

ATTACHMENT “A”

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:

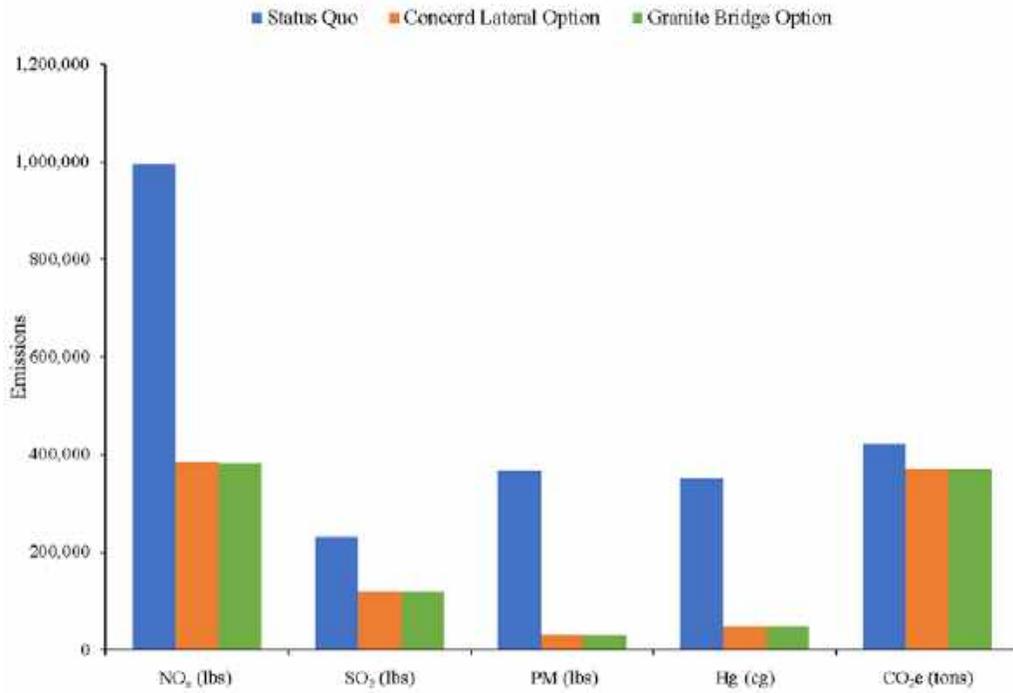
Please state how, if at all, the use of a GWP of 84 for methane for all of Paul J. Hibbard's emissions calculations and assessments would change them (including relevant tables and figures) and Mr. Hibbard's conclusions.

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:

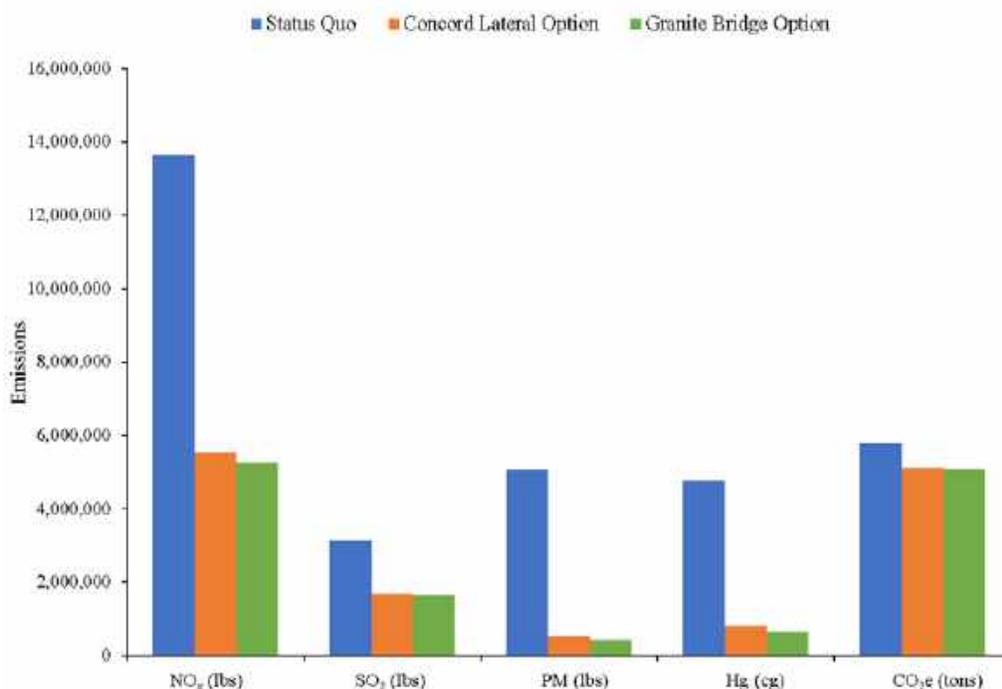
Sensitivity Figure 2: Short-run emissions impacts associated with total additional customers under IRP planning period - GWP of 84 for methane emissions.



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
SO₂ (lbs)	230,746	118,962	119,453
PM (lbs)	367,469	30,779	31,795
Hg (cg)	351,316	47,762	49,140
CO₂e (tons)	421,976	371,199	371,417

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.

<i>GB-LR</i>	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

ATTACHMENT “B”

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Liberty Utilities Announces New Solution to Preserve Energy Choices for NH Consumers

2020-07-31

Londonderry, NH -- Liberty Utilities filed supplemental testimony with the NH Public Utilities Commission (PUC) today, replacing the company's Granite Bridge proposal with a request to approve a 20-year contract for capacity on the existing gas transmission pipeline known as the Concord Lateral, serving Liberty's New Hampshire customers. By making use of newly-available capacity on existing infrastructure, Liberty Utilities would be able to allow New Hampshire families and businesses to choose clean, low-cost natural gas into the future, without the need to construct the Granite Bridge project. The new proposal could enable New Hampshire to eliminate more than 1 million tons of greenhouse gas emissions while preserving energy choice for New Hampshire consumers.

Liberty Utilities provides natural gas service to a growing customer base of more than 96,000 homes and businesses in 35 New Hampshire communities, including the cities of Manchester, Nashua, Concord, Laconia, Franklin, and surrounding towns. With more than 1,000 customers annually signing up for gas service in recent years, new customer load has been outpacing the gas system's capacity to meet peak demand. If approved, the solution Liberty announced today is expected to relieve the near-term system constraints threatening to cut off access to natural gas service for thousands of Granite Staters.

Granite Bridge was proposed in 2017 in response to the imminent threat of a natural gas capacity shortfall in New Hampshire. Additional capacity was not available on the Concord Lateral at the time, so Liberty identified the most cost-effective solution to allow customers continued access to natural gas. Granite Bridge would have made more efficient use of in-state infrastructure by linking two existing natural gas pipelines and would have included a state-of-the-art storage facility to increase supply diversity and resiliency while reducing customer exposure to extreme volatility in natural gas prices.

Recently, Liberty was able to negotiate for newly available capacity on the Concord Lateral at the lowest possible cost, presenting an opportunity to address forecasted demand without building Granite Bridge. Thanks to the rigorous review process at the PUC and a collaborative effort between PUC staff, the Office of the Consumer Advocate, other parties, and Liberty Utilities, a new solution was identified and proposed, providing enhanced value for Liberty Utilities' customers and for the State of New Hampshire.

Sue Fleck, President of Liberty-NH, issued the following statement:

"Liberty's customer-centric mission means we are constantly working to maximize value for our customers and for New Hampshire's communities. That's why we proposed the Granite Bridge project in the first place – to ensure natural gas service would be available for customers who want it with minimal impact to host communities. We always strive to put our customers and our communities first, and our new filing today reflects that.

Making sure natural gas is available for customers who want it is critical not only for New Hampshire's economy and for families' pocketbooks, but also to enable the deepest, fastest, and most achievable pathway for decarbonizing our economy and taking action on climate change. Customers choosing cleaner natural gas over dirtier fuels in Liberty's service territory alone could result in 1 million tons of greenhouse gases emission reductions over the next 20 years. But we know we must go even further to achieve the kind of emissions reductions necessary to avoid the worst effects of climate change. That's why Liberty is committed to expanding energy efficiency, developing local sources of net-zero or carbon-negative fuels like Renewable Natural Gas and hydrogen from renewable electricity, and other innovative solutions to keep Granite Staters warm in the winter and fuel our economy while enabling immediate, deep decarbonization.

Liberty is proud to be part of the Algonquin Power & Utilities Corp. family, and we are honored to be ranked #10 on the Global 100 list of the planet's most sustainable companies.¹ Sustainability guides everything we do, including our company-wide support for the Intergovernmental Panel on Climate Change's goals to limit planetary warming through decarbonization. We look forward to continuing to work toward a sustainable future for New Hampshire."

About Liberty Utilities

Liberty Utilities Co. and its affiliates owns and operates regulated water, wastewater, natural gas and electric transmission and distribution utilities in 13 states and 1 Canadian province, delivering responsive and reliable essential services to over 805,000 customers across the United States and Canada. With a local approach to management, service and support, we deliver efficient, dependable services to meet the needs of our customers. Liberty Utilities provides a superior customer experience through walk-in customer centers, locally focused conservation and energy efficiency initiatives, and programs for businesses and residential customers. We measure our performance in terms of service reliability, an enjoyable customer experience, and an unwavering dedication to public and workplace safety. Liberty Utilities currently operates in Arizona,

Arkansas, California, Georgia, Illinois, Iowa, Kansas, Massachusetts, Missouri, New Hampshire, New York, Oklahoma, Texas, and the Province of New Brunswick. For more information, please visit www.LibertyUtilities.com.

Caution Regarding Forward-Looking Information

Certain statements included in this news release constitute "forward-looking information" within the meaning of applicable securities laws in each of the provinces of Canada and the respective policies, regulations and rules under such laws and "forward-looking statements" within the meaning of the U.S. Private Securities Litigation Reform Act of 1995 (collectively, "forward-looking statements"). The words "will", "intends", "expects" and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. Specific forward-looking statements contained herein include, but are not limited to statements regarding future growth and capacity; reduction of greenhouse gas emissions; forecasted demand and system constraints; potential impacts and benefits to customers; and plans regarding sustainability, including potential energy sources. These statements are based on factors or assumptions that were applied in drawing a conclusion or making a forecast or projection, including assumptions based on historical trends, current conditions and expected future developments. Since forward-looking statements relate to future events and conditions, by their very nature they require making assumptions and involve inherent risks and uncertainties. Liberty Utilities cautions that although it is believed that the assumptions are reasonable in the circumstances, these risks and uncertainties give rise to the possibility that actual results may differ materially from the expectations set out in the forward-looking statements. Other than as specifically required by law, Liberty Utilities undertakes no obligation to update any forward-looking statements to reflect new information, subsequent or otherwise.

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¹ See Corporate Knights 2020 Global 100 ranking: <https://www.corporateknights.com/reports/2020-global-100/2020-global-100-ranking-15795648/>

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ATTACHMENT “C”



NEWSROOM ► POST

The evidence is clear: the time for action is now. We can halve emissions by 2030.

GENEVA, Apr 4 – In 2010-2019 average annual global greenhouse gas emissions were at their highest levels in human history, but the rate of growth has slowed. Without immediate and deep emissions reductions across all sectors, limiting global warming to 1.5°C is

beyond reach. However, there is increasing evidence of climate action, said scientists in the latest Intergovernmental Panel on Climate Change (IPCC) report released today.

Since 2010, there have been sustained decreases of up to 85% in the costs of solar and wind energy, and batteries. An increasing range of policies and laws have enhanced energy efficiency, reduced rates of deforestation and accelerated the deployment of renewable energy.

“We are at a crossroads. The decisions we make now can secure a liveable future. We have the tools and know-how required to limit warming,” said IPCC Chair Hoesung Lee. “I am encouraged by climate action being taken in many countries. There are policies, regulations and market instruments that are proving effective. If these are scaled up and applied more widely and equitably, they can support deep emissions reductions and stimulate innovation.”

The Summary for Policymakers of the IPCC Working Group III report, *Climate Change 2022: Mitigation of climate change* was approved on April 4 2022, by 195 member governments of the IPCC, through a virtual approval session that started on March 21. It is the third instalment of the IPCC’s Sixth Assessment Report (AR6), which will be completed this year.

We have options in all sectors to at least halve emissions by 2030

Limiting global warming will require major transitions in the energy sector. This will involve a substantial reduction in fossil fuel use, widespread electrification, improved energy efficiency, and use of alternative fuels (such as hydrogen).

“Having the right policies, infrastructure and technology in place to enable changes to our lifestyles and behaviour can result in a 40-70% reduction in greenhouse gas emissions by 2050. This offers significant untapped potential,” said IPCC Working Group III Co-Chair Priyadarshi Shukla. “The evidence also shows that these lifestyle changes can improve our health and wellbeing.”

Cities and other urban areas also offer significant opportunities for emissions reductions. These can be achieved through lower energy consumption (such as by creating compact, walkable cities), electrification of transport in combination with low-emission energy sources, and enhanced carbon uptake and storage using nature. There are options for established, rapidly growing and new cities.

“We see examples of zero energy or zero-carbon buildings in almost all climates,” said IPCC Working Group III Co-Chair Jim Skea. “Action in this decade is critical to capture the mitigation potential of buildings.”

Reducing emissions in industry will involve using materials more efficiently, reusing and recycling products and minimising waste. For basic materials, including steel, building materials and chemicals, low- to zero-greenhouse gas production processes are at their pilot to near-commercial stage.

This sector accounts for about a quarter of global emissions. Achieving net zero will be challenging and will require new production processes, low and zero emissions electricity, hydrogen, and, where necessary, carbon capture and storage.

Agriculture, forestry, and other land use can provide large-scale emissions reductions and also remove and store carbon dioxide at scale. However, land cannot compensate for delayed emissions reductions in other sectors. Response options can benefit biodiversity, help us adapt to climate change, and secure livelihoods, food and water, and wood supplies.

The next few years are critical

In the scenarios we assessed, limiting warming to around 1.5°C (2.7°F) requires global greenhouse gas emissions to peak before 2025 at the latest, and be reduced by 43% by 2030; at the same time, methane would also need to be reduced by about a third. Even if we do this, it is almost inevitable that we will temporarily exceed this temperature threshold but could return to below it by the end of the century.

“It’s now or never, if we want to limit global warming to 1.5°C (2.7°F),” said Skea. “Without immediate and deep emissions reductions across all sectors, it will be impossible.”

The global temperature will stabilise when carbon dioxide emissions reach net zero. For 1.5°C (2.7°F), this means achieving net zero carbon dioxide emissions globally in the early 2050s; for 2°C (3.6°F), it is in the early 2070s.

This assessment shows that limiting warming to around 2°C (3.6°F) still requires global greenhouse gas emissions to peak before 2025 at the latest, and be reduced by a quarter by 2030.

Closing investment gaps

The report looks beyond technologies and demonstrates that while financial flows are a factor of three to six times lower than levels needed by 2030 to limit warming to below 2°C (3.6°F), there is sufficient global capital and liquidity to close investment gaps. However, it relies on clear signalling from governments and the international community, including a stronger alignment of public sector finance and policy.

“Without taking into account the economic benefits of reduced adaptation costs or avoided climate impacts, global Gross Domestic Product (GDP) would be just a few percentage points lower in 2050 if we take the actions necessary to limit warming to 2°C (3.6°F) or below, compared to maintaining current policies,” said Shukla.

Achieving the Sustainable Development Goals

Accelerated and equitable climate action in mitigating and adapting to climate change impacts is critical to sustainable development.

Some response options can absorb and store carbon and, at the same time, help communities limit the impacts associated with climate change. For example, in cities, networks of parks and open spaces, wetlands and urban agriculture can reduce flood risk and reduce heat-island effects.

Mitigation in industry can reduce environmental impacts and increase employment and business opportunities. Electrification with renewables and shifts in public transport can enhance health, employment, and equity.

“Climate change is the result of more than a century of unsustainable energy and land use, lifestyles and patterns of consumption and production,” said Skea. “This report shows how taking action now can move us towards a fairer, more sustainable world.”

For more information, please contact:

IPCC Press Office, Email: ipcc-media@wmo.int

IPCC Working Group III:

Sigourney Luz: s.luz@ipcc-wg3.ac.uk

Notes for editors:

Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

The Working Group III report provides an updated global assessment of climate change mitigation progress and pledges, and examines the sources of global emissions. It explains developments in emission reduction and mitigation efforts, assessing the impact of national climate pledges in relation to long-term emissions goals.

Working Group III introduces several new components in its latest report: One is a new chapter on the social aspects of mitigation, which explores the ‘demand side’, i.e. what drives consumption and greenhouse gas emissions. This chapter is a partner to the sectoral chapters in the report, which explore the ‘supply side’ of climate change – what produces emissions. There is also a cross-sector

chapter on mitigation options that cut across sectors, including carbon dioxide removal techniques. And there is a new chapter on innovation, technology development and transfer, which describes how a well-established innovation system at a national level, guided by well-designed policies, can contribute to mitigation, adaptation and achieving the sustainable development goals, while avoiding undesired consequences.

The Summary for Policymakers of the Working Group III contribution to the Sixth Assessment Report (AR6) as well as additional materials and information are available at <https://www.ipcc.ch/report/ar6/wg3/>

Note: Originally scheduled for release in July 2021, the report was delayed for several months by the COVID-19 pandemic, as work in the scientific community including the IPCC shifted online. This is the third time that the IPCC has conducted a virtual approval session for one of its reports.

AR6 Working Group III in numbers

278 authors from 65 countries

- 36 – coordinating lead authors
- 163 – lead authors
- 38 – review editors

plus

- 354 – contributing authors

Over 18,000 cited references

A total of 59,212 expert and government review comments

(First Order Draft 21,703; Second Order Draft 32,555; Final Government Distribution: 4, 954)

About the IPCC

The Intergovernmental Panel on Climate Change (IPCC) is the UN body for assessing the science related to climate change. It was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988 to provide political leaders with periodic scientific assessments concerning climate change, its implications and risks, as well as to put forward adaptation and mitigation strategies. In the same year the UN General Assembly endorsed the action by the WMO and UNEP in jointly establishing the IPCC. It has 195 member states.

Thousands of people from all over the world contribute to the work of the IPCC. For the assessment reports, experts volunteer their time as IPCC authors to assess the thousands of scientific papers published each year to provide a comprehensive summary of what is known about the drivers of climate change, its impacts and future risks, and how adaptation and mitigation can reduce those risks.

The IPCC has three working groups: [Working Group I](#), dealing with the physical science basis of climate change; [Working Group II](#), dealing with impacts, adaptation and vulnerability; and [Working](#)

Group III, dealing with the mitigation of climate change. It also has a Task Force on National Greenhouse Gas Inventories that develops methodologies for measuring emissions and removals.

IPCC assessments provide governments, at all levels, with scientific information that they can use to develop climate policies. IPCC assessments are a key input into the international negotiations to tackle climate change. IPCC reports are drafted and reviewed in several stages, thus guaranteeing objectivity and transparency.

About the Sixth Assessment Cycle

Comprehensive scientific assessment reports are published every 6 to 7 years; the latest, the [Fifth Assessment Report](#), was completed in 2014 and provided the main scientific input to the Paris Agreement.

At its 41st Session in February 2015, the IPCC decided to produce a [Sixth Assessment Report \(AR6\)](#). At its 42nd Session in October 2015 it elected a new Bureau that would oversee the work on this report and Special Reports to be produced in the assessment cycle. At its 43rd Session in April 2016, it decided to produce three Special Reports, a Methodology Report and AR6.

The Working Group I contribution to the Sixth Assessment Report *Climate Change 2021: the Physical Science Basis* was released on 9 August 2021. The Working Group II contribution, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, was released on 28 February 2022.

The concluding Synthesis Report is due in autumn 2022.

The IPCC also publishes special reports on more specific issues between assessment reports.

Global Warming of 1.5°C, an IPCC special report on the impacts of global warming of 1.5 degrees Celsius (2.7°F) 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 was launched in October 2018.

Climate Change and Land, an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems was launched in August 2019, and the *Special Report on the Ocean and Cryosphere in a Changing Climate* was released in September 2019.

In May 2019 the IPCC released the *2019 Refinement to the 2006 IPCC Guidelines on National Greenhouse Gas Inventories*, an update to the methodology used by governments to estimate their greenhouse gas emissions and removals.

For more information visit www.ipcc.ch.

The website includes outreach materials including videos about the IPCC and video recordings from outreach events conducted as webinars or live-streamed events.

Most videos published by the IPCC can be found on our YouTube channel.

DATE

April 4, 2022

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ASSESSMENT REPORT

- Sixth Assessment Report

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