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

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**REQUEST:**

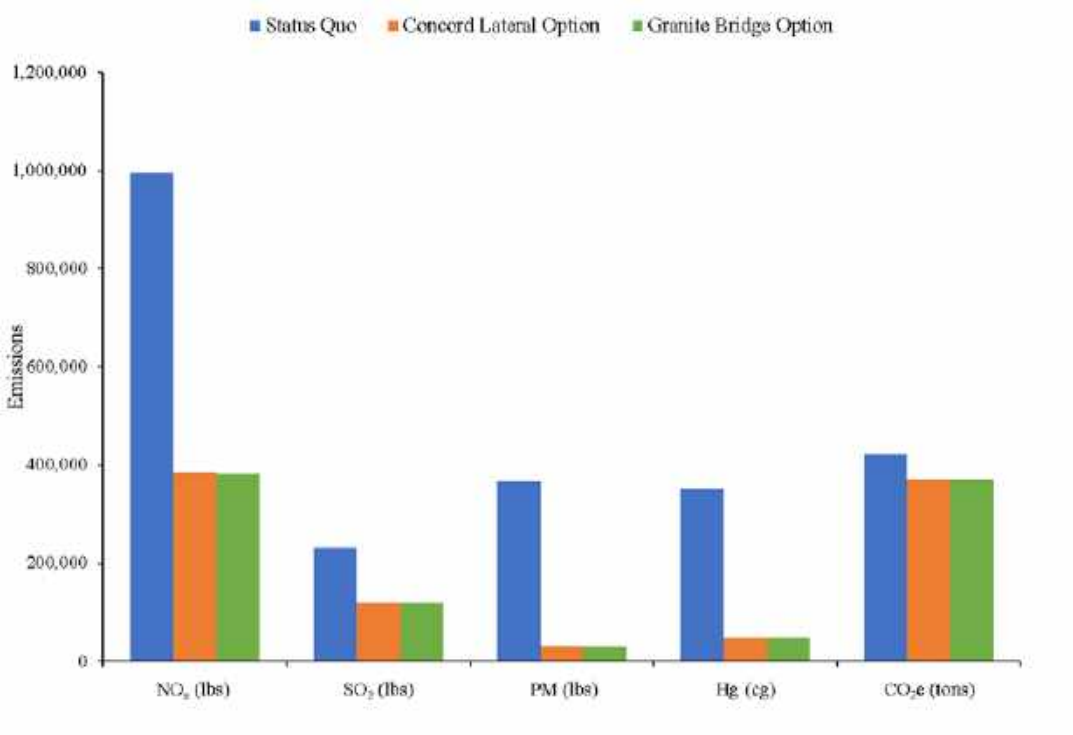
Please state how, if at all, the use of a GWP of 84 for methane for all of Paul J. Hibbard's emissions calculations and assessments would change them (including relevant tables and figures) and Mr. Hibbard's conclusions.

**RESPONSE:**

Mr. Hibbard recognizes there is some disagreement over GWP factors used in calculations of $CO_2$ 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 $CO_2$ 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 $CO_2$ equivalent emissions in Mr. Hibbard's testimony reproduced using an 84 GWP for methane, below:

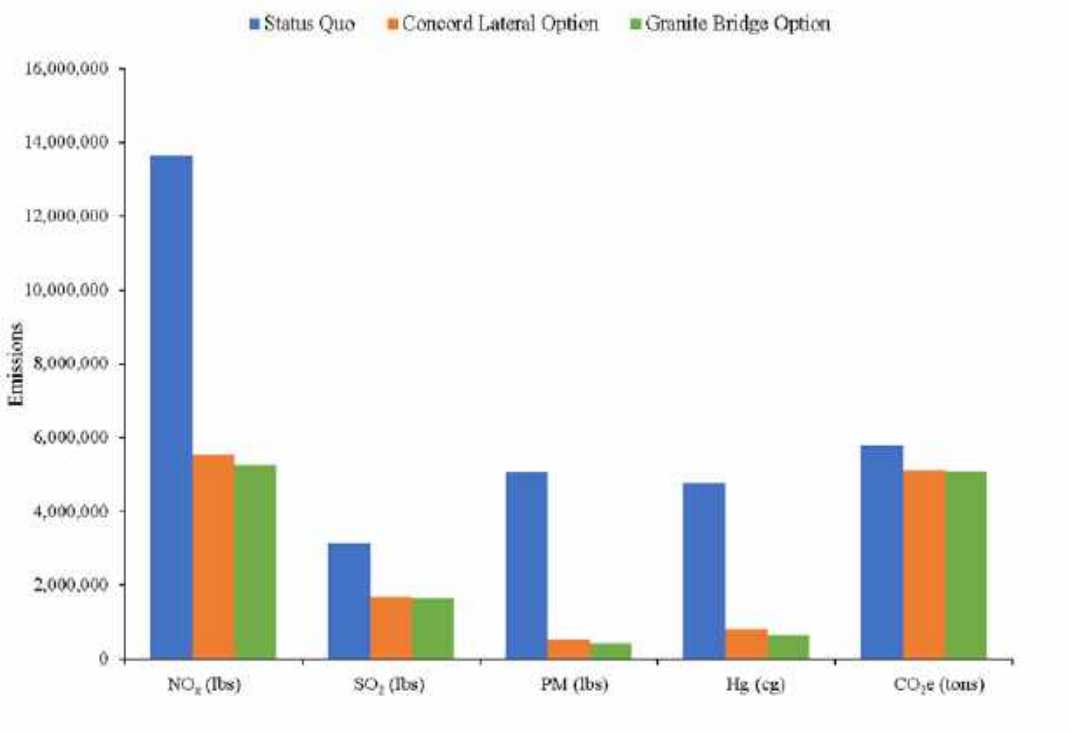
**Sensitivity Figure 2**: Short-run emissions impacts associated with total additional customers under IRP planning period - GWP of 84 for methane emissions.




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.

| *IRP* | 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 |
| **$CO_2e$ (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.

| *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 |
| **$CO_2e$ (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 |
|---|---|---|
| **$CO_2e$ ($CO_2$ + $CH_4$)** | 49,603.8 | 63,324.0 |
| **$NO_x$** | 285.7 | 364.7 |
| **$PM_{2.5}$** | 6.7 | 8.5 |