LNG Basics

What is LNG?
- LNG is natural gas in liquid form
- It is made by cooling natural gas to approximately -260 Degrees (f)
- The volume of the gas is reduced to 1/600 of its original size

How is LNG Made?
- Gas is transported via pipeline to a liquefaction facility
- Impurities are removed from the gas
- Gas is run through a cooling process and stored cryogenically
**LNG Basics**

How is LNG vaporized?
- LNG is stored until it is needed
- LNG is removed from the tank and reheated
- The reheated LNG vaporizes back into gaseous form
- The natural gas is then re-odorized and put into pipelines for distribution

**LNG Uses:**
- Peak Shaving
- Transportation
- Supply Reliability
- Base Load
Operating Parameters: (Questions 22g, 24, & 25)

- Liquefaction of gas would occur approximately 180* days each year April-September (would not utilize peak capacity of feeder line)
- Approximate 30 day transition window (October)
- Vaporization of gas available approximately 150 days each year (November-March)

*Typo in M.Gill testimony incorrectly indicated 100 days
Sizing Criteria: (Questions 22a, 22d, 22e, & 22f)

Liquefaction Rate: 8.2 MMcfd (Common Capacity Size)
Vaporization Rate: 150 MMcfd
Storage Tank Size: 15 million gallons (See Table Below)

<table>
<thead>
<tr>
<th>Size</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 M Gallon</td>
<td>25</td>
<td>36%</td>
</tr>
<tr>
<td>15 M Gallon</td>
<td>11</td>
<td>16%</td>
</tr>
<tr>
<td>Greater than 5M Less Than 12M Gallon</td>
<td>34</td>
<td>48%</td>
</tr>
</tbody>
</table>

Ancillary Uses: (Questions 13 & 21)

- In addition to providing supply reliability, the plant could be used to serve remote communities in Utah.
  - Satellite vaporization facilities could use trucked LNG to provide base load for their communities.
  - After initial filling, the full liquefaction window would likely not be needed solely to fill the tank. Portions of the liquefaction window could be used to fill remote tanks.
  - The current design of the plant does not include trucking terminals.
    - Additional liquefaction trains and trucking terminals could be added in the future.
Ancillary Uses: (Questions 5, 13d, 22d, & 22f)

Serving Remote Communities:

<table>
<thead>
<tr>
<th>City</th>
<th>Footage</th>
<th>Pipeline Extension</th>
<th>Cost</th>
<th>Peak Daily Load MMcf</th>
<th>Max Annual Load MMcf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green River</td>
<td>232,000</td>
<td>4&quot;</td>
<td>$42,246,000</td>
<td>0.7</td>
<td>52</td>
</tr>
<tr>
<td>Bear Lake</td>
<td>61,175</td>
<td>6&quot;</td>
<td>$15,120,000</td>
<td>8.2</td>
<td>1125</td>
</tr>
<tr>
<td>Kanab</td>
<td>332,640</td>
<td>6&quot;</td>
<td>$94,864,898</td>
<td>2.3</td>
<td>160</td>
</tr>
<tr>
<td>Wendover</td>
<td>397,000</td>
<td>6&quot;</td>
<td>$119,122,127</td>
<td>1.7</td>
<td>144</td>
</tr>
</tbody>
</table>

*Satellite Facility with 270,000 gallon storage and 10 MMcf vaporization: $25M-$30M
(Pipeline Extension Costs do not include IHP distribution system costs)
Project Rendering
LNG Facility for Peak-Hour Needs vs. LNG Facility for Supply Reliability (Question 1)

- DEU explores all alternatives when evaluating solutions to business needs
  - 1990's – an LNG facility was considered to meet customer growth as opposed to pipeline expansion and new gate station construction
  - 2014 – an LNG facility was considered as an alternative to off-system Aquifer storage contracts
  - 2016-2017 – an LNG facility was considered to meet peak-hour demands
    DEU determined Firm Peaking Services were a more cost-effective solution
  - 2017-2018 – an LNG facility was considered for supply reliability
    Current facility design is smaller than what was considered to meet both the peak-hour demand and supply reliability
Probability of Supply Shortfalls on Cold Days (Questions 7, 16, & 22c)

Supply Cuts vs. Mean Temp (2011-2017)
Why Can't DEU Continue to Rely on Purchases and/or Storage to Make Up for Supply Shortfalls as it has for Past Events? (Question 8)

2018 - 2019 Sources for Peak Day

- Ryckman Storage
- Aquifers
- Clay Basin
- Spot
- Peaking Purchase
- Baseload Purchase
- Cost-of-service

Peak Day High Sendout Day
Comparisons of the LNG facility to other Alternatives (Question 11)
Is the LNG the "Least Expensive Option"? (Question 12)

- A few of the options that were considered were at a lower cost than an LNG facility
- These "lower cost" options did not meet all of the needs to ensure supply reliability and presented unacceptably high risk
- In addition to cost, the statute also requires consideration of:
  - Long-term and short-term impacts
  - Risk
  - Reliability
  - Financial impacts on the utility
  - Other factors determined by the Commission
Planned In-Service Date for the LNG Facility? (Question 14)

- The planned in-service date is 2022
- Paragraph 28 of the Application contains a typographical error
Force Majeure Clauses in Supply Contracts and Transportation Contracts (Question 18)

- DEU has not agreed to add supply freeze-offs as a force majeure event in its gas supply contracts
- DEU has penalties in its contracts for liquidated damages
- From a commercial standpoint the Company cannot insist on increased penalties without limiting the counterparties that would be willing to sell gas to DEU
- Limiting the number of counterparties transacting will result in reduced availability and/or increased costs
- Counterparties will not agree to remove force majeure clauses from contracts or tariffs
Storage Cavern Potential on DEU System (Question 17)

- No known gas fields or salt caverns at, near or adjacent to the DEU system
- Confirmed with a Geologist and Petroleum Engineer
Other Uses (Questions 3 & 26)

- 30% needs to be used yearly
  - Serving rural communities
  - Potential flexibility/reduction in gas supply purchases
- Wexpro gas used for injections
  - Reduction in amount of summer shut-ins
**Economic Impact (Question 9)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Low Scenario</th>
<th>High Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absolute</td>
<td>Relative*</td>
</tr>
<tr>
<td>Total Employment</td>
<td>-7,103</td>
<td>-0.36%</td>
</tr>
<tr>
<td>Personal Income</td>
<td>-$341.5</td>
<td>-0.26%</td>
</tr>
<tr>
<td>Gross State Product</td>
<td>-$1,445.9</td>
<td>-0.85%</td>
</tr>
</tbody>
</table>

* Relative to 2017 baseline.

Source: Kem C. Gardner Policy Institute analysis of Dominion Energy data using the REMI Pl+ v2.1.2 model.
Restoration Cost

- Restoration Timeline – 51 Days

- Cost to the Company
  Estimated Minimum $10,450,000
  Estimated Maximum $104,600,000 - (Coalville extrapolation)
## Cost of a Major System Outage

<table>
<thead>
<tr>
<th></th>
<th>Major System Outage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Disruption Probability</td>
<td>&gt; 7%</td>
</tr>
<tr>
<td>State Economic Impact</td>
<td>$2.4B</td>
</tr>
<tr>
<td>Company Costs</td>
<td>$105M</td>
</tr>
<tr>
<td>Property Damage</td>
<td>&gt; $0</td>
</tr>
<tr>
<td>Resulting Loss of Life</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
Other System Risks that Increase the Probability

- Landslides
- Flooding
- Earthquakes
- Human Error
- Upstream Facility Design Inadequacies and Maintenance
- Cyber Attacks
- Third-Party Damage
- Risk Factors Associated with NAESB Cycles
Cost / Benefit – Other Companies

- We do not have access to other companies’ Cost / Benefit analyses

- Other companies have commission-approved on-system storage
  
  LNG on LDC systems in the US  45%
  Reported on-system storage  77%

- Dominion Energy Utah currently has no on-system storage of any kind
Length of Coverage (Questions 15, 19, & 20)

No reduction in vaporization capacity due to tank volume
Sizing Scenarios (Question 22a & b)
Specific Sites

In addition to the selected site, the Company considered the following locations:

- Point of the Mountain
- Lark
- North Salt Lake
Interruptible Transportation customers who don't interrupt

- Customers Volumes are cut
- Customer continues to burn
- Customer penalized $40/Dth
- Penalties returned to other customers
Rate Issues

Interruptible Customers who do not interrupt (Question 2)

Transportation Customers in Green River, Kanab (Question 4)

Remote locations Cost Sharing (Question 6 and 13e)

What's included in 30 Year Levelized Cost (Question 10)
30 Year Levelized Costs

- Operating Expenses
- Maintenance Expenses
- Overheads
- Depreciation Expense
- Income Taxes
- Other Taxes
- Return on Rate Base