Supply Reliability Technical Conference

Docket 18-057-03

Dominion Energy

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

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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)

Typical PHMSA Tank Sizes (Peak Shaver Facilities)		
Size	Number	Percentage
12 M Gallon	25	36%
15 M Gallon	11	16%
Greater than 5M Less Than 12M Gallon	34	48%

*Does not include marine terminals, trucking and satellite facilities. See https://www.phmsa.dot.gov/pipeline/liquified-natural-gas/lng-data-and-maps for more information

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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:

City	Footage	Pipeline Extension	Cost	Peak Daily Load MMcfd	Max Annual Load MMcf
Green River	232,000	4"	$ 42,246,000	0.7	52
Bear Lake	61,175	6"	$ 15,120,000	8.2	1125
Kanab	332,640	6"	$ 94,864,898	2.3	160
Wendover	397,000	6"	$ 119,122,127	1.7	144

*Satellite Facility with 270,000 gallon storage and 10 MMcfd vaporization: $25M-$30M
(Pipeline Extension Costs do not include IHP distribution system costs)

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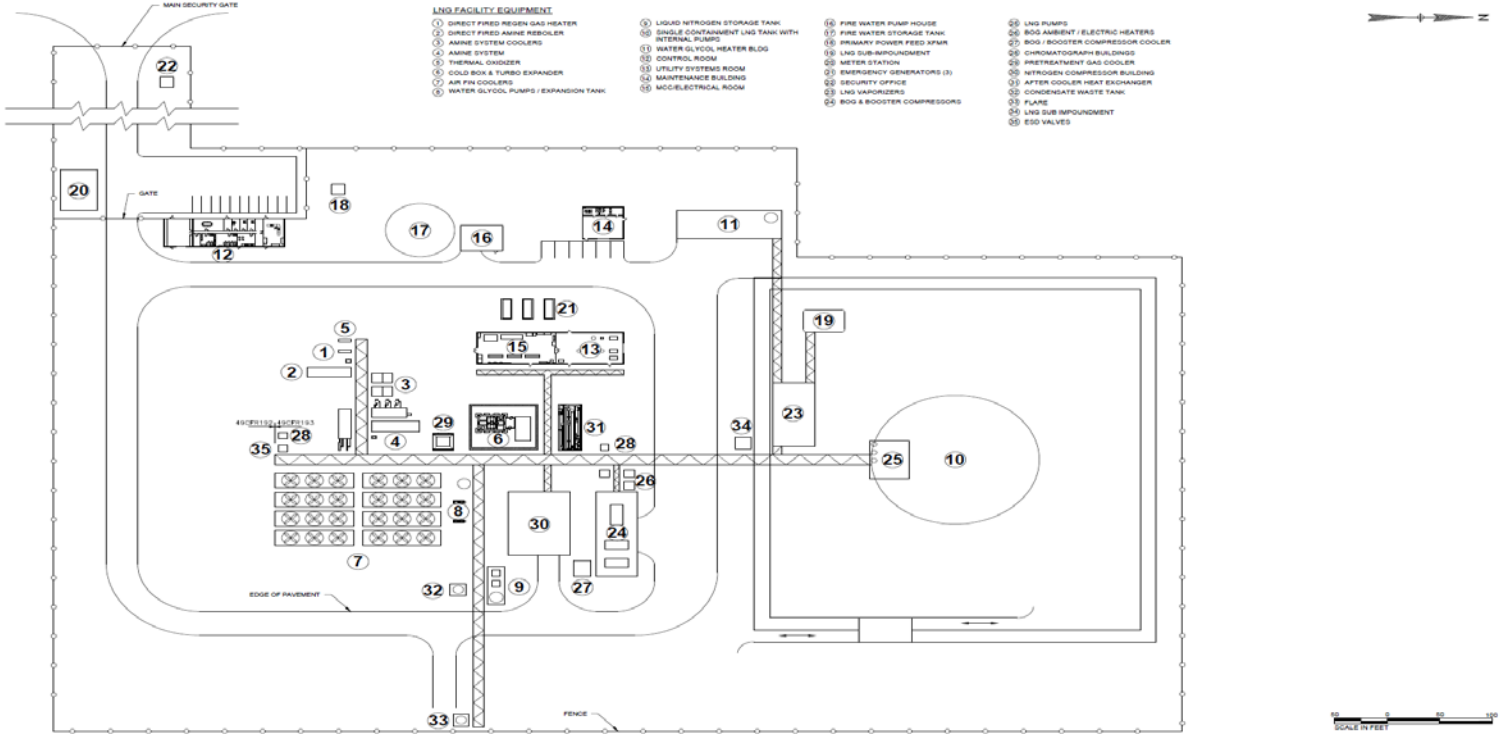
Site Layout



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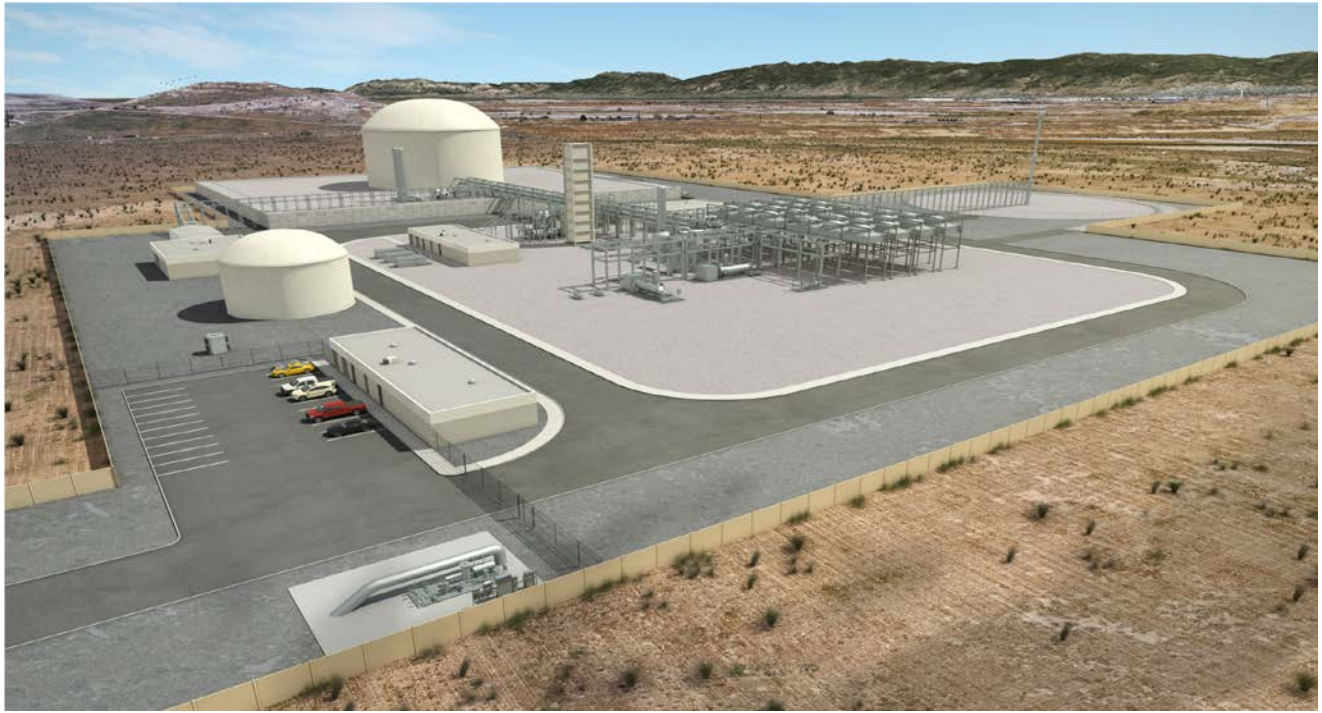
Project Rendering



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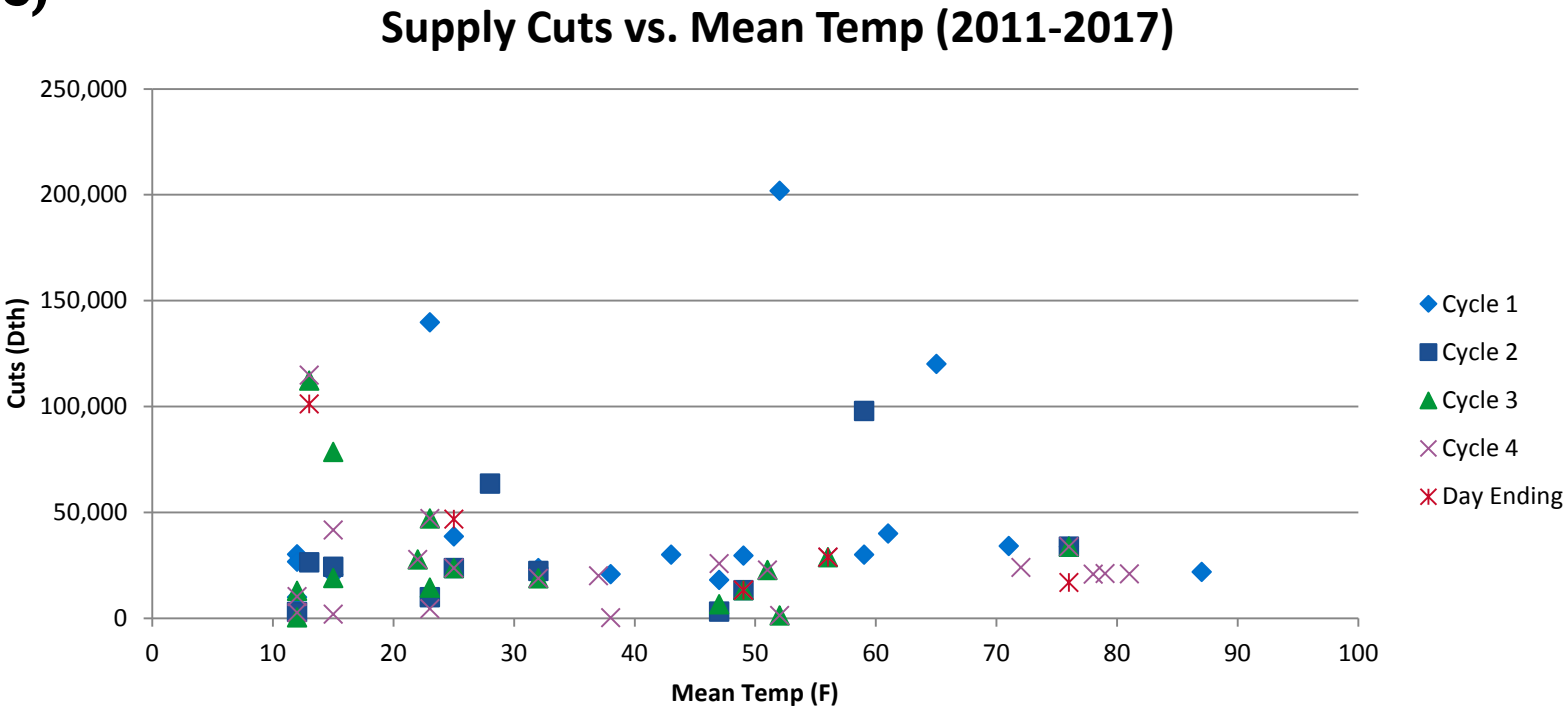
LNG Facility for Peak-Hour Needs vs. LNG Facility for Supply Reliability (Question 1)

- 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)



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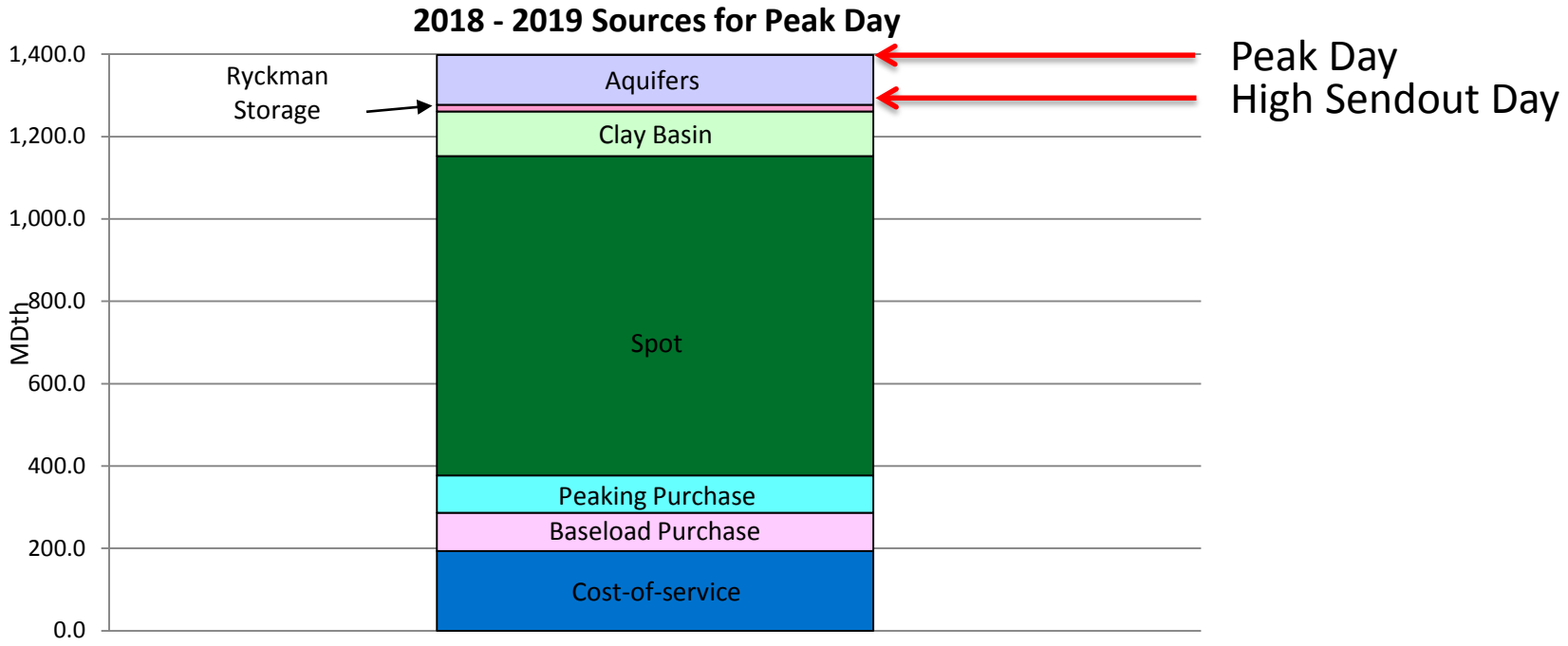
Why Can't DEU Continue to Rely on Purchases and/or Storage to Make Up for Supply Shortfalls as it has for Past Events? (Question 8)



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Comparisons of the LNG facility to other Alternatives (Question 11)

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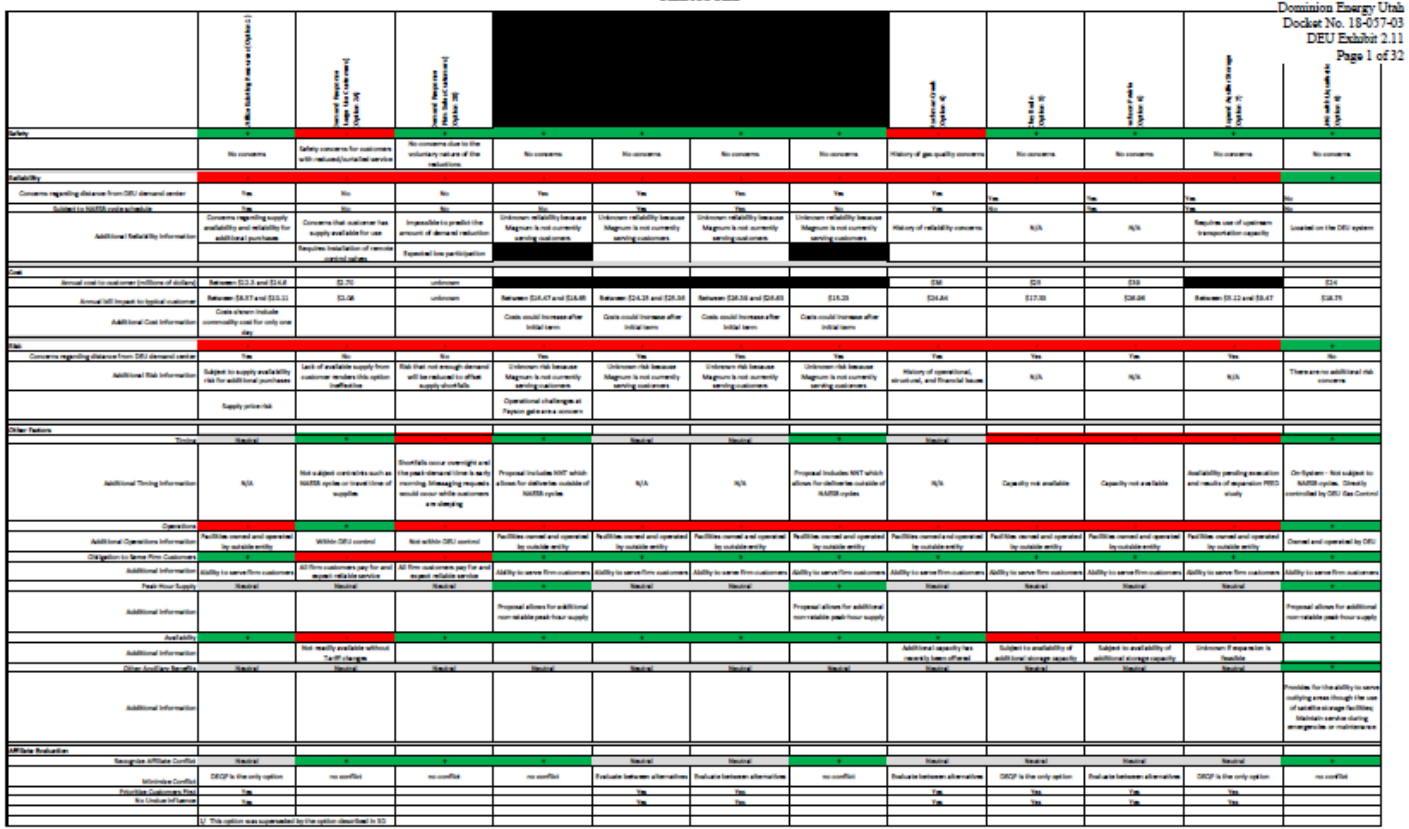

Is the LNG the "Least Expensive Option"? (Question 12)

- 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

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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

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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

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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

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Economic Impact (Question 9)

Table 1: Economic Impacts of a Natural Gas System Outage
(Millions of 2017 Dollars)

Category	Low Scenario		High Scenario	
	Absolute	Relative*	Absolute	Relative*
Total Employment	–7,103	–0.36%	–11,586	–0.58%
Personal Income	–$341.5	–0.26%	–$556.9	–0.42%
Gross State Product	–$1,445.9	–0.85%	–$2,375.6	–1.39%

* Relative to 2017 baseline.
Source: Kem C. Gardner Policy Institute analysis of Dominion Energy data using the REMI PI+ v2.1.2 model.

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Restoration Cost

- Restoration Timeline – 51 Days

- Cost to the Company

  Estimated Minimum $10,450,000

  Estimated Maximum $104,600,000 - (Coalville extrapolation)

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Cost of a Major System Outage

	Major System Outage
Supply Disruption Probability	> 7%
State Economic Impact	$2.4B
Company Costs	$105M
Property Damage	> $0
Resulting Loss of Life	Unknown

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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

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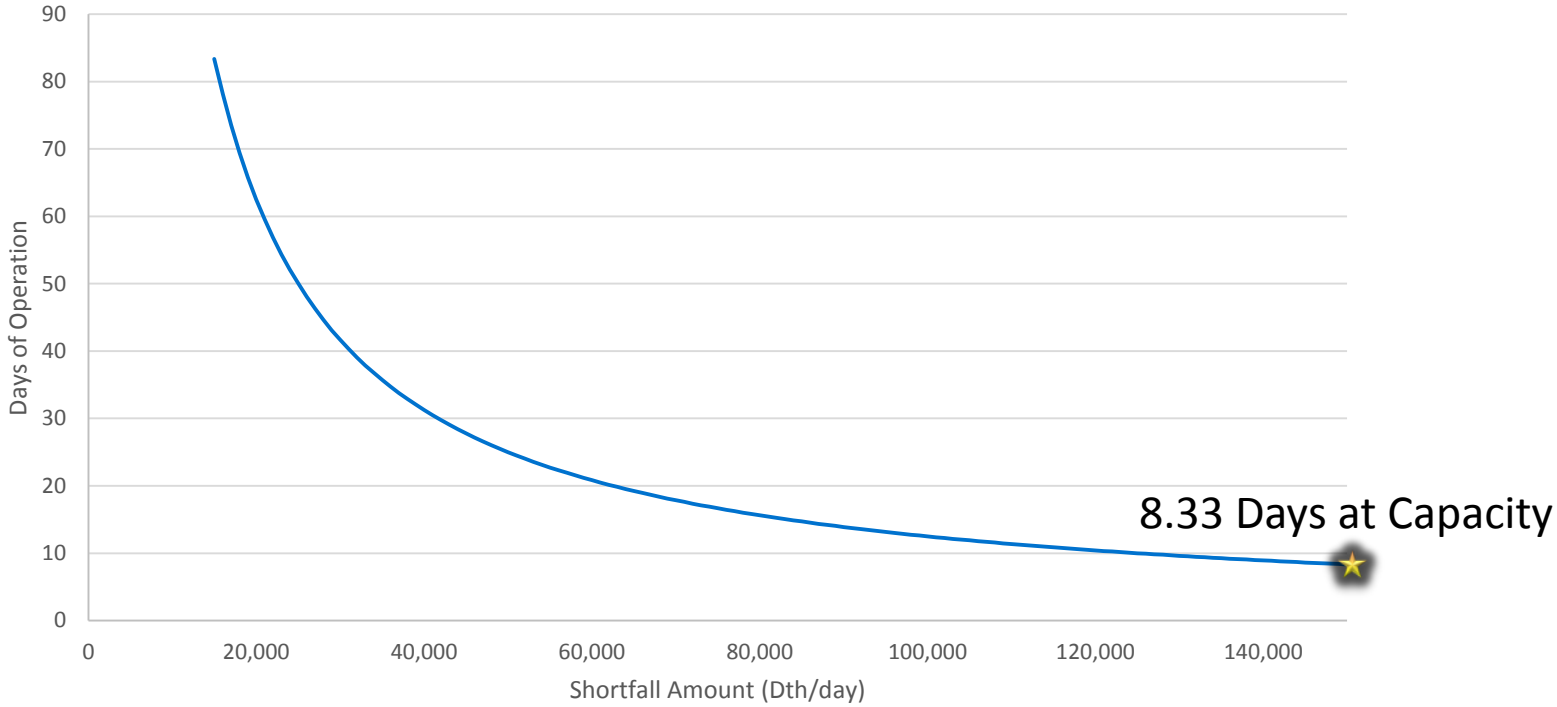
Cost / Benefit – Other Companies

- 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

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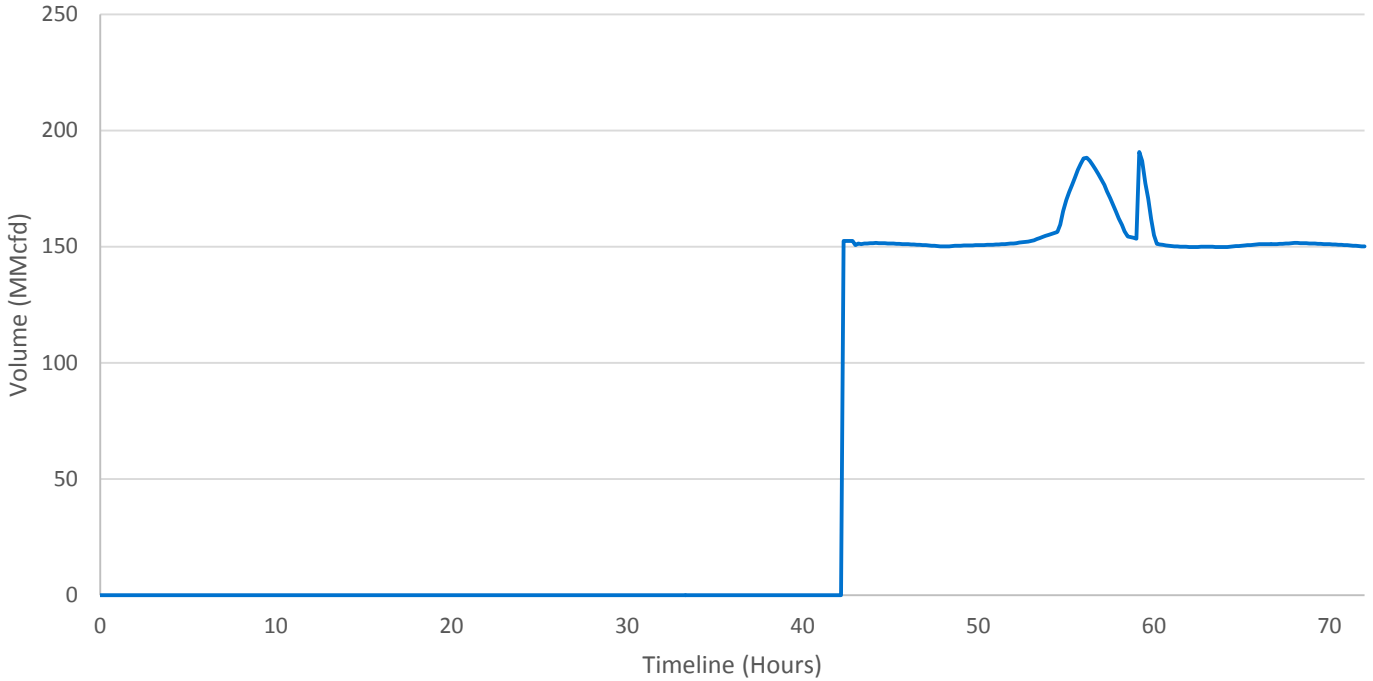
Sizing Scenarios (Question 22a & b)



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Specific Sites

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

- Point of the Mountain
- Lark
- North Salt Lake

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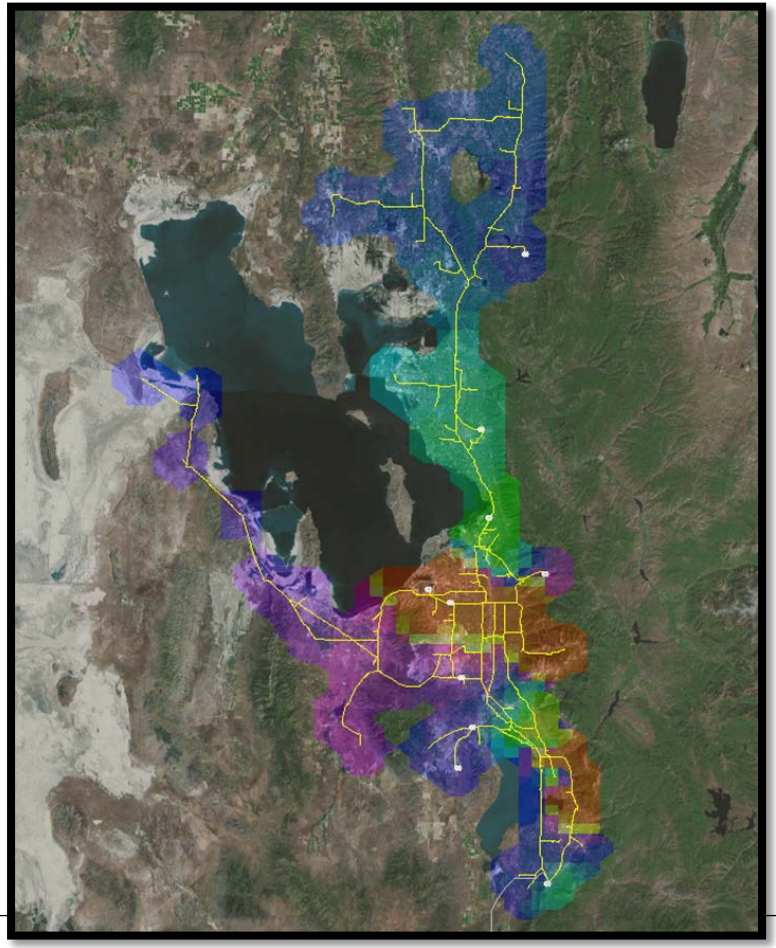
Flow Direction (Question 23)



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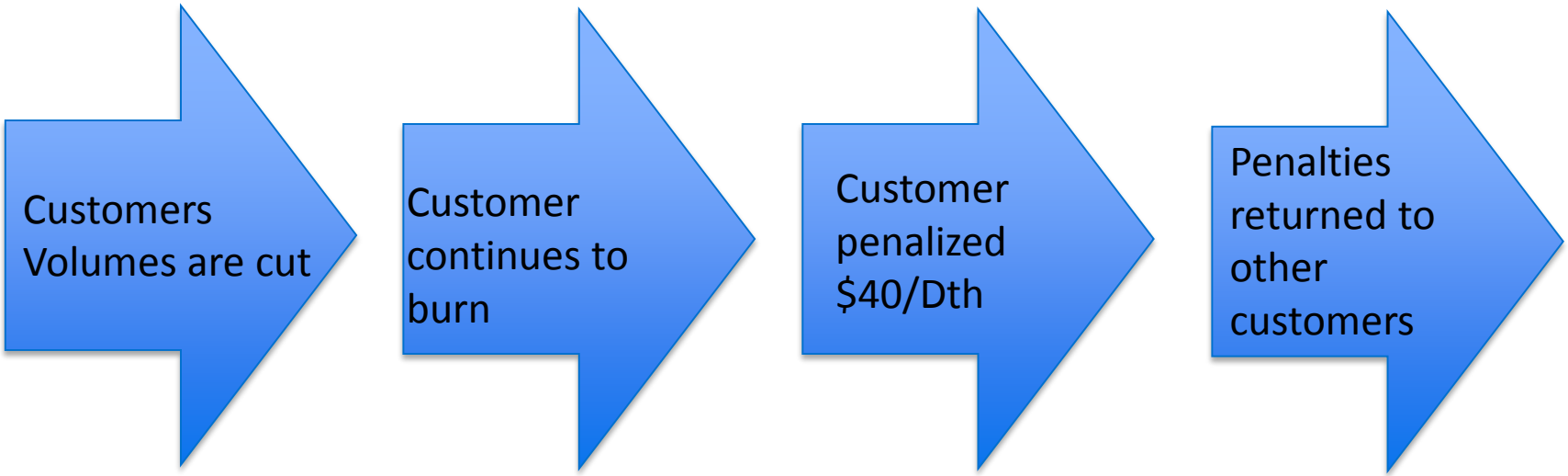
Interruptible Transportation customers who don't interrupt



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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