National Grid LNG Overview

Case 24-G-0248
Technical Conference

November 20, 2024

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Welcome to All

Agenda

1. Introduction
2. Overview of LNG Facilities
3. LNG as a Supply & Reliability Resource
4. Greenpoint LNG Joint Proposal Analysis
5. Q&A

Meeting Logistics:

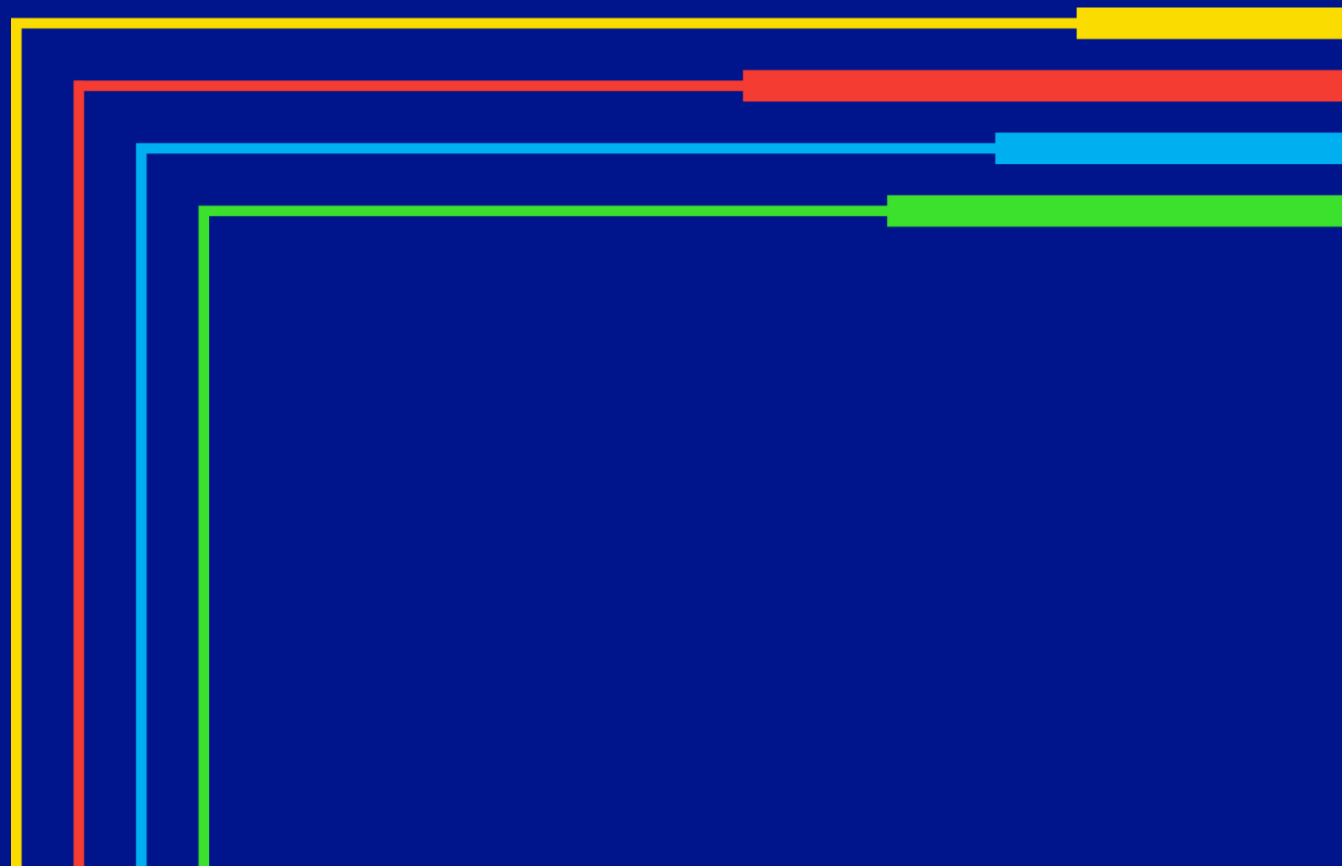
Q&A will be held at the end of the presentation to address matters related to the material presented.

Please use the “raise hand” feature of the meeting platform.

DPS Staff will be moderating the Q&A portion of today’s conference.

1

Introduction



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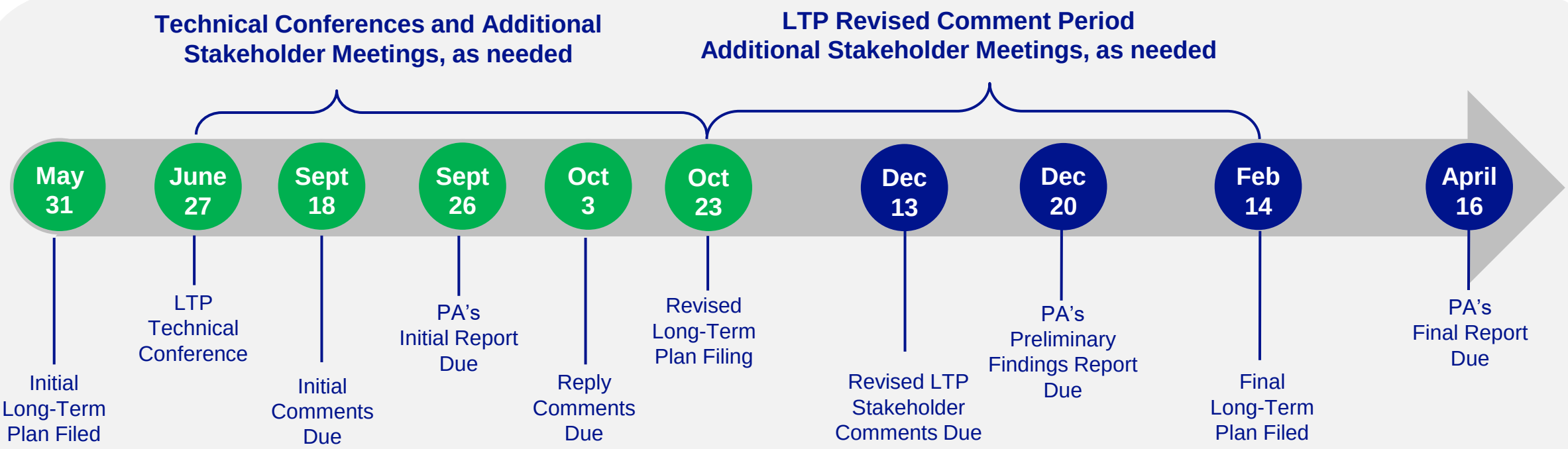
Introduction to National Grid's LTP

- National Grid filed our LTP for KEDNY/KEDLI/NMPC on 5/31/24; Case 24-G-0248; materials available on **ngridsolutions.com**
- We are working on our Final LTP, which will incorporate stakeholder feedback
- The schedule below is updated to reflect the extended comment and reply comment period



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Overview of LNG

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Liquified Natural Gas (LNG) Sites

National Grid's Downstate NY LNG Sites have Liquefaction and Peak Shaving Vaporization Capabilities as well as Boil-Off Management Systems.

The double wall LNG tanks have carbon steel outer shells with a 9% nickel steel inner tank. The annular space is filled with perlite insulation.

LNG provides an efficient way to store gas, as the volume of natural gas in its liquid state is about 600 times smaller than its volume in a gaseous state in a natural gas pipeline. LNG Sites provide on system localized storage, which are typically filled during off-peak season, and allow for a high hourly vaporization rate.

Ensures reliable supply during peak demand or supply constraints, mitigating risks associated with upstream supply issues (e.g., Winter Storm Elliot, December 2022).

Greenpoint, Brooklyn

Holtsville, Long Island

Greenpoint, Brooklyn	Holtsville, Long Island

▪ **Total Storage of 1600 MMSCF**
  ○ Tank #1 - 600 MMSCF
  ○ Tank #2 - 1000 MMSCF
	▪ **Total Storage of 600 MMSCF**

▪ **Liquefaction Design rate: 8.5 MMSCF per day**	▪ **Liquefaction Design rate: 6.3 MMSCF per day**
▪ **Maximum Vaporization rate: 285 MMSCF per day**	▪ **Maximum Vaporization rate:100 MMSCF per day**
▪ **Dual turbo-expander open end system design**	▪ **Nitrogen Compander-expander System Design**

LNG Design Day Capacities

Greenpoint LNG Plant
Asset
V7 High Pressure (350 PSIG) T-Thermal Vaporizer
V8 High Pressure (350 PSIG) T-Thermal Vaporizer
V9 Low Pressure (60 PSIG) T-Thermal Vaporizer
V10 Low Pressure (60 PSIG) T-Thermal Vaporizer
V11 Low Pressure (60 PSIG) Linde Sub-X Vaporizer
V12 High Pressure (350 PSIG) Linde Sub-X Vaporizer
Total Vaporization Capacity: 291,200 Dth/Day

Holtsville LNG Plant
Asset
High Pressure (350 PSIG) T-Thermal Vaporizer
High Pressure (350 PSIG) T-Thermal Vaporizer
High Pressure (350 PSIG) T-Thermal Vaporizer
Total Vaporization Capacity: 103,000 Dth/Day

Age of LNG Facilities

Holtsville, Long Island

Tank Commissioned 1971
Liquefaction System Commissioned 2001
Vaporizer #1 Commissioned 2006
Vaporizer #2 Commissioned 2007
Vaporizer #3 Commissioned 2009
LNG Truck Station Commissioned 2016

Greenpoint, Brooklyn

Tank 1 Commissioned 1968
Tank 2 Commissioned 1969
Liquefaction Plant Commissioned 2007
Vaporizer #7 Commissioned 1980
Vaporizer #8 Commissioned 1980
Vaporizer #9 Commissioned 1986
Vaporizer #10 Commissioned 1986
Vaporizer #11 Commissioned 2022
Vaporizer #12 Commissioned 2022
LNG Truck Station Commissioned 2023

Lifespan & Upkeep of LNG Facilities

The life of LNG plants are dependent upon the care and maintenance of its components.

Monitoring and modernizing in the most cost-effective way provides reliability and maximizes asset life.

By investing in new equipment, technology, and infrastructure, facilities will continue to operate safely and reliably.

Greenpoint LNG		Holtsville LNG	
Capital Projects	**Expected Completion**	**Capital Projects**	**Expected Completion**
New Control System	FY30	Holtsville Plant Modernization	FY28
Maintenance Building	FY27	Hydrant Piping Refurbishment	FY29
Tail Gas Compressor Refurbishment	FY29	Liquefaction System Refurbishment	FY29
Tank 1 LP (60 PSIG) LNG Send-Out Pump Refurbishment	FY29	High Pressure (350 PSIG) LNG Send-Out Pump Upgrade	FY32
High Pressure (350 PSIG) LNG Vaporizers 7 & 8 Refurbishment	FY30		
Nitrogen System Refurbishment	FY27		
Tank 2 Foundation Heaters Upgrade	FY28		
Salt Water Pump House Upgrade	FY27		
Hydrant & Deluge Piping Upgrade	FY27		
Fire Protection Panel System Upgrade	FY29		

3

LNG as a Supply & Reliability Resource

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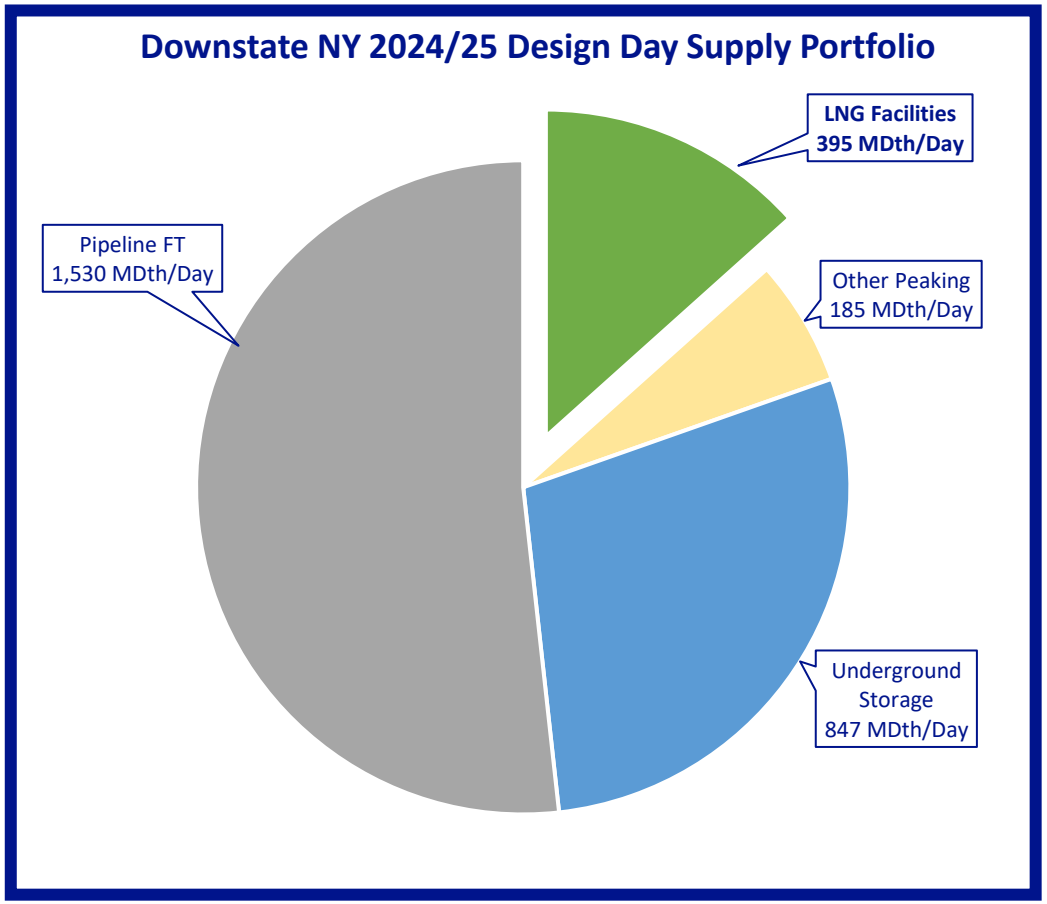
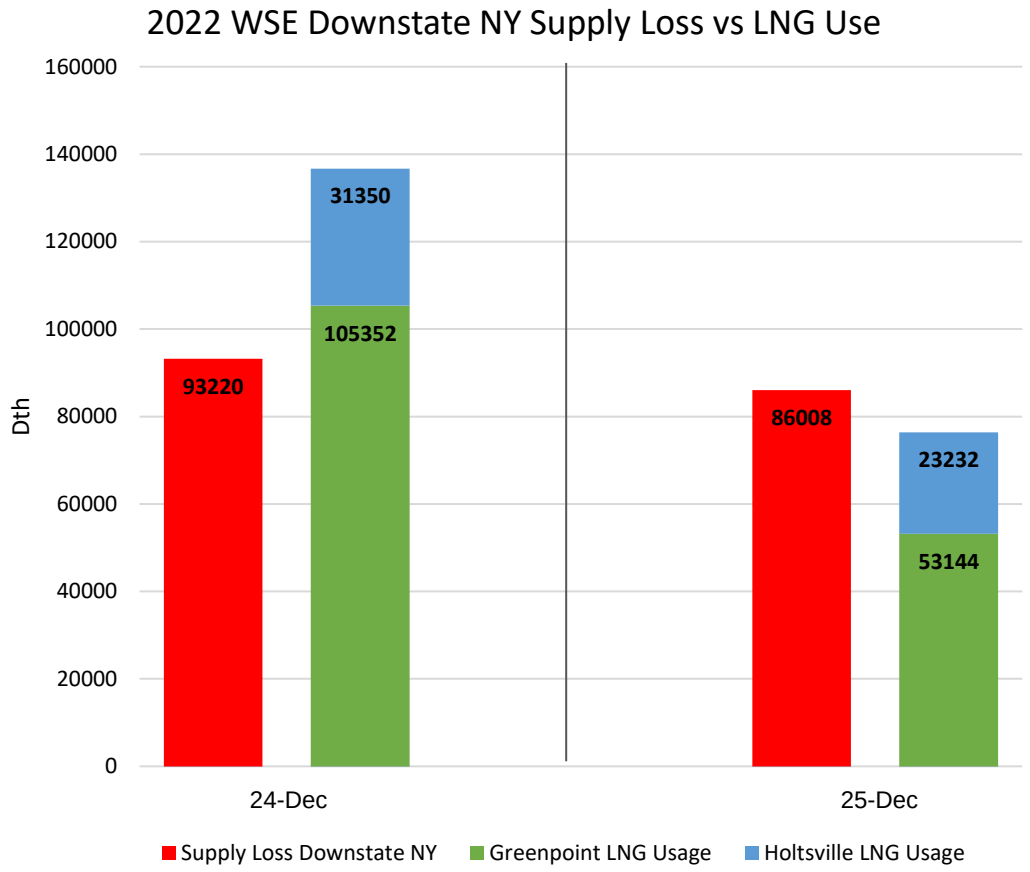
LNG in the Supply Portfolio

- Critical assets in National Grid's gas portfolio, providing 13% of Downstate NY Design Day Supply
- Offers flexible and scalable solutions for meeting sudden spikes in demand
- Supports peaking supply needs on the coldest of days to help keep customers warm
- Provides a reliable backup supply and reduces dependency on constrained pipelines
- Enhances supply reliability and diversity



Use of LNG during Winter Storm Elliot

- **If the gas system is unable to meet demand, National Grid would need to curtail customers' usage by shutting off parts of its system to avoid unsafe operating conditions.**
- During Winter Storm Elliot ("WSE") Downstate NY experienced supply losses on all three main pipelines that provide the majority of supply
- Supply loss was caused by
  - Extreme and rapid temperature drops coupled with rain, wind, and snow
  - Compressor failures
  - Producer Equipment failures caused by freeze offs
- **The use of on-system LNG assets at Greenpoint and Holtsville were critical in maintaining adequate system pressures as well as providing supply.**

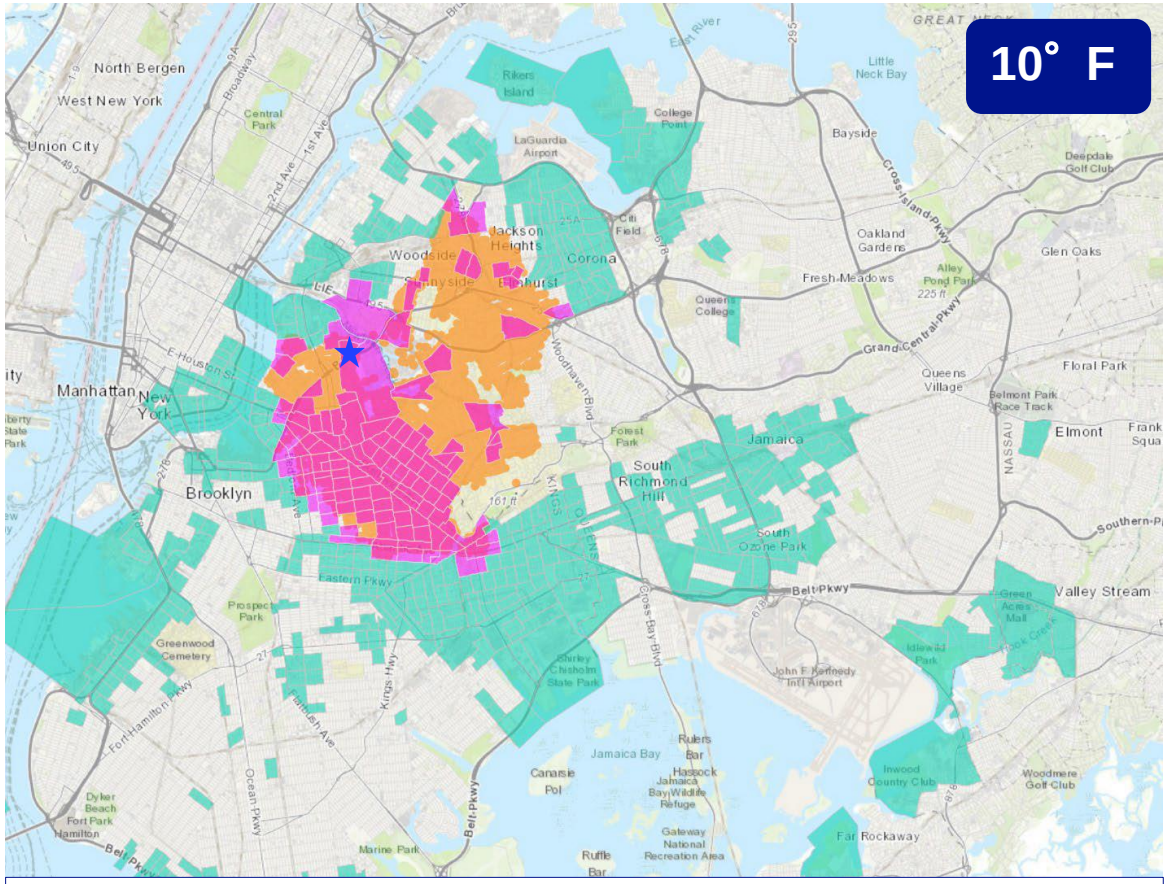


Many DAC Customers Rely on Greenpoint LNG in Cold Weather

- All Customers in Brooklyn and Queens benefit from the Greenpoint LNG Facility
- A disruption of gas service would impact the reliability of the entire gas system in Brooklyn and Queens
- The Brooklyn and Queens gas system is a subset of the New York Facilities System. Gas demand in these areas impacts Consolidated Edison Company of New York as well as National Grid Long Island and Staten Island
- At 10℉, almost 195,000 customers depend on the Greenpoint LNG Facility for 5% or more of their peak hour gas needs.

Summary	DAC Customers	Non-DAC Customers	Total Customers
<5% LNG	342,686	623,441	966,127
>= %5LNG	110,973	83,913	194,886
Grand Total	**453,659**	**707,354**	**1,161,013**

Assumptions:
- 5 DNY CNG sites operation at maximum capacity
- Holtsville LNG Plant operating at maximum capacity
- Iroquois Expansion project fully in service
- Demand Response Customers Off



LNG Design Day Support Info-Graphic

LNG Delivering Reliable Energy

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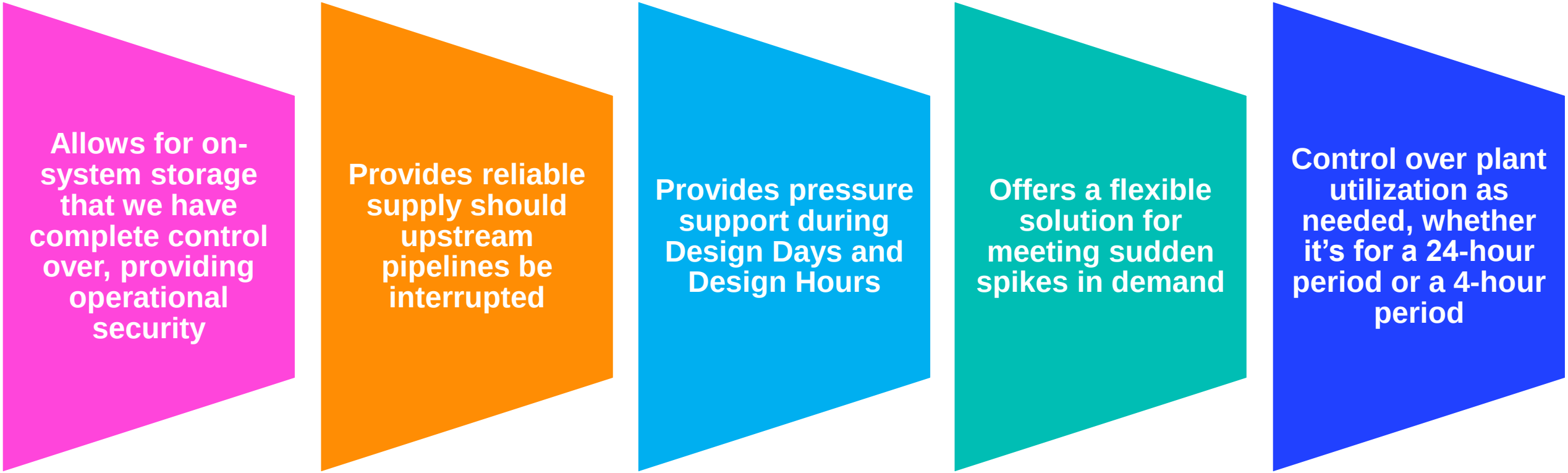
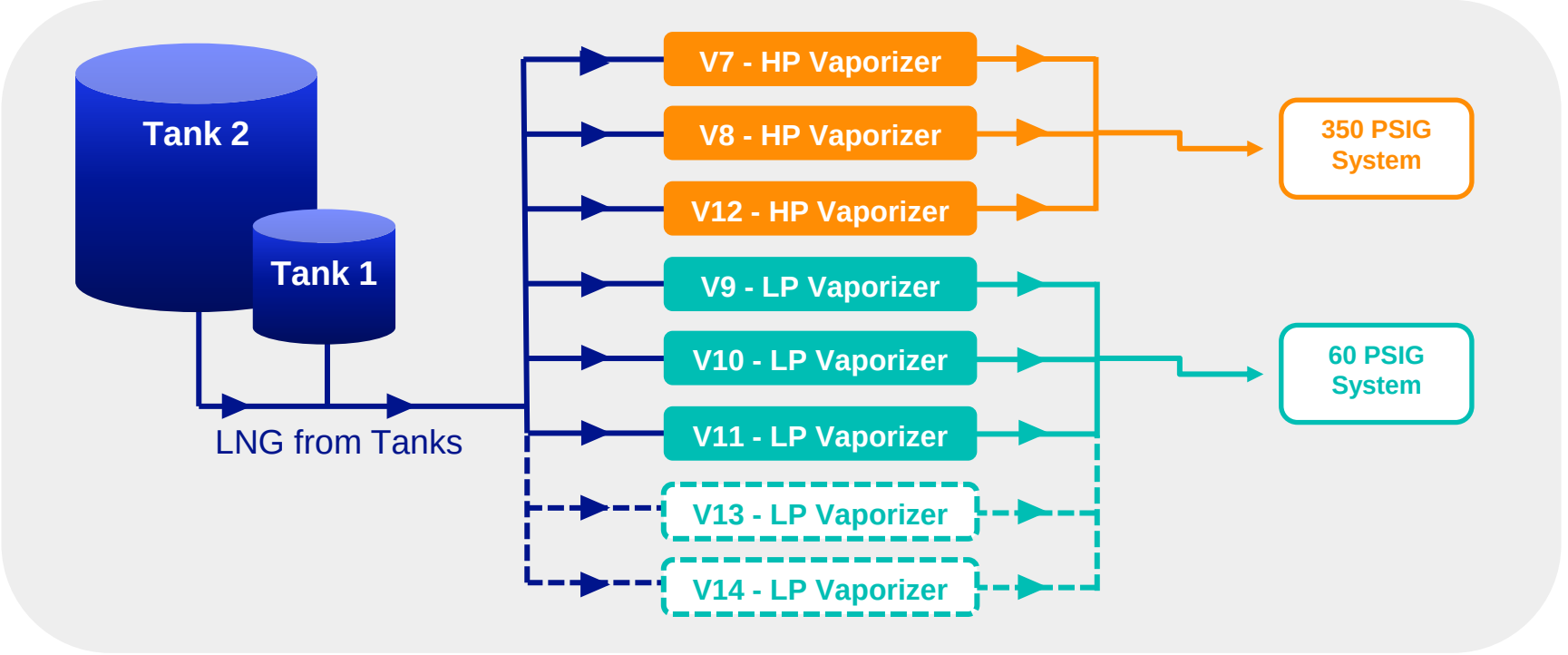
LNG Reliability Benefits



Greenpoint Vaporizers 13/14

- Consists of two new low-pressure LNG Vaporizers (13/14) to expand hourly and daily output
- Does not increase storage capacity at the facility
- Leverages existing assets, resulting in minimal construction impacts
- Vaporizers 13/14 will allow for more efficient extraction of LNG from the existing storage tanks, providing additional supply



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Greenpoint LNG Joint Proposal Analysis

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Why don’t we just reduce demand through clean energy programs so we can decommission Greenpoint?

- National Grid’s (and Electric Distribution Companies') programs have long contributed to managing demand. The portfolio continues to evolve to prioritize measures with longer effective useful lives and with higher demand reduction potential. Program success is dependent upon customer participation.
- Future amounts of expected DSM are embedded into the forecast, which the need for Greenpoint is based on. Therefore, reducing demand to the degree needed to remove the need for Greenpoint altogether would require DSM at levels that are above and beyond what is possible with the funding available.
- Higher levels of DSM and/or accelerated achievements of DSM will be exceedingly more expensive. Encouraging customers to participate in programs that require a high up front cost or prior to their current gas equipment reaching the end of its useful life will likely require higher incentives.

Greenpoint LNG Hypothetical Heat Pump Alternative

- An infeasible hypothetical case under which a combination of weatherization (energy efficiency) and full-displacement electrification (heat pumps) of customers serves as an alternative to Greenpoint LNG Plant by 2035.
- Approximately 291,200 single family homes would need to be fully electrified and disconnected from the gas system to reduce Design Day demand to a level equivalent to the supply provided by the Greenpoint LNG facility.
- Theoretical annual maximum number of customers who could be electrified per year in this analysis is based on 7% heating equipment turnover rate. 36,120 customers is 12 times the number of customers electrified by Con Edison in 2023
- The cost per year of full building electrification is $791 million, 23 times the annual cost to operate and maintain the Greenpoint LNG Facility per year.
- It is important to note that these costs do not include the incremental transmission and distribution costs to build a network capable of supporting this additional electric load

Project Cost Estimates	
Total per Non-DAC Customer, without Weatherization	$19k
Total per Non-DAC Customer, with Weatherization	$28k
Total per DAC customer, without Health and Safety barrier removal	$42k
Total per DAC customer, with Health and Safety barrier removal	$45k

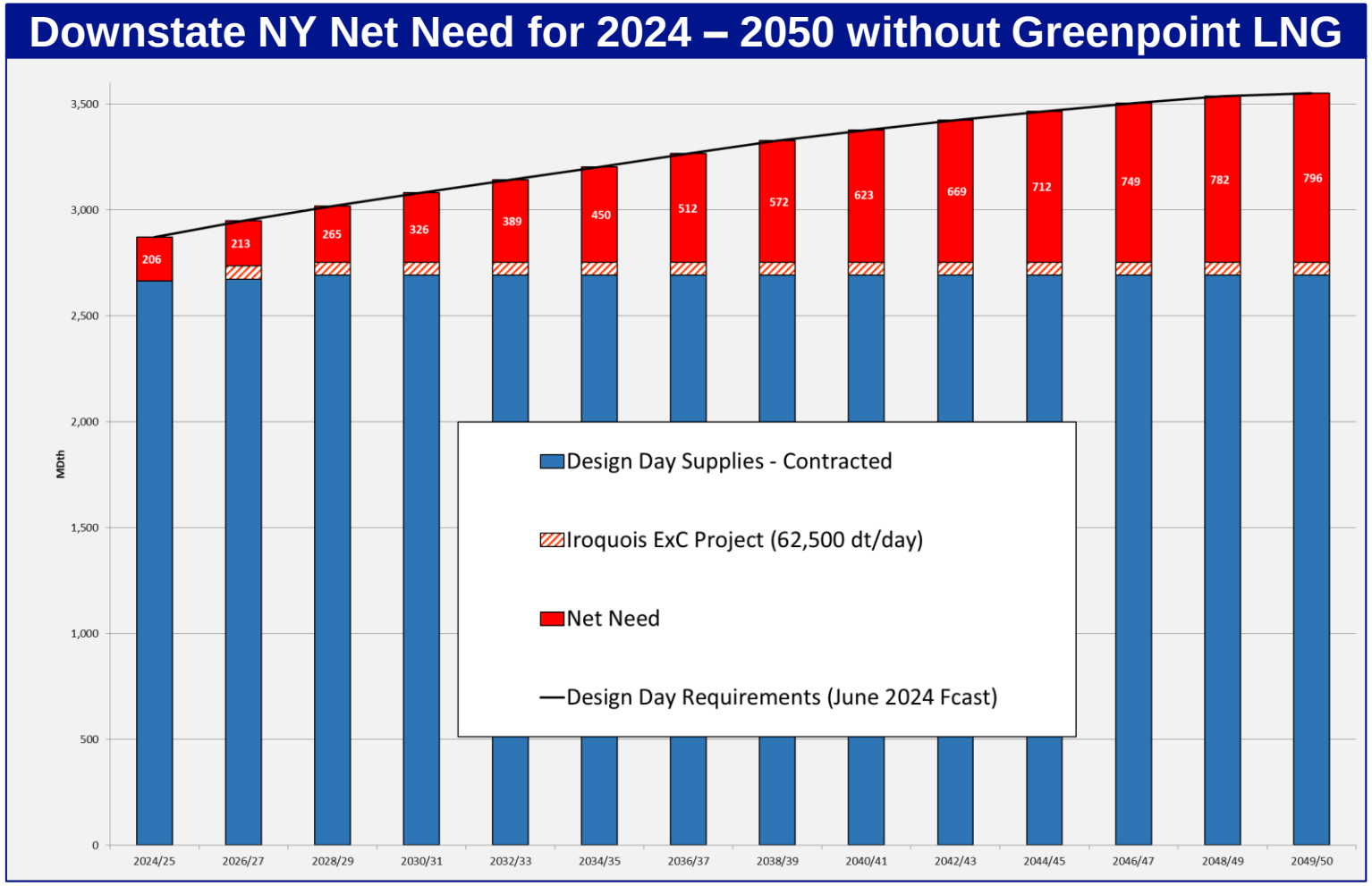
Full Building Electrification Comparison

Year	Annual # of Customers	Cumulative # of Customers	Total Est. Annual Cost ($M)
2024	3,060	3,060	$99
2025	4,506	7,566	$146
2026	6,635	14,200	$216
2027	9,769	23,970	$317
2028	14,385	38,355	$467
2029	36,121	74,475	$1,174
2030	36,121	110,596	$1,174
2031	36,121	146,717	$1,174
2032	36,121	182,838	$1,174
2033	36,121	218,958	$1,174
2034	36,121	255,079	$1,174
2035	36,121	291,200	$1,174
Total Cost of Full Building Electrification DSM instead of Greenpoint LNG			**$9.5 Billion**

Note: DAC stands for Disadvantaged Community as defined by the Climate Justice Working Group (CJWG) for the purposes of prioritizing energy equity

Moratorium/Curtailment Risk

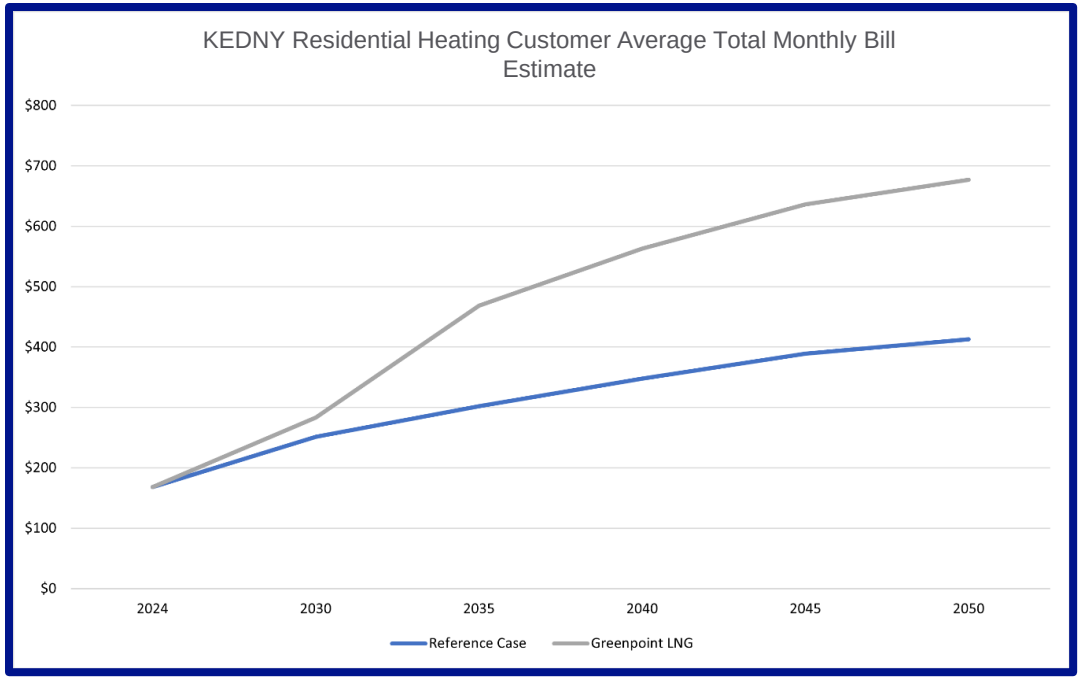
- The Loss of the Greenpoint LNG facility would require an immediate need to declare a moratorium
- A moratorium would curtail growth, but would not impact current Design Day Demand
- With Design Day Demand unchanged, the risk of curtailment to existing customers would be extremely high if actual weather was at or near design day conditions
- Curtailment of firm customers on a design day could cause damage to property as well as serious health implications due to loss of heating and hot water, resulting in the potential for loss of life.



Greenpoint LNG Hypothetical Heat Pump Alternative Bill Impacts

- **Assumptions**
  - Revenue Allocation is consistent with current rate plan (Case 23-G-0226)
  - Sales forecast used includes a reduction of residential heat customers (SC-1B) to equal the output of the Green Point vaporizer on design day
  - Revenue Requirement was adjusted to exclude capital projects/investments pertaining to the Greenpoint LNG Facility
  - It is important to note that this bill impact analysis does not reflect the expected increase to electric bills that customers would experience in support of the new incentives and infrastructure upgrades'

	SC-1B Residential (Heat)	SC 2-1 Small Commercial (Non-Heat)	SC 2-2 Small Commercial (Heat)	SC-3 Multi-Family
Current	$168	$738	$504	$1,623
2030	$283	$1,125	$742	$2,304
2035	$468	$1,360	$898	$2,730
2040	$563	$1,591	$1,051	$3,152
2045	$636	$1,821	$1,204	$3,560
2050	$677	$1,948	$1,284	$3,752

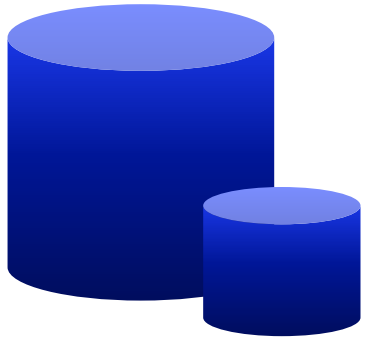


Greenpoint LNG Hypothetical Heat Pump Alternative BCA

- Uses the Societal Cost Test (SCT), which takes the holistic perspective of society
- Note: this BCA does not include the cost of site remediation, which may cost an additional $100-$300 million over several years.

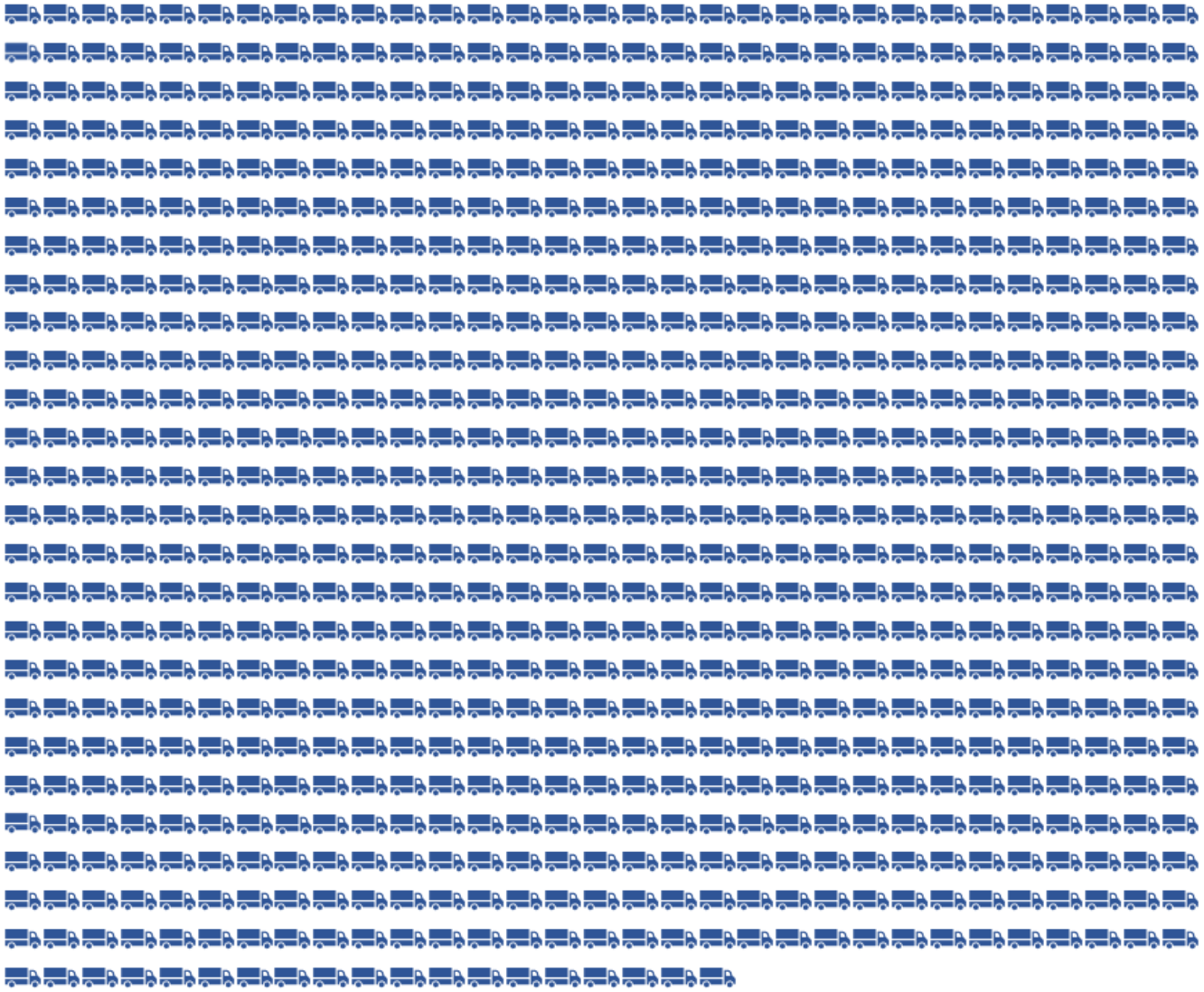
Benefit or Cost Category	Adjusted Baseline - GP LNG ($M)
Avoided Gas Supply	$1,872
Avoided Gas Infrastructure Revenue Requirement	$447
Avoided GHG Emissions from Gas Combustion	$6,997
Total PV Benefits	**$9,316**
Increased Electricity Consumption	$2,408
Increased Electric Capacity	$14,178
Increased GHG Emission from Electricity	$209
Incremental Participant Cost	$4,197
Electric Utility Admin	$83
Total PV Costs	**$21,075**
NPV	**-$11,759**
SCT Ratio	**0.44**

Greenpoint LNG Plant Supply Side Alternatives – CNG Trucking



Greenpoint LNG Plant

Greenpoint LNG Plant & CNG Trucking Comparison		
Greenpoint LNG Plant Vaporization Capacity	291,200	Dth/day
CNG Truck Vaporization Capacity	367	Dth/truck
Total Trucks Needed	**794**	**trucks/day**



CNG Trucking

Q&A

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