still be technically, economically, and environmentally superior to no grid modernization.

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PUC 2-5, page 2

Onshore and Offshore Wind Forecast

(c) As described in the response to part (b), above, the forecast inputs in the GMP are not a prediction of the future deployment of any resource. They are a forecast that has a direct relationship to the state's CO2 emissions and sufficiently tests the electric system to compare grid modernization and no grid modernization alternatives. Although solar produces far fewer kWh than offshore wind per MW of capacity, offshore wind is less predictable and will be remote to the load. As the benefits associated with grid modernization are largely driven by its ability to manage and shift energy, it remains a significant component in meeting the State's Climate Mandates regardless of the amounts of solar, onshore wind, and offshore wind generation.

PUC 2-6
Solar PV Penetration Forecast

Request:

Referring to Bates page 96, the text refers to "over 600 MW [of solar PV] in the interconnection queue." Please provide a list of the projects in the queue in the same format as the Company's response to PUC 1-8 in Docket No. 22-39-REG, but add an additional category for facilities that are 5 MW or greater, identifying: (i) the nameplate capacity, (ii) expected annual generation in MWHs, (iii) the municipality in which the project is proposed to be located, and (iv) whether the project is expected to interconnect to a dedicated distribution line to a substation or the Company is expecting to allow an interconnection to a distribution feeder that is providing distribution service to other customers. If the Company cannot respond to subsection (iv), please explain why and identify those projects together with the per-project nameplate capacity and any aggregate nameplate for projects submitted by a single developer for different projects on adjacent parcels.

Response:

The total associated MW AC of net metering and Renewable Energy ("RE") Growth applications that are pending and under review, as of December 31, 2022,[1] is 662.76 MW. Applications by the size class equivalent can be found in the table below.

Table PUC 2-6 – Pending DG By Size Class and Program

		MW Under Review	
Size Class	**AC Rating Range**	**Net Metering**	**Re-Growth**
Small Scale	25 kW and less	23.66	8.79
Medium Scale	Between 26 kW and 250 kW	4.14	6.20
Commercial Scale	Between 251 kW and 999 kW	9.39	16.76
Large Scale	5 MW and less	177.44	52.52
Large Scale	5 MW or greater	349.86	14.00
Total		**564.49**	**98.27**

[1] Please note the response to PUC 1-8 in Docket No. 22-39-REG used data as of December 1, 2022. The updated data in this response also includes corrections made to fix developer entered data made since the previous filing.

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PUC 2-6, page 2

Solar PV Penetration Forecast

Attachment PUC 2-6 includes the pending distributed generation ("DG") with (i) the nameplate capacity, (ii) expected annual generation in MWHs, and (iii) the municipality in which the project is proposed to be located, and (iv) whether the project is expected to interconnect to a dedicated distribution line to a substation or the Company is expecting to allow an interconnection to a distribution feeder that is providing distribution service to other customers. Specifically for item (iv), a column titled 'Dedicated Line' has notes on whether the project is expected to interconnect to a dedicated sub-transmission line, distribution line, or to a substation. A 'Yes' in this column indicates a dedicated line, a blank indicates no dedicated line, and 'Possible/Pending' indicates that the project is under study and a dedicated line may be possible.

Attachment PUC 2-6

The Company is providing Attachment PUC 2-6 in Excel Format

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PUC 2-7
Solar PV Penetration Forecast

Request:

Figure 5.3.2 on Bates page 84 indicates an assumption that Rhode Island will have 1,500 MW of solar PV throughout the state by 2030, 3,400 MW by 2040, and 5,000 MW by 2050.

(a) Did the Company's forecast address the practical realities of whether Rhode Island has enough buildings and land suitable to effectively accommodate this much solar throughout the state? If so, please explain. If not, why not.

(b) On August 18, 2020, the Office of Energy Resources published a study entitled Solar Siting Opportunities for Rhode Island, which can be found at: https://www.synapse-energy.com/sites/default/files/Solar_Siting_Opportunities_for_Rhode_Island_19-076.pdf When the Company forecasted 1,500 MW of solar by 2030 and 3,400 MW by 2040, did the Company consider the total potential for rooftop solar in Rhode Island that was indicated to be limited to 850 MW? If so, please explain how it was taken into account. If not, please reconcile the Company's forecast for 2030, 2040, and 2050 with the conclusions regarding solar potential in the referenced study.

(c) Did the Company's analysis include any consideration given to changes in building codes related to fire safety and the effects such changes would have on available rooftop space? If so, please explain.

Response:

(a) The Company's forecast did not address the practical realities of whether Rhode Island has enough buildings and land suitable to effectively accommodate this much solar throughout the state. The Company aligned the forecast with the emission reduction needs of the Act of Climate. The response to part (b), below, provides further details.

(b) The Company's Grid Modernization Plan ("GMP") forecast is generally aligned with the Office of Energy Resources ("OER") Solar Siting Opportunities for Rhode Island study. The study found the technical potential in Rhode Island to be "between 3,390 megawatts (MW) and 7,340 MW." The Company's forecasted amount is roughly the average of the technical potential. The GMP Distribution Study was intentionally agnostic to the categories in the OER report as described in the response to PUC 2-3. There is no misalignment to the OER's findings on 850 MW of rooftop potential.

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PUC 2-7, page 2
Solar PV Penetration Forecast

(c) As described in the response to part (b), above, the Company's GMP Distribution Study did not specifically consider types of installations. Accordingly, the Company did not consider potential changes in building codes related to fire safety and the effects such changes would have on available rooftop space. The Company does not believe this is a necessary consideration to compare electric system grid modernization to no grid modernization.

PUC 2-8
Solar PV Penetration Forecast

Request:

Referring to Bates pages 96-97 of the Grid Modernization Plan, there is the following explanation:

> "To allocate the forecasted Solar PV to the distribution network for the 2030/40/50 study years, the total solar generation determined by the emission analysis was assigned to the distribution feeder based upon its load. In other words, the generation was allocated to the load as closely as possible. In this manner, the analysis is not influenced by large locational differences between generation and load that could skew infrastructure requirements. Instead, as intended, the analysis could focus on the time disparity between the generation and load cycles. Once the generation was allocated by feeder, it was spread randomly across the circuit topology in relatively small sizes. This ensured the analysis and infrastructure requirements were not influenced by large clusters of generation. Although this contrasts with the real-world conditions where large DER sites are interconnected, this allocation method was chosen to be conservative in nature, representing a best-case outcome." (emphasis added)

(a) Please explain whether this means that each MW of Solar PV in the DER penetration forecast is assumed to be interconnected to feeders that also have distribution service connections to customers who are taking distribution service? In other words, does it mean that there was no allocation in the forecast for MW of large-scale Solar PV that will have interconnections which are dedicated solely to the Solar PV resource to reach a substation?

(b) What does the Company mean by "conservative" and "best-case outcome" within the statement: "Although this contrasts with the real-world conditions where large DER sites are interconnected, this allocation method was chosen to be conservative in nature, representing a best-case outcome?"

(c) What are the less conservative and worst-case scenarios that the Company believes exist, and how would these scenarios directionally change the results of the analysis qualitatively and by order of magnitude?

(d) What are the referenced "real-world conditions?"

(e) If the forecasting methodology "contrasts with the real-world conditions where large DER sites are interconnected," why did the Company not alter the methodology to reflect the real-world conditions?

Prepared by or under the supervision of: Ryan Constable

PUC 2-8, page 2
Solar PV Penetration Forecast

Response:

(a) This means that all of the MW of Solar PV in the DER penetration forecast was allocated to existing sub-transmission and distribution lines. There was no allocation in the forecast for MW of large-scale Solar PV that will have interconnections which are dedicated solely to the Solar PV resource to reach a substation.

(b) In all cases when determining assumptions and inputs, the Company used an assumption or input that best used the existing system capacity. In this manner, the no grid modernization alternative was neither favored nor disadvantaged. The Company did this to be clear that it was fairly evaluating the no grid modernization solution and if such assumptions were to be challenged then the grid modernization alternative would become more beneficial than stated in the Grid Modernization Plan ("GMP").

(c) The less conservative and worst-case scenarios are ones in which distributed generation, electric vehicles (or fast charging stations), and electric heat occur in concentrated locations. These scenarios do and will exist, and, when they happen, grid modernization investments that can sense and react to these concentrated locations would provide greater benefits than stated in the GMP. The Company has not done an analysis to determine the order of magnitude for these less conservative scenarios.

(d) The concentrated or large sized DER applications described in (c) occur often and therefore are real-world conditions.

(e) The forecasting methodology does not contrast "real-world conditions where large DER sites are interconnected." The forecast methodology was aligned with the Act on Climate mandates and represents one of many possible real-world futures. The allocation of the forecast to the distribution system model was done in a way to maximize the existing system capability and not disadvantage the no grid modernization alternative.

PUC 2-9

Electric Heat Pump Forecast and Gas Distribution Planning

Request:

Referring to the Electric Heat Pump Forecast on Bates pages 93-95 of the Grid Modernization Plan (GMP), the analysis estimates that there are 400,000 businesses and residences heating with gas/oil fuel in Rhode Island. What is the source data for the 400,000 count of businesses and residences heating with gas/oil in Rhode Island?

Response:

The source of the data is the Rhode Island Office of Energy Resources' "RHODE ISLAND RENEWABLE THERMAL MARKET DEVELOPMENT STRATEGY" study in January 2017, which can be found at this link: https://www.synapse-energy.com/sites/default/files/RI-Renewable-Thermal-15-119.pdf

Prepared by or under the supervision of: Ryan Constable

PUC 2-10

Electric Heat Pump Forecast and Gas Distribution Planning

Request:

On Bates pages 93-95 of the Grid Modernization Plan, the Company forecasts 51,000 gas/oil conversions to electric heat pumps by 2030; 325,000 by 2040; and 400,000 converted by 2050 (i.e., including 13% of Rhode Island homes by 2030, 80% of homes by 2040, and 100% of homes by 2050).

(a) Mathematically, the forecast indicates an assumption that 54,000 electric customers will convert from gas/oil heating to heat pumps between 2024 and 2030 (a calculated pace of approximately 148 conversions per week over that period from 2024 through 2030). Please provide an estimate of how many of these conversions are forecasted to be natural gas to electric heat pumps over that period and explain why the Company believes the State of Rhode Island and Rhode Island Energy will be equipped to convert that many homes at that pace of installations.

(b) Mathematically, the forecast indicates an assumption that 271,000 electric customers will convert from gas/oil heating to heat pumps over ten years from 2030 through 2040 (a calculated pace of approximately 521 conversions per week over that period). Please provide an estimate of how many of these conversions are forecasted to be natural gas to electric heat pumps over that ten-year period.

Response:

(a) The Company's Grid Modernization Plan ("GMP") forecasts approximately 9,000 to 11,000 conversions from natural gas to electric heat pumps over the period from 2024 to 2030. The Company does not determine the pace of home conversions within Rhode Island and assumes the State of Rhode Island will take action to achieve the Act on Climate mandates. Similarly, the Company has determined a reasonable home conversion allocation that is aligned with the Act on Climate to suitably test the electric system.

(b) The Company's GMP forecasts approximately 140,000 to 180,000 homes to convert from natural gas to electric heat pumps over the period from 2030 to 2040. There are many possible scenarios to achieve the Act on Climate goals. This forecast should not be interpreted as the Company's belief in a specific scenario. The Company applied this scenario to appropriately test the electric system.

PUC 2-11

Electric Heat Pump Forecast and Gas Distribution Planning

Request:

Does the Company agree that the implications of the Electric Heat Pump Forecast (on Bates pages 93-95 of the Grid Modernization Plan), if realistic, are that the Company will need to plan for substantial abandonment of significant portions of the gas distribution system by 2040 as customers convert from natural gas to electric heat pumps? Please explain.

Response:

No, the Company does not agree that the implications of the Electric Heat Pump Forecast are that the Company will need to plan for substantial abandonment of significant portions of the gas distribution system by 2040. The Electric Heat Pump Forecast (on Bates pages 93-95 of the Grid Modernization Plan ("GMP")) is a forecast that is used to sufficiently test and plan the electric system. The sole message the Company is communicating with the forecast and the GMP is that if the GMP is followed and a similar forecast occurs, then the electric system would be prepared. The Company suggests no other inference should be attributed to the GMP forecast.

With that context, the Company recognizes that electrification will impact future gas distribution modelling. The pathways and implications for achieving the Act on Climate objectives are under consideration in various venues and proceedings in which the Company is actively involved. At this point, the role of the numerous components of the energy delivery chain (i.e., natural gas production, pipeline and storage transportation, natural gas distribution, renewable natural gas, electric distribution system, renewable generation, load -following generation, electric transmission, other end-use fuels, and individual customer decisions)[1] are being reviewed and analyzed. As such, it is premature to draw any conclusions regarding the role of any of the energy delivery chain components.

[1] In addition to the energy delivery chain components that are listed, there is the need to consider the electrification of other market segments such as the transportation sector.

Prepared by or under the supervision of: Ryan Constable

PUC 2-12

Electric Heat Pump Forecast and Gas Distribution Planning

Request:

Before the Company relied upon the forecast of electric heat pump conversions for the development of components of its Grid Modernization Plan, to what extent did the Company consult with the gas distribution side of the business? Please explain.

Response:

Please see the response to PUC 2-11.

The objective of the forecast submitted for the Grid Modernization Plan ("GMP") was to assess and prepare the electric system. As such, there was no consultation with the gas distribution side of the business. The GMP forecast expanded upon the existing electric forecast to align with the Act on Climate to sufficiently test the electric system in a manner that enables achievement of the Climate Mandates comparing use cases with "grid modernization" versus "no grid modernization". This forecast should not be interpreted as the Company's expectation that a specific scenario will occur, but rather the belief that this modeled scenario is appropriate to test the electric system's capability to enable the achievement of the Act on Climate mandates.

PUC 2-13

Electric Heat Pump Forecast and Gas Distribution Planning

Request:

Is the Company's infrastructure and financial planning for the gas distribution business factoring in a substantial loss of business and residential heating customers at the pace forecasted in the Grid Modernization Plan? If so, please provide an explanation of how the Company is now incorporating this forecast in its gas distribution investment planning. If the Company has not addressed this in gas distribution planning, please explain why not.

Response:

Please see the responses to PUC 2-11 and PUC 2-12. For the reasons explained in those responses, the Company's infrastructure and financial planning for the gas distribution business is not factoring in a substantial loss of business and residential heating customers at the pace modeled in the Grid Modernization Plan.

PUC 2-14

Electric Heat Pump Forecast and Gas Distribution Planning

Request:

If, for purposes of supporting its electric Grid Modernization investments, the Company is forecasting losing gas heating customers to electric heat at the pace indicated in Section 5 of the Grid Modernization Plan, please explain why the Company has preliminary plans to deploy new ultrasonic gas distribution meters beginning in 2025? See the AMF Business Case in Docket No. 22-49-EL, Bates page 57, stating: "Preliminary plans are underway for accelerated deployment of methane detectors and Ultrasonic Gas Meters beginning after the Electric AMF has been completed starting in 2025."

Response:

Please see the responses to PUC 2-11 and PUC 2-12. For the reasons explained in those responses, the Company is not forecasting losing gas heating customers to electric heat at the pace indicated in Section 5 of the Grid Modernization Plan for purposes of gas distribution planning.

The Company included gas technology modernization as a possible example of a future applications that advanced metering functionality ("AMF") enables to demonstrate how it is a strategic platform that can be built upon to provide incremental value beyond the AMF Business Case. The statements in the AMF Business Case regarding gas metering technology were intended to describe how the Company's proposed AMF solution enables the ability to replace the existing gas meters with newer gas meter technologies.

PUC 2-15

Electric Heat Pump Forecast and Gas Distribution Planning

Request:

Does the Company have any short-term, medium-term, and/or long-term forecasts of natural gas distribution system growth that the Company's gas distribution business is relying upon for gas distribution and financial planning? If so, please provide those forecasts and explain whether they are consistent with the assumptions implicit in the Electric Heat Pump forecast.

Response:

The Company's gas distribution business relies on its "Gas Long-Range Resource and Requirements Plan for the Forecast period 2022/2023 to 2026/2027," which the Company filed in Docket No. 22-06-NG, for gas distribution and financial planning. The demand forecast used in Docket No. 22-06-NG was developed in a manner consistent with those filed by the Company in prior long-range forecasts for natural gas. Please see the responses to PUC 2-11 and 2-12. For the reasons explained in those responses, the Company is not preparing or relying on forecasts of natural gas distribution system growth that apply the assumptions implicit in the Electric Heat Pump forecast.

PUC 2-16

Electric Heat Pump Forecast and Gas Distribution Planning

Request:

In the comments filed on October 21, 2022 by Rhode Island Energy in the Future of Gas Docket No. 22-01-NG, the Company made the following statements:

> "The insights from the 2020 Rhode Island Heating Sector Transformation Report – specifically, the finding that there is insufficient certainty about the long-run costs and technological maturity of many decarbonized thermal solutions to definitively choose a single pathway – should serve as the overarching guiding principle throughout this proceeding. This insight recognizes the limitations, both technical and economic, of any single technology today. Rhode Island Energy urges the Commission not to foreclose any options because a mix of electrification, decarbonized fuels and other technologies are likely to be seen in the future." (page 3)

> "Meeting the State's climate objectives will require balancing diverse near-term investments in, for example, energy efficiency, energy supply and delivery infrastructure, energy efficient gas equipment, and targeted electrification, along with medium to longer-term advanced decarbonized energy solutions such as broader application of electrification and the use of renewable natural gas (e.g., green hydrogen and biogas)." (page 4)

Please reconcile these two statements with the assumptions made on Bates pages 93-95 of the Grid Modernization Plan, which forecast 80% of electrification of the heating sector by 2040 and 100% electrification of the heating sector by 2050.

Response:

The statements made by Rhode Island Energy in the Future of Gas Docket No. 22-01-NG by the Company are a part of the Company's input to the Public Utilities Commission and other State agencies as they work to develop the path forward for the State's energy future. For the reasons explained in the responses to PUC 2-11 and PUC 2-12, these statements are not inconsistent with the assumptions made on Bates pages 93-95 of the Grid Modernization Plan.