

**THE STATE OF NEW HAMPSHIRE
PUBLIC UTILITIES COMMISSION**

DG 17-152

Liberty Utilities (EnergyNorth Natural Gas) Corp. dba Liberty Utilities

Least Cost Integrated Resource Plan

**DIRECT TESTIMONY OF
TERRY MICHAEL CLARK**

September 6, 2019

TABLE OF CONTENTS

I.	Introduction.....	3
II.	Purpose of Testimony.....	3
III.	Discussion of Issues.....	7
	A. It is a Crisis, All Right.....	7
	B. The Problems With Liberty’s Planning.....	13
	1. The Granite Bridge Project.....	13
	2. Emissions Issues.....	14
	3. Health Concerns.....	24
	4. Safety Concerns.....	26
	5. The Hidden Costs of Liberty’s Plans.....	28
	6. Liberty’s Plans are Not Approvable.....	33
	C. The Right Choice.....	38
IV.	Conclusion.....	39

1 **I. INTRODUCTION**

2 **Q. Please state your name, residential address and occupation.**

3. A. My name is Terry Michael Clark. I reside at 14 Barrett Avenue, Keene, New
4. Hampshire, and have lived in Keene for over 40 years. From an occupational
5. standpoint, I am a retired marketing agent and New Hampshire realtor. On the
6. side, so to speak, I am a member of the Monadnock Energy Hub, and a Keene
7. City Councilor serving on the Keene Energy and Climate Committee (as well as
8. the Finance Committee). I have intervened in this matter solely in my capacity as
9. a citizen, and not as a Keene City Councilor.

10. **Q. Do you claim to be an expert on any topic discussed in your testimony?**

11. A. No, I am testifying solely as a concerned citizen, based on my knowledge of
12. and experience in the matters I discuss, and my understanding of relevant
13. pleadings and documents that I will refer to as we proceed.

14. **Q. Have you previously provided testimony before this Commission?**

15. A. No, but I have been an intervenor in Docket Nos. DG 17-068 and DG 18-092,
16. involving Liberty's natural gas expansion activities in Keene, for similar
17. concerns.

18. **II. PURPOSE OF TESTIMONY**

19. **Q. What is the purpose of your testimony in this proceeding?**

20. A. To address those concerns. I believe that a rapid transition to electrification
21. through green energy sources, like wind and solar, is necessary to address the
22. climate crisis. Liberty's expansion activities and plans, including those
23. proposed for approval in this proceeding—which will facilitate the growth

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. of the utility's greenhouse gas emitting business until at least 2037/2038 and
2. approve the use of greenhouse gas emitting infrastructure for decades beyond the
3. circa 2050 deadline for reducing human-caused emissions to net-zero to avoid the
4. worst impacts of climate change—only create a demand for, and commitment to,
5. a fossil fuel we must abandon, rather than addressing the real demand for
6. sustainable green energy, and will impede green energy development in New
7. Hampshire for at least the next generation and exacerbate, rather than mitigate
8. the climate crisis. This is not what I, and I believe the citizens of Keene and New
9. Hampshire, as a whole, want and, given all the additional health and other hidden
10. costs of natural gas use, it is certainly not, in my opinion, the “lowest reasonable
11. cost” energy option or otherwise consistent with my reading of [R.S.A. 378:37](#)
12. and the policy concerns expressed in the statute.

13. **Q. Why do you believe that the public at large does not want more natural gas?**

14. A. I know from working with many citizens within my ward and throughout the state
15. who have expressed concern with climate change and/or the health and safety
16. concerns related to fossil fuel, and particularly hydraulically fractured, or
17. “fracked,” natural gas, use—and most, if not all, of the gas that Liberty uses
18. or will use in the upcoming years seems likely to be fracked gas¹—that
19. citizens want to commit to truly clean, climate-friendly energy sources now, not
20. more fossil fuel use for decades. A number of New Hampshire municipalities,

¹ See discussion in [Intervenor, Terry Clark's, Motion to Dismiss and for a Moratorium on Gas Expansion Plans](#), ¶ 19.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. including Keene, Concord, Portsmouth, Dover, Lebanon, Exeter and Nashua, and
2. colleges and universities throughout the state, have pledged to meet the goals of
3. the Paris Climate Accord and/or to support clean energy projects,² and the Keene
4. Energy and Climate Committee is currently working to establish a comprehensive
5. energy plan for the public and private sectors in the city to meet green transition
6. goals.³ The will to transition to clean, safe, green energy is statewide, well-
7. established and strong—especially with Millennials, understandably, as they will
8. be heavily impacted by climate change. A greater than 2/3 Majority of New
9. Hampshire cities and towns (160+ out of 234)⁴ voted for strong federal climate
10. initiatives⁵ in a state referendum way back in 2007 and, just two years ago, the
11. 2017 Annual Report from the Governor’s Millennial Advisory Council
12. concluded, in relevant part, that:
13.
14. “It is overwhelmingly clear through polls and studies that a progressive
15. and proactive stance on Climate Change and Climate Policy is important
16. to members of the Millennial Generation. Regard-less of background,
17. political affiliation, or other personally-held beliefs, a large majority of
18. Millennials believe that climate change is happening and that the earth's
19. warming is due to human activity. Millennials are particularly in favor of

² See April 25, 2017 online article “New Hampshire Municipalities Announce Support for Paris Climate Accord,” by Lisa Graichen, at <https://www.nhcaw.org/nh-municipalities-announce-support-for-paris-climate-accord/> and March 13, 2019 online article “N.H. Town Meeting Voters Approve a Range of Responses to Climate Change,” by Annie Ropeik, at <https://www.nhpr.org/post/nh-town-meeting-voters-approve-range-responses-climate-change#stream/0>.

³ See August 31, 2019 *Keene Sentinel* (sentinelsource.com) online article “Turning Green Panel focused on city push to renewable energy,” by Sierra Hubbard (Sentinel Staff), at https://www.sentinelsource.com/news/front_and_center/panel-focused-on-city-push-to-renewable-energy/article_2b8181af-eb0a-5a4a-ad7a-14bc46a96145.html.

⁴ See April 15, 2010 online article “Plymouth leads the way to new energy future,” by Marcia Morris, at <http://www.newhampshirelakesandmountains.com/Articles-c-2010-04-15-151000.113119-Plymouth-leads-the-way-to-new-energy-future.html>.

⁵ See March 19, 2017 online New York Times article “In New Hampshire, Towns Put Climate on the Agenda,” by Katie Zezima, at http://www.nytimes.com/2007/03/19/us/19climate.html?_r=1.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. sustainable energy generation. Approximately 71% of Millennials believe
2. we should prioritize alternative energy generation over oil, gas, and coal
3. exploration, and 82% favor increased funding for wind, solar, and
4. hydrogen technologies ...”⁶
5.
6. New Hampshire has been a leader in climate action and reducing
7. greenhouse gas emissions for more than a decade, in numerous ways, including
8. by becoming a member of the Regional Greenhouse Gas Initiative, commonly
9. known as “RGGI,” in 2008, and adopting the New Hampshire Climate Action
10. Plan and its goal of lowering emissions 80% below 1990 levels by 2050,⁷ in 2009,
11. and by joining the Under2Coalition, in 2015, with its even stronger commitment
12. to limiting emissions.⁸ I know from living in New Hampshire for nearly 60 years
13. that the people of this state enjoy and depend upon the environment for their
14. recreation and livelihoods, through hunting, fishing, hiking, canoeing, tourism,
15. skiing, farming, *etc.*, *etc.* There is very strong support in New Hampshire for
16. environmental protections in general, as is shown by a 2017 University of New
17. Hampshire poll which found that nearly ¾ of New Hampshire residents want our
19. state environmental protection laws strengthened, if anything.⁹ Millennials, by

⁶ See Governor’s Millennial Advisory Council 2017 Annual Report, p. 14 (emphasis added) at http://mediad.publicbroadcasting.net/p/nhpr/files/201712/governor_s_millennial_advisory_council_2017_annual_report_0.pdf.

⁷ See pp. 1-2 of The New Hampshire Climate Action Plan, available on the Department of Environmental Services (“DES”) website at https://www.des.nh.gov/organization/divisions/air/tsb/tps/climate/action_plan/documents/nhcap_final.pdf.

⁸ “By signing the agreement each government commits to limiting emissions to 80-95% below 1990 levels, or to below 2 annual metric tons per capita, by 2050 – the level of emission reduction necessary to limit global warming to under 2°C by the end of this century.” See <https://www.under2coalition.org/under2-mou>.

⁹ See February 17, 2017 online NHPR article “UNH Poll: There’s Strong Support for Environmental Protections in New Hampshire,” by Jason Moon, at <http://nhpr.org/post/unh-poll-theres-strong-public-support-environmental-protections-new-hampshire#stream/0>.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. almost that same majority (71%), support funding sustainable energy over fossil
2. fuel use, as is shown by the Millennial Advisory Council's conclusions noted
3. above. Conversely, there is extremely vehement public opposition to energy
4. projects and decisions which negatively impact our environment, as was shown
5. with Northern Pass and in the public comments for high-profile natural gas
6. expansion cases such as Docket Nos. [DG 14-380](#) involving the Northeast Energy
7. pipeline, [DG 16-241](#) concerning approval of the Eversource-Algonquin pipeline
8. contract, [DG 16-852](#) pertaining to Liberty's request for approval to provide
9. natural gas distribution services in the Town of Hanover and City of Lebanon,
10. [DG 17-068](#) concerning the utility's petition to provide natural gas service in
11. Keene, and [DG 17-198](#) involving the Granite Bridge Project.

12. **III. DISCUSSION OF ISSUES**

13. **A. It is a Crisis, All Right**

14. **Q. Why all the concern for climate change?**

15. A. I can only speak for myself, of course, but I expect that others are reading
16. and hearing the same things I am, which clearly establish, in my view, that
17. climate change is truly a crisis, an existential threat, and we are rapidly running
18. out of time to address it. Some alarming climate studies and findings are
19. discussed in my pleadings filed in this matter,¹⁰ but I am particularly concerned
20. with the Intergovernmental Panel on Climate Change ("IPCC") special report¹¹

¹⁰ See, e.g., discussion in [Intervenor, Terry Clark's, Motion to Dismiss and for a Moratorium on Gas Expansion Plans](#), ¶ 7.

¹¹ IPCC, 2018: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. that issued last fall. In this report, the IPCC, a United Nations intergovernmental
2. body tasked with assessing climate change and the world's leading international
3. authority on the matter,¹² warns that:

4. -- We are in desperate straits with climate change. Currently at only
5. 1°C global warming, we are on a path for 3°C warming by 2100,
6. with continuing warming afterwards;

7. -- We will be much worse at even 1.5°C warming, with substantial
8. increases in climate-related harms to health, food and water
9. supplies, livelihoods, economic growth and human security;

10. -- Just a half of a degree increase from 1.5°C to 2°C global warming
11. will significantly increase the risks and harms of droughts, floods,
12. extreme heat and other climate-related events;

13. -- We have only until about 2030 to reduce emissions sufficiently to
14. limit global warming to 1.5°C, and only then if we cut emissions
15. by about 45% from 2010 rates (which have gone up since then),
16. which will require an incredibly ambitious, united, sustained
17. worldwide effort. Even then, to limit global warming to 1.5°C, we
18. will have to achieve net-zero in human-caused emissions by about
19. 2050;

eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. In Press. The entire report may be downloaded at https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf or from <https://www.ipcc.ch/sr15/download/>.

¹² See IPCC website <https://archive.ipcc.ch/organization/organization.shtml>.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. -- *Everything* we do to mitigate, or increase, warming is important as
2. every fraction of a degree will make a difference.
3. I did not read the entire IPCC 2018 special report, of course—it is enormous.¹³
4. But, the crux of the report may be found in its Summary for Policymakers¹⁴ and
5. the IPCC’s October 8, 2018 press release, both of which are readily available
6. online.¹⁵
7. The climate crisis and its primary cause are not debatable. According to
8. NASA:
- 9.
10. “... 97 percent or more of actively publishing climate scientists
11. agree: warming trends over the past century are extremely likely
12. due to human activities. In addition, most of the leading scientific
13. organizations world-wide have issue public statements endorsing
14. the position.”¹⁶
- 15.
16. A 2017, 13-agency U.S. government report¹⁷ released by the Trump Administration
17. agrees that climate change is real and largely caused by humans:

¹³ See Footnote 11, *supra*, for citation and downloading information.

¹⁴ Cited as: IPCC, 2018: Summary for Policymakers. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. *World Meteorological Organization, Geneva, Switzerland, 32 pp.*

¹⁵ The Summary for Policymakers is available at https://www.ipcc.ch/site/assets/uploads/2018/10/SR15_SPM_version_stand_alone_LR.pdf. The October 8, 2018 press release is available at https://www.ipcc.ch/site/assets/uploads/2018/11/pr_181008_P48_spm_en.pdf.

¹⁶ See NASA website at <https://climate.nasa.gov/scientific-consensus/>.

¹⁷ USGCRP, 2017: *Climate Science Special Report: Fourth National Climate Assessment, Volume I* [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 470 pp., doi: 10.7930/J0J964J6. For the full report, please see https://science2017.globalchange.gov/downloads/CSSR2017_FullReport.pdf.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. “This assessment concludes, based on extensive evidence, that it is
2. extremely likely that human activities, especially emissions of
3. greenhouse gases, are the dominant cause of the observed warming
4. since the mid-20th Century. For the warming over the last century,
5. there is no convincing alternative explanation ...”¹⁸

6.
7. If humans are causing climate change by their greenhouse gas producing activities,
8. humans can likewise ameliorate it by reducing their greenhouse gas emissions.

9. Again, the government report acknowledges this:

10.
11. “The magnitude of climate change beyond the next few decades will
12. depend primarily on the amount of greenhouse gases (especially
13. carbon dioxide) emitted globally.”¹⁹

14.
15. As concerns this proceeding, reducing greenhouse gas emissions means limiting,
16. not increasing, those emissions in Liberty’s planning, particularly in the
17. critical period between now and 2030 when we must substantially decrease the
18. impact of greenhouse gases on global warming, and not planning for emissions
19. past the 2050 net-zero deadline we have essentially agreed to meet as a state
20. under the [Under2Coalition](#), and must meet to avoid the worst of climate change.

21. **Q. You do not believe that Liberty’s planning achieves these short- and**
22. **long-term goals?**

23. A. Not at all. The company’s planning is the opposite of the responsible climate
24. action we need, short- and long-term.

25. **Q. Please elaborate.**

26. Let us start with short-term. Liberty plans for continuing, sustained
27. customer growth *beyond the next 20 years*, increasing its greenhouse gas

¹⁸ *Id.* at 10.

¹⁹ *Id.* at 11.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. emissions by about the same percentage during that period of time as last fall's
 2. IPCC report warns we must decrease emissions by between now and 2030 to
 3. avoid substantial increased harms and risks of climate change. At Bates 024 of
 4. Paul Hibbard's testimony in support of the [LCIRP](#), Liberty projects that it will
 5. add nearly 11,000 new customers to the utility's customer base just during the
 6. five-year term of its plan.²⁰ While this is certainly bad enough at this critical
 7. period of the climate crisis, the utility forecasts increasing demand by
 8. approximately 40-50% for 2018/2019 - 2038/2039,²¹ adding "an annual average
 9. of 1,418 new residential and 357 new [commercial and industrial] customers ...
 10. over the 21year period 2017-2038,"²² for a total increase of over 37,000 new gas
 11. customers during that time.²³ Longer-term, Liberty's planning only becomes
 12. more shocking, as the utility indicates in its filings that the company, "by
 13. 2037/2038, still anticipates adding over 1,000 residential customers and over 200
 14. [commercial and industrial] 20 customers per year,"²⁴ and plans to keep its
 15. customers online, exacerbating the climate crisis, well beyond 2077²⁵—decades
 16. past the 2050 net-zero deadline.

²⁰ See [Direct Testimony of Paul J. Hibbard \(June 28, 2019\)](#), at Bates 024.

²¹ See [Supplemental Direct Testimony of Francisco C. DaFonte and William R. Killeen \(March 15, 2019\)](#) at Bates 053 (Table 1), filed in Docket No. DG 17-198.

²² See Direct Testimony of Paul J. Hibbard (June 28, 2019), [Exhibit 2](#) at Bates 056 Footnote 19.

²³ See [Direct Testimony of Paul J. Hibbard \(June 28, 2019\)](#), at Bates 024-025.

²⁴ [Direct Testimony of Paul J. Hibbard \(June 28, 2019\)](#), at Bates 030.

²⁵ See testimony, *infra*.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. **Q. Why should Liberty’s activities beyond the 2021/2022 term of the**
2. **LCIRP be considered in this proceeding?**

3. A. Because the linchpin of the [LCIRP](#) and Liberty’s expansion plans is the
4. Granite Bridge Project, which the company intends to continue to use to service
5. customers, with resulting emissions and other impacts, well beyond 2077, and all
6. impacts of the [LCIRP](#), including projects approved within its term, should be
7. considered, especially as there is no limitation on the duration of the “long-term
8. impacts” of a utility’s planning that must be considered in the planning process
9. under [R.S.A. 378:38](#) and [R.S.A. 378:39](#).

10. **Q. What is the basis for your assertion that the linchpin of the [LCIRP](#) and**
11. **Liberty’s expansion plans is the Granite Bridge Project?**

12. A. The Granite Bridge Project is obviously the linchpin of the utility’s [LCIRP](#)
13. as it is the only fuel option utilized under the [LCIRP](#), and the company has
14. otherwise made plain that its expansion plans completely depend on the project.
15. In its petition to approve the Granite Bridge Project, the company flat out tethers
16. its expansion plans to the project:

17.
18. “The problem addressed in this petition is that EnergyNorth’s growth will
19. soon exceed the capacity of the Concord Lateral. Absent an alternative,
20. EnergyNorth will have to impose a moratorium on further expansion ...”²⁶

21.
22. Moreover, in its filings for this proceeding, Liberty confirms that the project is the
23. source of Liberty’s planned expansion continuing beyond 2037/2038:

24.
25. “... Liberty estimates that in the first year after Granite Bridge comes into
26. service, it would add approximately 1,800 residential customers and over

²⁶ [Petition to Approve Firm Supply and Transportation Agreements and the Granite Bridge Project](#), ¶ 4, filed in Docket No. DG 17-198.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. 500 commercial and industrial (“C&I”) customers. In each subsequent
2. year, Liberty expects to add fewer customers, but by 2037/2038, still
3. anticipates adding over 1,000 residential customers and over 200 C&I
4. customers per year.”²⁷
5.

6. **B. The Problems With Liberty’s Planning**

7. **1. The Granite Bridge Project**

8. **Q. What is the Granite Bridge Project?**

9. A. There are three components to it: (1) a 2.0 Bcf liquid natural gas (LNG) facility
10. located in Epping, New Hampshire, with roughly half of the storage capacity for
11. all of the LNG used in the entire, far more populous, state of New Jersey²⁸; (2) an
12. approximately 26.5-mile long, 16-inch diameter high-pressure pipeline running
13. from Manchester, New Hampshire to Exeter, New Hampshire, with a full
14. operating capacity of 200,000 Dth/day, nearly double the capacity of Liberty’s
15. current natural gas Design Day resources²⁹ and twice the capacity that Liberty
16. was found to need from the Northeast Energy Direct (NED) pipeline less than
17. four years ago³⁰ (which Liberty clearly intends to fully utilize as the 200,000
18. Dth/day capacity represents a 50,000 Dth/day increase from prior planning,³¹ and
19. there would be no need for the increase without the anticipated use of it); and

²⁷ [Direct Testimony of Paul J. Hibbard \(June 28, 2019\)](#), at Bates 030.

²⁸ See http://www.northeastgas.org/about_lng.php.

²⁹ 107,833 Dth/day of firm transportation. See [Pre-filed Direct Testimony of William R. Killeen and James M. Stephens \(December 21, 2017\)](#), at Bates 168 (Table 6), filed in Docket No. DG 17-198. The 107,833 Dth/day is supplemented by far lesser amounts of propane and LNG, as indicated in Table 6.

³⁰ “[U]p to 115,000 deckatherms (‘Dth’) per day.” [Order No. 25,822 \(Oct. 2, 2015\)](#), at 4.

³¹ See [Supplemental Direct Testimony of Francisco C. DaFonte and William R. Killeen \(March 15, 2019\)](#), at Bates 034 Footnote 25 (“full operating capacity of 150,000 Dth per day”), filed in Docket No. DG 17-198.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. (3) two complementary (5,000 Dth/day and 7,000 Dth/day) gas supply contracts
2. which collectively extend until about 2040.³² Liberty has assigned a 55-year
3. lifespan for the pipeline and a 40-year lifespan for the LNG facility, but, in fact,
4. plans to use them for a “much greater” period of time than their assigned
5. lifespans.³³ Thus, as the project will not begin service until 2021/2022³⁴ or
6. 2022/2023,³⁵ New Hampshire will still be producing greenhouse gas emissions
7. from the Granite Bridge Project well beyond 2077.

8. **2. Emissions Issues**

9. **Q. What does Liberty have to say about the Granite Bridge Project’s emissions?**

10. A. In the summary of Liberty’s position on the environmental and health impacts of
11. the project at (Bates) page numbers 036-037 of Mr. Hibbard’s testimony, Liberty
12. claims that the project would reduce greenhouse gas and pollutant emissions
13. *relative to the status quo* and “thereby contribute to a lowering of risks associated
14. with climate change.”³⁶

15. **Q. What are your thoughts on those claims?**

16. A. On page 10 of his testimony, Mr. Hibbard defines the “status quo scenario” as one

³² See [Petition to Approve Firm Supply and Transportation Agreements and the Granite Bridge Project](#), ¶¶ 6 and 7, filed in Docket No. DG 17-198.

³³ See Liberty’s (6-22-18) Response to Clark Data Request 2-1, included in [Exhibit “C”](#) to Intervenor, Terry Clark’s, Objection to, and Motion to Strike, Liberty’s Supplemental Filing.

³⁴ See [Pre-filed Direct Testimony of William R. Killeen and James M. Stephens](#), at Bates 123 (pipeline in-service November 1, 2021; LNG facility in-service April 1, 2022), filed in Docket No. DG 17-198.

³⁵ See [Supplemental Direct Testimony of Francisco C. DaFonte and William R. Killeen \(March 15, 2019\)](#), at Bates 44 (LNG facility to open in 2023), 51-52 (pipeline in-service in late 2022), filed in Docket No. DG 17-198.

³⁶ See [Direct Testimony of Paul J. Hibbard \(June 28, 2019\)](#), at Bates 036-037.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. where no new gas project is approved to meet the company's claimed resource
2. need,³⁷ and, in Exhibit 2 of his testimony, he explains that this means that energy
3. users who would have become natural gas customers if natural gas were made
4. available "will use (or continue to use) oil, propane, biomass, and electric heating
5. technologies *in the same proportion as current customers* in the counties" where
6. the natural gas service would have been offered.³⁸

7. It does not make sense to me to use the *current* proportion of oil and
8. alternative energy use as a constant baseline proportion for calculations which run
9. through 2037/2038, according to Exhibit 2 of Mr. Hibbard's testimony.³⁹ Given
10. the urgent need to address climate change all over the news, and the increasing
11. public will to transition to green energy as soon as possible, it seems to me
12. common sense that an accurate assessment of the real emissions impact of the
13. Granite Bridge Project would have to factor in a rising proportionate number of
14. green energy users—even larger without the project, obviously—that you would
15. think will surely occur from now through 2037/2038 as responsible citizens and
16. businesses address the crisis by transitioning to green energy in ever greater
17. numbers. I cannot tell you just how fast the rise will be, but I believe it
18. was up to Liberty to figure that out. Yet, in Liberty's Response to Clark Data
19. Request 5-17, attached as **Exhibit 1** to my testimony, Liberty acknowledges that
20. "Mr. Hibbard's testimony does not include or involve research or analyses

³⁷ *Id.* at Bates 010.

³⁸ See Direct Testimony of Paul J. Hibbard (June 28, 2019), [Exhibit 2](#) at Bates 047-048 (emphasis added).

³⁹ See Direct Testimony of Paul J. Hibbard (June 28, 2019), [Exhibit 2](#) at Bates 048 ("The time period for the GB-LR scenario extends to the 2037/2038 gas year ...").

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. concerning the projected transitioning rate of energy users to green energy
2. sources from now through 2037/2038.” In other words, Liberty did not even
3. consider this issue, but just assumed that we would maintain the *status quo* and do
4. nothing, while Paul Revere is screaming “2030 is coming! 2050 is coming!” up
5. and down our streets. Liberty’s banking on us to close our ears and eyes to a
6. crisis, to lose without a fight, to fail; but that is not the reality I know from our
7. history, or from my involvement in the transition: I would not count on Liberty’s
8. “plan,” as Americans have always risen to a challenge, and more and more are
9. rising now.

10. **Q. Do you see any support for Liberty’s emissions claims in its filings?**

11. A. No, and I do not think that you have to be an expert to see why. Numerous
12. obvious deficiencies in the filings, involving emissions and other assessments,
13. have been well-documented in this case.⁴⁰ This includes Liberty’s failure to
14. provide the full option assessments required under [R.S.A. 378:38](#) and
15. [R.S.A. 378:39](#) (including emissions impact comparisons for green energy options,
16. as just discussed, and consideration of potential new energy efficiency programs),
17. refusal to include the proposed Epping LNG facility in its assessments, reliance
18. on an incorrect growth warming potential for its emissions comparisons—I will
19. explain this later—and improper capping of its impact assessments at 2037/2038

⁴⁰ See [Intervenor, Terry Clark's, Objection to, and Motion to Strike, Liberty's Supplemental Filing](#), [Intervenor, Terry Clark's, Reply to Liberty's Objection to Motion to Strike Supplemental Filing](#), [Intervenor, Terry Clark's, Response to Liberty Utilities' June 28, 2019 Filing and Correspondence](#), [Conservation Law Foundation Motion to Find Liberty's April 30 Supplement Filing Non-Compliant](#), [Conservation Law Foundation's Reply to Liberty's Objection to CLF's Motion](#) and [Conservation Law Foundation's Reply to Liberty Utilities' June 28, 2019 Filing and Motion to Direct Liberty to Refile its Plan with Meaningful Alternatives and Impact Analyses](#). See also [May 19, 2019 OCA letter responding to pending motions](#).

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. when the long-term emissions impacts of the Granite Bridge Project should have
2. been calculated at least through the entire lifetime of the project, *i.e.* 2077.⁴¹
3. Liberty should have assessed all of the energy options available to address the
4. energy needs being considered under its planning and compared *all* of the
5. emissions impacts of those options to each other. Instead, Liberty just considered
6. one other option, the Concord Lateral Extension, also a gas option, and only
7. compared the emissions of the two gas options and the emissions of oil from a
8. continued status *status quo*. Obviously, this comparison favored approval more
9. than the required full comparison of all options—even more when Liberty limited
10. its emissions analysis to only a truncated version of the actual emissions impacts
11. of the Granite Bridge Project (without the LNG impacts and only to 2037/2038,
12. not through the entire projected life of the infrastructure). As Liberty’s R.S.A.
13. 378 assessments were not made and submitted in support of its [LCIRP](#) until June,
14. 2019, 20 months after Liberty filed this case in October, 2017, and therefore were
15. clearly not part of the planning process, only provide comparably favorable
16. options and do not take all long-term emissions impacts into account, I do not see
17. how they can be read to provide anything other than back-filled, cherry-picked,
18. meaningless “support,” as I have said in my pleadings.

19. **Q. If you cannot tell anything from Liberty’s emissions assessments, why do you**
20. **believe that the Granite Bridge Project will “exacerbate, rather**
21. **than mitigate, the climate crisis,” as you stated near the beginning of your**

⁴¹ See [Intervenor, Terry Clark’s, Response to Liberty Utilities’ June 28, 2019 Filing and Correspondence](#), ¶ 5.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. **testimony?**

2. A. I believe this for a couple of reasons.

3. First, if *all* of the emissions resulting from the Granite Bridge Project and
4. Liberty's expansion plans were actually, properly included and analyzed in the
5. company's impact assessments, and if the negative impact of those plans on the
6. development of green energy were actually factored in and considered (which,
7. again, the utility's LCIRP filings do not do), I have no doubt that Liberty's plans
8. would generate far more greenhouse gas emissions and negative climate impact
9. than would result if its plans were denied. Certainly, the company's plans would
10. result in astronomically more emissions than those from green choices, as green
11. energy generates no, or nearly zero, greenhouse gas emissions

12. **Q. What is the second reason?**

13. A. Second, as previously noted, Liberty used too low of a global warming potential,
14. or GWP, for all of its natural gas emissions calculations. Again, I do not think
15. that you have to be an expert to see this, it seems pretty obvious, and it is
16. according to the EPA and IPCC, not me. The use of GWPs is explained on the
17. EPA website:

18. "The Global Warming Potential (GWP) was developed to allow
19. comparisons of the global warming impacts of different gases.
20. Specifically, it is a measure of how much energy the emissions of 1 ton of
21. a gas will absorb over a given period of time, relative to the emissions of 1
22. ton of carbon dioxide (CO₂). The larger the GWP, the more that a given
23. gas warms the Earth compared to CO₂ over that time period ...
24.
25. CO₂, by definition, has a GWP of 1 regardless of the time period used,
26. because it is the gas being used as the reference ..."⁴²
27.

⁴² See EPA discussion "Understanding Global Warming Potentials" on the EPA website at
<https://www.epa.gov/ghgemissions/understanding-global-warming-potentials>.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. As natural gas is almost all methane,⁴³ natural gas emissions show up in the GWP
2. charts under methane. Using natural gas is not better for the climate than using
3. oil, which is why President Obama's Climate Action Plan from over *six years ago*
4. noted: "curbing emissions of methane is critical to our overall effort to address
5. global climate change."⁴⁴ Compared to the GWP of only 1 for the CO₂ emissions
6. from oil, "regardless of the time period used" (*see* above quote from EPA
7. website), methane has a GWP of 84 for the first couple of decades following its
8. use, and a GWP of 28 over the first 100 years of its use, meaning it warms the
9. planet that many times more than carbon dioxide for those timeframes. This is
10. established by the following relevant portion of a table⁴⁵ included in the IPCC's
11. Fifth Assessment Report—the most recent assessment by the IPCC:

Acronym, Common Name or Chemical Name	Chemical Formula	Lifetime (Years)	Radiative Efficiency (W m ⁻² ppb ⁻¹)	AGWP 20-year (W m ⁻² yr kg ⁻¹)	GWP 20-year	AGWP 100-year (W m ⁻² yr kg ⁻¹)	GWP 100-year
Carbon dioxide	CO ₂	see*	1.37e-5	2.49e-14	1	9.17e-14	1
Methane	CH ₄	12.4 [†]	3.63e-4	2.09e-12	84	2.61e-12	28
Fossil methane‡	CH ₄	12.4 [†]	3.63e-4	2.11e-12	85	2.73e-12	30
Nitrous Oxide	N ₂ O	121 [†]	3.00e-3	6.58e-12	264	2.43e-11	265

⁴³ About 94% methane according to <https://www.uniongas.com/about-us/about-natural-gas/Chemical-Composition-of-Natural-Gas>.

⁴⁴ See "The President's Climate Action Plan, Executive Office of the President," dated June, 2013, at <https://www.scribd.com/document/149809454/President-Obama-s-Climate-Action-Plan> at 10.

⁴⁵ Informally cited as "IPCC AR5 WGI Chapter 8, Table 8.A.1," the complete table may be found on page 731 of the IPCC report at https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf. The full citation for this report is IPCC, 2013: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker T.F., D. Qin, G-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. On its website, the EPA confirms that the above GWPs should be accepted as
2. “reflect[ing] the state of the science,” as should all GWPs in the IPCC’s Fifth
3. Assessment Report:
- 4.
5. “The EPA considers the GWP estimates presented in the most recent
6. IPCC scientific assessment to reflect the state of the science ... The GWPs
7. listed above [on the EPA’s website] are from the IPCC’s Fifth Assessment
8. Report ...”⁴⁶
- 9.
10. Just because the EPA website only lists 100-year GWPs does not make the 20-
11. year GWPs provided in the IPCC’s Fifth Assessment Report any less appropriate
12. —and they certainly seem more relevant here than the 100- year GWPs, as
13. Liberty’s emissions analysis does not go beyond the next 20 years.⁴⁷
14. **Q. What GWP or GWPs does Liberty rely on for methane?**
15. A. Liberty’s Response to Clark’s Data Request 5-7, attached as **Exhibit 2** to my
16. testimony, confirms that Mr. Hibbard relies on a GWP of only 25 for all of the
17. methane emissions analysis provided in his testimony, as suggested by Exhibit 2
18. to his testimony⁴⁸—even though the analysis concerns emissions which all occur
19. within the first two decades of methane use, as the analysis ends at 2037-2038.⁴⁹
20. **Q. What is the result of Mr. Hibbard using a GWP of only 25 instead of 84 for**
21. **his emissions impact analysis?**

⁴⁶ See EPA discussion “Understanding Global Warming Potentials” at <https://www.epa.gov/ghgemissions/understanding-global-warming-potentials>.

⁴⁷ See Direct Testimony of Paul J. Hibbard (June 28, 2019), [Exhibit 2](#) at Bates 048 (“The time period for the GB-LR scenario extends to the 2037/2038 gas year ...”).

⁴⁸ See *id.* at Bates 066 (“note that we convert methane into equivalent CO2 impacts by taking methane’s global warming potential to be 25 times that of carbon dioxide’s”).

⁴⁹ See *id.* at Bates 048 (“The time period for the GB-LR scenario extends to the 2037/2038 gas year ...”).

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. A. According to Liberty’s Response to Clark’s Data Request 5-9, attached as **Exhibit**
2. **3** to my testimony, the difference “does not qualitatively change the outcome and
3. would not affect the conclusions of Mr. Hibbard’s analysis.”

4. **Q. So, why are we even talking about GWPs?**

5. A. I think that Mr. Hibbard will have to better explain his position, that using a
6. warming factor of only 25 when it should have been 84 “does not qualitatively
7. change the outcome,” to the Commission—at least as to his conclusions
8. concerning the “lowering of risks associated with climate change.”⁵⁰ I do not
9. understand how the huge increase in warming impact would not worsen climate
10. change, and therefore the “risks associated with climate change.” In any event,
11. even if Mr. Hibbard’s analysis is believed, his “[l]ong run emissions impacts”
12. Sensitivity Figure 3 reproduced below⁵¹ shows that the greenhouse gas emissions
13. (CO₂e) from the Granite Bridge Project will be barely less than the *status quo*—
14. **without** factoring in the Epping LNG facility emissions and all of the long-term
15. emissions through the entire projected use of the project (well beyond 2077 for
16. the pipeline) that Liberty refuses to provide, and without consideration for any
17. potential increase in the green transition rate to meet the climate crisis:

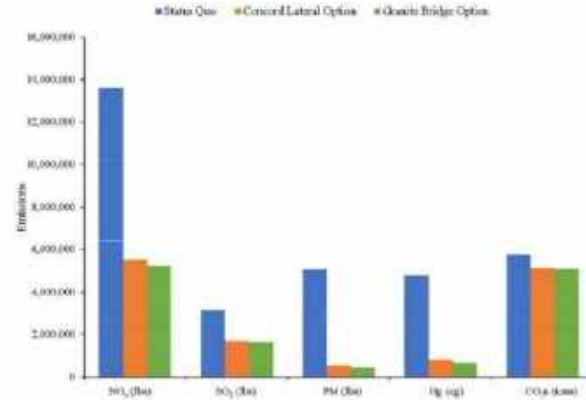
⁵⁰ See [Direct Testimony of Paul J. Hibbard \(June 28, 2019\)](#) at Bates 036-037.

⁵¹ From Liberty’s Response to Clark’s Data Request 5-9, attached as **Exhibit 3** to my testimony.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

Docket No. DG 17-152 Request No. Clark 5-9

Sensitivity Figure 3: Long-run emissions impacts associated with total additional customers under long-term Granite Bridge Pipeline planning period - GWP of 84 for methane emissions.



Sensitivity Table 2: Total long-run emissions from customers remaining on existing heating technologies compared to switching to natural gas heating technologies under the Granite Bridge or Concord Lateral Expansion options - GWP of 84 for methane emissions.

GB-LR	Status Quo	Granite Bridge Option	Concord Lateral Option
NO _x (lbs)	13,629,053	5,220,732	5,521,009
SO ₂ (lbs)	3,157,123	1,620,470	1,681,805
PM (lbs)	5,062,057	421,858	527,927
Hg (cg)	4,768,887	654,623	798,470
CO ₂ e (tons)	5,771,166	5,087,590	5,110,354

Sensitivity Table 4: Annual reductions in emissions associated with reduced delivery truck traffic - GWP of 84 for methane emissions (estimates in pounds).

	235 trucks	300 trucks
CO ₂ e (CO ₂ + CH ₄)	49,603.8	63,324.0
NO _x	285.7	364.7
PM _{2.5}	6.7	8.5

Page 3 of 3

1. So, Sensitivity Figure 3 above, if anything, would seem to disprove Liberty's
2. claim that the Granite Bridge Project would reduce greenhouse gas emissions
3. relative to the *status quo*, and lower the "risks associated with climate change."⁵²

⁵² See [Direct Testimony of Paul J. Hibbard \(June 28, 2019\)](#) at Bates 036-037.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. **Q. Do you have any other thoughts concerning Liberty’s plans with respect to**
2. **the climate crisis?**

3. A. Yes, despite their deficiencies, Liberty’s filings do establish two very significant
4. numbers: The first is 37,294, the number of new customers Liberty plans on
5. adding by the Granite Bridge Project in the first 21 years alone.⁵³ Every new
6. natural gas customer is one less potential green energy user, as the company
7. acknowledges in its filings,⁵⁴ so the Granite Bridge Project would result in over
8. 37,000 less potential green energy users, who generate *no* emissions. The second
9. number is \$400+ million, the projected construction costs for the Granite Bridge
10. Project pipeline and LNG facility,⁵⁵ to be paid by ratepayers. That is a lot of
11. money—probably close to a half a billion dollar subsidy, really, when the final
12. bill is totaled for the project—to commit to keeping foreign fuel emissions in New
13. Hampshire, and to take out of our own green economy. As the DES website
14. notes:

15.
16. “Much or most of the renewable energy used in New Hampshire can come
17. from indigenous sources. This keeps jobs and energy dollars in local
18. economies, where the multiplier effect actually creates more money and
19. helps sustain rural communities. Increased use of renewables can reduce
20. vulnerability to energy disruptions, create more jobs and retain more

⁵³ *Id.* at Bates 024-025.

⁵⁴ *See id.* at Bates 024-025 (new Granite Bridge Project customers would come from energy users who would be choosing its gas “over alternative fuels in the state of New Hampshire.”) and Bates 030-031 (“These customers will be choosing natural gas for heating over oil, propane, **or some other heating source ...**”)(emphasis added).

⁵⁵ Although the total numbers are undoubtedly higher by now—the projected cost of these projects always seems to continue to rise through completion—Liberty estimated the construction costs for the pipeline and LNG facility to be \$414 million this past March. *See Supplemental Direct Testimony of Francisco C. DaFonte and William R. Killeen (March 15, 2019)*, at Bates 010-011 (revised cost of the pipeline is \$168 million and the revised cost of the LNG facility is approximately \$246 million, totaling \$414 million), filed in Docket No. DG 17-198.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. energy dollars in local economies.”⁵⁶

2. **3. Health Concerns**

3. **Q. How about Liberty’s claim that the Granite Bridge Project would reduce**
4. **pollutant emissions relative to the *status quo*?**

5. A. Even if the Commission believes that Liberty has provided sufficient proof of this
6. claim, we cannot afford the negative climate impact that the project—or any other
7. large natural gas project, like the Concord Lateral Extension—would bring,
8. particularly at this critical period in the climate crisis. But, again, there are the
9. same concerns with Liberty’s analysis of this issue: how can any meaningful
10. pollutant emissions analysis not include the Epping LNG facility emissions; all of
11. the emissions through the entire projected use of the project (well beyond 2077
12. for the pipeline) and not just through 2037/2038, when Liberty’s projections stop;
13. and not consider the potential for an increase in the green energy transition rate
14. due to the climate crisis? Beyond that, it should be noted that Mr. Hibbard
15. acknowledges that natural gas (methane) emissions contain particulates and other
16. harmful pollutants, such as nitrogen oxides (NOx), sulfur dioxide (SO₂), and
17. mercury (Hg), which may cause or exacerbate health problems, including asthma,
18. and premature deaths.⁵⁷ Even worse, Liberty claims that it cannot tell us for sure
19. how much of the gas it sells is fracked gas⁵⁸—even though a recent WMUR

⁵⁶ See DES website at <https://www.des.nh.gov/organization/divisions/air/tsb/tps/energy/categories/overview.htm>.

⁵⁷ See [Direct Testimony of Paul J. Hibbard \(June 28, 2019\)](#) at Bates 026-029 (beginning with testimony at Bates 026: “The use of such fuels, in turn, leads to emissions that affect public health ...”).

⁵⁸ See Liberty’s Response to Clark Data Request 1-1 and Liberty’s Response to Clark Data Request 1-2 included within [Exhibit “B”](#) to [Initial Brief of Intervenor, Terry Clark](#), filed in Docket No. DG 17-068.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. online news article identifies all of the Granite Bridge Project fuel as fracked
2. gas,⁵⁹ as are 90% of all new gas wells⁶⁰—and that it does not know what other
3. pollutants may be in the gas it sells: fracked gas has been associated with heart,
4. respiratory and other serious health problems in addition to those noted by Mr.
5. Hibbard, and studies and data have associated as many as two dozen or more
6. of New Hampshire’s regulated toxic air pollutants with fracked gas tested at one
7. or more stages of the manufacturing and distribution process, either as additives
8. or as a product of its combustion.⁶¹ This is not good, this is not comforting
9. and, again, these are not concerns associated with green energy: an option
10. Liberty refused to even consider, to any degree, under its LCIRP.

11. **Q. Do you have any other health concerns with Liberty’s emissions?**

12. A. One that is part health, part economics. Liberty’s Response to Clark Data
13. Request 3-5, attached as **Exhibit 4** to my testimony, discloses that roughly 1,500
14. pounds of an odorant called Scentinel® E, containing about 555 pounds of sulfur,
15. would be “used” in vaporizing each full storage tank of LNG in Epping. What
16. about the emissions and/or associated smell from this process? Liberty claims
17. that the facility will not pose health problems and will not smell,⁶² but how can

⁵⁹ See July 26, 2019 WMUR online article “Presidential candidate Inslee weighs in on NH dispute, opposes Granite Bridge project,” by John DiStaso at <https://www.wmur.com/article/presidential-candidate-inslee-weighs-in-on-nh-dispute-opposes-granite-bridge-project/28523482>.

⁶⁰ See “Summary” of [Tiemann and Vann, "Hydraulic Fracturing and Safe Drinking Water Act Regulatory Issues," Introduction \(Congressional Research Service\)\(2015\).](#)

⁶¹ See [Intervenor, Terry Clark’s, Motion to Dismiss and for a Moratorium on Gas Expansion Plans](#), ¶¶ 17-20; [Exhibit “A”](#) to [Initial Brief of Intervenor, Terry Clark](#), filed in Docket No. DG 17-068.

⁶² See <https://www.granitebridgenh.com/storage-facility> (click “Would the LNG storage facility smell?”).

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. that be with so much sulfur-based odorant “used” for decades? Even if does not
2. potentially cause health problems, New Hampshire does not need a “Stank Tank
3. Zone,” especially on a major traffic corridor, Route 101, mid-route to and from
4. one of the state’s largest tourist attractions, the seacoast area.

5. **Q. Do you have any other concerns with Liberty’s plans?**

6. **4. Safety Concerns**

7. A. Yes, a huge concern: safety. Of course, the Commission will not approve the
8. Granite Bridge Project unless it is satisfied that it has been safely designed, and
9. the Commission has a very capable Safety Division to monitor matters. But,
10. gas explosions do not happen by design or poor oversight by public utility
11. commissions, but by accident; and the decision here should not overlook the
12. catastrophic series of high-pressure natural gas explosions which occurred in
13. Massachusetts just last year, by accident, as they damaged 131 structures,
14. including destroying five homes, killed one individual and injured 28 others.⁶³
15. Nor should it be overlooked that the project’s pipeline will be capable of a 950 psi
16. operating pressure,⁶⁴ which is a higher operating pressure than Liberty currently
17. has any experience with in New Hampshire,⁶⁵ or that Liberty’s proposal calls for

⁶³ See National Safety Transportation Board “Preliminary Report Pipeline: Over-pressure of a Columbia Gas of Massachusetts Low-pressure Natural Gas Distribution System, Executive Summary” online at <https://www.nts.gov/investigations/AccidentReports/Pages/PLD18MR003-preliminary-report.aspx>. See also https://en.wikipedia.org/wiki/Merrimack_Valley_gas_explosions.

⁶⁴ See <https://www.granitebridgenh.com/pipeline> (click “What would be the size and pressure of the Granite Bridge pipeline?”).

⁶⁵ See [Safety Division Adequacy Assessment](#) at 2 (besides proposed Keene pipeline, “Liberty’s next highest pressurized pipeline within New Hampshire operates at 750 psig, directly serving an independent power producer.”), filed in Docket No. DG 17-068.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. its pipeline to be largely constructed within the NHDOT's right-of-way along one
2. of the main thoroughfares in our state, Route 101, which itself serves as an
3. emergency evacuation route in the event of an incident at Seabrook (and can turn
4. into a parking lot in places during the summer), and that some residences and
5. businesses along the pipeline's route will surely be in its danger zone, as well.
6. Again, accidents do happen, as do the leaks that often cause them,⁶⁶ pipelines do
7. explode—the Pipeline and Hazardous Materials Safety Administration has
8. identified more than 3,200 “serious” or “significant” natural gas pipeline
9. accidents, with many involving fatalities, since 1987 alone⁶⁷—and their
10. “incineration zones” may extend for hundreds of feet.⁶⁸ Nor should the risk
11. associated with the proposed 2 billion cubic feet LNG storage facility in Epping
12. be underestimated: an explosion at a far smaller LNG facility near the town of
13. Plymouth, Washington in 2014 is reported to have propelled 250-pound pieces of
14. steel up to 300 yards through the air, injuring five, and resulting in an initial
15. *two-mile evacuation radius*.⁶⁹ Hopefully, the technology *has* improved and is

⁶⁶ See April 24, 2018 online *Keene Sentinel* article “Gas leak on Keene’s West Street repaired,” by Sierra Hubbard at http://www.sentinel-source.com/news/local/gas-leak-on-keene-s-west-street-repaired/article_30b6a32e-5e2b-535b-9400-a891b7233eb3.html?utm_source=Weekday+Newsletter&utm_campaign=373fe20f1b-EMAIL_CAMPAIGN_2018_04_24&utm_medium=email&utm_term=0_be271ac818-373fe20f1b-136251925.

⁶⁷ See generally https://en.wikipedia.org/wiki/List_of_pipeline_accidents_in_the_United_States_in_2018.

⁶⁸ See page 14 chart of explosions at <http://www.pipelinesafetytrust.com/docs/C-FerCircle.pdf>.

⁶⁹ See April 2, 2014 online article “‘Miracle’ nobody died in blast at Eastern Washington LNG plant” by Jeff Barnard (Associated Press) in the online edition of *The Seattle Times* at <https://www.seattletimes.com/seattle-news/lsquomiraclesquo-nobody-died-in-blast-at-eastern-washington-lng-plant/> and March 31, 2014 (updated August 24, 2015) online article “UPDATE: Evacuation radius near Plymouth plant to be reduced” in the online edition of *The Tri-City Herald* at <http://www.tri-cityherald.com/news/local/article32173386.html>.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. safer—that is usually the response when the discussion turns to explosions—but
2. those words were probably spoken in support of every one of those 3,200+
3. pipelines that had accidents, and the Plymouth, Washington LNG facility before
4. its accident: today’s gas pipelines and LNG facilities may be safer than in the
5. past but, from what I have read and seen, they remain inherently volatile.

6. **5. The Hidden Costs of Liberty’s Plans**

7. **Q. Near the beginning of your testimony you stated that natural gas should not**
8. **be considered the “lowest reasonable cost” energy option, given all of its**
9. **“hidden costs”—are the climate, health and safety concerns you have since**
10. **discussed some of the “hidden costs” that you were referring to?**

11. A. Precisely.

12. **Q. Would you please discuss this issue, specifically in terms of the “hidden**
13. **costs” of natural gas use to New Hampshire?**

14. A. Sure. As has been discussed in my pleadings in this case, the continued use of
15. natural gas, especially fracked gas, comes at tremendous costs to New Hampshire
16. that are not reflected on the face of natural gas bills, including health problems
17. and associated remedial charges, losses suffered by our tourism, maple sugar and
18. dairy industries, agriculture, seacoast homeowners and towns, and the ever-
19. increasing cleanup costs of addressing storms, droughts and other weather events
20. associated with climate change.⁷⁰ All such costs should be quantified and
21. factored in our decision-making as much as possible, and some have been

⁷⁰ See, e.g., [Intervenor, Terry Clark’s, Motion to Dismiss and for a Moratorium on Gas Expansion Plans](#) at ¶ 30; see also [August 2016 EPA publication: What Climate Change Means for New Hampshire](#).

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. quantified and must be factored in here.
2. For example, again, Liberty acknowledges that natural gas (methane)
3. emissions contain particulates and other harmful pollutants which may cause or
4. exacerbate health problems, including asthma, heart issues and premature
5. deaths.⁷¹ New Hampshire has one of the highest asthma rates in the country, with
6. approximately 110,000 adult and 25,000 child asthma sufferers.⁷² The DES
7. estimates that one asthma- or heat-related emergency room visit averages
8. \$440.00, and each premature death results in \$9.35 million in costs—costs Liberty
9. acknowledges itself.⁷³ The health impacts from particulates and ozone alone cost
10. New Hampshire nearly \$4 billion for just the three-year period 2013-2015.⁷⁴ We
11. know that health harms, including premature deaths, will only increase because of
12. climate change:
- 13.
14. “[I]n New Hampshire, the projected increase in the frequency of hot days
15. ... and the associated increase in heat stress will likely lead to more heat
16. injuries and deaths. Based on the assumption that the mortality rate is
17. related to the projected increase in the number of days where maximum
18. temperature is greater than 95oF and using the conservative 2012 New
19. York City base rate of 0.11 deaths per 100,000, the fatality rate could
20. increase more than an order of magnitude across New Hampshire by the
21. end of the century under the high emissions scenario ...”⁷⁵

⁷¹ See [Direct Testimony of Paul J. Hibbard \(June 28, 2019\)](#) at Bates 026-029.

⁷² See page 22 of “Greater Manchester, New Hampshire Health Improvement Plan” online at <https://www.manchesternh.gov/Portals/2/Departments/health/GManCHIP.pdf>.

⁷³ See [Direct Testimony of Paul J. Hibbard \(June 28, 2019\)](#) at Bates 029.

⁷⁴ *Id.*

⁷⁵ [Climate Change and Human Health in New Hampshire, an Impact Assessment](#) at 8 (University of New Hampshire Sustainability Institute, 2014).

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. Moreover, we know that climate change is already costing New
2. Hampshire millions in lost property values,⁷⁶ and will cost the state billions more
3. in property damage if we do not stop it. One 2012 study⁷⁷ found that it will cost
4. just three New Hampshire coastal towns between \$1.9 and \$2.9 billion to address
5. the sea level rise caused by climate change.⁷⁸ A 2016 report of the New
6. Hampshire Coastal Risk and Hazards Commission,⁷⁹ concerning all 17 of the
7. state's coastal zone municipalities, notes vulnerability assessments that
8. determined approximately 8,600 coastal properties total, worth over \$5 billion,
9. are at risk.⁸⁰ In between, an analysis last year found that approximately 5,000
10. New Hampshire homes, currently worth about \$2.4 billion, will be at risk by the
11. end of this century, but notes that, if nations meet the goals of the Paris Climate
12. Accord, we could prevent roughly 65% of these homes from being chronically
13. flooded.⁸¹ So, while it is not exactly clear to me from these reports how much

⁷⁶ See January 22, 2019 online nhpr.org article "Rising Seas are Already Costing N.H. Millions in Property Value, Study Finds," by Annie Ropeik at <https://www.nhpr.org/post/rising-seas-are-already-costing-nh-millions-property-value-study-finds#stream/0>.

⁷⁷ Merrill, S., P. Kirshen, D. Yakovleff, S. Lloyd, C. Keeley, and B. Hill. 2012. COAST in Action: 2012 Projects from New Hampshire and Maine. New England Environmental Finance Center Series Report #12-05. Portland, Maine, available at http://efc.muskie.usm.maine.edu/docs/cre_coast_final_report.pdf.

⁷⁸ See ["Changing Tides How Sea-Level Rise Harms Wildlife and Recreation Economies Along the U.S. Eastern Seaboard,"](#) p. 23 (2016 National Wildlife Federation).

⁷⁹ *New Hampshire Coastal Risk and Hazards Commission (2016). Preparing New Hampshire for Projected Storm Surge, Sea-Level Rise and Extreme Precipitation*, available at <https://www.nhcrhc.org/wp-content/uploads/2016-CRHC-final-report.pdf>.

⁸⁰ *Id.* at IV.

⁸¹ See June 18, 2018 online Union of Concerned Scientists article "New Study Finds 5,000 New Hampshire Homes Worth \$2.4 Billion Will be at Risk from Tidal Flooding," at <https://www.ucsusa.org/press/2018/new-study-finds-5000-new-hampshire-homes-worth-24-billion-will-be-risk-tidal-flooding>.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. New Hampshire stands to lose, just on its coastline, from climate change, it is in
2. the billions—and responsible climate action, including not using natural gas,
3. could save us most of that money. Is there any guarantee? No, only that we
4. won't if we don't try—and a lot of New Hampshire residents will lose their
5. homes and livelihoods.

6. **Q. Do you have any other examples of the “hidden costs” of natural gas use to**
7. **New Hampshire, due to climate change or otherwise?**

8. A. Sure, I briefly mentioned some of these already, but other examples are the costs
9. -- **to one of our leading industries, tourism**, by the negative impacts of
10. climate change on winter recreation, hunting (by the decimation of the
11. moose population), fishing and foliage—threatening hundreds of millions
12. in annual revenues;⁸²
13. -- **to our maple sugar industry**, again, due to climate change, as “[s]ugar
14. maples are extremely susceptible to mid-winter thaws and summer
15. droughts”,⁸³
16. -- **to our moose and loon populations (also fueling tourism)**: Moose and
17. loons are climate change “canaries in a coal mine.”⁸⁴ In fact, climate

⁸² See 2008 DES Fact Sheet “Global Climate Change and its Impact on New Hampshire” at <https://www.des.nh.gov/organization/commissioner/pip/factsheets/ard/documents/ard-23.pdf>.

⁸³ See 2008 DES Fact Sheet “Global Climate Change and its Impact on New Hampshire’s Fall Foliage and Maple Sugar Industry” at <https://www.des.nh.gov/organization/commissioner/pip/factsheets/ard/documents/ard-25.pdf>.

⁸⁴ See February 22, 2018 online nhpr.org article “Moose, Loons Are ‘Canaries in Coal Mine’ Say N.H. Conservationists,” by Annie Ropeik, at <http://nhpr.org/post/moose-loons-are-climate-change-canaries-coal-mine-say-nh-conservationists#stream/0>.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. change is the leading cause of their decline.⁸⁵ Moose hunters and wildlife
2. watchers inject over \$340 million a year into the New Hampshire
3. economy;⁸⁶
4. -- **to our dairy industry**, by increasing, intensifying droughts associated
5. with climate change;⁸⁷
6. -- **to agriculture**, an annual \$330 billion U.S. industry, from climate change
7. induced stresses ranging from extreme weather events to increased insect
8. pests and diseases;⁸⁸
9. -- **to taxpayers and ratepayers** in cleaning up from ice and other
10. destructive storms caused by climate change, and addressing all of the
11. above other harms; and
12. -- **to everyone's cost of insurance** as the price of addressing all of the
13. negatives rises for insurance companies, and their insureds.
14. A 13-agency federal government report⁸⁹ released by the Trump

⁸⁵ See August 1, 2017 online nhpr.org article "Climate Change is the Leading Cause of Moose and Loon Population Decline in New Hampshire," by The Exchange, at <http://nhpr.org/post/climate-change-leading-cause-moose-and-loon-population-decline-new-hampshire#stream/0>.

⁸⁶ See June 1, 2015 *National Geographic* online article "What's a Ghost Moose: How Ticks Are Killing an Iconic Animal," by Christine Dell'Amore, at <https://news.nationalgeographic.com/2015/06/150601-ghost-moose-animals-science-new-england-environment/>.

⁸⁷ See August 30, 2016 *Concord Monitor* online article "Dying dairies: How drought, low milk prices lead to decline in N.H. farms" by Elodie Reed, at <http://www.concordmonitor.com/NH-Dairy-Farms-Struggle-Close-Because-of-Drought-Low-Prices-Yeaton-Farm-Epsom-NH-4346716>.

⁸⁸ See National Climate Assessment Report, summarized and available at <https://nca2014.globalchange.gov/report/sectors/agriculture#intro-section-2>.

⁸⁹ "[The Fourth National Climate Assessment](#)," Vol. 2, cited as USGCRP, 2018: Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 1515 pp. doi: 10.7930/NCA4.2018.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. Administration in November, 2018 further establishes the economic harm to New
2. Hampshire, along with the rest of the country, that will be caused by climate
3. change. In summary, this report found that:

4. “In the absence of significant global mitigation action and regional
5. adaptation efforts, rising temperatures, sea level rise, and changes in
6. extreme events are expected to increasingly disrupt and damage critical
7. infrastructure and property, labor productivity, and the vitality of our
8. communities. Regional economies and industries that depend on natural
9. resources and favorable climate conditions, such as agriculture, tourism,
10. and fisheries, are vulnerable to the growing impacts of climate change.
11. Rising temperatures are projected to reduce the efficiency of power
12. generation while increasing energy demands, resulting in higher electricity
13. costs. The impacts of climate change beyond our borders are expected to
14. increasingly affect our trade and economy, including import and export
15. prices and U.S. businesses with overseas operations and supply chains.
16. Some aspects of our economy may see slight near-term improvements in a
17. modestly warmer world. However, the continued warming that is
18. projected to occur without substantial and sustained reductions in global
19. greenhouse gas emissions is expected to cause substantial net damage to
20. the U.S. economy throughout this century, especially in the absence of
21. increased adaptation efforts. With continued growth in emissions at
22. historic rates, annual losses in some economic sectors are projected to
23. reach hundreds of billions of dollars by the end of the century—more than
24. the current gross domestic product (GDP) of many U.S. states.”⁹⁰
25.

26.
27. **6. Liberty’s Plans are Not Approvable**

28. **Q. So, what is your bottom line on Liberty’s LCIRP, expansion plans and the**
29. **Granite Bridge Project?**

30. **A.** Given all of the issues with natural gas use that I have discussed, it is plain, in my
31. opinion, that Liberty’s LCIRP and expansion plans (including the Granite Bridge
32. Project) are absolutely *not* in the public interest, and cannot be approved,
33. accordingly. Moreover, particularly given the climate crisis, Liberty’s plans are

⁹⁰ *Id.* at 25-26.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. completely inconsistent with the [R.S.A. 378:37](#) policy concerns for protecting the
2. physical environment and health and safety of citizens, and, given all of the
3. hidden costs, cannot be considered the “lowest *reasonable* cost” energy option
4. under the statute “to meet the energy needs of the citizens and businesses of the
5. state” being considered in this proceeding. “[R]easonable” is a very important,
6. undoubtedly carefully chosen, word in the statute that compels consideration of
7. more than just the “lowest cost”: if the legislature were only concerned with
8. those two words and purely monetary considerations, it would not have required
9. energy decision-makers to also be “reasonable” in their analysis.

10. **Q. But there are other policy concerns under R.S.A. 378:37 than environmental,**
11. **health and safety concerns, aren’t there?**

12. A. Yes, the statute also declares it to be the official state energy policy to provide for
13. the “reliability and diversity of energy sources,” to “maximize the use of cost
14. effective energy efficiency and other demand side resources,” to protect “the
15. future supplies of resources” and to consider “the financial stability of the state’s
16. utilities.” Only two of these policy concerns *might* weigh in favor of Liberty’s
17. expansion plans, the perceived “reliability” of natural gas and consideration for
18. the utility’s “financial stability.” But these two factors cannot reasonably be read
19. to outweigh the *public need*, and thus Commission duty, to meet the climate
20. crisis—not to mention the health and safety concerns associated with fracked gas
21. use.

22. **Q. Isn’t reliability important?**

23. A. Certainly, but it does not weigh heavily in favor of Liberty. I said “perceived”

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. reliability because it is more the perception that gas is reliable that gives it a slight
2. nod, not the reality. There is no reason to believe that natural gas, with its finite
3. resources and price volatility, will be any more “reliable”—price or availability
4. wise—as an energy source going forward than the alternatives: particularly wind,
5. solar and other forms of sustainable energy. Moreover, the concerns for
6. “reliability” and “diversity” are linked together under the statute and, when you
7. get to the diversity side, it is completely inconsistent with maintaining fuel
8. diversity to commit more of our energy needs to natural gas, when we are already
9. overdependent on gas: currently, gas use already comprises about half or more of
10. the total share of all of the available energy alternatives.⁹¹ Indeed, the New
11. Hampshire Office of Energy and Planning (“OEP”)⁹² concluded that we were
12. already too dependent on natural gas, to the point of causing winter price spikes,
13. back in 2015⁹³—and that was before Liberty’s expansion plans even kicked in.

14. **Q. Well, why isn’t the R.S.A. 378:37 concern for a utility’s financial stability**
15. **reason enough to approve Liberty’s expansion plans?**

16. A. Liberty has offered no evidence that it is not financially stable and will not
17. continue to be financially stable without expansion. Expansion, with the
18. infrastructure investments it brings, like the \$400+ million Granite Bridge Project,
19. clearly only goes to *more profit* for shareholders—to be skimmed off the top—

⁹¹ See current use percentage at <https://www.iso-ne.com/>.

⁹² Now known as the New Hampshire Office of Strategic Initiatives.

⁹³ See [October 15, 2015 OEP letter to Commission](#), p. 2 (“increasing reliance on one fuel, namely natural gas, is what caused the wholesale price spikes in the winter of 2013-2014 in the first place ...”), filed in Docket No. IR 15-124.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. which shareholders may *want*, but do not need or use to operate the company—it
2. is not necessary for financial stability. Again, the legislature’s insertion of the
3. word “reasonable” between “lowest” and “cost” in the statute tells me that
4. [R.S.A. 378:37](#) rejects purely fiscally-driven results, so the utility’s “financial
5. stability” should not be a paramount concern, but only something to be given
6. “consideration”—which is the precise word used by the statute.

7. **Q. What about the remaining policy concerns of R.S.A. 378:37?**

8. A. There are only two that we have not discussed yet, and they do not help Liberty at
9. all. The first is to “maximize the use of cost effective energy efficiency and other
10. demand side resources.” Using natural gas does not maximize either and, in fact,
11. the OCA has sharply criticized Liberty in this case for not properly assessing all
12. of its energy efficiency options:

13.
14. “... [T]he cursory references in the LCIRP to the outcomes of
15. Commission energy efficiency proceedings (which focus on the use of
16. ratepayer funds to meet the Commissionapproved Energy Efficiency
17. Resource Standard, EERS) do not even begin to assess the extent to which
18. all available energy efficiency options (including those that might go
19. beyond those funded via the EERS mechanism) could be least-cost within
20. the meaning of the least cost integrated resource planning rubric. Cf.
21. Consolidated Edison Co. of New York (N.Y. Public Serv. Comm’n, 3
22. Case 17-G-0606), orders of Feb. 7, 2019 (approving non-pipelines
23. solutions portfolio); Aug. 9, 2018 (approving gas demand response pilot);
24. and July 12, 2018 (approving Smart Solutions Program to address
25. forecasted growing shortfall of peak day pipeline capacity).”⁹⁴

26.
27. The only other [R.S.A. 378:37](#) policy concern is to protect “the future supplies of
28. resources.” Again, natural gas is a finite resource, so using more of it and as

⁹⁴ See OCA May 20, 2019 response to pending motions at 2-3, available at
https://puc.nh.gov/Regulatory/Docketbk/2017/17-152/MOTIONS-OBJECTIONS/17-152_2019-05-20_OCA_RESP_PENDING_MOTIONS.PDF.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. much of it as possible now is not going to “protect” its “future supplies”; in fact,
2. such use is actually contrary to the concern.

3. **Q. Is that all you have to say about Liberty’s planning?**

4. A. One more topic has to be addressed: stranded costs. If the Granite Bridge Project
5. is approved, the pipeline will have to be used until at least 2076/2077, the end of
6. its 55-year lifespan, and the facility will have to be used until at least 2062/2063,
7. the end of its 40-year lifespan, for ratepayers to avoid stranded costs. Yet, we
8. have a circa 2050 net-zero emissions deadline under the IPCC’s special report.
9. So, again, it seems to me that Liberty must be planning on us to lose the battle
10. against the climate crisis by just giving up, or it would not be planning to emit
11. greenhouse gases from the LNG facility for at least 12 years, and from the
12. pipeline for at least 26 years, beyond the circa 2050 deadline—or there are going
13. to be a lot of stranded costs from the project. From Liberty’s Response to Clark
14. Request 2-2⁹⁵, it appears that these stranded costs may be reflected in the
15. levelized rates for the pipeline and LNG facility discussed in the Direct
16. Testimony of Testimony of Timothy S. Lyons (December 21, 2017) filed in
17. Docket No. DG 17-198, at Bates 076R-096R, which concludes:

18.
19. “Based on a three-step process used to develop the levelized cost for the
20. investments, the levelized cost for the proposed Granite Bridge Pipeline is
21. approximately \$12.8 million per year ... and the levelized annual cost for
22. the proposed Granite Bridge LNG facility is approximately \$28.0
23. million.”⁹⁶

⁹⁵ Included in [Exhibit “C”](#) to Intervenor, Terry Clark’s, Objection to, and Motion to Strike, Liberty’s Supplemental Filing.

⁹⁶ See *id.* at Bates 095-096 at http://www.puc.state.nh.us/Regulatory/Docketbk/2017/17-198/TESTIMONY/17-198_2018-04-10_ENGI_REV_PDTESTIMONY_LYONS.PDF.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. At \$12.8 million per year for 26 years, this would amount to \$332.8 million for
2. the pipeline and, at \$28 million per year for 12 years for the LNG facility, this
3. would amount to \$336 million for the LNG facility, but I will leave it to the
4. evidence, as a whole, to establish the potential stranded costs. Whatever the
5. actual total, the potential for seemingly enormous stranded costs is one more
6. reason why Liberty's expansion plans, LCIRP and the Granite Bridge Project
7. should be found to be contrary to the public interest and [R.S.A. 378:37](#).

8. **C. The Right Choice**

9. **Q. What would be your option for addressing the energy needs met by Liberty's**
10. **expansion plans, LCIRP and the Granite Bridge Project, then?**

11. **A.** Well, again, I think that it is artificially created need. A faster transition is what
12. people really want, and need, so that is the option Liberty needs to choose for its
13. planning. There is no rational reason to hook as many people in the state up to
14. natural gas, as possible, at this point in time. New Hampshire has tremendous
15. green energy potential,⁹⁷ and we may soon be looking at extremely large volume
16. availability: offshore wind—which is one of the cheapest ways to produce
17. electricity, and getting cheaper.⁹⁸ Per Governor Sununu's letter attached to my
18. testimony as **Exhibit 5**, "one of the strongest opportunities for offshore wind
19. production in the world" is right off our coast. Turbine development may be as

⁹⁷ See discussion on DES website at
<https://www.des.nh.gov/organization/divisions/air/tsb/tps/energy/categories/overview.htm>.

⁹⁸ See August 28, 2017 online Scientific American article "Wind Energy is One of the Cheapest Sources of Electricity, and It's Getting Cheaper," by Robert Fares, at
<https://blogs.scientificamerican.com/plugged-in/wind-energy-is-one-of-the-cheapest-sources-of-electricity-and-its-getting-cheaper/>.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. little as four years away.⁹⁹ Offshore wind presents as much as 3,400 megawatts
2. of electric energy potential for New Hampshire—almost as much as *three*
3. Seabrook nuclear power plants (roughly 1,244 MW rated capacity), only of clean,
4. green energy—along with tremendous job opportunities and positive economic
5. impacts.¹⁰⁰ If it happens, and it should, given not only the public demand for
6. green energy, but the governor’s strong support for offshore wind, as is shown by
7. **Exhibit 5**, we should be well on our way to transitioning New Hampshire to
8. completely sustainable, local energy. That is not a bad option to choose, at all,
9. especially as offshore wind may be online just about as soon as the Granite
10. Bridge Project would be.

11. **IV. CONCLUSION**

12. We must substantially reduce greenhouse gas emissions by 2030, and reduce them
13. to net-zero by 2050, or we fail, and “[e]very extra bit of warming matters.”¹⁰¹
14. That is our charge, everyone’s charge, that is what the IPCC made clear last year,
15. and any responsible plan to combat climate change requires that we make
16. decisions that way, particularly as we cannot precisely predict exact “tipping
17. points” to worse plateaus in warming. However, Liberty’s expansion plans pile
18. on, rather than reduce, methane emissions, for *beyond the next 20 years*, and

⁹⁹ See March 29, 2019 online article “Energy Industry Says N.H. Could Soon See Offshore Wind, Modernized Grid, More E.V. Chargers,” at <http://www.nhenergyfuture.org/2019/03/29/energy-industry-says-n-h-could-soon-see-offshore-wind-modernized-grid-more-e-v-chargers/>.

¹⁰⁰ See March 8, 2019 online NH Business Review article, “Offshore wind getting its sea legs in New Hampshire,” by Michael Behrmann, at <https://www.nhbr.com/offshore-wind-getting-its-sea-legs-in-new-hampshire/>.

¹⁰¹ See the October 8, 2018 press release at https://www.ipcc.ch/site/assets/uploads/2018/11/pr_181008_P48_spm_en.pdf.

Direct Testimony of Terry Michael Clark
Docket DG 17-152

1. call for subsidizing Liberty's continuation of those emissions into nearly the next
2. century. The only "planning" under Liberty's LCIRP is for us to fail, and fail
3. miserably. The public does not want that; the Commission does not want that;
4. the Commission should tell Liberty this in no uncertain terms, and to come back
5. with something much, much better: a plan of self-restraint; a plan that furthers
6. transitioning; a plan we can actually live with.



Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a Liberty Utilities

DG 17-152
Least Cost Integrated Resource Plan

Clark Data Requests - Set 5

Date Request Received: 8/16/19
Request No. Clark 5-17

Date of Response: 8/23/19
Respondent: Paul J. Hibbard

REQUEST:

Please provide, in detail, all of Paul J. Hibbard's research, analyses and assumptions concerning the projected transitioning rate of energy users to green energy sources from now through 2037/2038.

RESPONSE:

Mr. Hibbard's testimony does not include or involve research or analyses concerning the projected transitioning rate of energy users to green energy sources from now through 2037/38.

Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a Liberty Utilities

DG 17-152

Least Cost Integrated Resource Plan

Clark Data Requests - Set 5

Date Request Received: 8/16/19
Request No. Clark 5-7

Date of Response: 8/23/19
Respondent: Paul J. Hibbard

REQUEST:

Please state what global warming potential (GWP) that Paul J. Hibbard used for methane in his emissions calculations for determining the emissions impact of the Granite Bridge Project vis-à-vis the status quo or Concord Lateral Extension.

RESPONSE:

Mr. Hibbard used a GWP of 25 for methane in his analysis, see Table 10a of EPA's March 2018 "Emission Factors for Greenhouse Gas Inventories," available here, https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf.

Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a Liberty Utilities

DG 17-152

Least Cost Integrated Resource Plan

Clark Data Requests - Set 5

Date Request Received: 8/16/19
Request No. Clark 5-9

Date of Response: 8/23/19
Respondent: Paul J. Hibbard

REQUEST:

Please state how, if at all, the use of a GWP of 84 for methane for all of Paul J. Hibbard's emissions calculations and assessments would change them (including relevant tables and figures) and Mr. Hibbard's conclusions.

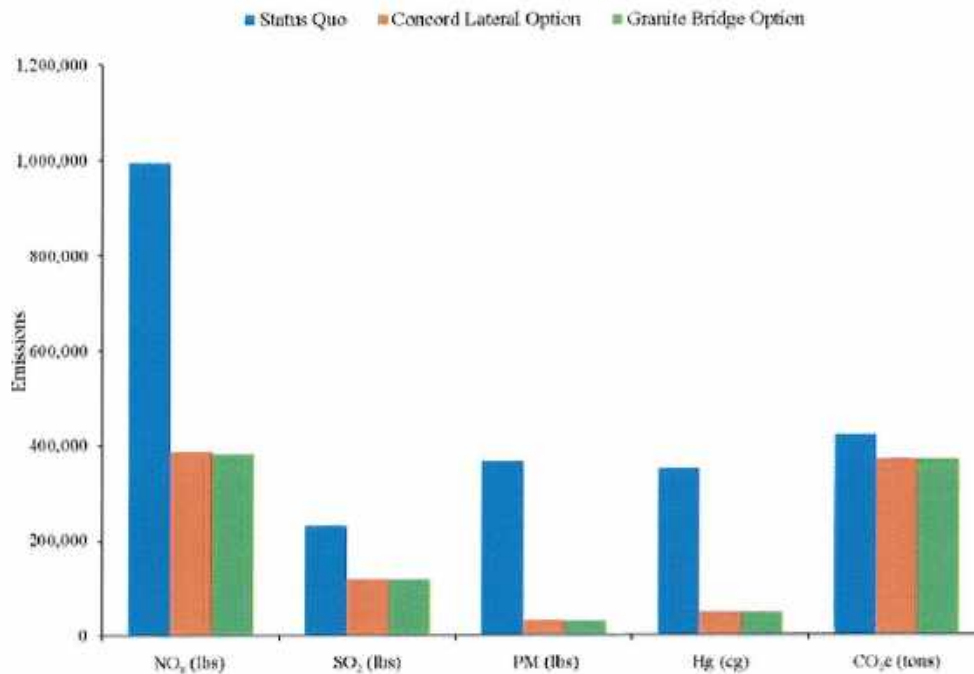
RESPONSE:

Mr. Hibbard recognizes there is some disagreement over GWP factors used in calculations of CO₂ equivalent emissions. However, Mr. Hibbard considers it most relevant and appropriate to apply a GWP of 25 for methane - which is a 100-year GWP - as it is the standard and default for policy and regulatory proceedings to use 100 year GWPs. See the sources under Table 10a of EPA's March 2018 "Emission Factors for Greenhouse Gas Inventories," available here, https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf. Also see the description of the 24.5 GWP of methane on page 70 of the New Hampshire Climate Action Plan, prepared by the New Hampshire Department of Environmental Services, March 2009, available at https://www.des.nh.gov/organization/divisions/air/tsb/tps/climate/action_plan/documents/nhcap_final.pdf.

Nevertheless, a calculation may be performed as a sensitivity using a different GWP for methane. In this case, the use of a 20-year GWP for methane of 84 as a sensitivity changes the magnitude of CO₂ equivalent emissions in Mr. Hibbard's results, but does not qualitatively change the outcome and would not affect the conclusions of Mr. Hibbard's analysis. Even with the use of an 84 GWP potential for methane, the Granite Bridge Option is still advantageous relative to the Concord Lateral and Status Quo options. See the figures and tables reporting CO₂ equivalent emissions in Mr. Hibbard's testimony reproduced using an 84 GWP for methane, below:

Docket No. DG 17-152 Request No. Clark 5-9

Sensitivity Figure 2: Short-run emissions impacts associated with total additional customers under IRP planning period - GWP of 84 for methane emissions.

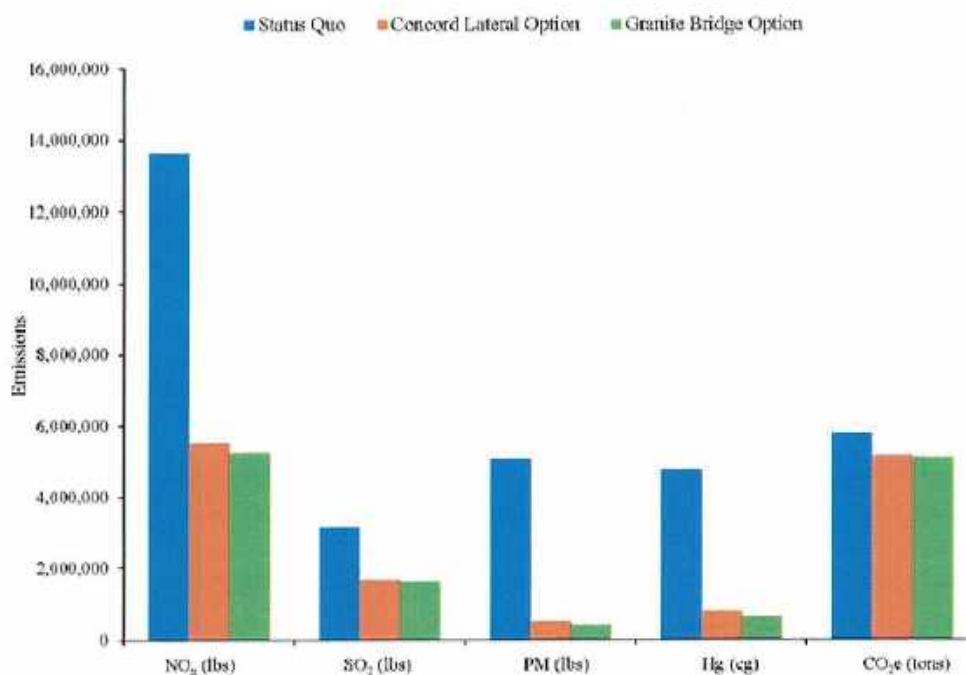


Backup Table to Sensitivity Figure 2: Total short-run emissions from customers remaining on existing heating technologies compared to switching to natural gas heating technologies under the IRP planning period - GWP of 84 for methane emissions.

<i>IRP</i>	Status Quo	Granite Bridge Option	Concord Lateral Option
NO _x (lbs)	995,514	383,102	385,690
SO ₂ (lbs)	230,746	118,962	119,453
PM (lbs)	367,469	30,779	31,795
Hg (cg)	351,316	47,762	49,140
CO ₂ e (tons)	421,976	371,199	371,417

Docket No. DG 17-152 Request No. Clark 5-9

Sensitivity Figure 3: Long-run emissions impacts associated with total additional customers under long-term Granite Bridge Pipeline planning period - GWP of 84 for methane emissions.



Sensitivity Table 2: Total long-run emissions from customers remaining on existing heating technologies compared to switching to natural gas heating technologies under the Granite Bridge or Concord Lateral Expansion options - GWP of 84 for methane emissions.

GB-LR	Status Quo	Granite Bridge Option	Concord Lateral Option
NO _x (lbs)	13,629,053	5,250,732	5,521,009
SO ₂ (lbs)	3,157,123	1,630,470	1,681,805
PM (lbs)	5,062,057	421,858	527,957
Hg (cg)	4,768,887	654,623	798,470
CO ₂ e (tons)	5,771,166	5,087,590	5,110,354

Sensitivity Table 4: Annual reductions in emissions associated with reduced delivery truck traffic - GWP of 84 for methane emissions (estimates in pounds).

	235 trucks	300 trucks
CO ₂ e (CO ₂ + CH ₄)	49,603.8	63,324.0
NO _x	285.7	364.7
PM _{2.5}	6.7	8.5

Liberty Utilities (EnergyNorth Natural Gas) Corp. d/b/a Liberty Utilities

DG 17-152
Least Cost Integrated Resource Plan

Clark Data Requests - Set 3

Date Request Received: 6/20/18
Request No. Clark 3-5

Date of Response: 7/2/18
Respondent: William R. Killeen

REQUEST:

Please see Liberty's responses to Request No. Clark 1-6, Request No. Clark 1-10, Request No. Clark 1-11 and Request No. Clark 1-12, and Attachment Clark 1-6. Should Liberty choose to inject the following natural gas supplies with sulfur, please identify the approximate amount of pounds that would be used for:

- A. The 100,000 gallons of LNG that may be stored at the Keene facilities.
- B. The 240,000 gallons of LNG that may be stored at the Lebanon facilities.
- C. The approximately 25 million gallons of LNG that may be stored at the Epping facilities.

RESPONSE:

- A. A typical level of odorant in a natural gas distribution system in the U.S. is 0.75 pounds per MMcf. Natural gas delivered via upstream transmission pipelines will typically have some level of odorant in it. In the event that it is not at the level required by the New Hampshire PUC, the Company will inject odorant to ensure these standards are met to ensure the safety of its customers. Assuming LNG were to have no odorant in it already, approximately 6 pounds of odorant would be used when vaporizing 100,000 gallons of LNG. (Please note that Scentinel® E, the odorant used by the Company, based on the manufacture specifications, contains 37% sulfur by weight. Thus, approximately 2.2 pounds of sulfur would be injected into 100,000 gallons of LNG as it is vaporized).
- B. Using the same assumptions in the response to subpart A., approximately 14.4 pounds of odorant would be used when vaporizing 240,000 gallons of LNG. (Also note, again based on the manufacture specifications, approximately 5.33 pounds of sulfur would be injected into 240,000 gallons of LNG as it is vaporized).
- C. Using the same assumptions in the response to subpart A., approximately 1,500 pounds of odorant would be used when vaporizing 25,000,000 gallons of LNG. (Also note, again based on the manufacture specifications, approximately 555 pounds of sulfur would be injected into 25,000,000 gallons of LNG as it is vaporized).



CHRISTOPHER T. SUNUNU
Governor

STATE OF NEW HAMPSHIRE
OFFICE OF THE GOVERNOR

DG 17-152 Exhibit 7

EXHIBIT

5

June 27, 2019

Richard Husband
10 Mallard Court
Litchfield, NH 03052

Dear Richard,

Thank you for reaching out to my office regarding offshore wind energy.

My administration has taken the first steps and we are working with the Bureau of Ocean Energy Management (BOEM) to establish a task force that will facilitate the coordination and consultation among federal, state, and local governments on renewable energy options in federal waters in the Gulf of Maine. The task force will undertake a public process over the next 1-2 years, which will include multiple public hearings.

The Gulf of Maine is one of the strongest opportunities for offshore wind production in the world. Offshore turbine energy is extremely efficient and emission free, and nineteen towns in New Hampshire have sent letters of support for the project. There are also numerous potential economic benefits, including establishing supply chain infrastructure in New Hampshire for our state and the entire region. The New Hampshire Department of Business and Economic Affairs is leading the charge to make the seacoast a hub for economic development of offshore wind.

As an environmental engineer, I am dedicated to New Hampshire's long and proud tradition of responsible environmental stewardship. Please know that the wind turbines would all be located in federal waters, at least 3 miles offshore. Throughout this process, New Hampshire will be listening to other states that have moved first on offshore wind energy, and learn from their experiences in balancing clean energy and protecting the ecosystem on New Hampshire's coastline. Every part of this project will go through permitting and BOEM approval for effects on the environment.

I will continue to work towards improving renewable energy options and lowering electric rates for Granite Staters. Again, thank you for contacting my office and please do not hesitate to get in touch with my office about other issues of concern to you.

Sincerely,

Christopher T. Sununu
Governor

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