STATE OF NEW HAMPSHIRE

BEFORE THE PUBLIC UTILITIES COMMISSION

Liberty Utilities Petition to Approve Firm supply and Transportation Agreements and the Granite Bridge Project	))))	**Docket No. DG 17-198**

DIRECT TESTIMONY OF

PAUL CHERNICK

ON BEHALF OF

CONSERVATION LAW FOUNDATION

Resource Insight, Inc.

SEPTEMBER 13, 2019

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EXHIBITS

I. Identification & Qualifications

Q: Mr. Chernick, please state your name, occupation, and business address.

A: My name is Paul L. Chernick. I am the president of Resource Insight, Incorporated, 5 Water Street, Arlington, Massachusetts.

Q: Summarize your professional education and experience.

A: I received a Bachelor of Science degree from the Massachusetts Institute of Technology in June 1974 from the Civil Engineering Department, and a Master of Science degree from the Massachusetts Institute of Technology in February 1978 in technology and policy.

I was a utility analyst for the Massachusetts Attorney General for more than three years. I was involved in numerous aspects of utility rate design, costing, load forecasting, and the evaluation of power supply options. Since 1981, I have been a consultant in utility regulation and planning, first as a research associate at Analysis and Inference, after 1986 as president of PLC, Inc., and in my current position at Resource Insight since 1990. In these capacities, I have advised a variety of clients on utility matters.

My work has considered, among other things, the cost-effectiveness of prospective new electric generation plants and transmission lines, retrospective review of generation-planning decisions, ratemaking for plants under construction, ratemaking for excess and/or uneconomical plants entering service, conservation program design, cost recovery for utility efficiency programs, the valuation of environmental externalities from energy production and use, allocation of costs of service between rate classes and jurisdictions, design of retail and wholesale rates, and performance-based ratemaking and cost recovery in restructured gas and electric

industries. My professional qualifications are further summarized in Attachment PLC-1.

Q: Have you testified previously in utility proceedings?

A: Yes. I have testified over three hundred times on utility issues before various regulatory, legislative, and judicial bodies, including utility regulators in thirty-seven states and six Canadian provinces, and three U.S. federal agencies. This previous testimony has included many reviews of the economics of power plants, utility planning, marginal costs, and related issues.

Q: On whose behalf have you worked?

A: A large percentage of my testimony has been filed on behalf of consumer advocates (e.g., the Massachusetts, New Mexico, Washington, and Illinois Attorney Generals; other official public consumer advocates in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, Pennsylvania, Illinois, Minnesota, Maryland, Ohio, Vermont, Indiana, South Carolina, Arizona, West Virginia, Utah, District of Columbia, and Nova Scotia; and such non-profit consumer advocates as AARP, East Texas Legal Services, Public Interest Research Groups, Alliance for Affordable Energy, citizens' groups, Ontario School Energy Group, Citizens Action Coalition, and Small Business Utility Advocates). I have also worked for regulatory bodies in Massachusetts, Connecticut, District of Columbia, and Puerto Rico, as well as the Vermont House of Representatives.

The remainder of my clients include investor-owned and municipal utilities, municipalities (New York City, Chicago, Cincinnati, several Massachusetts, New Hampshire and New York towns in various proceedings), large customers, power-plant developers and owners, labor unions, energy advocates and environmental groups.

II. Introduction

Q: On whose behalf are you testifying?

A: I am testifying on behalf of Conservation Law Foundation.

Q: What is the scope of your testimony?

A: In this proceeding, Liberty has submitted a petition requesting the New Hampshire Public Utilities Commission to:

- Approve a delivered supply contract with ENGIE Gas & LNG, LLC ("ENGIE");
- Approve a precedent agreement with Portland Natural Gas Transmission System ("PNGTS") for firm transportation capacity on the Portland XPress Project;[1]
- Find to be prudent the Company's decision to build an in-state pipeline, the Granite Bridge Pipeline; and
- Find to be prudent the Company's decision to build an on-system liquefied natural gas ("LNG") facility, the Granite Bridge LNG facility.[2]

Petition at 1.

In its Order of Notice dated February 8, 2018, the Commission noted that the proposal raises issues:

> … related to RSA 374:1 and 374:2 (public utilities to provide reasonably safe and adequate service at "just and reasonable" rates); RSA 374:4 (Commission's duty to keep informed of the manner in which all public utilities in the state provide for safe and adequate service); RSA 374:7 (Commission's authority to investigate and ascertain the methods employed by public utilities to "order all reasonable and just improvements and extensions in service or methods" to supply gas); RSA 378:7 (rates collected by a public utility for services rendered or to be rendered must be just and reasonable); and, by implication, the standards of RSA 378:28 (all utility plant to be included in permanent rates must be found by the Commission to be prudent, used, and useful). These issues embrace, but are not limited to, the question of whether Liberty reasonably investigated and

[1] This supply will also require contracts on Union Gas in Ontario and the TransCanada Mainline.

[2] Liberty Utilities refers to the pipeline and LNG facility collectively as the Granite Bridge Project.

analyzed its long-term supply requirements and the alternatives for satisfying those requirements.

Order of Notice at 2.

Q: What is the scope of your testimony?

A: I specifically consider the following issues raised in Liberty's Petition:

- The role of increased gas penetration in Liberty's load forecast.
- The imprudence of encouraging shifting energy load to gas.
- The uncertainty in future gas use and the resulting risk of commitment to new transportation agreements and pipelines.
- The failure of the Company to reasonably investigate and analyze the long-term supply requirements and the alternatives to the Granite Bridge Pipeline, and the upstream pipeline contracts that Liberty proposes to utilize Granite Bridge.

Q: Please summarize your conclusions and recommendations.

A: Liberty's proposed contracts and new pipeline do not advance economically prudent or environmentally sound energy investments, and therefore should not be approved by the Commission.

Liberty's petition and supporting testimony do not demonstrate that the proposed contracts and new pipeline will be used and useful over the expected lifetime of the proposed investments, or that it is reasonable for ratepayers to bear the costs of these investments in light of the availability of alternatives to new natural gas infrastructure investments and commitments.

Liberty's proposal fails to demonstrate that its proposed investments are prudent and will be used and useful, in light of the need to reduce fossil fuel use—including natural gas—to mitigate climate change and pollution impacts.

Liberty's proposal fails to reasonably address future need, to reflect the availability of cleaner and lower cost resources, including electricity and high-performance air-source electric heat pumps.

There is significant risk that the proposed investments will result in future stranded costs and higher customer costs, as the region and New Hampshire transitions away from direct use of fossil fuels to cleaner energy resources.

Q: What is the global and national background to local decisions about natural gas use?

A: Natural gas use, in New Hampshire and nationally, must decline if we are to avoid the most severe consequences of global warming, as discussed in the testimony of CLF witness Elizabeth Stanton in this docket. About two dozen US regulatory jurisdictions have recognized this reality by establishing greenhouse-gas reduction targets, including California,[3] Connecticut, Massachusetts, Vermont, Maine, and New York. In order to minimize the economic burden of unsustainable long-term commitments, New Hampshire would be well advised to similarly reflect the carbon-constrained future in current decision-making.

Q: Does Liberty address the greenhouse gas implications of its planned expansions of gas supply and sales?

A: No. None of Liberty's testimony in this proceeding addresses greenhouse gas emissions. In Liberty's Least Cost Integrated Resources Planning proceeding (Docket DG 17-152), Liberty Witness William Killeen basically denies that Liberty needs to think about greenhouse gases at all, because the Company interpret[s] the requirement to assess the LCIRP's "'integration and impact on state compliance with the Clean Air Act of 1990, as amended, and other environmental laws that may impact a utility's assets or customers,' as required by RSA 378:38, V" in

[3] Draft Results: Future of Natural Gas Distribution in California, CEC Staff Workshop for CEC PIER-16-011, June 6, 2019, available at https://ww2.energy.ca.gov/research/notices/2019-06-06_workshop/2019-06-06_Future_of_Gas_Distribution.pdf.

irresponsibly narrow terms that is limited to only evaluating acid rain, urban air pollution, and toxic air emissions.[4]

III. Gas Promotion in Liberty's Load Forecast

Q: What is Liberty's justification for Granite Bridge and the associated supply contracts?

A: The joint testimony of William Killeen and James Stephens describes an expected increase in customers and an increase in demand. Specifically, their testimony states this is a result of "EnergyNorth's continued focus on customer growth in its existing service territories; …. and additional growth from service area expansions."[5]

Mr. Killeen similarly explains in his testimony in the Liberty LCIRP docket that the Company's claimed need for Granite Bridge arises from forecast load growth:

> Q. Is the Company's existing delivery capacity sufficient to meet the forecasted demand requirements of its customers?
>
> A. No. The Company's design day demand during the planning period will exceed its capacity on the Concord Lateral, and there is no more capacity available on the Concord Lateral….[6]

He similarly explains that forecast load growth drives the need for the new supply contracts:

> Q. Is the Company's existing gas supply sufficient to meet the forecasted demand?

[4] DG 17-152, Killeen Direct Testimony at p. 9, lines 14-20.

[5] DG 17-198, Killeen & Stephens Direct Testimony at p. 151, line 8 – p. 152 line 2.

[6] DG 17-152, Killeen Direct Testimony at p. 7, lines 5-8.

A. No. Although the Company currently has sufficient supplies to use all the available capacity on the Concord Lateral, the Company does not have the incremental supply to meet the forecasted increase in demand. Specifically, the Company requires incremental supply during the development of the Granite Bridge Pipeline, and to utilize the capacity of the Granite Bridge Pipeline once it is placed into service.[7]

In other words, load growth drives Liberty's case for both Granite Bridge and the new long-term supply contracts.

Q: How much of Liberty's projected load growth would result from its promotion of conversion from other fuels to natural gas?

A: Table 1 reproduces Liberty's forecast based on historical trends (which would include some fuel-switching from other fuels to natural gas) and Liberty's total forecast, including the results of Liberty's fuel-switching efforts.[8]

Table 1: Effect of Fuel-Switching Promotion on Liberty Load Forecast (BBtu)

	Residential		C&I		Total
	Heating	Non-Heating	Heating	Non-Heating	
From LCIRP Table 20: Econometric Demand Forecast					
2017/18	6,025	68	6,242	1,984	14,319
2018/19	6,089	66	6,332	1,979	14,466
2019/20	6,168	64	6,422	1,963	14,617
2020/21	6,235	62	6,484	1,942	14,722
2021/22	6,308	59	6,568	1,922	14,858
From LCIRP Table 23: Demand Forecast Including Promotion					
2017/18	6,302	68	6,670	2,102	15,142
2018/19	6,427	66	6,871	2,119	15,483
2019/20	6,568	64	7,107	2,147	15,885
2020/21	6,733	62	7,375	2,192	16,360
2021/22	6,908	59	7,655	2,228	16,851
Promotional Load Growth					
2017/18	277	-	428	118	823
2018/19	338	-	538	140	1,017
2019/20	400	-	684	184	1,268
2020/21	498	-	891	250	1,638
2021/22	600	-	1,088	305	1,993

[7] *Id.* at p. 9, lines 1-6.

[8] The values in both LCIRP Table 20 (before the load-promotion efforts) and Table 23 (with load promotion) are both prior to the inclusion of energy efficiency.

Q: Please describe Liberty's promotional efforts.

A: The difference between the model results in LCIRP Table 20 and the enhanced forecast in LCIRP Table 23 is due to the effect of two Liberty programs, as estimated by EnergyNorth's Sales and Marketing Group:

> Two out-of-model adjustments were made to the econometric forecast to account for additional growth that is not reflected in the historical billing data. Those out-of-model adjustments were related to: (1) expected increases in the number of customers in the Company's existing service territory related to increasing sales and marketing efforts; and (2) estimates of the number of customers in new service territories in which the Company is expanding.[9]

The additional natural gas use by new customers resulting from Liberty's planned promotion efforts accounts for 68% of the load growth that Liberty projects over the forecast period. Without these new heating customers, Liberty's forecast would fall from 2.7% annually to 0.9%.

Q: What are the implications of the large role of fuel-switching in Liberty's forecast?

A: If Liberty were not promoting the shifting of customer loads from other fuels to natural gas, its need for additional resources would be dramatically reduced. Liberty's case for acquiring additional gas supplies is driven by Liberty's own plans to increase sales, but Liberty has not shown that such increases in natural gas combustion result in prudent investments or are the result of a reasonable investigation and analysis of its long-term supply requirements and the alternatives for satisfying those requirements. Thus, Liberty has not shown that the proposed investments are reasonable or that their costs should be borne by ratepayers.

[9] DG 17-152, Liberty LCIRP at p. 25-26.

IV. Shifting Energy Load Among Fuels

Q: Does Liberty consider whether shifting customer energy use to gas would have environmental effects?

A: The Company's testimony in this proceeding does not address environmental impacts. In the LCIRP proceeding, Mr. Killeen purports to provide the Company's assessment of the environmental, economic and health impacts of the options considered in the LCIRP, but he fails to adequately do so for several reasons.

First, he admits that the company only identified three resource options: two pipeline delivery options and LNG purchases.[10] The Company failed to consider additional options to balance natural gas demand and supply, including suspension of the promotional efforts and enhanced energy-efficiency programs. Nor did the Company test cases with lower demand and smaller supply options. As a result, he simply provides a cursory comparison of these two very limited options, and concludes that of the two, Granite Bridge is superior. He does the same for the gas supply sources, again failing to analyze other available energy resources.

Second, Mr. Killeen makes conclusory statements (without any supporting analysis) about the increased use of gas in the state. For these reasons, the Company's testimony does not provide a reasonable analysis of the impacts of the proposed project, that the proposed investments and contracts are prudent, or that those commitments would improve Liberty's service at reasonable and just rates.

Q: Do the environmental impacts affect the economics of the proposals?

A: Yes, in two ways. First, by failing to evaluate the environmental impacts of the proposals, the Company has not shown that the costs that will be borne by ratepayers are reasonable and prudent over the life of the investments. New Hampshire will face impacts from greenhouse gas emissions and climate change over the expected term

[10] DG 17-152, Killeen Direct Testimony at p. 7, lines 7-13.

of these investments. Those impacts affect the economics and the overall reasonableness of the proposed investments; thus, they must be considered during the Commission's prudence review.

Second, New Hampshire consumers will eventually bear the costs of reducing emissions from gas combustion, while still paying for the new gas resources in Liberty's proposal, including the capital costs of the Granite Bridge project and the capacity charges of the pipeline supply. These costs will be borne by New Hampshire customers even as gas use is reduced significantly in the future to address its environmental impacts. Increasing the efficiency of gas consumption, stopping the promotion of new gas connections, and encouraging installation of alternative technologies (such as high-efficiency heat pumps) would constitute a more prudent approach to balancing Liberty's supply and demand while moving New Hampshire towards a low-carbon future. Liberty's current plan would simultaneously increase the emissions that future consumers will need to reduce, while burdening current and future customers with fixed supply costs.

Q: Is natural gas the preferred energy choice for space and water heating?

A: No. Compared to natural gas combustion at the end use, electricity can provide energy services while emitting less greenhouse gases, so long as it is either (1) sourced largely from renewable resources, including wind, solar and hydro or (2) produced and used in a manner that is more efficient than direct gas use at the end use. I discuss the potential for high-efficiency heat pumps in detail in my testimony in DG 17-152, Liberty's Least Cost Integrated Resource Planning docket, and point out that in the LCIRP, Liberty failed to consider any alternatives to new gas infrastructure. As I state in that testimony, increasing natural gas use and committing to long-term contracts to support increasing (or even current) gas loads, will only increase the cost of transitioning away from fossil fuels and increase the economic

burden created by the proposed investments. Many other jurisdictions are taking steps to avoid increasing gas use and the risks that come with it. My analysis in the LCIRP case is relevant here because the Commission must evaluate "whether Liberty reasonably investigated and analyzed its long-term supply requirements and the alternatives for satisfying those requirements."[11]

V. Risks of New Long-Term Gas Commitments

Q: To what risks are ratepayers exposed as a result of Liberty investing in a major supply pipeline and upstream pipeline commitments?

A: Liberty has not demonstrated that the planned investments and commitments will be beneficial to customers, even in the near term. There is a significant risk that the resources will not remain economic through their expected terms of service. The Granite Bridge Pipeline would be in place and available for several decades, with maintenance expenditures and investments that will need to be recovered from ratepayers, but Liberty is unlikely to need the delivery capacity for very long, leaving its customers vulnerable to having to pay for stranded assets.

One source of that risk is future national regulation and/or taxation of greenhouse gas emissions. As New Hampshire faces requirements to reduce emissions, including from natural gas combustion, improved efficiency of gas use and conversion of fossil end uses to electricity will reduce Liberty's load, reducing the need for the Granite Bridge Pipeline. Since other regional gas distributors (and gas-fired generators) would face similar declines in demand, Liberty is unlikely to find buyers for its unused upstream capacity at full contract prices, further burdening consumers with stranded costs.

[11] DG 17-198 Order of Notice, February 8, 2018, at p. 2.

Q: Can Liberty count on recovering from off-system sales the full cost of the excess capacity from the Granite Bridge pipeline, the Granite Bridge LNG facility, and the contracts with Portland Pipeline, TransCanada and Enbridge?

A: No. Liberty has a memorandum of understanding with the Granite Ridge gas combined-cycle plant for some peaking supply for a small (but confidential) portion of the expected physical lives of the Granite Bridge facilities and the lives of the supply contracts. Granite Ridge's owner, Calpine, has "indicated that it was not yet willing to further commit itself to a service that would not be available until 2023. Calpine indicated that a precedent agreement for winter peaking service at this time would be premature given the projected in-service date of the Granite Bridge LNG project and the uncertainty of future New England power market changes." [12] In other words, Calpine does not know how much Granite Ridge will operate in the late 2020s, or what the ISO-NE market rules will be, or what the costs of peaking resources will be, and will not take on the risk of even a short-term commitment for the Liberty peaking supply.

As greenhouse gas limits and renewable energy standards reduce gas consumption by generation and end users, the market for natural-gas deliverability will decline. More of the generation load (both in therms and in percentage) will be served from existing pipelines, reducing the demand and price for peaking supplies, such as the Granite Bridge LNG plant or the proposed pipeline contracts.

This issue is addressed in a recent report from the Rocky Mountain Institute that addresses the issue of wind, solar, storage and demand resources displacing gas generation, and finds that even new combined-cycle units will be uneconomic to keep

[12] Supplemental Direct Testimony of Francisco C. DaFonte and William R. Killeen at p. 39, lines 14–18.

in service by the early 2030s.[13] While the RMI study does not examine the economics of less efficient gas-fired steam plants and older combined-cycle units, they are likely to become uncompetitive even earlier. As the output of those gas-fired generators declines, so will the price basis for New England gas and thus Liberty's opportunities to recoup the costs of its proposed contracts.

The RMI study describes the risks of gas LDCs depending on sales to generators to cover the fixed-cost commitments:

> An increase in unit cost of delivered fuel due to declining throughput is seen most immediately by whichever party bears a sunk cost for the pipeline (e.g., the investment in the pipeline, or a demand-based contract for pipeline capacity) but whose revenue or value depends on pipeline throughput. For example, a gas marketing company or gas utility who enters into a demand-based contract with a pipeline developer but expects to sell gas to electric utilities or independent power producers on a per-unit basis would have to adjust prices upward in order to recover sunk costs. Any price increase seen by gas generators would put further downward pressure on power sector demand; this dynamic risks setting up a reinforcing feedback loop, sometimes referred to as a "death spiral," for gas pipelines whose unit costs rise as throughput declines, which in turn leads to further cost increases and further loss of throughput. (Dyson, et al., 2019, at 42)

> Captive ratepayers of gas utilities bear the risk of secondary market sales failing to meet expectations due to falling demand for gas in the power sector, and thus average prices for fuel delivery rising significantly.[14]

RMI also offers some recommendations to gas utility regulators:[15]

[13] Mark Dyson, Grant Glazer, and Charles Teplin. Prospects for Gas Pipelines in the Era of Clean Energy: How Clean Energy Portfolios Are Reducing US Power Sector Demand for Natural Gas and Creating Stranded Asset Risks for Gas Pipelines. Rocky Mountain Institute, 2019, https://rmi.org/cep-reports.

[14] Ibid. at 44.

[15] Ibid at 47.

> Gas distribution companies are often the primary contract holder for new pipeline capacity, even though electric generators are increasingly the largest users of pipelines, because gas distribution companies resell their capacity rights to generators. Gas utilities rely on these revenues to keep costs low for their customers; a loss of revenue in the secondary market due to falling power sector demand will effectively raise the price paid by captive gas customers. Gas utility regulators considering proposed gas utility positions in new pipeline capacity should carefully assess the risks imposed on customers if expected electric sector demand fails to materialize, and allocate risks and incentives accordingly. Regulators should consider a representative list of questions in this determination, including:
>
> »» To what extent does a gas utility's proposed investment in, or contract for new pipeline capacity rely on secondary market sales to electric power customers to bolster project economics for gas customers?
>
> »» Does any expected revenue from secondary sales to the power market accurately reflect the declining economics of gas-fired generation relative to clean energy in the next 15 years?
>
> »» Are risks passed on to captive retail customers if expected secondary market sales to power plants do not materialize?

Liberty and its customers will face these same circumstances that put its proposed investments at substantial risk of being stranded assets.

Q: Have other jurisdictions recognized the reality that natural gas use must decline?

A: Yes. In California, analysis of options for meeting greenhouse gas goals found that the least-cost pathway would require a relatively rapid transition of new and replacement heating equipment to electricity. Even once the vast majority of new equipment installed in homes and businesses is electric, the slow turnover in appliances means that many gas furnaces, once installed, are likely to operate for decades longer, as illustrated in Figure 1.

Figure 1: Projected California Residential Heating Transition[16]

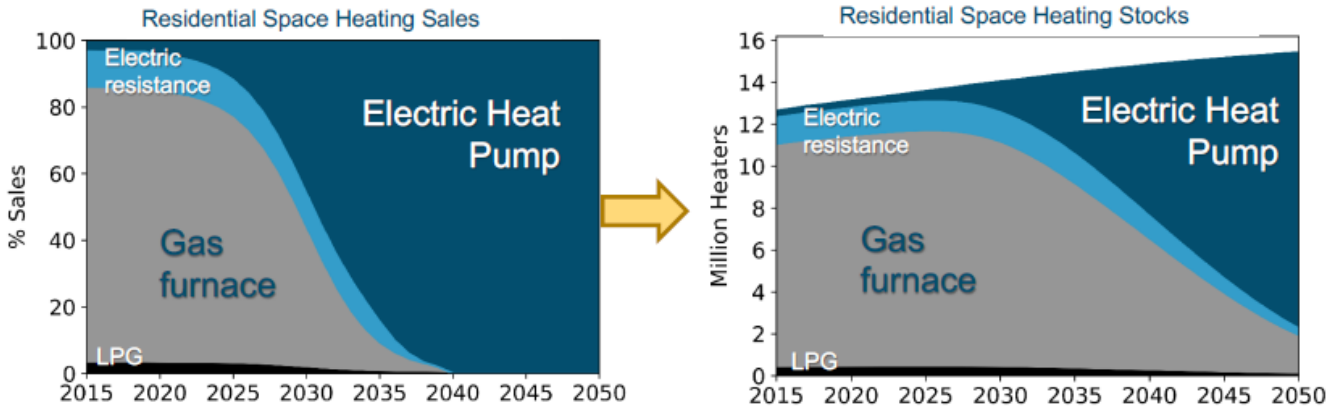
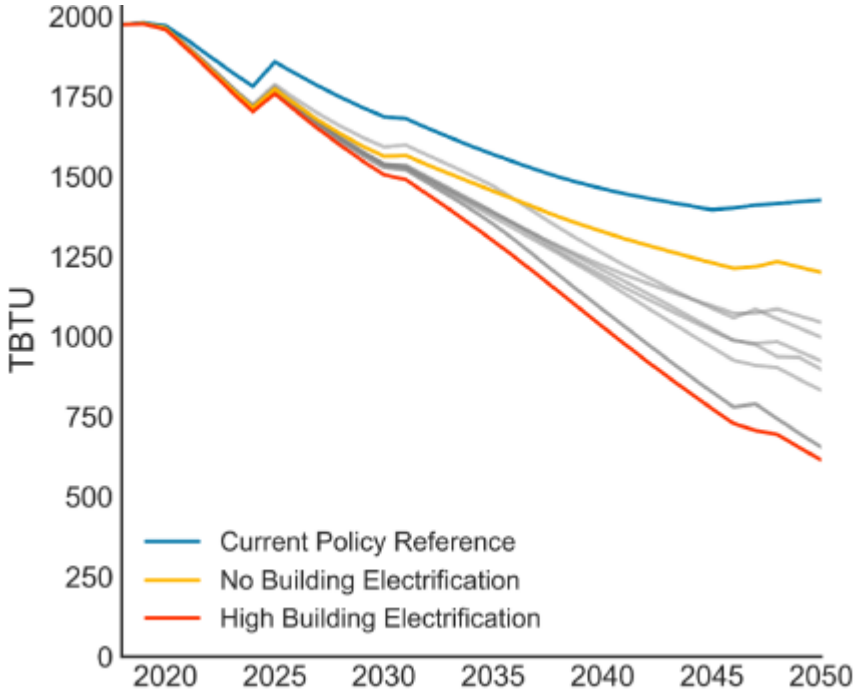


Figure 2 shows the projected deliveries of natural gas (along with biogas and other renewable gas) under the range of approaches considered in the study. The High Building Electrification case is the lowest-cost option.

Figure 2: California Gas Distribution Futures[17]



[16] Aas, et al., 2019 (op cit) at 48.

[17] Aas, et al., 2019 (op cit) at 52.

Q: How are these California results relevant to New Hampshire?

A: New Hampshire's climate and energy use mix differ from California's, so the optimal decarbonization trajectory will not be identical for the two states. But the general relationships are likely to be similar. A low-carbon future for New Hampshire and the region requires replacement of fossil-fueled space- and water-heating with electric appliances, as well as increased energy efficiency.

Going forward with the Granite Bridge project and the upstream contracts would amount to an expensive bet that New Hampshire will never be faced with the need or desire to reduce greenhouse gas emissions.

Q: What would a shorter useful life of Granite Bridge Pipeline mean for Liberty and its customers?

A: Either the near-term recovery of the pipeline cost would need to be accelerated, such as through a higher depreciation rate, or Liberty and the Commission will need to deal with recovering the stranded costs in the out years, spreading the costs over a falling sales base. The same would be true for associated supply contracts that are no longer needed or economic as regional gas load falls; Liberty would need to accelerate contract cost recovery through creation of a regulatory liability, creating a fund to pay down contract costs in the last years of the contract, rather than burdening the declining customer base with the full annual costs of the contracts.

Q: If Liberty does not need its full contract capacity during the life of the new supply contracts and the Granite Bridge Pipeline, could Liberty balance its supply by allowing other contracts to expire?

A: Yes, but at a significant cost. Liberty currently holds a portfolio of contracts that are lower in cost than the Portland XPress Project and associated upstream contracts.[18]

[18] "These existing contracts have favorable terms that could not be obtained in today's market." DG 17-152 Killeen Direct Testimony at p. 8, lines 14–15.

So ratepayers would be stuck paying for the new supply contracts and Granite Bridge, while giving up lower-cost existing contracts.

Q: Are there regulatory precedents for these situations?

A: Yes. A number of electric utilities have found that continued operation of their coal plants—which were typically being depreciated over a 60-year life—would be uneconomic in the near future. For example, a plant might be 30 years old, with its original investment half depreciated and subsequent capital additions (for example, for environmental retrofits, perhaps including some very recent ones). When the falling cost of renewables and market power prices means further operation would increase rates, the utility is faced with a decision as to how to recover the remaining investment. Some utilities have accelerated the depreciation of these plants in their final years, while others have promptly retired the uneconomic assets and requested recovery of the investment balance through a regulatory asset. In either case, customers wind up paying more than if the utility had never built the plant or had retired it prior to large recent retrofits. The same was true for the above-market power purchases at the time of restructuring; there is a substantial risk of similar outcomes for new long-term gas contracts and pipeline construction.

VI. Alternatives to the Granite Bridge Pipeline

Q: What alternatives does Liberty have to balance load and capacity, without prohibiting new gas uses?

A: Most of the demand growth that Liberty has proposed would be eliminated by ceasing Liberty's efforts to promote new gas space and water heating (and some other end uses). For meeting the remainder of the load, above current supply, Liberty's options include energy efficiency, including facilitating the penetration of heat pumps as I discuss in detail in my LCIRP testimony; a limited expansion of LNG supply in its

service territory as needed to cover needle peaks; and (if necessary during a transition period) limited imports of LNG. The Liberty LCIRP notes that Liberty has been purchasing LNG and associated vapor from ENGIE.

A. Energy Efficiency

Q: Did Liberty evaluate an aggressive energy-efficiency effort as an alternative to a new pipeline and new gas contracts?

A: No. The Liberty testimony states: "[t]he energy efficiency savings were assumed to be equal to those estimated by the Company in the 2018-2020 New Hampshire Statewide Energy Efficiency Plan filed with the Commission in Docket No. DE 17-136.[19] As elaborated in the Liberty LCIRP, the forecast shows only minimal amounts of energy-efficiency load reductions. Table 2 shows the energy-efficiency savings that Liberty reports in its load forecast. LCIRP Table 24 subtracts the energy-efficiency column from the total pre-efficiency forecast to derive the total net forecast, so the data must be cumulative. Hence, I added a column for the incremental energy-efficiency savings in each year.

Table 2: Energy-efficiency Savings in Liberty LCIRP Forecast (BBtu)

Year	Pre-Efficiency Forecast	Energy Efficiency	Forecast net of Energy Efficiency	New Energy Efficiency	Energy Efficiency as % Load
	a	b	c	d	e
2017/18	15,142	108	15,034		
2018/19	15,483	114	15,369	6.2	0.04%
2019/20	15,885	122	15,763	8.2	0.05%
2020/21	16,360	127	16,234	4.7	0.03%
2021/22	16,851	131	16,720	3.9	0.02%

a, b, c LCIRP Table 24 MMBtu ÷ 1,000
d *b* minus *b* previous year
e *d* ÷ (*a* - *b* previous year)

[19] DG 17-198 Killeen & Stephens Direct Testimony at p. 157, lines 4-6.

Q: How do the forecast energy efficiency savings compare to Liberty's reported past energy efficiency savings?

A: Table 3 shows the historical energy efficiency savings that Liberty claims for each year, from Liberty's LCIRP Appendix 2, Table 2-1. Liberty describes these as annual savings, and they bounce up and down, so they appear to be the new savings each year.

Table 3: Historical Energy-Efficiency Savings in Liberty LCIRP (BBtu/year)

Year	Annual Savings
2003	38
2004	73
2005	76
2006	84
2007	153
2008	97
2009	121
2010	78
2011	76
2012	148
2013	115
2014	117
2015	144
2016	110
Cumulative	1,430

Liberty's LCIRP testimony of Eric M. Stanley provides an estimate of Liberty's 2018 incremental annual savings of 130 BBtu, or 0.73% of 2018 sales.

Q: Does Liberty explain why it projects its savings to fall from about 100 BBtu/year annually to less than 10 BBtu, as you compute in Table 2?

A: No.

Q: You assumed that the energy-efficiency values in your Table 2 and Liberty LCIRP Table 24 are cumulative values from some unspecified starting year. Is

it possible that Liberty intended that those values be interpreted as incremental annual savings, as in Liberty LCIRP Table 2-1?

A: That interpretation would mean that Liberty incorrectly computed the post-energy-efficiency forecast in LCIRP Table 24. Table 4 computes the net-of-energy-efficiency forecast, assuming that Liberty intended the energy-efficiency values in LCIRP Table 24 to be annual.

Table 4: Alternative Interpretation of Liberty LCIRP Energy-efficiency Savings (BBtu)

Year	Pre-Efficiency Forecast	Annual Energy Efficiency	Cumulative Energy Efficiency	Forecast net of Energy Efficiency	Energy Efficiency as % Load
	a	*b*	*c*	*d*	*e*
2017/18	15,142	108	108	15,034	
2018/19	15,483	114	222	15,261	0.7%
2019/20	15,885	122	344	15,541	0.8%
2020/21	16,360	127	471	15,889	0.8%
2021/22	16,851	131	602	16,249	0.8%

a, b Table 24
c *b* plus *c* previous year
d *a* minus *c*
e *d* ÷ (*a* - *c* previous year)

This correction would reduce the forecast for 2021/22 by 471 BBtu, or 28% of the post-energy-efficiency forecast load growth from Table 2.

Q: If this interpretation of Liberty's energy efficiency plan is correct, what would be the effect of this energy efficiency plan on the load forecast without Liberty's vigorous fuel-switching plans?

A: Table 5 subtracts the cumulative energy-efficiency savings (under the alternative interpretation in Table 4) from Liberty's load forecast without the promotional program, from Table 2.

Table 5: Liberty Forecast without Promotion (BBtu)

	Pre-Efficiency Demand	Post-2016/17 Efficiency	Post-Efficiency Demand
2017/18	14,319	108	14,211
2018/19	14,466	222	14,244
2019/20	14,617	344	14,273
2020/21	14,722	471	14,251
2021/22	14,858	602	14,256

Eliminating the promotional efforts and maintaining the energy-efficiency savings would essentially eliminate Liberty's load growth.

Q: Are Liberty's energy efficiency programs particularly aggressive?

A: No. Taken literally, LCIRP Table 24 reports very small savings. Under the alternative interpretation, Liberty would be conserving 0.7% or 0.8% of energy use annually, just about enough to offset non-promotional load growth, and the LCIRP load forecast would need to be adjusted downward. The Liberty LCIRP testimony of Mr. Stanley supports that alternative interpretation, that Liberty intended to include much more energy efficiency in its forecast.

The Massachusetts Joint Statewide Electric and Gas Three-Year Energy Efficiency Plan 2019–2021 (October 31, 2018) includes gas savings of 1.25% of statewide sales.[20] The most recent ACEEE scorecard (which analyzes 2017 savings) shows gas savings of 1.35% of sales in Minnesota, 1.1% in Massachusetts, and 1% in Rhode Island and Michigan. It appears likely that Liberty could do more, cost-effectively, than the 0.8% it reports in the LCIRP.[21] In ignoring increased energy efficiency as a resource to meet customer energy needs, Liberty has failed to reasonably investigate and analyze its long-term supply requirements and the alternatives available to satisfy those requirements.

[20] http://ma-eeac.org/plans-updates/.

[21] https://aceee.org/research-report/u1808

Q: Does Liberty's testimony address the failures of its Granite Bridge analysis and LCIRP to adequately consider demand-side alternatives?

A: No. Liberty provides no specific evaluation of energy efficiency as an alternative resource in this proceeding.[22] Liberty has failed to consider whether additional cost-effective demand-side programs warrant investment as a more prudent way to meet its customers' needs in the future. Indeed, my understanding is the LCIRP law includes a hierarchy of resources that places demand reduction and energy efficiency at the top. Liberty has not addressed whether enhanced demand reduction would contribute to reducing the cost of balancing supply and demand or more generally investigated and analyzed the alternatives for balancing its long-term supply and demand.

B. LNG

Q: Does New England have adequate LNG import capacity?

A: Yes. The Liberty LCIRP notes as much:

> Although the New England region continues to have certain volumes of imported LNG, those volumes have been variable and are becoming winter season focused. …[T]he two off-shore LNG importation facilities (i.e., Northeast Gateway and Neptune LNG) had limited activity since commencing service in 2009 and 2010, respectively, and ENGIE's Distrigas LNG facility has experienced a declining trend in LNG import volumes since 2009. (LCIRP, p. 45)

> The volume of LNG imported into the region is influenced by various factors, including…the need for the New England market to pull the supply by contracting for imported LNG volumes." (LCIRP, p. 46)

[22] The Company simply asserts that its forecast includes continuation of its current program savings (see DG 17-198 Killeen & Stephens Direct Testimony at p. 157, lines 1-11, which as I show above, Liberty grossly understated in the final forecast. In the LCIRP testimony, Mr. Stanley largely defends the Company's current gas efficiency programs (which are approved in a separate docket) as being cost-effective and meeting the state's minimum Energy Efficiency Resource Standard.

While the LCIRP may be painting the lack of demand for LNG in the New England market as some sort of problem, it is in fact an advantage for gas buyers, since import (and associated storage) capacity is readily available.

By the end of 2018, domestic gas liquefaction and shipping capacity, along the Gulf and the Southeast, was expected to more than double in 2019, from 4.9 Bcf/day to about 10 Bcf/day.[23] As of July 31, 2019, 13 Bcf/day of supply was in operation, in commissioning or under construction.[24] Additional LNG supply is under construction in Canada, Australia, Indonesia, Russia, Mozambique, Malaysia, Senegal and Argentina, with more projects proposed.[25]

If New England needs some supplemental gas, before the regional transition to electricity reduces gas load below the capacity of the existing pipeline system, LNG should be available. Of course, LNG is still natural gas, with its carbon emissions from combustion and methane emissions from leaks, so New England should not be planning on using large amounts of LNG for the long term. However, using small amounts of LNG in the near term would avoid the build-out of infrastructure and associated capacity contracts that lock in high costs to consumers, with a substantial risk of eventually being stranded costs.

VII. Conclusions

Q: Please briefly summarize your conclusions.

A: Liberty failed to demonstrate that the proposed investments and commitments are prudent. Liberty failed to evaluate cost-effective and lower polluting alternatives

[23] https://www.eia.gov/todayinenergy/detail.php?id=37732.

[24] https://www.eia.gov/naturalgas/U.S.liquefactioncapacity.xlsx.

[25] https://www.igu.org/sites/default/files/node-news_item-field_file/IGU%20Annual%20Report%202019_23%20loresfinal.pdf.

including energy efficiency and heat pumps. In doing so, Liberty failed to reasonably investigate and analyze its long-term supply requirements and the alternatives for satisfying those requirements. Liberty also failed to demonstrate that its proposals will reasonably meet the needs of its customers and will be used and useful. Despite New Hampshire's planning requirements, Liberty failed to include the necessary analysis of available alternatives to new natural gas infrastructure projects, which the Company insists are the only reasonable options for meeting Liberty's need to balance supply and demand.

Liberty's proposal creates a significant risk future stranded costs and higher customer bills, as New Hampshire customers transition away from fossil fuels to cleaner electric resources but continue to be charged for imprudent natural gas investments far into the future.

Q: Does this conclude your testimony?

A: Yes.