Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-1 | Respondent: Christopher Green

REQUEST:

Do suppliers inform your utility whether they do or do not intend to bid on a solicitation?

a. If so, how far in advance of the solicitation do suppliers inform your utility of their intent?
b. What, if any, reasoning is provided by suppliers to your utility regarding their decision to bid or not?
c. As applicable, please provide specific reasoning by bid opportunity in the last five years.

RESPONSE:

Generally, suppliers that have previously served Liberty's default service load will informally let the Company know if they do not plan to bid. However, there have been occasions where the Company has had to reach out to the supplier regarding their intent. Additionally, there are a number of suppliers who have never participated and have never provided a response regarding their lack of participation.

a. The timing of notification varies but is generally between RFP issuance and the deadline for suppliers to provide background information, prior to the indicative bid deadline. There have been suppliers who provide indicative bids but fail to provide a final bid due to market risk/volatility.
b. Suppliers' primary reasons for not bidding have been market risk and volatility. However, reasons have also included composition of suppliers' existing load portfolio including volumetric risk relating to community aggregation, uncertainty with the impacts of COVID, and uncertainty regarding Mystic cost of service cost. Bidding participation also varies by load block (tranche).
c. The Liberty employee who was long responsible for procurement has retired, which limits our institutional knowledge earlier than November 2020. However, below is a list of supplier reasons by bid opportunity for the period in which we were able to recover supporting communication.

1. November 2020
    a. Market risk and volatility
    b. COVID impacts on commercial load
    c. Weather forecast risk
2. June 2021
    a. Market risk
    b. Tranche span
    c. COVID risk in commercial class
    d. Historical lack of bid success
3. November 2021
    a. Market Conditions
    b. Option to pass through Mystic COS
    c. Load portfolio composition
        i. ISO-NE exposure if they were to take on additional load obligations
4. June 2022
    a. Large customer migration risk
    b. Market volatility
    c. Suppliers trading positions
    d. Suppliers value at risk
    e. Period covered and perceived volatility
5. November 2022
    a. Internal constraints
    b. Historical lack of bid success
    c. Load/auction schedule not aligning with market trades
6. June 2023
    a. No reasoning provided from suppliers

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23
Request No: DOE 2-2

Date of Response: 10/4/23
Respondent: Christopher Green

REQUEST:

Does your utility conduct any formal or informal interviews with suppliers for feedback regarding their participation or lack of participation in solicitations?

a. If so, what feedback has been received in the last five years?
b. As applicable, please provide specific feedback by solicitation in the last five years.

RESPONSE:

Liberty reaches out to suppliers who have participated in the Companys' past solicitations for feedback. These conversations are very informal, generally in email form, and typically lead to concise responses. The responses are generally about perceived market risk with few exceptions. Please see the response to DOE 2-1 for feedback received from suppliers.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23
Request No: DOE 2-3

Date of Response: 10/4/23
Respondent: Christopher Green

REQUEST:

Is there an informal opportunity for suppliers to provide feedback outside of typical solicitation processes?

a. If so, how do suppliers identify exceptions, express concerns, or otherwise provide feedback on future or past solicitations?
b. As applicable, please provide specific feedback provided by suppliers, by date, in the last five years.

RESPONSE:

Liberty provides a forum for supplier feedback but rarely receives feedback outside of the solicitation process. The Energy Support Services group has established a distribution list for any inquiries related to default service but generally, the Company has to request feedback from suppliers.

a. The Company prefers to keep the feedback loop informal; any concerns or questions are generally fielded in the form of a phone call or email. Although the communications window is open continuously, the feedback has recently been limited to the solicitation window.
b. Similar to the responses for DOE 2-1 and DOE 2-2, the Company is limited to the last three years of communication. The Company was unable to find any default service solicitation questions from suppliers outside of the solicitation process window.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-4 | Respondent: Christopher Green

REQUEST:

Please provide a list of requested exceptions in the last five years by solicitation and indicate whether the exception was granted, rejected, or addressed in another manner. For each requested exception, please identify the name of the bidder/supplier making the request and whether they ultimately submitted a bid.

RESPONSE:

Similar to the responses given to DOE 2-1 and DOE 2-2, Liberty has reviewed email correspondence back to 2020 and has found a single requested exception. In the November 2022 solicitation Vitol, Inc. asked Liberty if it would be willing to make Mystic COS a pass-through to eliminate that portion of risk premium from their bid. Liberty followed up to see if, by granting that exception, the party would provide a bid. The supplier was uncertain and mentioned it would be based on market conditions on the bid day. This led Liberty to reject the exception and proceed with the existing participating suppliers.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23
Request No: DOE 2-5

Date of Response: 10/4/23
Respondent: Christopher Green

REQUEST:

Please provide the complete timeline for default service solicitation from the time in which first notification of the RFP is posted up to contract execution by the New Hampshire Public Utilities Commission (Commission). (Please detail all intermediary steps, including notices requests for questions or comments, reply deadlines, timelines between bid receipt and review, etc.)

RESPONSE:

An example timeline from the most recent solicitation is provided in the table below. The intent is for all Default Service solicitations to follow a similar timeline, which has been the case for many years. The respondents can ask for clarifying data all the way up until Final Pricing is received. The Company prepares a proxy price forecast prior to both receiving indicative bids and final bids. This forecast gives the Company a framework to pose questions to suppliers if pricing is deemed out-of-bounds when compared to the proxy.

Activity	Start	End	Notes
Notify NH-PUC of RFP timeline			RFP notification to NH-PUC two weeks prior to issuing RFP.
Issue Request for Proposal	5/1/2023	5/12/2023	Deadlines and details are emailed to the distribution list containing possible participating suppliers. The RFP document is posted to the Liberty Utilities website prior to notifying suppliers.
Submit Respondent	5/12/2023	6/13/2023	Respondents are required to provide Proposal Information

Proposal Information			to the utility by the deadline (5 PM ET) Example: background and financial information. This data is used to verify the supplier qualifies to provide service.
Submit Indicative Pricing	6/13/2023	6/13/2023	Respondents to provide indicative pricing information by 10:00 a.m. ET on Tuesday, June 13, 2023, at the above address. Liberty will evaluate the indicative pricing, and if required, Liberty may seek clarifications from Respondents.
Submit Final Pricing	6/20/2023	6/20/2023	Respondents provide final pricing information by 10:00 a.m. ET on Tuesday, June 20, 2023, at the above address. Liberty requests final pricing be valid until 2:00 p.m. that same day. Liberty intends to evaluate the final pricing and select a Supplier that day by that time. Final pricing shall be binding until execution of a confirmation.
Execute Contractual Agreements			Once bidders are awarded the appropriate approvals and signatures are requested to execute agreements. This can happen same day but generally within 48

			hours of the award notification email.
Execute Agreements and Submit solicitation process summary, Agreements, and retail rates to NHPUC			Within three business days of receipt of all executed agreements, Liberty will file with the NHPUC a confidential summary of the solicitation process, the executed agreement(s) and proposed Energy Service Rates.
NHPUC Reviews and Approves Energy Service Rates			Consistent with the Default Service Settlement Agreement, the NHPUC will have five business days to either approve the proposed Energy Service Rates or reject them. If the NHPUC denies Liberty's request for approval of the retail rates, the agreement(s) will be void and the parties will have no further obligation under the agreements(s)

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-6 | Respondent: Christopher Green

REQUEST:

Has any element of the timeline for default service solicitation changed in the last five years? If so, please explain the nature and timing of the changes.

RESPONSE:

There have been no material changes to the general timeline, as provided in the response to DOE 2-5.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-7 | Respondent: Christopher Green

REQUEST:

Has the Commission ever rejected a default service auction bid put forth by your utility (i.e., after the utility has selected the supplier and bid)?

RESPONSE:

To my knowledge, the Commission has never rejected a bid that was accepted by the utility.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23
Request No: DOE 2-8

Date of Response: 10/4/23
Respondent: Christopher Green

REQUEST:

In your view, does the existing procurement period timeline make any of the ISO-NE charges difficult for suppliers to estimate for purposes of submitting a bid? Does the existing procurement period timeline make any of the ISO-NE charges difficult for your utility to construct the threshold/proxy price.

RESPONSE:

At this point in time no, with the exception being the volatility of Mystic cost of service. Historical monthly bills from the ISO provide sufficient details to create forecast tolerance bands for most variables.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23
Request No: DOE 2-9

Date of Response: 10/4/23
Respondent: Christopher Green

REQUEST:

Please provide all actual bids received by bidder, customer group, and solicitation during the last five years. For each bid, please identify the name of the bidder/supplier, the number of tranches proposed, the applicable customer group, the applicable solicitation, and any exceptions/conditions.

RESPONSE:

Please see Confidential Attachment INV 2023-001 DOE 2-9 for all final bids received for the last 5 years. To my knowledge, there have been no exceptions/conditions to report.

Confidential Attachment INV 2023-001 DOE 2-9 contains the names of bidders for the past solicitations, which is "confidential, commercial, or financial information" and is thus protected from disclosure by RSA 91-A:5, IV, and presumed to be confidential in default service proceedings pursuant to Puc 201.06(a)(15). Therefore, pursuant to that statute and Puc 203.08(d) and Puc 201.01.06(a)(11)(g) (protecting "responses to data requests related to a. through f. above"), the Company has a good faith basis to seek confidential treatment of this information and asserts confidentiality pursuant to those rules.

No Bid
Bid Price

REDACTED

[redacted]

Small Customer Group-BLOCK C					
8/1/2018	9/1/2018	10/1/2018	11/1/2018	12/1/2018	1/1/2019
$ 74.17	$ 78.76	$ 83 02	$ 80.17	$ 102.89	$ 128.90
$ 67 87	$ 72.38	$ 77 87	$ 75.36	$ 92.79	$ 118.56
$ 68.18	$ 74.38	$ 80.18	$ 76.58	$ 93.35	$ 119.68
$ 67.72	$ 72.38	$ 78 08	$ 75.06	$ 91.66	$ 116.44
$ 71.67	$ 74.20	$ 80.60	$ 76.13	$ 94 31	$ 114.95

Large Customer Group-BLOCK A		
8/1/2018	9/1/2018	10/1/2018
$ 69.52	$ 73.90	$ 79 93
$ 68.60	$ 71.54	$ 76.74
$ 64.98	$ 68.58	$ 74.77
$ 64.18	$ 66.89	$ 74.44
$ 66.60	$ 69.37	$ 76.74
$ 78.80	$ 89.75	$ 95 93

Large Customer Group-BLOCK B		
11/1/2018	12/1/2018	1/1/2019
$ 76.74	$ 101 32	$ 130.53
$ 79.13	$ 99 38	$ 123.16
$ 76.37	$ 96.67	$ 121.24
$ 75.16	$ 97 25	$ 122.63
$ 79.60	$ 101 58	$ 127.48
$ 100.32	$ 119.64	$ 143.91

[redacted]

2/1/2019	3/1/2019	4/1/2019	5/1/2019	6/1/2019	7/1/2019
$ 135.11	$ 106.65	$ 83.14	$ 79.37	$ 63.68	$ 66.38
$ 137 00	$ 107.61	$ 83.61	$ 74.92	$ 64.19	$ 69.25
$ 138.41	$ 109.06	$ 84.19	$ 76.91	$ 67.52	$ 68.63
$ 126 80	$ 101.26	$ 78.41	$ 71.26	$ 66.73	$ 71.58
$ 137.43	$ 101.17	$ 80 32	$ 73.29	$ 65 07	$ 68.21

2/1/2019	3/1/2019	4/1/2019
$ 138.56	$ 106.93	$ 83.19
$ 145.83	$ 114.97	$ 88 23
$ 140.03	$ 108.52	$ 82 86
$ 132.56	$ 105.63	$ 81 34
$ 138.83	$ 103.46	$ 79.79

5/1/2019	6/1/2019	7/1/2019
$ 73.67	$ 61 01	$ 66.18
$ 79.67	$ 65 92	$ 72.04
$ 73.00	$ 62 89	$ 66.88
$ 72.07	$ 65.46	$ 69.86
$ 69.15	$ 63 55	$ 69.65

[redacted]

8/1/2019	9/1/2019	10/1/2019	11/1/2019	12/1/2019	1/1/2020
$ 64 84	$ 66.81	$ 66 20	$ 74.07	$ 91.67	$ 103.57
$ 62.18	$ 63.95	$ 63.49	$ 69.96	$ 86.17	$ 101.99
$ 63.66	$ 64.92	$ 65.19	$ 70.34	$ 88.67	$ 105.61
$ 60 52	$ 63.18	$ 63 01	$ 69.01	$ 84.36	$ 100.24

8/1/2019	9/1/2019	10/1/2019
$ 60.13	$ 60.70	$ 60.67
$ 59.55	$ 59.58	$ 59 09
$ 57.45	$ 56.69	$ 56 93
$ 57.49	$ 57.76	$ 57 87

11/1/2019	12/1/2019	1/1/2020
$ 70.06	$ 90.65	$ 102.79
$ 70.05	$ 88.12	$ 103.57
$ 66.98	$ 87 06	$ 102.44
$ 67.95	$ 86.67	$ 103.35

[redacted]

2/1/2020	3/1/2020	4/1/2020	5/1/2020	6/1/2020	7/1/2020
$ 94.11	$ 75.71	$ 69 96	$ 61.85	$ 54.15	$ 58.76
$ 94 25	$ 75.58	$ 67 88	$ 60.79	$ 53.71	$ 58.10
$ 103 31	$ 81.20	$ 70.77	$ 64.55	$ 56.16	$ 58.40
$ 95 34	$ 73.48	$ 68.19	$ 61.25	$ 54.35	$ 56.37

2/1/2020	3/1/2020	4/1/2020
$ 94.43	$ 73.97	$ 65.49
$ 92.11	$ 73.19	$ 63 00
$ 101.97	$ 79.51	$ 68 83
$ 96.99	$ 74.50	$ 66.74

5/1/2020	6/1/2020	7/1/2020
$ 57.38	$ 48.13	$ 54.53
$ 54.87	$ 48 90	$ 54.12
$ 61.51	$ 55 31	$ 58.72
$ 57.77	$ 47 98	$ 53.61

[redacted]

8/1/2020	9/1/2020	10/1/2020	11/1/2020	12/1/2020	1/1/2021
$ 48 99	$ 50.91	$ 51.40	$ 58.85	$ 72.24	$ 83.05
$ 55.76	$ 53.98	$ 55 00	$ 63.62	$ 78.61	$ 89.81
$ 48 50	$ 50.96	$ 50 88	$ 58.49	$ 70.56	$ 82.80
$ 48.48	$ 51.96	$ 51.48	$ 59.77	$ 71.14	$ 83.48
$ 50 28	$ 53.16	$ 52.60	$ 60.03	$ 72.06	$ 82.67
$ 51.74	$ 54.98	$ 54 50	$ 62.69	$ 77.94	$ 88.64

8/1/2020	9/1/2020	10/1/2020
$ 52.49	$ 51.91	$ 52 06
$ 49.63	$ 48.04	$ 50.15
$ 50.87	$ 51.28	$ 52 21

11/1/2020	12/1/2020	1/1/2021
$ 62.44	$ 77 02	$ 87.42
$ 61.56	$ 75 85	$ 86.35
$ 60.77	$ 74 01	$ 87.19

[redacted]

2/1/2021	3/1/2021	4/1/2021	5/1/2021	6/1/2021	7/1/2021
$ 77 08	$ 64.88	$ 58.77	$ 58.28	$ 53.24	$ 55.95
$ 74 83	$ 65.23	$ 60 54	$ 57.25	$ 54.11	$ 54.55
$ 74 91	$ 65.15	$ 58 96	$ 56.45	$ 52.67	$ 54.13
$ 73.47	$ 61.71	$ 56 30	$ 53.08	$ 49.94	$ 52.06
$ 76 04	$ 64.37	$ 58 82	$ 54.79	$ 51.68	$ 54.46
$ 81.70	$ 68.12	$ 60 36	$ 57.23	$ 52.83	$ 53.86

2/1/2021	3/1/2021	4/1/2021
$ 79.96	$ 67.04	$ 58.66
$ 78.17	$ 67.28	$ 60 09
$ 75.12	$ 65.53	$ 57 82
$ 83.17	$ 68.44	$ 60 56
$ 77.80	$ 64.72	$ 56 99

5/1/2021	6/1/2021	7/1/2021
$ 51.29	$ 49.61	$ 55.46
$ 53.29	$ 49 21	$ 52.59
$ 53.69	$ 52 01	$ 56.68
$ 52.62	$ 50 20	$ 54.88

[redacted]

8/1/2021	9/1/2021	10/1/2021	11/1/2021	12/1/2021	1/1/2022
$ 56 38	$ 56.12	$ 57 29	$ 65.54	$ 84.15	$ 109.65
$ 58.76	$ 58.87	$ 58.70	$ 68.52	$ 89.06	$ 111.73
$ 55.79	$ 56.29	$ 56.11	$ 64.97	$ 85.71	$ 109.01
$ 62 28	$ 60.20	$ 62.75	$ 71.99	$ 90.90	$ 112.53
$ 56.76	$ 58.10	$ 58.65	$ 67.30	$ 85.67	$ 109.40

8/1/2021	9/1/2021	10/1/2021
$ 55.93	$ 54.16	$ 55.15
$ 55.40	$ 51.97	$ 53.62
$ 58.06	$ 56.52	$ 56 20
$ 59.18	$ 56.65	$ 58.66

11/1/2021	12/1/2021	1/1/2022
$ 66.31	$ 86 52	$ 112.56
$ 65.72	$ 84 91	$ 107.38
$ 67.04	$ 88 81	$ 112.61
$ 69.82	$ 89 55	$ 110.86

[redacted]

2/1/2022	3/1/2022	4/1/2022	5/1/2022	6/1/2022	7/1/2022
$ 187.12	$ 117.51	$ 77.47	$ 63.67	$ 69.64	$ 79.72
$ 179 55	$ 121.54	$ 79.15	$ 68.44	$ 72.74	$ 77.22
$ 189.78	$ 124.62	$ 82 05	$ 68.94	$ 70.42	$ 77.66
$ 183.67	$ 118.66	$ 76.40	$ 62.94	$ 67.18	$ 76.45

2/1/2022	3/1/2022	4/1/2022
$ 198.40	$ 123.66	$ 77.73
$ 187.56	$ 121.95	$ 79 37
$ 232.36	$ 154.11	$ 101.74

5/1/2022	6/1/2022	7/1/2022
$ 62.86	$ 64 59	$ 77.42
$ 61.13	$ 64 57	$ 73.03
$ 87.67	$ 102 54	$ 132.29

[redacted]

8/1/2022	9/1/2022	10/1/2022	11/1/2022	12/1/2022	1/1/2023
$ 175.11	$ 159.16	$ 150 89	$ 186.70	$ 268.82	$ 313.33
$ 158 85	$ 138.39	$ 129.67	$ 165.32	$ 268.06	$ 317.15
$ 167.14	$ 151.60	$ 145.62	$ 189.20	$ 288.13	$ 345.45

8/1/2022	9/1/2022	10/1/2022
$ 167.47	$ 143.43	$ 134.35

11/1/2022	12/1/2022	1/1/2023
$ 179.72	$ 318.69	$ 384.74

[redacted]

2/1/2023	3/1/2023	4/1/2023	5/1/2023	6/1/2023	7/1/2023
$ 420.63	$ 217.49	$ 164.15	$ 122.02	$ 119.57	$ 169.87

2/1/2023	3/1/2023	4/1/2023

5/1/2023	6/1/2023	7/1/2023
$ 104.42	$ 110.43	$ 119.55

[redacted]

8/1/2023	9/1/2023	10/1/2023	11/1/2023	12/1/2023	1/1/2024
$ 88 50	$ 72.71	$ 67 39	$ 97.96	$ 160.88	$ 202.63
$ 89 99	$ 72.33	$ 68 93	$ 104.36	$ 170.08	$ 211.92
$ 80.47	$ 59.76	$ 55 51	$ 85.27	$ 193.59	$ 240.65

8/1/2023	9/1/2023	10/1/2023
$ 90.95	$ 74.82	$ 69.78
$ 101.00	$ 85.44	$ 83 06
$ 83.51	$ 59.89	$ 56.43

11/1/2023	12/1/2023	1/1/2024
$ 133.83	$ 198.78	$ 232.38
$ 101.10	$ 229 04	$ 300.47

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23
Request No: DOE 2-10

Date of Response: 10/4/23
Respondent: Christopher Green

REQUEST:

Please share your utility's threshold/proxy price for the last five years of solicitations for each customer class, including all associated workpapers used to calculate the price.

RESPONSE:

Please see Confidential Attachment INV 2023-001 DOE 2-10.1.xlsx for Liberty proxy prices for the last five years. Additionally, the supporting workpapers for each period are provided in Confidential Attachment INV 2023-001 DOE 2-10.2.zip.

Confidential Attachment INV 2023-001 DOE 2-10.1.xlsx and Confidential Attachment INV 2023-001 DOE 2-10.2.zip contain the Company's internal calculations of proxy prices in prior default service proceedings, which information that is "confidential, commercial, or financial information" and is thus protected from disclosure by RSA 91-A:5, IV, and presumed to be confidential in default service proceedings pursuant to Puc 201.06(a)(15). Therefore, pursuant to that statute and Puc 203.08(d) and Puc 201.01.06(a)(11)(g) (protecting "responses to data requests related to a. through f. above"), the Company has a good faith basis to seek confidential treatment of this information and asserts confidentiality pursuant to those rules. Providing redacted versions of these files would render the documents useless as all the substantive information would not be visible or is infeasible as the file contains linked information that cannot be readily redacted.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-11 | Respondent: Christopher Green

REQUEST:

Please explain how each component of the threshold/proxy price is calculated.

RESPONSE:

When constructing a threshold/proxy price Liberty uses the following variables: Power Forwards, FCM Costs, Ancillary Costs, On/Off-Peak hours, ICAP load factors, Mystic COS, and a premium bid factor calculation.

- Power Forwards by Class (On/Off Peak)
  - Pulled from S&P Global
- FCM Costs
  - Prior period(s) $/MWh average
- Ancillary Prices
  - Prior period(s) $/MWh average
- Mystic COS
  - Maximum historical rate used for proxy
- On/Off-Peak weighting
  - Weighting calculated by determining amount of hours by class for the respective month
- ICAP load factors
  - Prior period(s) Liberty Utility averages
- Liberty applies a Premium Bid Factor to the calculation.
  - This multiplier is largely based on a comparison between actual historical solicitations and their respective Power Forward prices.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23
Request No: DOE 2-12

Date of Response: 10/4/23
Respondent: Melyssa Flaherty

REQUEST:

Please provide migration reports for the last five years that separate supply served under an aggregation from other third-party supply. Please maintain the existing migration breakdown by customer group, rate schedule, and period for both customer count and load.

RESPONSE:

Attachment INV 2023-001 DOE 2-12.zip contains quarterly migration reports from 2018 through Q2 2023.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-13 | Respondent: Christine Downing

REQUEST:

Please provide the following information, by customer group and rate schedule, for each existing aggregation within your utility's service territory:

a. Number of customers
b. Load (kW, kWh, or both)
c. Term of aggregation (including start date and end date)

RESPONSE:

The table below shows each town with customer count and average monthly kWh. The enrollment date for the 5 towns in EDI was 04/27/2023. There is no end date that Liberty is aware of.

Town	Supplier ID	Customer Count	Average Mo. kWh
Enfield	167C752	2,122	511,102
Hanover	167C753	2,488	905,674
Lebanon	167C754	6,612	3,533,706
Plainfield	167C755	451	229,030
Walpole	167C756	1,595	976,697

The table below shows each town, broken out by rate class with customer count and average monthly kWh.

Town	Supplier ID	GSEC_G1	GSEC_G2	GSEC_G3	GSEC_T	GSER_T	GSEC_V	GSER_D	GSER_D10	GSER_D11	GSER_D12	Average Mo. kWh
Enfield	167C752	0	8	191	1	23	1	1,847	50	1	0	511,102
Hanover	167C753	0	32	283	2	39	0	2,099	33	0	0	905,674
Lebanon	167C754	15	135	950	9	84	2	5,397	20	0	0	3,533,706
Plainfield	167C755	0	6	57	0	12	0	371	4	1	0	229,030
Walpole	167C756	0	20	163	5	62	1	1,335	9	0	0	976,697

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-14 | Respondent: Christine Downing

REQUEST:

What municipalities/towns within your utility's service territory have pending aggregation applications? For each pending aggregation application, please provide, by customer group and rate schedule, the number of prospective customers and amount of load that could be served by the aggregation.

RESPONSE:

The town of Pelham currently has a pending aggregation application. The first chart shows all customers by rate class currently in the town of Pelham. The second chart shows all customers currently unenrolled with a 3rd party marketer, by rate class.

All Customers:

Rate Class	2022 Annual Load (kWh)	Customer Count
Commerical G1	11,152,560	5
Commerical G2	10,049,459	50
Commercial G3	9,995,413	595
Commercial T	165,636	2
Residential D	62,820,206	5168
Residential D10	487,449	33
Residential D11	86,299	6
Residential T	3,502,749	227
Street Light M	113,410	76

Only Unenrolled Customers:

Rate Class	2022 Annual Load (kWh)	Customer Count
Commerical G1	975,000	2
Commerical G2	3,640,709	25
Commercial G3	8,545,972	417
Commercial T	151,680	1
Residential D	58,706,359	4620
Residential D10	441,473	29
Residential D11	86,299	5
Residential T	3,165,310	181
Street Light M	68,161	67

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23
Request No: DOE 2-15

Date of Response: 10/4/23
Respondent: Christopher Green

REQUEST:

Does your utility account for aggregation-related load risk in the threshold/proxy price? If so, please describe how this element is estimated.

RESPONSE:

To date, Liberty has not included an aggregation-related load risk in the threshold/proxy price. Liberty has determined that it may be a factor in supplier participation in the default service solicitation but has not attempted to quantify that risk.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-16 | Respondent: Robert Garcia

REQUEST:

How does your utility handle net metering as it relates to default service? Is the treatment of net metering different for customers that receive third-party, community power aggregation, and default retail supply?

RESPONSE:

Net metering is available to all Liberty customers and those taking default service will receive banked kWh for installations prior to September 1, 2017. For those customers with installation after September 1, 2017, they will receive credit for any exported kWh at 100% of the default rate. The treatment of net metering customers on Liberty's default supply is different from those supplied by a third party, such that Liberty does not apply banked kWh nor credit the rate by which the customer has contracted energy service through a third party for exported kWh.

The following rules provide opportunities for electricity suppliers and customers to receive the benefits of net metering if they choose not to take default service:

- Puc 903.01(c) Any electricity supplier operating within New Hampshire that is not the default service provider shall offer net metering pursuant to Puc 900 but may provide for rates and terms as provided in RSA 362-A:9, II and Puc 903.02(g).
- Puc 903.02(h) Competitive electricity suppliers registered under RSA 374-F:7 and Puc 2000 may voluntarily determine the terms, conditions, and prices under which they shall agree to provide electric energy supply to, and purchase net electric energy output from, customer-generators.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-17 | Respondent: Christopher Green

REQUEST:

Does your utility coordinate with affiliates in other ISO-NE states as it relates to default electric service (e.g., timeline coordination)? If so, in what ways does your utility coordinate?

RESPONSE:

No, Liberty Utilities does not have any affiliates in other ISO-NE states with which it coordinates as it relates to default electric service.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-18 | Respondent: Christopher Green

REQUEST:

Does your utility share resources with affiliates in other ISO-NE states as it relates to default electric service (e.g., shared expert staff)? If so, in what ways does your utility share resources?

RESPONSE:

Liberty Utilities does not share resources with any affiliates in other ISO-NE states as it relates to default electric service.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-19 | Respondent: Christopher Green

REQUEST:

What factors does your utility use to calculate self-supply price? Please list each individual element with a brief description of how it is estimated. If applicable, please provide self-supply price calculations with all associated workpapers for all instances of self-supply within the last five years.

RESPONSE:

When Liberty Utilities self-supplied for the large customer group period ending April 2023, it provided a monthly settlement report as requested in DE 22-024. In order to get to the total wholesale power costs, this report relied on load data (both Day-Ahead and Real-Time), Forward Capacity Market costs, FCM Credits, ancillary service costs, uplift charges, Mystic COS, and Other ISO-NE Charges as seen in the monthly invoices and as described below. Self-supply calculations can be seen in Attachment INV 2023-001 DOE 2-19.xlsx.

- Load Data- Enverus load forecast to determine Day-Ahead bid
- Imbalances settled naturally at the Real-Time LMP
- Forward Capacity Market costs- Estimates relied on historical actuals and averages were used as the estimates for future periods during self-supply period.
- FCM Credits- Estimates relied on historical actuals and averages were used as the estimates for future periods during self-supply period.
- Ancillary service costs- Estimates relied on historical actuals and averages were used as the estimates for future periods during self-supply period.
- Uplift charges- Estimates relied on historical actuals and averages were used as the estimates for future periods during self-supply period.
- Other ISO-NE Charges- Estimates relied on historical actuals and averages were used as the estimates for future periods during self-supply period.
- Mystic COS- During the supply period estimates relied on historical actuals and averages were used as the estimates for future periods.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-20 | Respondent: Christopher Green

REQUEST:

Under what conditions would the self-supply price be adjusted? Please identify any applicable thresholds.

RESPONSE:

The meaning of the term "price" in the question is unclear. If "price" refers to actual costs incurred while providing self-supply, those "prices" would not be adjusted and would be passed through to customers. If "price" refers to the rates charged to customers while the Company is providing self-supply service, those rates could be adjusted if the forward estimates of costs that were used to calculate the default service rate turned out to be significantly higher or lower than actual costs incurred during the period. If that case, the Company would evaluate whether the differences in costs were sufficient to warrant a request that the Commission change the default service rate. The only threshold would be whether a sufficiently significant variance has been created between billed rates and updated forward rates to warrant seeking a rates case. Internal discussions would center on whether an adjustment of estimated rates for billing purposes should be requested to minimize an over/under recovery from customers. This process would likely be determined on a case-by-case basis and does not lend itself to rigid guidelines to determine thresholds. Note that the Company did seek a change in its default service rate while providing self-service in 2023 due to a significant decline in costs. See Docket No. DE 22-024.

Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty

INV 2023-001
Investigative Proceeding Relative to Energy Service Procurement

Department of Energy Data Requests - Set 2

Date Request Received: 9/20/23 | Date of Response: 10/4/23
Request No: DOE 2-21 | Respondent: Danielle Ziv

REQUEST:

Please provide publicly available distribution load forecasts, including separate forecasts by customer group and rate class as available, prepared in the last five years. Please explain factors expected to affect your utility's distribution load (level and profile) over the term each recent forecast. If these factors have changed in the last five years, please identify which factors are expected to affect which forecasts.

RESPONSE:

Liberty Utilities has provided four separate attachments in response to the DOE 2-21 request. The first attachment, Attachment INV 2023-001 DOE 2-21.1, is a sales load forecast report that details the forecast methodology and explains the factors that affect each rate class in the 2022 forecast. The other attachments are three load forecasts that were prepared between 2020 and 2022. Please see Attachment INV 2023-001 DOE 2-21.2.xlsx for the 2020 forecast, Attachment INV 2023-001 DOE 2-21.3.xlsx for the 2021 forecast, and Attachment INV 2023-001 DOE 2-21.4.xlsx for the 2022 forecast. The distribution load forecasts include a 30-year forecast period and have the same methodology. Please be advised the 30-year forecast period began in the 2021 forecast.

Liberty Utilities New Hampshire

Granite State Company

Monthly Rate Class Load Forecasts
2022-2051

September 2023

Report Contact: Danielle Ziv
603-315-1420
danielle.ziv@libertyutilities.com
ENERGY FORECASTING – ENERGY PROCUREMENT

CONTENTS

Summary of Results

This report presents the results of rate class monthly sales load forecasts for Liberty Utilities New Hampshire (LUNH) for the 30-year forecast period of 2022-2051. Regression models estimating monthly customers and use-per-customer by rate class were employed to develop forecasts based upon average weather conditions. The average weather first full forecasted year in the monthly rate class sales load forecast appears in Table 1 below for January 1, 2023, through December 1, 2023. The average annual total sales growth rate in LUNH service territory between 2022 and 2051 is 0.182%. The rate class with the highest average compounded annual growth rate (CAGR) during the forecast period is D10 (3.25%) while the T rate class has the largest annual decrease (-5.519%) in the 2022 to 2051 time frame. The residential D02 class sales rise 0.686% annually on average over the forecast period and the G1 large class sales has a constant annual load of 107,987,133 kWh over the forecast period. The G3 class annual sales increases 0.102% annually from 2022 to 2051. The annual forecast for the first five years and every five years after appears in Table 2 below.

Monthly Load Forecast by Rate Class (Table 1):

date	total	d02	g3	g2	g1s	g1l	d10	m	v	t
1/1/2023	79,158,688	28,197,453	7,663,032	12,138,245	21,209,734	7,204,920	868,468	238,211	27,858	1,610,768
2/1/2023	71,411,416	24,323,109	6,978,855	11,117,610	19,670,669	6,914,455	755,962	224,940	26,116	1,399,700
3/1/2023	74,474,676	24,179,926	7,181,011	11,827,822	21,305,952	7,722,952	700,735	237,841	26,135	1,292,301
4/1/2023	68,571,321	20,859,502	6,351,503	11,073,286	20,145,112	8,422,005	523,223	229,993	22,160	944,538
5/1/2023	72,829,248	21,289,229	6,646,231	11,716,462	22,090,857	9,620,723	457,289	237,479	19,753	751,226
6/1/2023	78,543,248	24,458,024	6,945,978	12,124,438	23,297,036	10,314,994	462,883	229,645	19,974	690,275
7/1/2023	88,998,413	29,006,647	7,741,325	13,097,375	25,845,438	11,753,179	529,785	237,123	23,331	764,210
8/1/2023	87,307,154	28,015,165	7,579,305	13,088,724	25,721,739	11,386,032	515,098	236,947	21,131	743,013
9/1/2023	76,004,862	22,768,526	6,572,037	12,067,768	23,131,788	10,123,997	433,141	229,136	17,953	660,517
10/1/2023	72,965,799	21,751,892	6,407,018	11,901,032	22,379,450	8,976,425	482,206	244,456	19,975	803,345
11/1/2023	71,597,295	23,407,884	6,420,812	11,279,471	20,670,232	7,906,876	603,985	228,804	21,228	1,058,003
12/1/2023	78,530,022	27,891,092	7,211,017	12,071,514	21,240,114	7,640,576	798,524	236,262	26,130	1,414,793

**The load forecast for all rate classes is in kilowatts per hour (kWh).*

Annual Load Forecast by Rate Class (Table 2):

Year	d02	d10	g1l	g1s	g2	g3	m	v	t	total
2022/2023	292,149,471	6,977,021	107,987,133	264,489,866	139,678,399	83,260,625	2,828,390	268,157	12,368,813	910,007,874
2023/2024	298,227,167	7,290,436	107,904,153	267,361,871	144,872,818	83,864,016	2,802,668	272,833	11,919,879	924,515,841
2024/2025	300,981,836	7,640,929	107,987,133	273,755,744	152,151,468	83,579,812	2,779,636	274,318	11,352,998	940,503,873
2025/2026	303,097,350	8,004,878	107,987,133	274,730,045	156,164,703	83,434,297	2,758,799	274,919	10,809,637	947,261,762
2026/2027	305,197,874	8,368,791	107,987,133	274,730,843	156,771,028	83,329,555	2,739,788	275,133	10,268,897	949,669,042
2031/2032	315,876,955	10,206,340	107,904,153	266,767,522	159,159,212	83,373,803	2,663,988	275,606	8,068,077	954,295,656
2036/2037	325,722,585	12,004,780	107,987,133	256,450,579	161,025,157	83,586,428	2,608,405	275,252	6,303,925	955,964,245
2041/2042	335,807,479	13,820,452	107,987,133	245,109,800	162,596,662	84,194,120	2,564,698	275,252	4,859,010	957,214,606
2046/2047	345,831,417	15,634,675	107,987,133	232,688,759	164,221,113	84,966,718	2,528,783	275,252	3,547,787	957,681,637
2050/2051	353,819,856	17,085,089	107,987,133	221,974,135	165,741,574	85,668,432	2,504,087	275,252	2,522,967	957,578,525

**Last Historical Date April 2022. Forecast period starts in May 2022. Split year annual forecasts go from May-April.*

Table 3 displays the LUNH first full forecasted year of full-time customers by rate class. The average annual total customer growth rate between 2022 and 2051 is 0.597%. The D10 class has the largest annual average customer growth rate (3.29%) and class T has the largest average annual decrease in customers (-5.248%) during the forecast time frame. The average annual customer forecast for the first five years and every five years after appears in Table 4.

Monthly Customer Forecast by Rate Class (Table 3):

date	year	month	total	d02	d10	g1l	g1s	g2	g3	m	t	v
1/1/2023	2023	1	45,083	36,454	578	4	150	981	5,525	576	800	14
2/1/2023	2023	2	45,010	36,404	578	4	150	987	5,503	574	797	14
3/1/2023	2023	3	45,355	36,692	579	4	152	989	5,553	574	797	15
4/1/2023	2023	4	45,502	36,843	579	4	152	991	5,550	573	796	15
5/1/2023	2023	5	45,674	37,010	578	4	152	991	5,557	573	794	14
6/1/2023	2023	6	45,631	37,002	578	4	153	993	5,525	572	791	14
7/1/2023	2023	7	45,672	37,060	580	4	155	998	5,505	570	787	13
8/1/2023	2023	8	45,780	37,138	581	4	155	999	5,535	570	784	13
9/1/2023	2023	9	45,763	37,098	580	4	156	1,008	5,553	569	783	13
10/1/2023	2023	10	45,939	37,250	581	4	156	1,010	5,576	568	781	14
11/1/2023	2023	11	45,860	37,167	581	4	156	1,013	5,581	566	777	14
12/1/2023	2023	12	45,880	37,188	583	4	156	1,015	5,581	566	774	14

Average Annual Customer Forecast by Rate Class (Table 4):

Year	total	d02	d10	g1l	g1s	g2	g3	m	t	v
2022/2023	45,081	36,463	566	4	150	978	5,524	579	805	14
2023/2024	45,834	37,155	590	4	155	1,009	5,563	567	777	14
2024/2025	46,166	37,443	620	4	160	1,044	5,583	556	743	14
2025/2026	46,438	37,678	650	4	163	1,067	5,609	544	710	14
2026/2027	46,700	37,914	680	4	165	1,081	5,634	533	676	14
2031/2032	48,060	39,112	830	4	170	1,139	5,768	486	537	14
2036/2037	49,391	40,270	980	4	175	1,185	5,889	448	426	14
2041/2042	50,765	41,448	1,130	4	180	1,224	6,016	416	333	14
2046/2047	52,146	42,626	1,280	4	185	1,260	6,143	387	247	14
2050/2051	53,251	43,569	1,400	4	189	1,289	6,245	364	178	14

**Last Historical Date April 2022. Forecast period starts in May 2022. Split year annual forecasts go from May-April.*

The remainder of the report details the data used to perform the analyses, describes the analytical approach employed in developing the monthly LUNH rate class forecasts, presents the results of rate class specific regression analyses, and discusses how the model coefficients and data are employed to develop the monthly forecasts.

Introduction

This report presents the LUNH monthly rate class specific sales load forecasts for 2022-2051 under normal weather conditions. Regression analyses were used to estimate the LUNH historic rate class specific monthly customer and use-per-customer models. The monthly customer and use-per-customer model coefficients were then utilized to develop monthly rate class sales load forecasts.

The remainder of this report is organized as follows. First, the data used in the analysis is described. Second, the regression model specifications are provided. Third, the results from the regression models are discussed. Finally, the 2022-2051 rate class sales forecast process is described.

Data

There were three data sources that were combined to perform the historic rate class specific customer and use-per-customer modeling. These sources include historic LUNH monthly sales and customers by rate class, economic drivers for the LUNH service area, and weather information expressed as heating and cooling degree days.

Monthly rate class customers and total sales numbers for LUNH from August 2014 through April 2022 were supplied by LUNH staff. The rate class specific customers and sales were employed to create the dependent variables for the various regression models estimated.

There are a couple of economic drivers used in this study. One is a simple time trend taking the value of 1 in August 2014 and increases by one each month having a value of 456 in December 2051. The other is a covid indicator variable that takes on the value of 1 in the months of the 2020 covid year starting in April and every year after covid began. The months falling in years before covid take on the value of 0.

Weather information came from NOAA. Daily heating degree days (HDD) and cooling degree days (CDD) were computed from weather information from the Concord New Hampshire Airport (WBAN #14745) for January 2000 through April 2022. The daily HDDs and CDDs were then summed for the month. These degree days are calculated based on an average temperature of 65. The calculation is illustrated below:

HDD = 65 – Avg Daily Temp, 0 if Avg Daily Temp > 65
CDD = Avg Daily Temp – 65, 0 if Avg Daily Temp < 65

Specification of Models

This section first describes the rate class customer model specification followed by a discussion of the rate class use-per-customer model.

Customer Model Specification

The monthly customer models for rate class D02 and G03 are based on a time trend, covid indicator variable, monthly indicators, and a leap year variable that takes on 1 if year is a leap year, and 0 otherwise. The monthly indicators included are as follows:

JAN = one if month is January, zero otherwise
FEB = one if month is February, zero otherwise
MAR = one if month is March, zero otherwise
APR = one if month is April, zero otherwise
MAY = one if month is May, zero otherwise
JUN = one if month is June, zero otherwise
JUL = one if month is July, zero otherwise
AUG = one if month is August, zero otherwise
SEP = one if month is September, zero otherwise
OCT = one if month is October, zero otherwise
NOV = one if month is November, zero otherwise
DEC = one if month is December, zero otherwise

In mathematical terms, the customer model is expressed as:

Customers = a + b * JAN + c * FEB + d * MAR + e * APR
+ f * MAY + g * JUN + h * JUL + i * AUG + j * SEP + k * OCT
+ l * NOV + m * DEC + n * COVID + o * Time Trend + p*LEAP

The values “a”, "b", …”p” are estimated coefficients. Rate class specific customer model results are supplied in the next section of the report.

All other rate class customer forecasts are based on an annual forecast of each using historical averages from August 2014 to April 2022. To get the monthly customer forecast for these rate classes, a ratio is calculated using historical customer data to allocate the annual forecast into a monthly customer forecast. The rate classes D10, G1s, G1L, G02, M, T, and V have customer forecasts calculated this way because they are much smaller in size in comparison to D02 and G03.

Use-Per-Customer Model Specification

The use-per-customer (UPC) model by rate class is based on weather expressed in monthly heating and cooling degree days, time trend, and monthly indicators. The monthly indicators included are as follows:

FEB = one if month is February, zero otherwise
MAR = one if month is March, zero otherwise
APR = one if month is April, zero otherwise
MAY = one if month is May, zero otherwise
JUN = one if month is June, zero otherwise
JUL = one if month is July, zero otherwise
AUG = one if month is August, zero otherwise
SEP = one if month is September, zero otherwise
OCT = one if month is October, zero otherwise
NOV = one if month is November, zero otherwise
DEC = one if month is December, zero otherwise

The use-per-customer model expressed in mathematical terms is as follows:

Use-Per-Customer = a + b * FEB + c * MAR + d * APR + e * MAY
+ f * JUN + g * JUL + h * AUG + i * SEP + j * OCT + k * NOV
+ l * DEC + m * HDD + n * CDD + o * Time Trend

The results of the estimated coefficients (a, b …, o) will be discussed for each rate class in the next section of the report.

Regression Results

This section provides the customer and use-per-customer model estimated coefficient effects for all the LUNH rate classes.

D02 Results

The customer rate D02 regression model has an R-Squared value of .99 which suggests that over 99% of the variation in customers is explained by the model coefficients. The use-per-customer rate D02 regression model has an R-Squared value of .95 which means that slightly more than 95% of the variation in the use-per-customers is explained by the model coefficients.

For the D02 customer model the effects of the independent variables are as follows. The estimate of the time trend coefficient is positive meaning the number of customers rises over time. The estimate coefficients for the months are all negative except for February, indicating there is a decrease in customers in most months of the year except for February. The estimate of the coefficient of the economic variable, COVID, is positive. Thus, indicating all the years included in the Covid indicator variable, there is an increase in customers. Again, the overall outcome of the rate D02 customer forecast was a monthly positive increase.

The D02 use-per-customer independent variable effects are as follows. The estimate of the time trend coefficient is positive indicating the use per customer increases over time. The estimates of the weather coefficients are positive as expected based on the assumption that the higher the

cooling degree day in a given summer day, the higher the D02 use per customer will be. Likewise, the higher the heating degree days are (or the lower the temperature), the higher the use per customer will be. The estimates for the monthly indicator variables are positive for the summer months and negative for the winter months. This indicates the use per customer increases in the summer and decreases in the winter for rate D02.

D10 Results

The use-per-customer rate D10 regression model has an R-Squared value of .98 which suggests that over 98% of the variation in use-per-customer is explained by the model coefficients.

Using historical averages and ratios to forecast rate D10 customers, the monthly forecast results in the D10 customers increasing over time.

The D10 use-per-customer independent variable effects are as follows. The estimate of the time trend coefficient is negative indicating the use per customer decreases over time. The estimates of the weather coefficients are positive as expected based on the assumption that the higher the cooling degree day in a given summer day, the higher the rate D10 use per customer will be. Likewise, the higher the heating degree days are (or the lower the temperature), the higher the use per customer will be. The estimates for the monthly indicator variables are negative, indicating the use per customer for rate class D10 decreases in each month.

T Rate Results

The use-per-customer rate T regression models has an R-Squared of .99 which implies that more than 99% of the variation in the use-per-customer is explained by the model coefficients.

Using historical averages and ratios to forecast rate T customers, the monthly forecast results in the T customers decreasing over time.

The T use-per-customer independent variable effects are as follows. The estimate of the time trend coefficient is negative indicating the use per customer decreases over time which is expected due to the decrease of customers over time. The estimates of the weather coefficients are positive as expected based on the assumption that the higher the cooling degree day in a given summer day, the higher the rate T use per customer will be. Likewise, the higher the heating degree days are (or the lower the temperature), the higher the use per customer will be. The estimates for the monthly indicator variables are negative, indicating the use per customer for rate T decreases in each month.

G03 Results

The customer rate G03 regression model has an R-Squared value of .958 which suggests that over 95% of the variation in customers is explained by the model coefficients. The use-per-customer rate G03 regression model has an R-Squared value of .92 which means that more than 92% of the variation in the use-per-customers is explained by the model coefficients.

For the G03 customer model the effects of the independent variables are as follows. The estimate of the time trend coefficient is positive meaning the number of customers rises over time. The estimate coefficients for all months except for January, June, and July are positive, indicating that in those three months the number of customers decrease. The estimate of the coefficient for the indicator variable, LEAP is negative. Thus, indicating the number of customers in rate G03 decrease in leap years.

The G03 use-per-customer independent variable effects are as follows. The estimate of the time trend coefficient is negative indicating the use per customer decreases over time. The estimates of the weather coefficients are positive as expected based on the assumption that the higher the cooling degree day in a given summer day, the higher the G03 use per customer will be. Likewise, the higher the heating degree days are (or the lower the temperature), the higher the use per customer will be. The estimates for the monthly indicator variables are positive for the

summer months and negative for the winter months. This indicates the use per customer increases in the summer and decreases in the winter for rate G03.

G02 Results

The use-per-customer rate G02 regression model has an R-Squared value slightly over .95 which means that 95% of the variation in use-per-customer is explained by the model coefficients.

Using historical averages and ratios to forecast rate G02 customers, the monthly forecast results in the G02 customers increasing over time.

The G02 use-per-customer independent variable effects are as follows. The estimate of the time trend coefficient is negative indicating the use per customer decreases over time. The estimates of the weather coefficients are positive as expected based on the assumption that the higher the cooling degree day in a given summer day, the higher the rate G02 use per customer will be. Likewise, the higher the heating degree days are (or the lower the temperature), the higher the use per customer will be. The estimates for the monthly indicator variables are negative, indicating the use per customer for rate class G02 decreases in each month.

G01 Results

The G01 rate class was split between 5 very large customers and the remaining small G01 class. For the large G01 customer group, there was no use-per-customer model built due to a fixed number of customers in this class. A volume forecast built just for the large G1 class was modeled as a function of heating degree days, cooling degree days and monthly indicators. There is no time trend involved as the number of large G1 customers is fixed over time. The large G01 volume model R-Squared value is .95 which suggests more than 95% of the variation in G01 large volume is explained by the model coefficients. The G1 small use-per-customer model R-

squared value is .978 which means more than 98% of the variation in G1 small use-per-customer is explained by the model coefficients.
The G1 large customers is fixed over time so there is no customer model for this class.
Using historical averages and ratios to forecast rate G1 small customers, the monthly forecast results in the G1 small customers increasing over time.

The G01 large volume independent variable effects are as follows. The estimates of the weather coefficients are positive as expected based on the assumption that the higher the cooling degree day in a given summer day, the higher the rate G1 large volume will be. Likewise, the higher the heating degree days are (or the lower the temperature), the higher the volume will be. The estimates for the monthly indicator variables are positive, indicating the volume for rate class G01 large increases in most of the months. There is a variable in the G1 large volume model that indicates the covid year and this coefficient is negative which implies the volume of G1 large customers decreased in every month in 2020 except for January and February.

The G01 small use-per-customer independent variable effects are as follows. The estimate of the time trend coefficient is negative indicating the use per customer decreases over time. The estimates of the weather coefficients are positive as expected based on the assumption that the higher the cooling degree day in a given summer day, the higher the rate G01 small use per customer will be. Likewise, the higher the heating degree days are (or the lower the temperature), the higher the use per customer will be. The estimates for the monthly indicator variables are positive, indicating the use per customer for rate G01 small increases in each month.

V Rate Results

The use-per-customer rate V regression model has an R-Squared value slightly over .80 which means that 80% of the variation in use-per-customer is explained by the model coefficients.

Using historical averages and ratios to forecast rate V customers, the monthly forecast results in the V customers staying at a consistent amount averaging around 14 customers a month.

The V use-per-customer independent variable effects are as follows. There is no time trend variable as the customers in the V rate class stay consistent throughout the forecast period. The estimates of the weather coefficients are positive as expected based on the assumption that the higher the cooling degree day in a given summer day, the higher the rate V use per customer will be. Likewise, the higher the heating degree days are (or the lower the temperature), the higher the use per customer will be. The use-per-customer model has a monthly indicator for November, and the coefficient estimate is negative, indicating the use-per- customer decreases in November. All other months in the rate V use-per-customer model had no significance in predicting the UPC.

M Results

The rate class M does not have a use-per-customer model, but a volume model like the G1 large rate class. The rate M volume model has an R-Squared value of .90 implies that 90% of the customer variation is explained by the model coefficients.

Using historical averages and ratios to forecast rate M customers, the monthly forecast results in the M customers decreasing over time.

The rate M volume independent variable effects are as follows. The time trend coefficient estimate is negative, indicating a decrease in volume over time. There are no weather estimates as these variables were not significant in predicting the volume of rate M. The estimates for the monthly indicator variables are positive, indicating the volume for rate class M increases in most of the months.

Forecast Development for 2022-2051

The rate class specific customer and use-per-customer model coefficients explained in the previous section of the report are used with the covid, leap, and monthly indicator variables along with the normal weather to estimate monthly rate class sales forecasts for 2022 through 2051. The normal monthly CDD and HDD values were computed by taking the average values for those terms during the May 2003 through April 2022 time frame. The normal monthly CDDs and HDDs are provided below:

month	hdd.n	cdd.n
1	1315.763	0
2	1130.275	0
3	975.65	0
4	580.6475	2.6
5	275.06	24.7
6	75.55	94.2225
7	8.4	211.16
8	21.2	168.9625
9	137.85	54.4
10	467.6	2.5
11	791.35	0
12	1136.335	0

The heating degree day normal values are slightly lower than the numbers used for the 2021-2050 forecast while the cooling degree normal values are a little higher than before.

Total sales by rate class equals

Forecasted Sales Load = Predicted Customers * Predicted Use-per-Customer

The rate class customer forecast employs the April 2022 number of customers as a starting point. Predicted rate class specific customers are calculated using the model coefficients and driver forecasts.

The rate class specific predicted use-per-customer values are developed using the class specific regression coefficients and driver forecasts. Multiplying the class specific predicted customers by class specific predicted use-per-customer generates the class specific total sales load.

Total forecasted LUNH sales are highest in July. The non-residential rate classes (e.g. G03, G02, and G01) have the highest forecasted sales in the summer months while the residential rate classes forecasted use is highest in the winter. A discussion of the first forecasted year in the monthly sales load forecast is presented in the Summary of Results section at the beginning of the report.