

**THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC UTILITIES**

Massachusetts Electric Company)
and Nantucket Electric Company,) D.P.U. 23-XX
each d/b/a National Grid)

PRE-FILED TESTIMONY OF

**STEVEN MENGES
EZRA MCCARTHY
WHITNEY BROUGHER**

ON BEHALF OF

**MASSACHUSETTS ELECTRIC COMPANY
AND NANTUCKET ELECTRIC COMPANY, each d/b/a NATIONAL GRID**

**MASSACHUSETTS ELECTRIC COMPANY
AND NANTUCKET ELECTRIC COMPANY, each d/b/a NATIONAL GRID**

D.P.U. 23-XX

PRE-FILED TESTIMONY OF

**STEVEN MENGES
EZRA MCCARTHY
WHITNEY BROUGHER**

1 **I. INTRODUCTION AND PURPOSE OF TESTIMONY**

2 **Q. Mr. Menges, please state your name, business address, and employer.**

3 A. My name is Steven Menges. My business address is 170 Data Drive, Waltham,
4 Massachusetts. I am a Manager in Customer Energy Management in Massachusetts for
5 Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National
6 Grid (“National Grid” or “Company”).

7 **Q. Have you previously testified before this or any other Commission?**

8 A. Yes, I have previously testified before the Department of Public Utilities (the
9 “Department”) on behalf of National Grid in its 2019-2021 Energy Efficiency Plan
10 proceedings docketed, respectively, as Massachusetts Electric Company and Nantucket
11 Electric Company, each d/b/a National Grid, D.P.U. 18-118 and Boston Gas Company and
12 Colonial Gas Company, each d/b/a National Grid, D.P.U. 18-114; the 2022-2024 Energy
13 Efficiency Plan proceedings docketed, respectively, as Massachusetts Electric Company
14 and Nantucket Electric Company, each d/b/a National Grid, D.P.U. 21-118 and Boston Gas
15 Company and Colonial Gas Company, each d/b/a National Grid, D.P.U. 114; and the 2019-

1 2021 Term Report proceedings docketed, respectively, as Massachusetts Electric Company
2 and Nantucket Electric Company, each d/b/a National Grid, D.P.U. 22-118 and Boston Gas
3 Company and Colonial Gas Company, each d/b/a National Grid, D.P.U. 22-114.

4 **Q. Mr. McCarthy, please state your name, business address, and employer.**

5 A. My name is Ezra McCarthy. My business address is 170 Data Drive, Waltham,
6 Massachusetts. I am a Manager in Customer Energy Management in Massachusetts for
7 National Grid.

8 **Q. Have you previously testified before this or any other Commission?**

9 A. Yes, I have previously testified before the Department on behalf of National Grid in its
10 2016-2018 Energy Efficiency Plan proceedings docketed, respectively, as Boston Gas
11 Company and Colonial Gas Company, each d/b/a National Grid, D.P.U. 15-161 and
12 Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National
13 Grid, D.P.U. 15-168; and the 2019-2021 Energy Efficiency Plan proceedings docketed,
14 respectively, as Massachusetts Electric Company and Nantucket Electric Company, each
15 d/b/a National Grid, D.P.U. 18-118 and Boston Gas Company and Colonial Gas Company,
16 each d/b/a National Grid, D.P.U. 18-114; and the 2020 Daily Dispatch Petition docketed
17 as Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National
18 Grid, D.P.U. 20-35.

1 **Q. Ms. Brougher, please state your name, business address, and employer.**

2 A. My name is Whitney Brougher. My business address is 170 Data Drive, Waltham,
3 Massachusetts. I am a Lead Analyst for Product Growth and Development in
4 Massachusetts for National Grid.

5 **Q. Have you previously testified before this or any other Commission?**

6 A. No, I have not testified before this or any other Commission before.

7 **Q. What is the purpose of this pre-filed testimony?**

8 A. The purpose of this testimony is to present to the Department the Company's Category
9 Two Mid-Term Modification ("MTM") concerning its proposed demonstration project on
10 refrigerant management for the commercial and industrial ("C&I") sector. As further
11 explained below, the Company would like to initiate a demonstration project that will focus
12 on two measures: (1) refrigerant leak reduction - leak detection survey and repair; and (2)
13 high global warming potential ("GWP") refrigerant retrofits.

14 **Q. Are you providing any exhibits in conjunction with your testimony?**

15 A. Yes. The exhibits include:

- 16 • Exhibit NG-2, which is the benefit cost model used to calculate savings for this MTM;
17 • Exhibit NG-3, which is the evaluation plan put forward by the Company;
18 • and Exhibit NG-4, which is a narrative description of the proposed demonstration.

1 **Q. Please describe what the demonstration project is intended to demonstrate.**

2 A. This research is intended to identify specific ways in which the energy efficiency programs
3 can be leveraged to reduce both direct and indirect greenhouse gas emissions (“GHG”)
4 from grocery stores in Massachusetts. The principles demonstrated through this proposal
5 could apply broadly to Heating, Ventilation, and Air Conditioning (“HVAC”) and
6 refrigeration (“HVACR”) technologies across multiple sectors. Grocery stores, however,
7 are proposed as the focus of this demonstration project due to their unusually high GHG
8 emissions related to refrigerant leaks. The Company intends to demonstrate, through this
9 project, the importance and interactivity between system energy performance and
10 refrigerant management. Further, this proposal will demonstrate how progress towards
11 state climate goals can be accelerated, quantified, tracked at a granular level and potentially
12 achieved with greater cost efficiency when refrigerant emissions are considered as
13 complements to and essential components of the Program Administrators’ energy
14 efficiency portfolios.

15 **Q. What measures is National Grid proposing for this demonstration project?**

16 A. National Grid is proposing two decarbonization measures: (1) refrigerant leak reduction –
17 leak detection survey and repair; and (2) high GWP refrigerant retrofits.

18 **Q. Please describe the refrigerant leak reduction – leak detection survey and repair**
19 **measure, including any prior on-site research.**

20 A. For the refrigerant leak reduction – leak detection survey and repair measure, qualified
21 refrigerant technicians will provide a robust and detailed leak detection survey of the

1 refrigeration system at participating locations. Any identified refrigerant leaks will be
2 measured and repaired. This demonstration will focus on parallel rack direct expansion
3 systems using a high GWP refrigerant.

4 National Grid engaged vendors to perform three measurement and verification projects
5 exploring the feasibility of refrigerant leak detection surveys and repairs. The project
6 included data collection of two years pertaining to refrigerant additions to the system, pre-
7 and post-metering of refrigeration equipment, and the leak detection and repair work.
8 While the GHG reductions were very clear based on the analysis, the energy savings were
9 less clear between various engineers involved in the project due to some of the data
10 limitations in the number of participating sites and the limited availability of pre- and post-
11 metering data. The proposed demonstration would improve upon, and expand, the prior
12 research to provide a more robust analysis.

13 **Q. What is the expected cost per project and incentive support for the survey and repair**
14 **measure?**

15 A. Refrigerant leak reduction – leak detection survey and repair projects are expected to cost
16 between \$8,000 and \$13,000 per site. This cost is inclusive of both labor and cost of
17 refrigerant added to the system after the repairs are complete. The cost of added refrigerant
18 represents roughly 30 to 45 percent of the total customer cost. To encourage participation,
19 National Grid proposes covering full project costs for customers participating in this
20 demonstration.

1 **Q. What are the expected energy savings for the survey and repair measure?**

2 A. The evaluation of this measure will include discussion of appropriate energy baselines
3 considering the evaluation baseline framework, EPA refrigerant regulations and
4 requirements, and typical maintenance practices. Refrigerant leak reduction – leak
5 detection survey and repair measures in other jurisdiction estimate around 15,000 kWh
6 annual savings per participating location. The National Grid measurement and verification
7 project mentioned earlier found an average of about five percent system savings, or about
8 17,000 kWh average annual savings across participating facilities. However, due to
9 questions on standard maintenance, limitations in participation, and metering data available
10 for that measurement and verification projects, reviewing engineers believed that estimate
11 could be high. While the purpose of this proposed evaluation framework is to further refine
12 these estimates, the Company also believes that, even if the results of these studies were to
13 show smaller (or negligible) energy savings, pursuit of these GHG reductions would
14 remain consistent with the Company’s obligations under relevant climate statutes and
15 should be considered in future Three Year Plans.

16 **Q. What are the expected GHG savings for the survey and repair measure?**

17 A. Direct emissions will be strongly influenced by the type of refrigerant used on site and the
18 site’s historic annual leak rate. Refrigerant leak reduction - leak detection survey and repair
19 measures in other jurisdictions estimate around 62 metric tons of CO₂ equivalent (“MT
20 CO_{2e}”) emission reductions. The National Grid measurement and verification project
21 estimated around 118 MT CO_{2e} average annual savings across participating facilities.

1 However, these estimates are higher than expected due to two participants with historic
2 annual leak rates well above EPA limits, which illustrates the very real and significant on-
3 site conditions that can be improved by this measure.

4 **Q. Please describe the high GWP refrigerant retrofits measure, including any prior on-**
5 **site research.**

6 A. Existing refrigeration systems using a high GWP hydrofluorocarbon (“HFC”) refrigerant
7 will be retrofitted with a lower-GWP refrigerant. To qualify for this opportunity, existing
8 systems must not be near end of life and the proposed low-GWP refrigerant must have the
9 expectation of improving system efficiency. National Grid has not performed any prior
10 on-site research on refrigerant retrofits, however the intervention has been studied and
11 documented through a range of field testing and research. Efficiency Vermont has
12 supported refrigerant retrofit projects through their Refrigerant Management program as
13 well.

14 **Q. What is the expected cost per project and incentive support for the retrofit measure?**

15 A. Refrigerant retrofit costs will vary depending on the cost of the refrigerant itself, which has
16 risen significantly in recent years. National Grid anticipates a whole system refrigerant
17 retrofit project to cost the customer between \$30,000 and \$80,000 per site depending on
18 the system size. To encourage participation, National Grid proposes covering full project
19 costs for participating customers.

1 **Q. What are the expected energy savings for the retrofit measure?**

2 A. Based on research performed in other jurisdictions, National Grid anticipates retrofits of
3 medium temperature systems to produce about 12 percent system energy savings, or 40,000
4 kWh annual savings, and retrofits of low temperature systems to produce about three
5 percent system energy savings, or 10,000 kWh annual savings. Energy savings in other
6 jurisdictions are estimated at about 30,000 kWh annual savings.

7 **Q. What are the expected GHG savings for the retrofit measure?**

8 A. Direct emission reductions will be strongly influenced by the existing system charge,
9 refrigerant type, and annual leak rates. Direct emission reductions are estimated to be 424
10 MT CO_{2e} based on estimates from other jurisdictions.

11 **Q. Does the Company have the benefit cost ratio for these two measures?**

12 A. Yes, the below table summarizes the benefit cost ratios for both measures with and without
13 the non-energy GHG savings related to refrigerant emissions. Please also see Exhibit NG-
14 2 for the benefit cost model used to calculate these savings.

15 Table NG-1-1

			Annual Savings		Benefit Cost Ratio	
Measure	Measure Life	TRC	Energy (kWh)	Non-Energy (MT CO _{2eq})	Without Non-Energy	With Non-Energy
Refrigerant Leak Survey and Repair	5	\$12,000	15,000	62	0.83	4.39
Refrigerant Retrofit	10	\$70,000	30,000	424	0.56	9.15

1 **Q. What is the total budgetary cost that National Grid is seeking?**

2 A. National Grid is seeking approval for \$950,000 in funding for this proposal, which can be
3 utilized within existing approved budgets, but may require shifts from C&I programs to
4 the C&I research and development hard-to-measure core initiative. The budget will fund
5 customer incentives for participation, robust evaluation of energy and emission reductions
6 related to the decarbonization measures, evaluation of cost effectiveness, and overall
7 assessment of the feasibility of these measures within the energy efficiency programs.
8 Please see the table below for a cost breakdown:

9 Table NG-1-2

	PP&A	Marketing & Advertising	Participant Incentives	Sales, Technical Assistance & Training	EM&V	Total
Refrigerants Demonstration	\$-	\$-	\$490,000	\$10,000	\$450,000	\$950,000

10

11 **Q. What are the bill impacts from this demonstration project?**

12 A. The Company contends the demonstration can be conducted within existing approved C&I
13 budgets of the 2022-2024 Three-Year Energy Efficiency Plan. As such, National Grid is
14 not requesting additional funding from the Department, and approval will not result in an
15 impact to customer bills. Thus, the Company will not be providing any customer bill
16 impacts in this filing.

1 **Q. How will National Grid evaluate this demonstration project?**

2 A. National Grid will engage an existing evaluation vendor to evaluate this demonstration.
3 CLEAResult, who delivers the National Grid EnergySmart Grocer delivery effort, is
4 expected to assist in customer identification and recruitment, providing early feedback of
5 customer interest in participation. However, a third- party firm, with appropriate input
6 from the Energy Efficiency Advisory Council (“EEAC”), will be employed to develop and
7 execute the evaluation plan.

8 As a preliminary plan, which is subject to the selection and input of an appropriate
9 evaluation firm, National Grid will seek five customers to participate in the refrigerant leak
10 survey and repair effort and five customers to participate in the refrigerant retrofit effort.
11 The preliminary evaluation proposes both impact evaluation and process evaluation
12 components to collect robust qualitative and quantitative insights. This evaluation effort
13 will be completed through the Program Administrators’ evaluation, measurement, and
14 verification (“EM&V”) framework and will allow for the participation of the EEAC
15 consulting team if they choose to participate. The evaluation plan includes weather
16 dependent metering. The reliability and timely availability of the evaluation results will
17 be influenced by the timing of Department’s ruling and speed of customer recruitment.
18 Please see Exhibit NG-3 for the evaluation plan put forward by the Company.

19 **Q. Is the Company requesting Department action by a certain date?**

20 A. Yes, the Company is seeking Department approval of this MTM by June 30, 2023, to have
21 these measures in the field for the 2023 cooling season. Grocery stores generally increase

1 their refrigeration use during the summer months. Accordingly, National Grid would like
2 to have the MTM approved early enough to be able to enroll customers and implement the
3 measures to have the valuable data from the 2023 summer months for evaluation. After
4 submission of this filing, National Grid will begin socializing the concept of this MTM to
5 potential customers with the intention of having enrollment and implementation within
6 short order in the event the Department approves this MTM.

7 **Q. Can you provide further background on why grocery stores are good candidates for**
8 **this demonstration project?**

9 A. Massachusetts is home to roughly 900 medium and large grocery stores, which represent
10 hundreds of thousands of MT CO_{2e} emissions on an annual basis. Using EPA estimates
11 for typical grocery store conditions, adjusted for Massachusetts GHG emission factors, a
12 grocery store may emit 75 percent of their annual GHG emissions from refrigerant leaks
13 and only 25 percent from electric and gas consumption.

14 **Q. If this demonstration project shows cost effective savings and GHG emissions**
15 **reductions, how does National Grid anticipate incorporating these measures into its**
16 **current offerings for grocery stores?**

17 A. National Grid provides robust and comprehensive energy efficiency support, including
18 incentives, to the grocery segment. If these measures show cost effective savings and GHG
19 emissions reductions, National Grid will offer these measures within the context of the
20 existing EnergySmart Grocer delivery effort. The EnergySmart Grocer offer is delivered
21 through the National Grid Existing Building Retrofit custom electric programs. The
22 Company believes that finding projects that deliver additional greenhouse gas reductions,

1 in concert or independent of energy savings, is integral to the Program Administrators
2 desire to continue to expand offerings to customers to help the state meet its climate goals
3 and deliver on our statutorily mandated GHG emissions targets.

4 **Q. What is the size, scope, and scale of the proposed project in relation to the likely**
5 **benefits to be achieved?**

6 A. The scale and scope of the demonstration is within the scope of the energy efficiency plans
7 and the Company anticipates funding it with existing budgets. The Company believes that
8 having five customers participate in each offering will provide sufficient information to
9 study whether these measures can be scaled to a fully program offering.

10 **Q. To what extent did the Company coordinate with other Program Administrators in**
11 **preparation for this demonstration project?**

12 A. The Company has provided this proposed MTM to other Program Administrators to review
13 and determine whether or not they would like to jointly participate.

14 **Q: When will the Company submit this proposed modification to the EEAC?**

15 A: The Company will submit this proposed modification to the EEAC at the same time as it
16 submits this filing to the Department. The Company intends to submit, under separate
17 cover, Exhibit NG-4, along with the entirety of this filing, to the EEAC for its review.

18 **Does this conclude your testimony.**

19 A: Yes. It does.