Attachment A

MEMORANDUM

To: Energy Efficiency Advisory Council Executive Committee

From: Liberty Utilities (New England Natural Gas Company) Corp. d/b/a Liberty

Date: July 6, 2022

Re: **C&I Existing Building Retrofit Mid-Term Modification**

Executive Summary

Consistent with Section 3.8.2(c) of the Energy Efficiency Guidelines ("Guidelines") and the order issued by the Department of Public Utilities (the "Department") in D.P.U. 21-123, Liberty Utilities (New England Natural Gas Company) Corp. d/b/a Liberty ("Liberty" or the "Company") hereby submits, as an initial step, its proposed Mid-Term Modification ("MTM") to the Energy Efficiency Advisory Council ("EEAC") Executive Committee ("ExComm") for its review and approval to include a discussion of the MTM at the EEAC meeting scheduled for July 20, 2022.

The Company is seeking a budget increase of $2,135,250 for its Commercial and Industrial ("C&I") Existing Building Retrofit program in order to provide a participant incentive to Blount Fine Foods ("Blount") to be used to install an industrial heat pump as part of a significant facility expansion in Fall River, Massachusetts. Included as Appendix A is a letter from John R. Cavanagh, Director of Engineering for Blount regarding its facility expansion, including details on the industrial heat pump. Installation of the industrial heat pump at the Blount Fall River Facility is anticipated to result in a 46.4 percent therm usage reduction at the facility, as well as a reduction of 1,912 tons of CO_2.

Customer Project Description

Blount is an established food manufacturer located in Fall River, Massachusetts, which is an Environmental Justice Community ("EJC")[1] as designated by the Executive Office of Energy and Environmental Affairs ("EOEEA") and is served by the Company under its T53 rate. Blount manufactures premium prepared soups, entrees and side dishes for Panera Bread and other Private Label brands. Given the increase in demand for its products, Blount has determined that it is necessary to undertake a major facility expansion that will add 75 million pounds of capacity that will increase its retail production by approximately 50 percent. This production capacity expansion is anticipated to result in a 30 percent increase in the Blount labor force to meet the increased production needs.

[1] https://www.mass.gov/doc/massachusetts-cities-towns-with-environmental-justice-populations

Currently, Blount utilizes natural gas service for its operations. Specifically, Blount uses natural gas to heat water for various purposes, including:

1) Ingredient water - cold ingredient water is added to kettles and then steam from the boilers passes through the kettle jackets to heat the water.
2) Clean-In-Place ("CIP") - Typical of food processing facilities, a substantial amount of hot water is used for requisite cleaning and other sanitation needs.
3) Boiler make-up - cold water is added to the boiler system due to steam losses and blow-down.

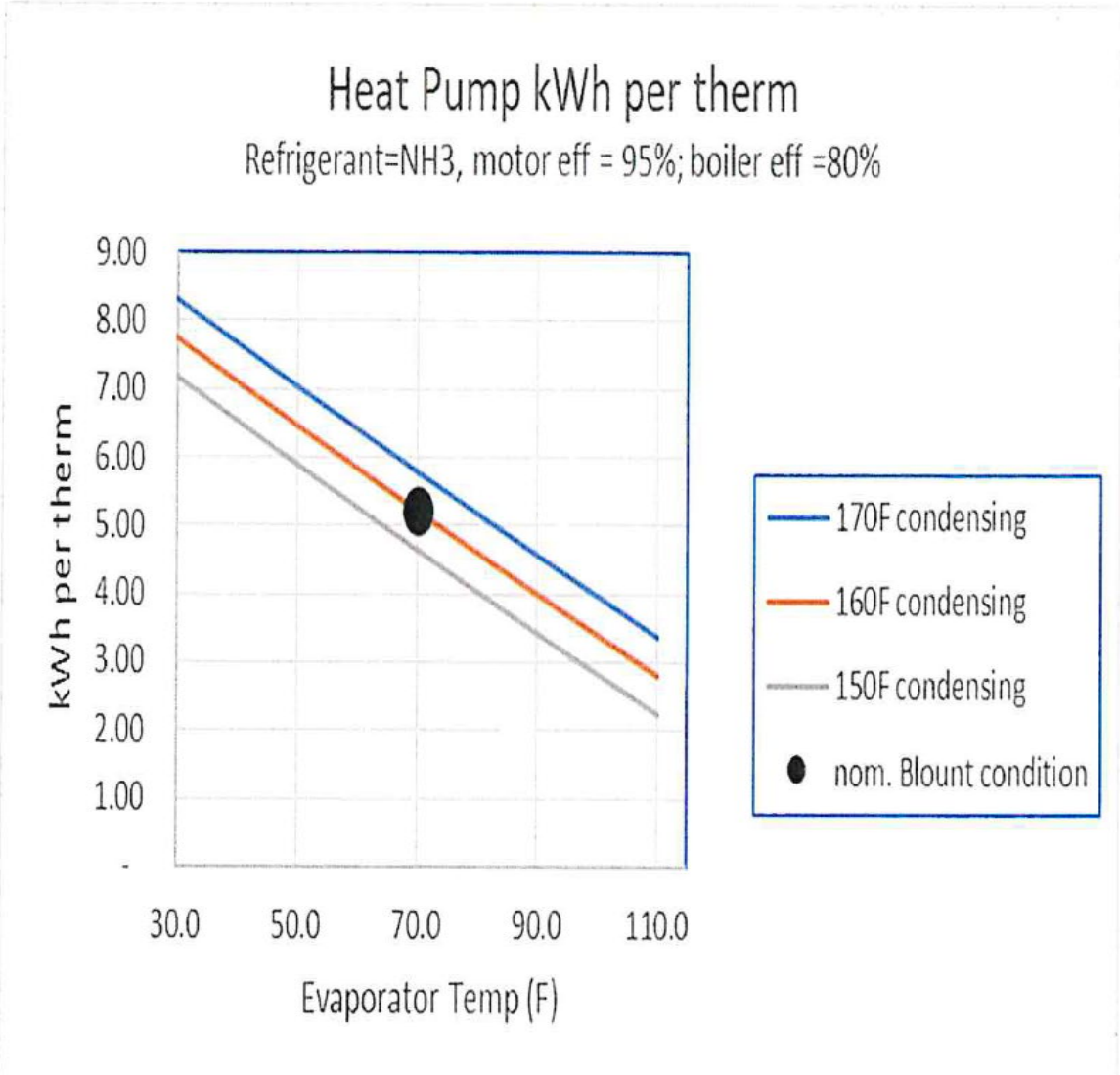
The Blount Fall River facility also has a large ammonia refrigeration system which can readily provide requisite heating source energy at an elevated temperature, thereby achieving a very high efficiency mechanism for delivering hot water.

Were Blount to continue to utilize "traditional" equipment to power its increased production, it would need purchase a new 500 HP Natural Gas Steam Boiler to supplement the increase in plant production. Based on conversations and collaborations with Liberty, Leidos and American Refrigeration Company Mechanical ("ARC") regarding its increased production and energy needs, Liberty, Leidos and ARC determined that there was a more efficient option to meet Blount's needs, including the installation of an industrial heat pump, discussed in greater detail below, that will save energy and reduce Blount's greenhouse gas ("GHG") footprint.[2]

From the perspective of energy efficiency and CO_2 reduction, the Blount Fall River expansion is well-suited for hot-water heat-pump technology. The Blount production facility currently uses a substantial amount of hot water from its gas-fired boilers for ingredient water, clean-up, and boiler make-up. This facility also has a large ammonia refrigeration system which can readily provide the requisite heating source energy at an elevated temperature, thereby achieving a very high efficiency mechanism for delivering hot water.

The following graph shows the typical operating range for cost-effective industrial hot water heat pumps. The Blount project is centrally located in this range and therefore deemed an appropriate application of this heat pump technology.

[2] ARC and Leidos have provided the Company with the anticipated CO_2 reduction: note that this figure may deviate from the reductions calculated by the Company in its BCR model. The Company does not anticipate a significant deviation between the supplied emissions reductions and the reductions calculated under the BCR model.



Specifically, ARC has proposed the installation of a hot-water heat-pump system at the Blount Fall River facility which utilizes the heat-of-rejection of its existing ammonia refrigeration system. High pressure, reciprocating ammonia-compressor heat pumps have been used in Europe for a number of years. They use the vapor-compression refrigeration cycle to transfer energy from one medium (the "source") where it is available to another medium (the "sink") where it can be utilized. The efficiency metric for heat pumps is the Coefficient of Performance ("COP"), defined as the ratio of the heat energy delivered to the sink and the amount of electrical power consumed by this process ($COP = Heat_{out} / Power_{in}$). Therefore, heat pump applications strive for the highest possible COP in order to deliver the maximum heat energy at the lowest power level. As determined by thermodynamic principles, the COP is dependent on the temperature of the sink and source, with the COP improving with increasing source temperature and decreasing sink temperature as shown by the graph below.

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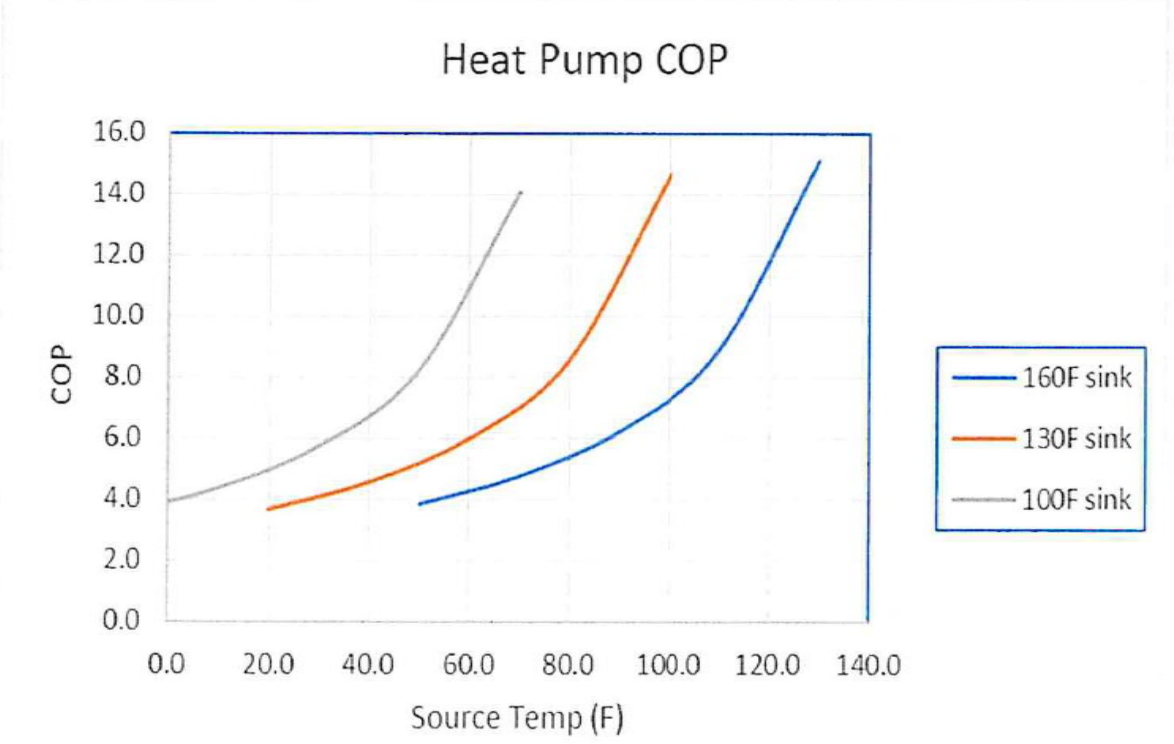

Industrial hot-water heat pumps provide hot-water at the elevated temperatures needed for industrial processes. Typical applications are food processing facilities, which use a substantial amount of water in the 140F to 160F range for cooking and clean-up. To achieve cost-effective hot water production, the source temperature should be as high as possible. For example, the use of outside air for the source would realize a low COP in the winter. In contrast, the heat-of-rejection from an on-site refrigeration system would provide a high COP throughout the year. Therefore, an ideal industrial application would have a substantial hot water requirement with the availability of refrigeration heat-of-rejection.

Below is a description of the proposed system:

1. Four ammonia compressors (termed "heat pump compressors") would be installed with an evaporator that will condense a portion of the discharge gas from the existing central refrigeration system. In this manner, the suction temperature for the heat pump compressors is nominally the same as the condensing temperature of the central system minus the evaporator temperature differential.
2. Discharge gas from the heat pump compressors is routed to a glycol-cooled condenser. A glycol loop transfers heat to an insulated hot-water storage tank through an isolation heat exchanger.
3. The compressors are modulated to maintain a 144F setpoint for the storage tank.
4. Hot water is drawn from the storage tank for the following uses:
    a. Ingredient water - Instead of using cold city water, hot water from the storage tank is used for ingredient water in order to reduce the heating requirement of the kettle jackets.

b. CIP – Hot water from the storage tank is used for CIP instead of using boiler-heated water, thus reducing the boiler load.
c. Boiler make-up water - Pre-heated water from the storage tank is used for boiler make-up, thereby further reducing the boiler load

This project is designed to reduce the steam usage of the existing boiler plant and offset the purchase of an additional boiler. A large majority of the savings are calculated to offset current gas consumption. For this reason, the project is planned within the C&I Existing Building Program, instead of the C&I New Building Program.

Project Benefits/Costs

The proposed Blount Fall River facility heat pump project will realize significant natural gas use reductions, with attendant emissions savings.

Total Savings Summary				
	Existing Case Use	Proposed Case Use	Project Savings	% Reduction
kWh	0	2,580,995	-2,580,995	-
Therms	1,036,856	555,423	481,433	46.4%

Savings Summary		
	Project Savings (kWh or Therms)	Carbon Reduction (Tons CO_2)
kWh	-2,580,995	-880
Therms	481,433	2,792
Total Carbon Reduction (Tons CO_2)		1,912

Given the significant size and complexity of the project, the costs to undertake the project are similarly significant.

Project Cost	
Equipment Cost	$1,505,180
Labor Cost	$1,505,180
Total Cost	$3,773,000
BCR	3.34

The Company has determined that the participant incentive for Blount is $2 Million. When the Company developed its 2022-2024 energy efficiency plan ("Plan") budgets, it did not account for a project of this size. The Company's approved budget for C&I energy efficiency programs is

$3.56 million (not including Company performance incentives). D.P.U. 21-123, Exhibit LU-4 at 4. Specifically, the C&I Retrofit participant incentive budget for the 2022-2024 Plan is: (1) $361,848 for 2022; (2) $365,398 for 2023; and (3) $380,798 for 2024.

Liberty MTM Proposal

Liberty intends to file an MTM simultaneously with the EEAC and the Department consistent with Section 3.8.2(c) of the Guidelines most recently issued in D.P.U. 20-159-A. The Blount Fall River facility project is wholly unique and could not, at the time the Company developed its C&I Retrofit budget, have been anticipated. This project is the first of its kind in the Company's service territory and will result in significant therm and GHG emissions reductions, consistent with the Plan's focus on electrification and the Department's directives in D.P.U. 21-123, as well as the Commonwealth's energy and environmental policies. Given that the Company is only midway through the first year of its Plan and based on C&I Retrofit projects anticipated to take place over the remainder of the Plan term, the Company has determined that it is most efficient to seek an MTM for the full project amount, $2,135,250, associated with the Blount Fall River facility project. This plan would leave the approved C&I Retrofit budget, less any amounts spent to date, intact to serve C&I customers seeking to participate in the program over the remainder of the Plan term and would potentially avoid the need for a future MTM for the C&I Retrofit program.[3]

Specifically, the Company is seeking to increase the C&I Retrofit budget by $2,135,250, which is a 60 percent increase to the C&I sector budget under the Plan approved by the Department. Under this MTM, the Company is proposing to recover the increased C&I Retrofit budget over one year.[4] Below, the Company has provided, for illustrative purposes, summary tables showing the results of this requested MTM to the Company savings, benefits, and budgets, by sector and within the C&I Programs. Additional tables also show the impact of this project on the Company 2025 and 2023 Avoided CO_2e goals.

[3] Depending on customer participation in the C&I Retrofit program over the remainder of the Plan term, the Company may need to seek a future MTM to ensure that it is able to serve all C&I customers who wish to participate in the program.

[4] The Company, along with the other Massachusetts Program Administrators, is actively seeking to secure American Rescue Plan Act ("ARPA") funding. In the event that Liberty is able to secure ARPA funds, a portion of those funds will be used to offset the requested budget increase, thereby reducing customer bill impacts associated with this MTM.

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SECTOR	ANNUAL SAVINGS (therms)			LIFETIME SAVINGS (therms)			LIFETIME SAVINGS (MMBTU)			BENEFITS (lifetime)			BUDGET		
	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Goal	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Goal	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Goal	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Goal	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Plan
RES	380,979	380,979	100%	7,442,659	7,442,659	100%	759,527	759,527	100%	15,941,042	15,941,042	100%	12,327,822	12,327,822	100%
IE	144,720	144,720	100%	3,019,507	3,019,507	100%	318,642	318,642	100%	15,519,152	15,519,152	100%	5,198,545	5,198,545	100%
C&I	407,874	898,936	220%	5,481,702	14,320,812	261%	548,286	1,149,382	210%	11,712,539	17,770,544	152%	3,568,321	5,703,571	160%
TOTAL	933,573	1,424,635	153%	15,943,868	24,782,978	155%	1,626,455	2,227,551	137%	43,172,733	49,230,738	114%	21,094,688	23,229,938	110%

C&I PROGRAMS	ANNUAL SAVINGS (therms)			LIFETIME SAVINGS (therms)			LIFETIME SAVINGS (MMBTU)			BENEFITS (lifetime)			BUDGET ($)		
	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Goal	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Goal	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Goal	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Goal	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Plan
C&I New Buildings	47,476	47,476	100%	876,382	876,382	100%	87,638	87,638	100%	1,253,132	1,253,132	100%	418,241	418,241	100%
C&I Existing Buildings	360,398	851,460	236%	4,605,320	13,444,430	292%	460,648	1,061,744	230%	10,459,407	16,517,412	158%	2,506,206	4,641,456	185%
C&I Hard-to-Measure	-	-	-	-	-	-	-	-	-	-	-	-	643,874	643,874	100%
SECTOR TOTAL	407,874	898,936	220%	5,481,702	14,320,812	261%	548,286	1,149,382	210%	11,712,539	17,770,544	152%	3,568,321	5,703,571	160%

SECTOR	2025 Avoided C02e (Metric Tons)			2030 Avoided C02e (Metric Tons)		
	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Goal	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Goal
RES	2,319	2,319	100%	2,306	2,306	100%
IE	789	789	100%	779	779	100%
C&I	2,716	4,996	184%	2,454	4,963	202%
TOTAL	5,824	8,104	139%	5,539	8,048	145%

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C&I PROGRAMS	2025 Avoided C02e (Metric Tons)			2030 Avoided C02e (Metric Tons)		
	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Goal	2022-2024 Approved	2022-2024 Proposed Adjustments/ Anticipated Performance	% of Goal
C&I New Buildings	389	389	100%	389	389	100%
C&I Existing Buildings	2,327	4,607	198%	2,065	4,574	222%
C&I Hard-to-Measure	-	-	-	-	-	-
SECTOR TOTAL	2,716	4,996	184%	2,454	4,963	202%

The Company does not propose any changes to the Department-approved performance incentive ("PI") model as a result of this MTM. The Company intends to compare actual results for the C&I Retrofit program to original Department-approved budgets as part of the Company's Plan Year and overall Term performance reporting for the 2022-2024 Plan.

The Company is also seeking expeditious review and approval of this MTM due to the time-sensitive nature of its request. Blount is seeking to implement the Fall River facility project as part of its overall production expansion. The lead time for ordering the heat-pump equipment is 30+ weeks and, due to the significant cost, Blount has elected not to move forward with ordering the equipment until the Company has received a Department order approving the MTM (see Guidelines Section 3.8.2). Accordingly, the Company is seeking EEAC and Department approval of the MTM no later than August 30, 2022.