

# Supply Reliability Technical Conference Docket 18-057-03

# 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)

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 <a href="https://www.phmsa.dot.gov/pipeline/liquified-natural-gas/lng-data-and-maps">https://www.phmsa.dot.gov/pipeline/liquified-natural-gas/lng-data-and-maps</a> for more information		

## Ancillary Uses: (Questions 13 & 21)

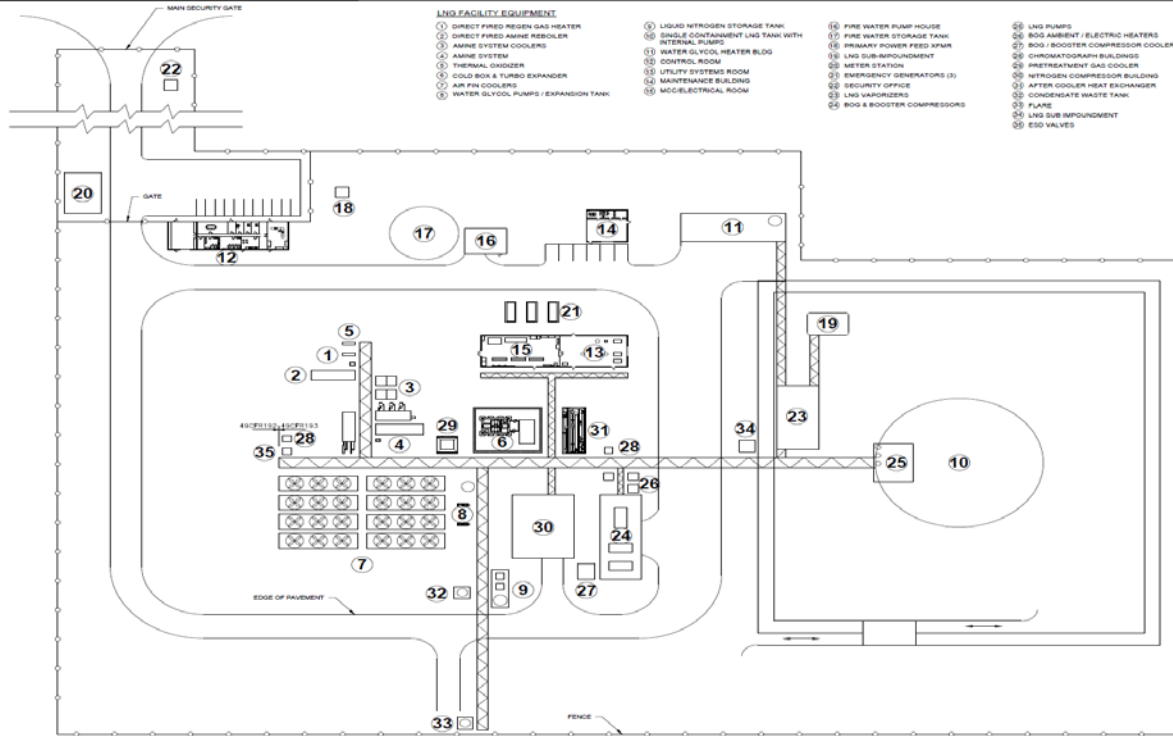
- In addition to providing supply reliability, the plant could be used to serve remote communities in Utah.
  - Satellite vaporization facilities could use trucked LNG to provide base load for their communities
  - After initial filling, the full liquefaction window would likely not be needed solely 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)					

# Site Layout





# Project Rendering

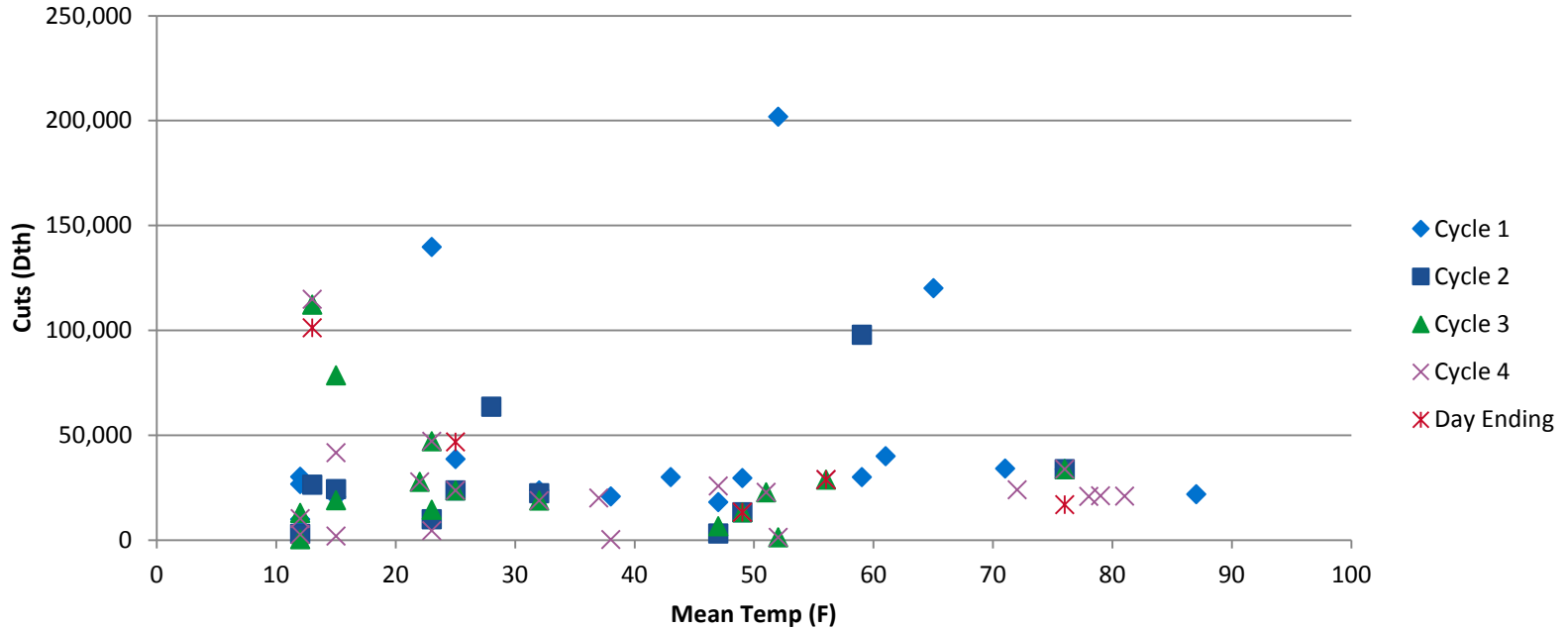


# LNG Facility for Peak-Hour Needs vs. LNG Facility for Supply Reliability (Question 1)

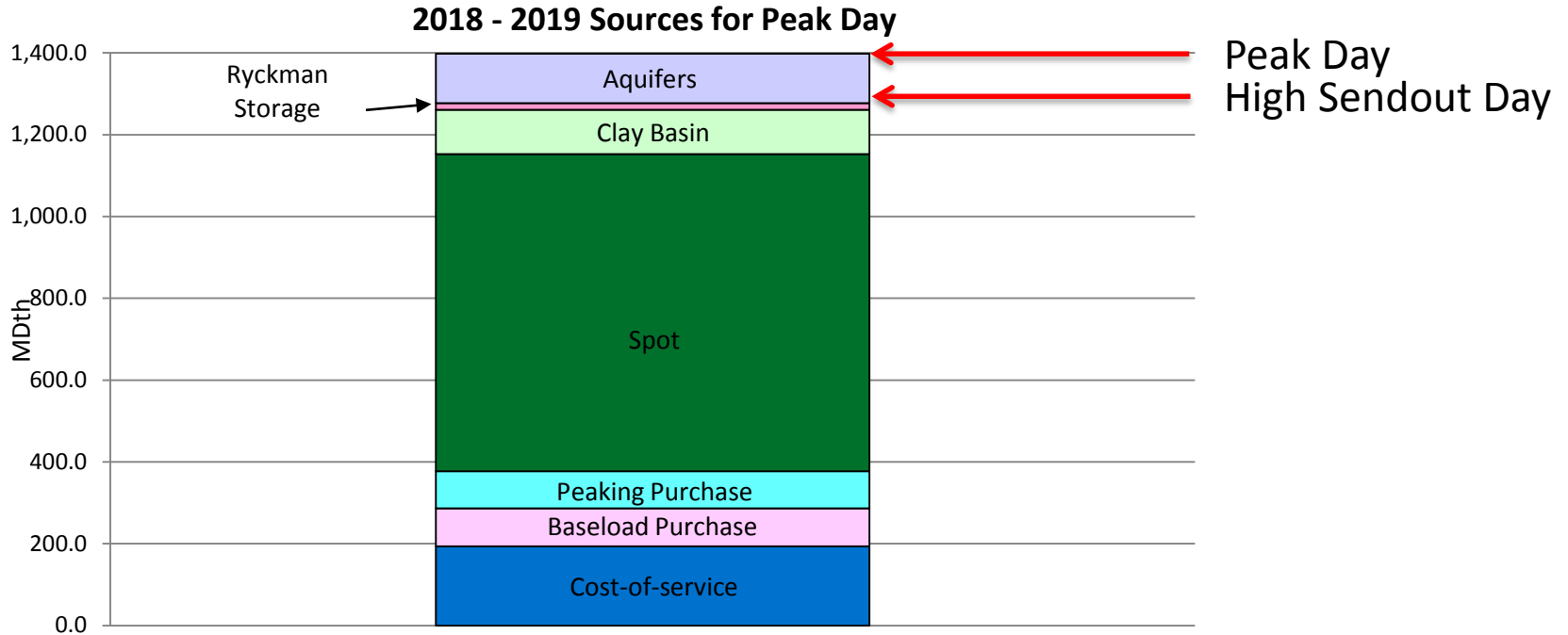
- DEU explores all alternatives when evaluating solutions to business needs
  - 1990's – an LNG facility was considered to meet customer growth as opposed to pipeline expansion and new gate station construction
  - 2014 – an LNG facility was considered as an alternative to off-system Aquifer storage 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)



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

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	Alternative 1 (LNG)	Alternative 2 (LNG)	Alternative 3 (LNG)	Alternative 4 (LNG)	Alternative 5 (LNG)	Alternative 6 (LNG)	Alternative 7 (LNG)	Alternative 8 (LNG)	Alternative 9 (LNG)	Alternative 10 (LNG)	Alternative 11 (LNG)	Alternative 12 (LNG)
<b>Safety</b>	No concerns	Safety concerns for customers with reduced functional service	No concerns due to the voluntary nature of the reduction	No concerns	No concerns	No concerns	No concerns	History of gas quality concerns	No concerns	No concerns	No concerns	No concerns
<b>Reliability</b>	Yes											
Concerns regarding distance from DER demand center	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
History of DER reliability concerns	Concerns regarding supply availability and reliability for additional purchases	Concerns that customer has supply available for use	Impedes to provide the amount of demand reduction	Unknown reliability because Magnum is not currently serving customers	Unknown reliability because Magnum is not currently serving customers	Unknown reliability because Magnum is not currently serving customers	Unknown reliability because Magnum is not currently serving customers	History of reliability concerns	N/A	N/A	Requires use of upstream transportation capacity	Located on the DER system
Additional Reliability Information	Requires transaction of remote DER assets	Requires low participation										
<b>Cost</b>	Yes											
Annual cost to customer (billions of dollars)	Between \$2.3 and \$14.8	\$2.70	unknown	Between \$2.47 and \$24.88	Between \$2.42 and \$22.38	Between \$28.28 and \$24.83	\$18.25	\$24.44	\$17.38	\$28.08	Between \$3.12 and \$24.47	\$28.79
Annual DER input to local customer	Between \$2.47 and \$23.23	\$2.36	unknown	Between \$2.47 and \$24.88	Between \$2.42 and \$22.38	Between \$28.28 and \$24.83	\$18.25	\$24.44	\$17.38	\$28.08	Between \$3.12 and \$24.47	\$28.79
Additional Cost Information	Costs shown include commodity cost for only one DER			Costs could increase after initial term	Costs could increase after initial term	Costs could increase after initial term	Costs could increase after initial term					
<b>Risk</b>	Yes											
Concerns regarding distance from DER demand center	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Additional Risk Information	Subject to supply availability risk for additional purchases	Not that risk through demand will be reduced to offset supply shortfalls	Not that risk through demand will be reduced to offset supply shortfalls	Unknown risk because Magnum is not currently serving customers	Unknown risk because Magnum is not currently serving customers	Unknown risk because Magnum is not currently serving customers	Unknown risk because Magnum is not currently serving customers	History of operational, structural, and financial issues	N/A	N/A	N/A	There are no additional risk concerns
Supply price risk				Operational challenges at Paper generation concern								
<b>Other Factors</b>	Neutral											
Additional Testing Information	N/A	Not subject to controls such as SCADA system or time-of-day supply	SCADA falls over overnight and the peak demand time is early morning. Missing requests would occur while customers are sleeping	Proposed includes NRT which allows for dispatch outside of SCADA system	N/A	N/A	Proposed includes NRT which allows for dispatch outside of SCADA system	N/A	Capacity not available	Capacity not available	Availability pending execution and results of expansion PDES study	On-system - Not subject to SCADA system. Closely controlled by DER Site Control
<b>Operational</b>	Yes											
Additional Operations Information	Will be owned and operated by outside entity	Will be owned and operated by outside entity	Not within DER system	Facilities owned and operated by outside entity	Facilities owned and operated by outside entity	Facilities owned and operated by outside entity	Facilities owned and operated by outside entity	Facilities owned and operated by outside entity	Facilities owned and operated by outside entity	Facilities owned and operated by outside entity	Facilities owned and operated by outside entity	Facilities owned and operated by DER
<b>Customer to Service From Customers</b>	Yes											
Additional Information	Ability to serve DER customers	All DER customers pay for and accept reliable service	All DER customers pay for and accept reliable service	Ability to serve DER customers	Ability to serve DER customers	Ability to serve DER customers	Ability to serve DER customers	Ability to serve DER customers	Ability to serve DER customers	Ability to serve DER customers	Ability to serve DER customers	Ability to serve DER customers
<b>Peak Hour Supply</b>	Neutral											
Additional Information				Proposed allows for additional non-eligible peak-hour supply			Proposed allows for additional non-eligible peak-hour supply					Proposed allows for additional non-eligible peak-hour supply
<b>Flexibility</b>	Yes											
Additional Information		Not readily available without T-DEP changes						Additional capacity has recently been offered	Subject to availability of additional storage capacity	Subject to availability of additional storage capacity	Unknown if expansion is feasible	Feasible
<b>Other Analysis Benefits</b>	Neutral											
Additional Information												Provides for the ability to serve existing areas through the use of various storage facilities. Potential benefit during emergency or maintenance
<b>Utility Evaluation</b>	Neutral											
Recognize Off-Peak Corridor	Neutral	Yes	Yes	Neutral	Neutral	Yes	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral
Minimize Corridor	DEEP is the only option	no conflict	no conflict	no conflict	Evaluate between alternatives	Evaluate between alternatives	no conflict	Evaluate between alternatives	DEEP is the only option	Evaluate between alternatives	DEEP is the only option	no conflict
Prevent Corridor from Flow	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No Unfair Influence	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1. This option was superseded by the option described in D2.												

## 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 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.

# 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

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

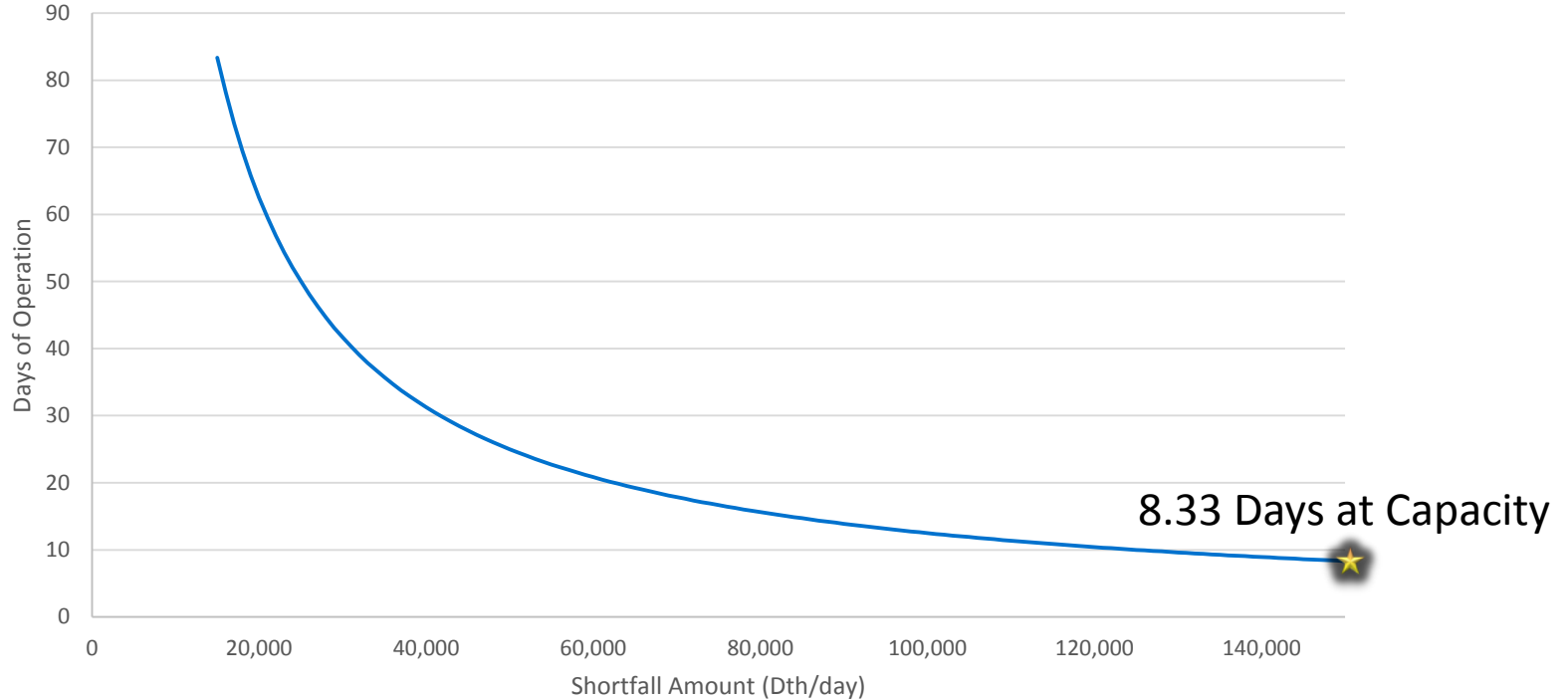
## Other System Risks that Increase the Probability

- 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

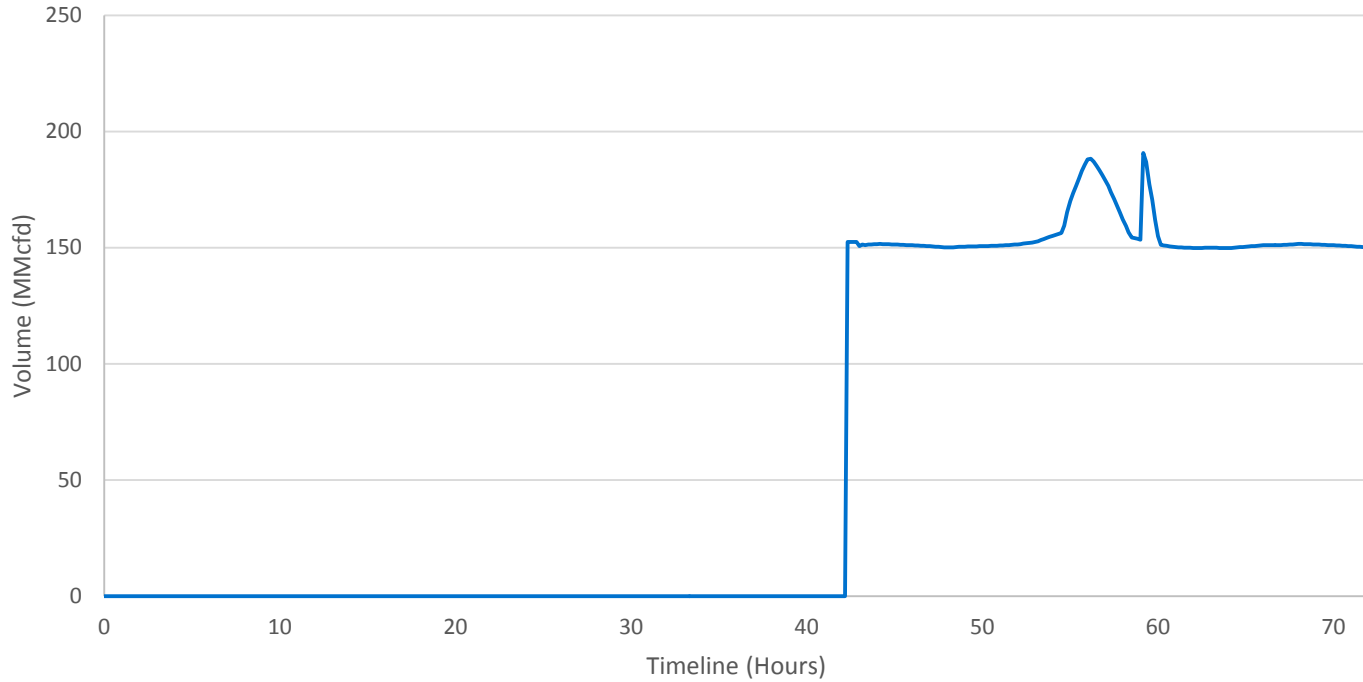
- We do not have access to other companies' Cost /Benefit analyses
- Other companies have commission-approved on-system storage
  - LNG on LDC systems in the US 45%
  - Reported on-system storage 77%
- Dominion Energy Utah currently has no on-system storage of any kind

# Length of Coverage (Questions 15, 19, & 20)





# Sizing Scenarios (Question 22a & b)

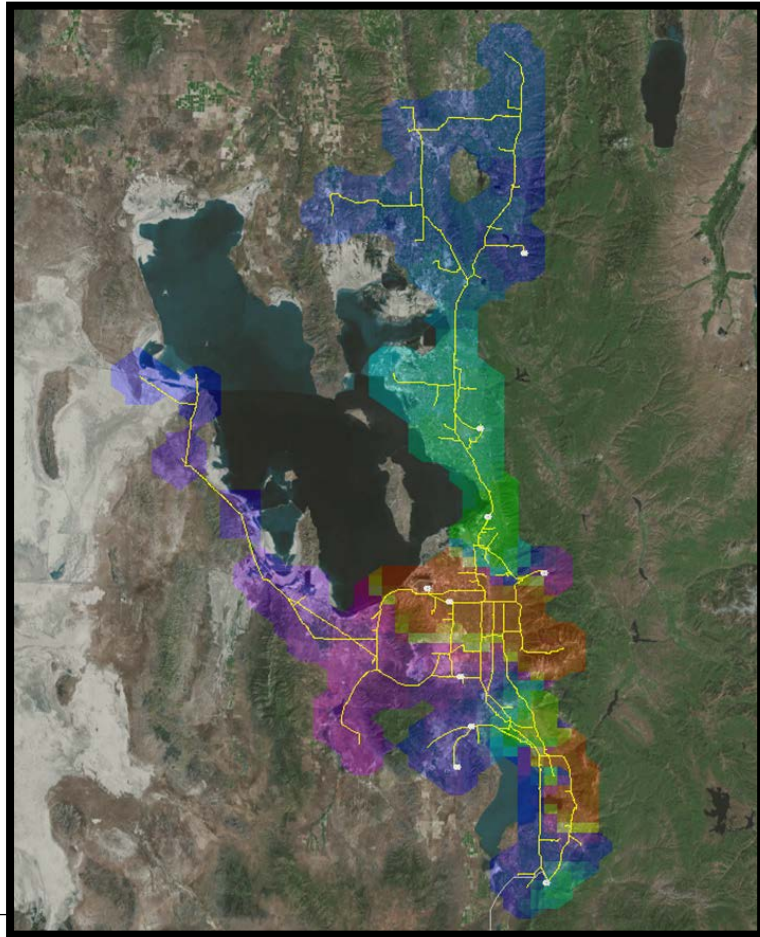


## Specific Sites

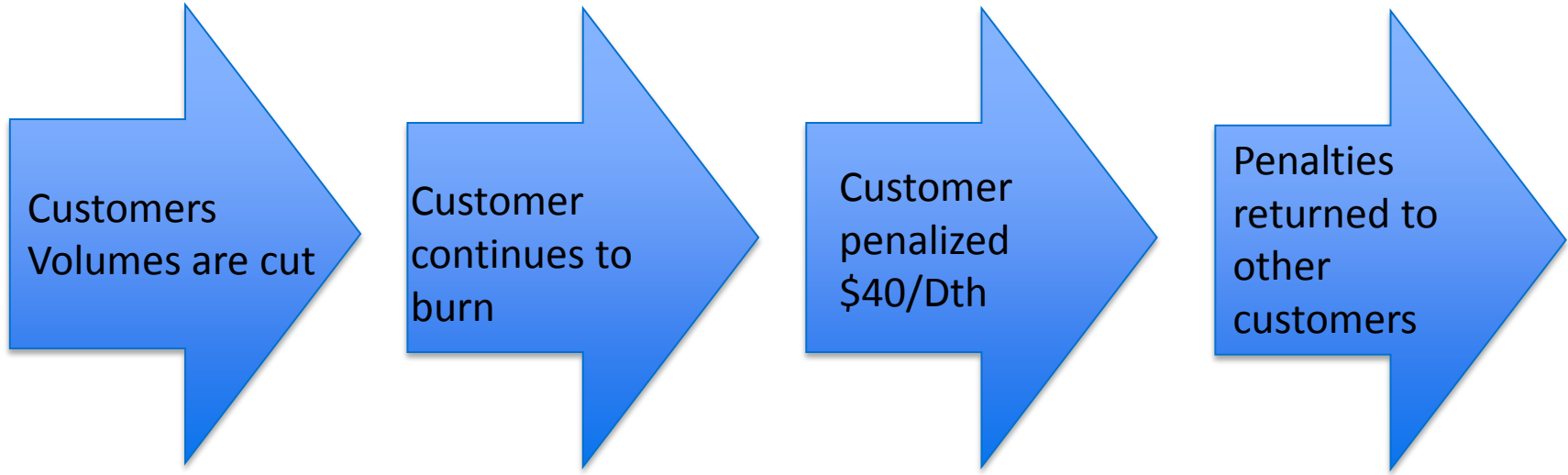
In addition to the selected site, the Company considered the following locations:

- Point of the Mountain
- Lark
- North Salt Lake

# Flow Direction (Question 23)



# Interruptible Transportation customers who don't interrupt



## **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