



MMU Analysis of Gas Availability in Eastern New York

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Introduction

- Capacity accreditation based on marginal contribution to reliability will be implemented for all resources in 2024/25.
 - ✓ Accurate measurement requires realistic representation in resource adequacy model.
- Gas-fired resources are currently assumed to be available in peak winter conditions regardless of whether they have firm gas or backup fuel.
 - ✓ Experience in recent winters suggests this is unrealistic.
- **This presentation discusses availability of gas for power generators in cold winter weather.**
 - ✓ **We find that the resource adequacy model and capacity accreditation should reflect gas limitations in the winter.**



Overview

- This presentation includes the following sections:
 - ✓ Geography of gas supply limitations
 - ✓ Regional gas supply and core demand on peak winter days
 - ✓ Analysis of gas available to power generators
 - ✓ Implications for marginal capacity value of gas generators



Gas Pipeline Geography in the Region

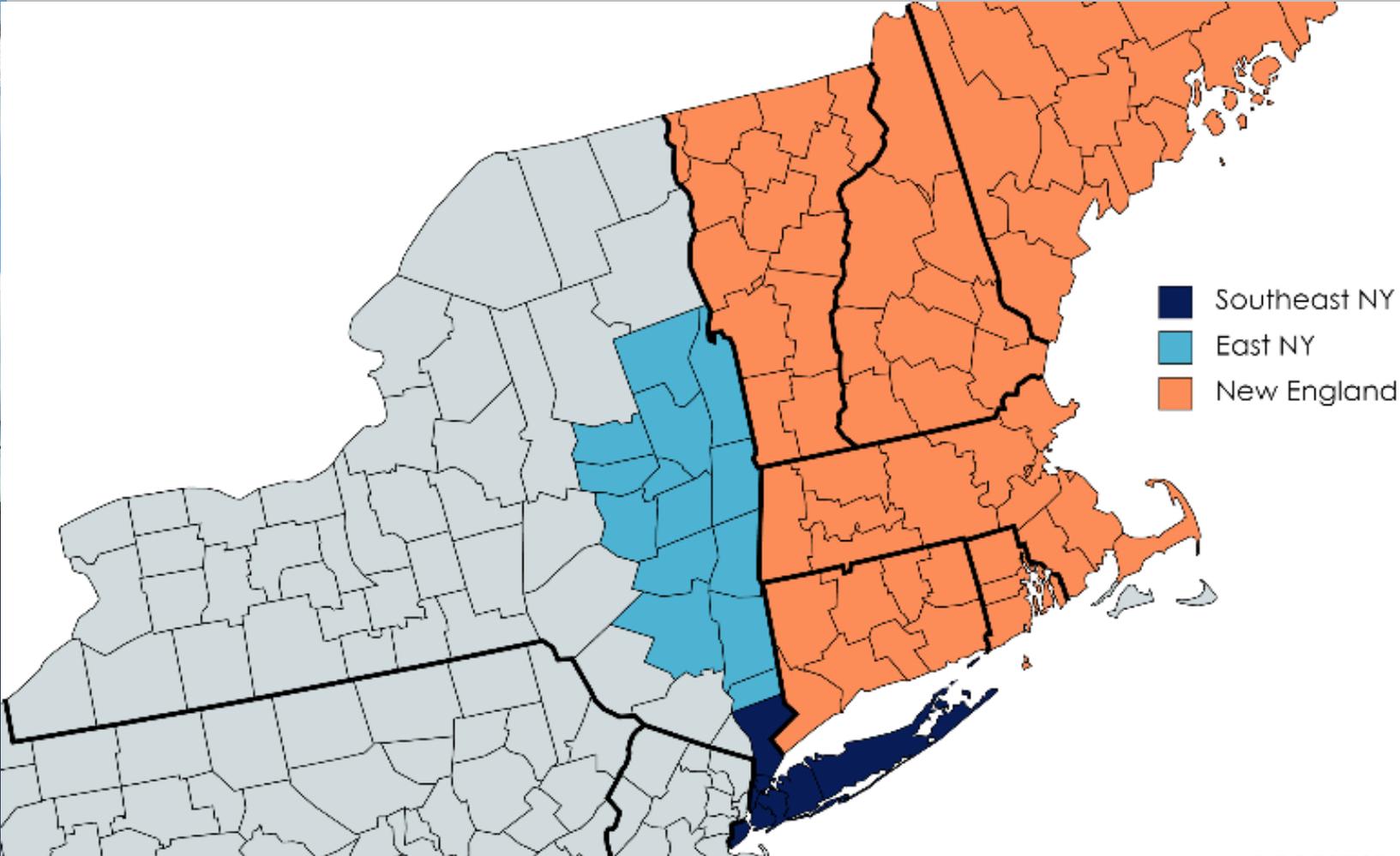


Definition of Region

- We focus on availability of gas to eastern New York and New England.
 - ✓ Pipeline constraints limit total flows into this region.
 - ✓ Pipeline capacity is less constrained west of this region.
- Served by 8 interstate pipelines:
 - ✓ 6 entering New York from the west/north
 - ✓ 2 entering New England from Canada
- Local Distribution Companies (LDCs) have local distribution systems that serve many power generators.



Region of Focus

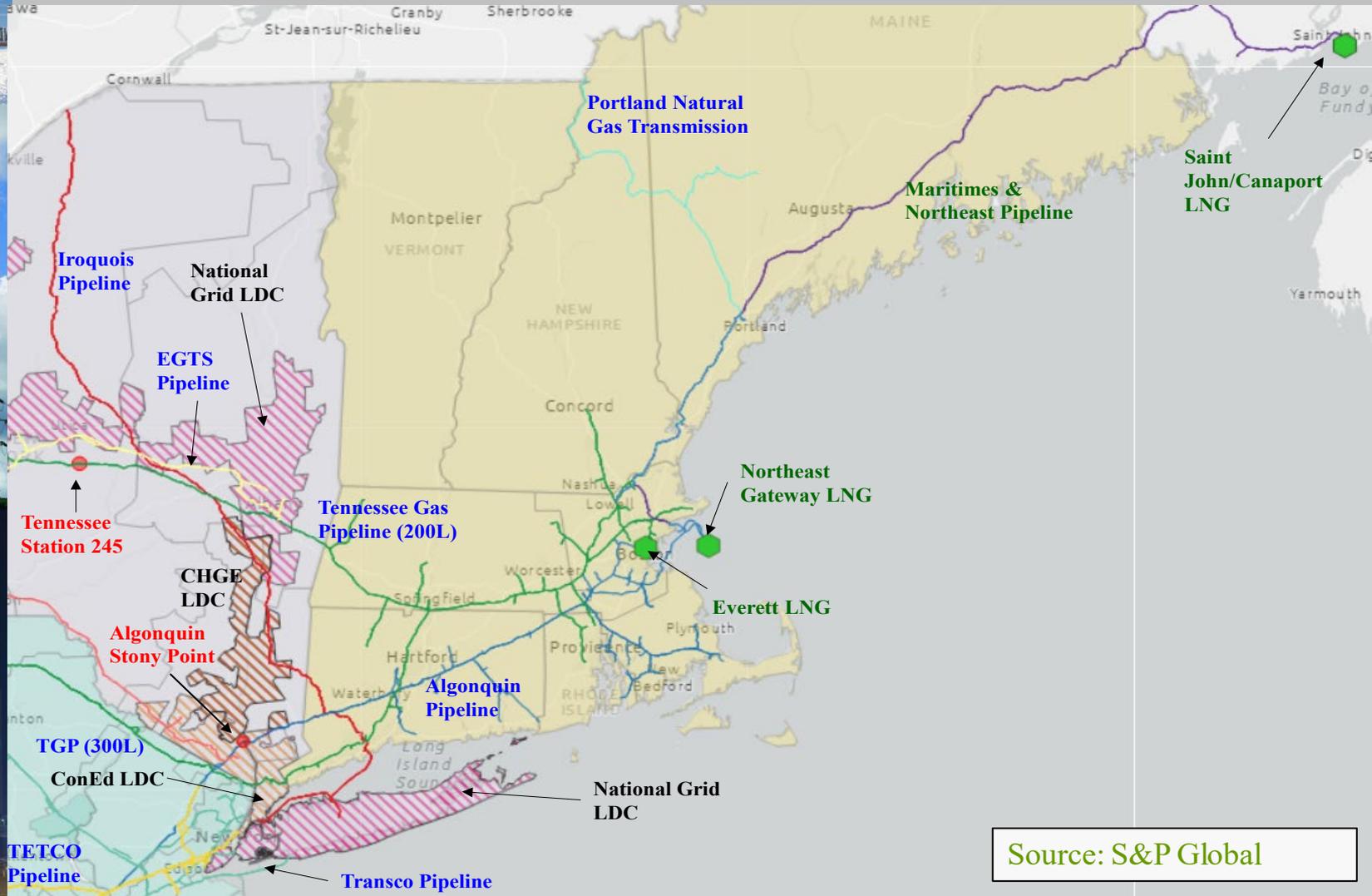




Interstate Pipelines Serving Region

Pipeline	Relevant Points/Bottlenecks
Transco	Endpoints in NYC and Long Island
TETCO	Endpoints in NYC
Tennessee (TGP)	200 Leg: Segment 245 entering Capital region 300 Leg: Segment 324 entering Westchester
Algonquin	Stony Point station (Rockland/Westchester border)
Iroquois	Deliveries at/south of Wright (Capital region)
Eastern Natural Gas Transmission (EGTS)	Endpoints in Capital region, deliveries to Iroquois and TGP
Portland Nat. Gas Transmission System (PNGTS)	Receipts from Canada border into New England
Maritimes & Northeast	Receipts from Canada border into New England (LNG imports from Saint John terminal)

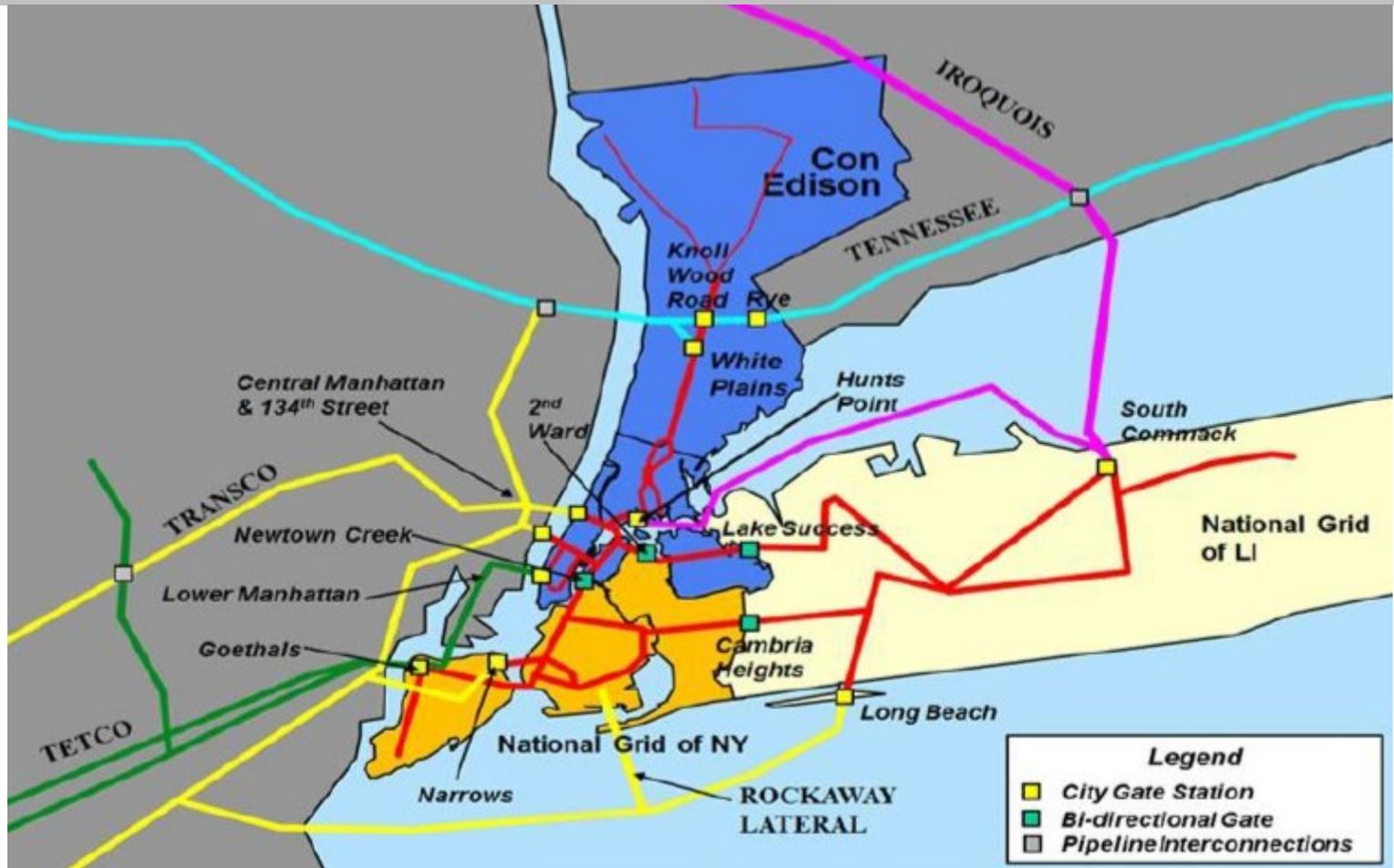
Interstate Pipelines Serving Region



Source: S&P Global



Southeast NY Pipelines and LDC System



Source: National Grid



Summary of Regional Gas Supply and Core Demand

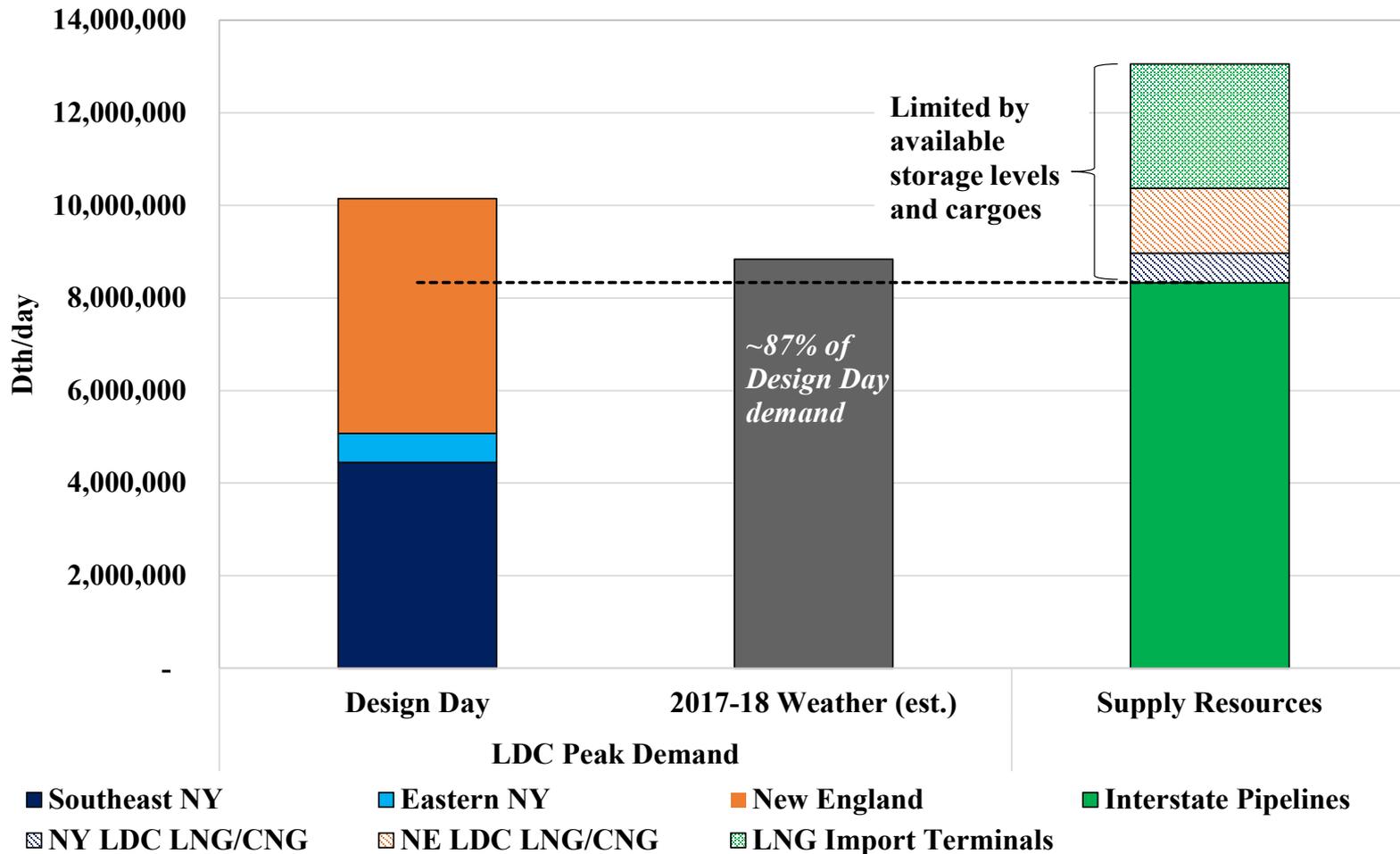


Regional Pipeline Capacity

- Slide 12 compares estimated Design Day gas demand of regional gas LDCs to available supply sources.
 - ✓ LDCs secure supply to meet firm demand on unusually cold winter “Design Day” (e.g. 1-in-33 year) conditions.
 - Power plant demand generally treated as non-firm by LDCs.
 - ✓ We also show estimated peak demand in weather comparable to 2017/18 cold snap.
- Slide 13 shows maximum regional pipeline imports (excluding LNG) each winter since 2017-18.
 - ✓ Values shown are for coincident maximum of all pipelines each winter (joint import limit).
 - ✓ Some pipelines added incremental capability over this period
 - ✓ Import limit slightly higher in warmer winters (2019, 2020).



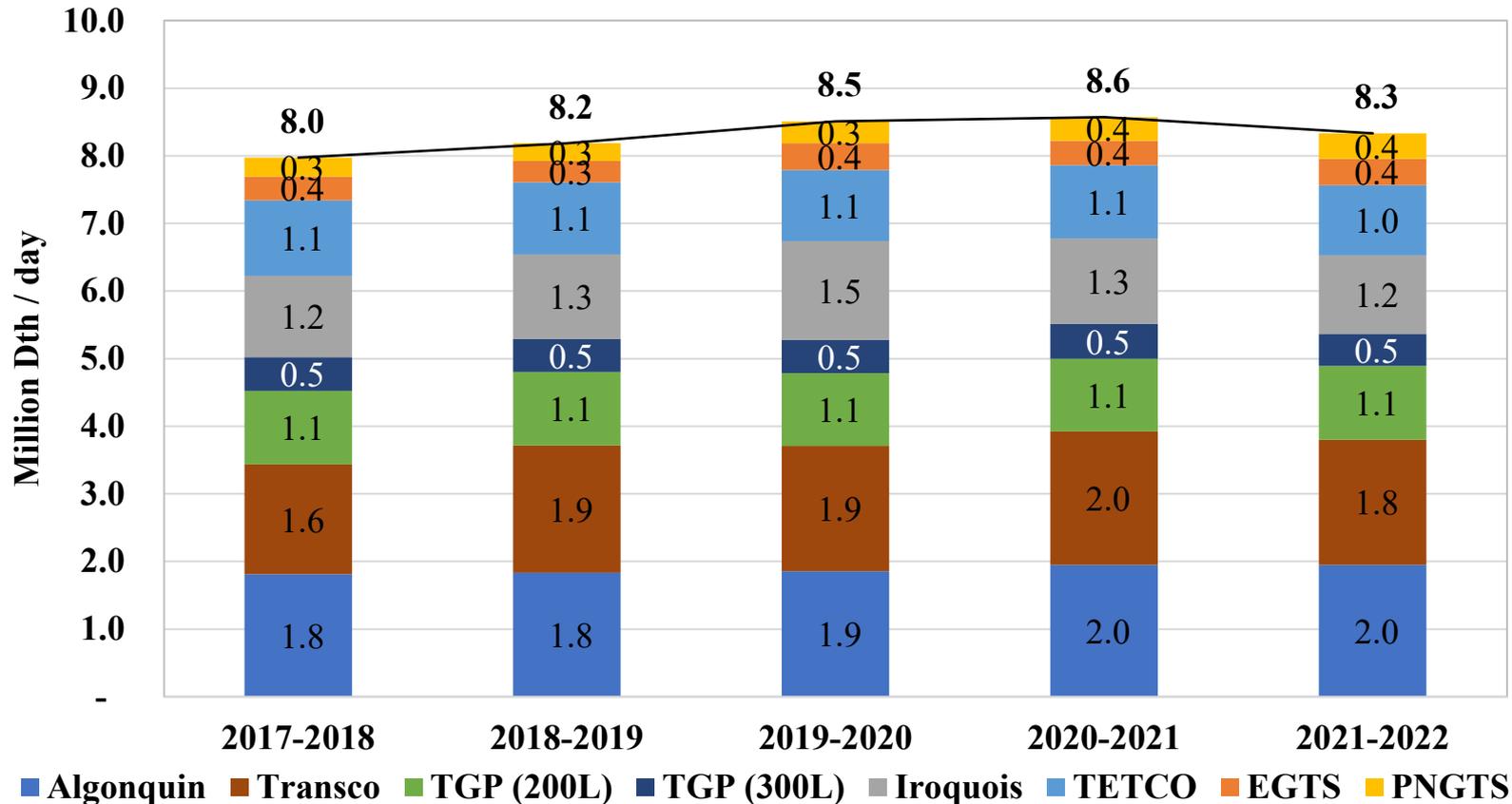
LDC Winter Peak Demand Exceeds Pipeline Capability



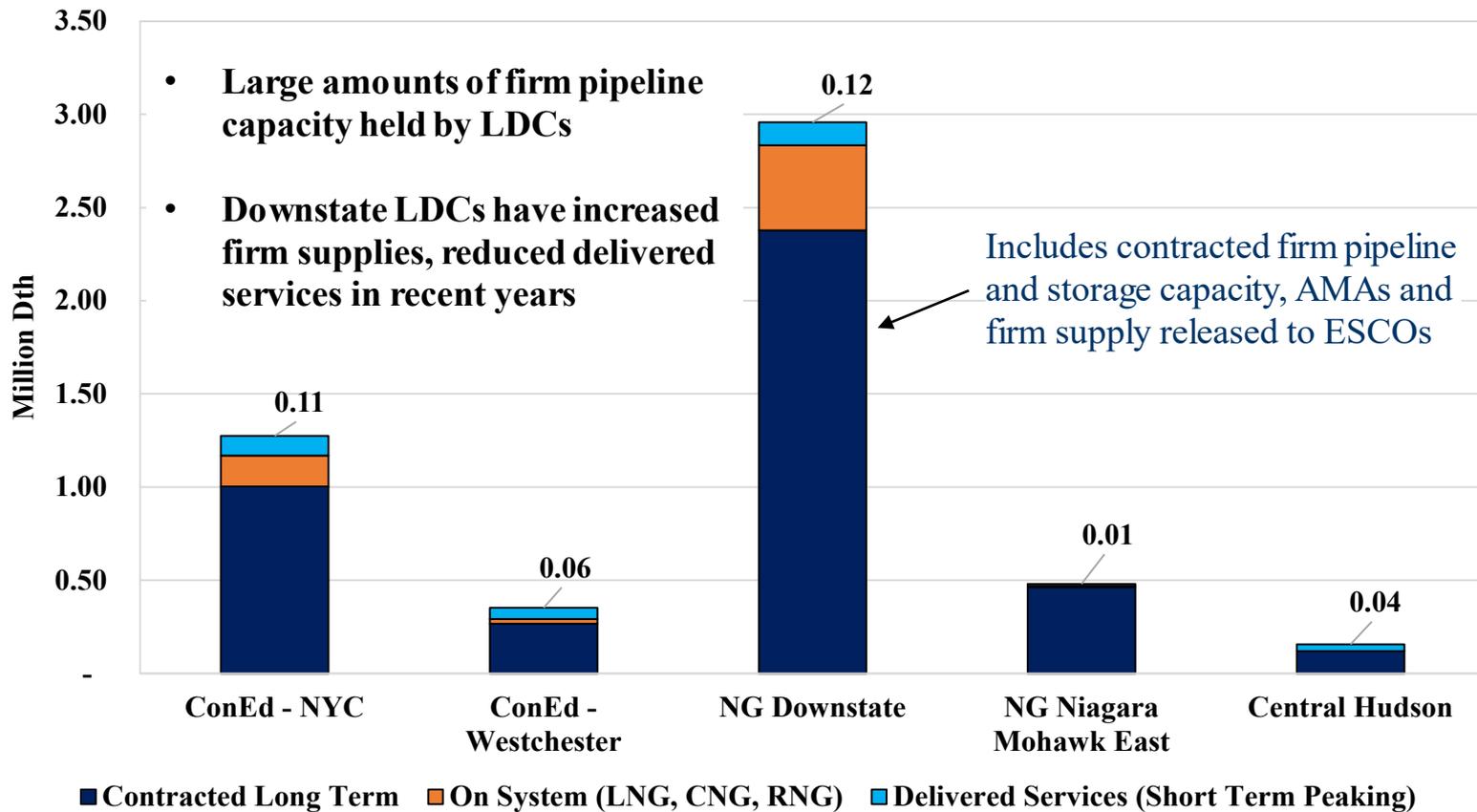


Interstate Pipeline Summary

Max Simultaneous Imports to Eastern NY/NE



Eastern New York LDCs' Supply Sources



Source: LDC winter fuel supply filings with NY DPS



LNG Storage and Imports

- **LNG storage/imports provide vital peaking supply.**
 - ✓ LDCs in NY and New England maintain on-system storage tanks that are filled during non-winter months.
 - ✓ Three import terminals can send imported LNG to pipelines serving New England.
- **LNG importers generally do not provide speculative supply or short-notice cargoes.**
 - ✓ Shippers typically require a contract months before winter.
 - ✓ Excess LNG stored/delivered to terminals (e.g. firm supply not needed by LDC) may increase gas available to generators.
 - It is dangerous to assume this will occur in a very cold period, since most LNG supplies are contracted to meet a firm customer's demand.

Summary of LNG Import and Storage Capability

<i>LDCs' LNG Storage Facilities</i>	Vaporization Capability (million Dth/day)	Storage (million Dth)	Liquefaction Rate (million Dth/day)
New York	0.6	3.3	0.017
New England	1.4	16.0	0.044

<i>LNG Import Terminals</i>	Maximum Sendout (million Dth/day)	Storage (million Dth)
New England		
Everett ¹	0.7	3.4
Northeast Gateway ²	0.5 - 0.8	0
New Brunswick		
Saint John	1.2	9.9

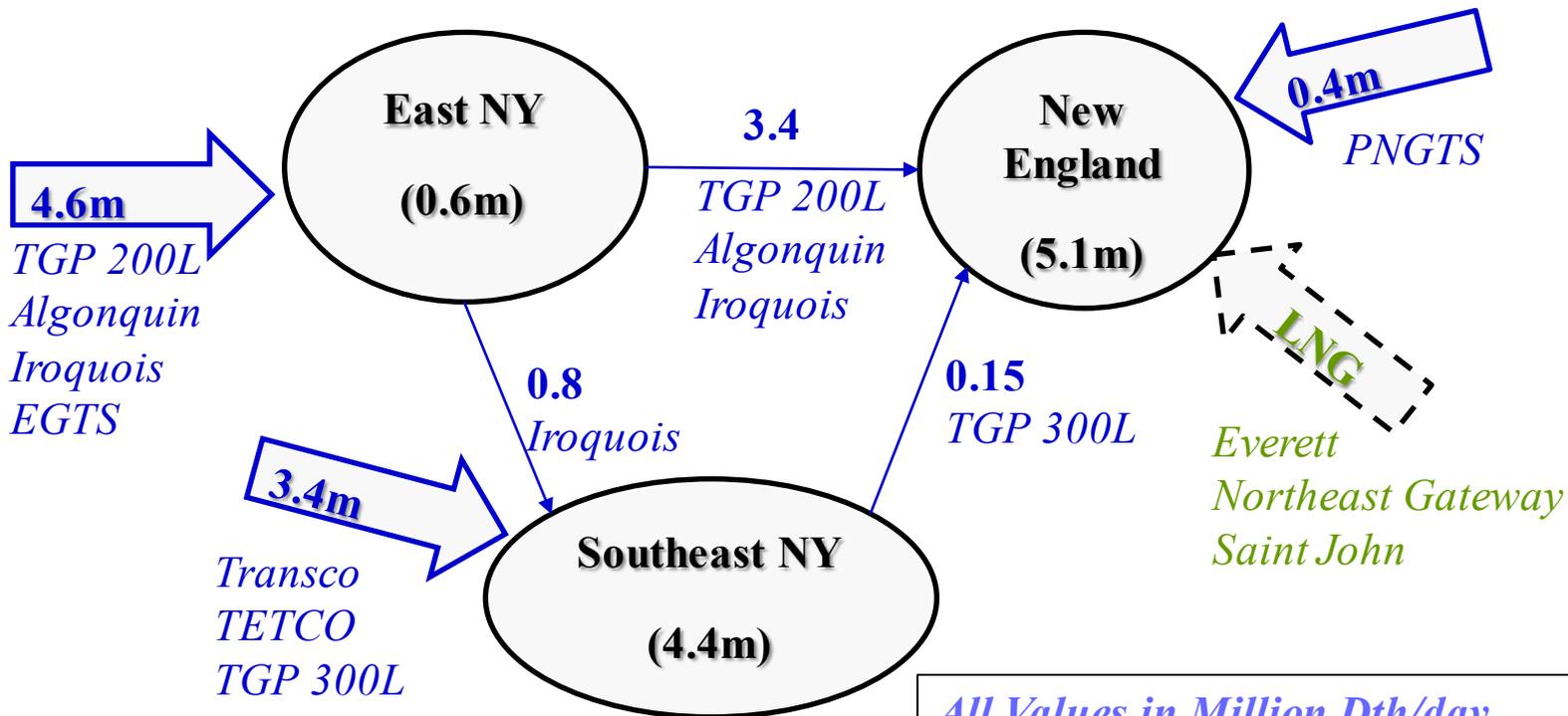
LDCs' LNG refill rates are very slow – months to refill

¹ Includes 0.3 million Dth from Everett sent directly to Mystic power plant.

² Maximum sendout depends on number of FSRUs at terminal (1 or 2).

External and Internal Pipeline Limits

- Stored/imported LNG is needed to satisfy *regional* peak gas demand.
- Transport through NY to NE may be limited on the margin...but does not lead to significant surplus gas in eastern NY.



*All Values in Million Dth/day
LDC Design Day Demand
Interstate Pipelines (excl. LNG)*

Pipeline limits based on simultaneous max in 2021/22 winter.



Regional Gas Supply & Core Demand: Conclusions

- Under severe winter conditions, LDC demand is expected to exceed pipeline capability to the region.
 - ✓ Incremental firm gas will likely require additional LNG imports to the region.
 - ✓ LNG imports must be arranged many months before the winter.
- In a typical winter, LDCs' actual demand is lower than Design Day demand.
 - ✓ Thus, firm pipeline capacity often becomes available to power generators on a short-term basis.
 - ✓ However, we should not assume that short-term firm capacity will be available under severe winter conditions.



Analysis of Gas Available to Generators

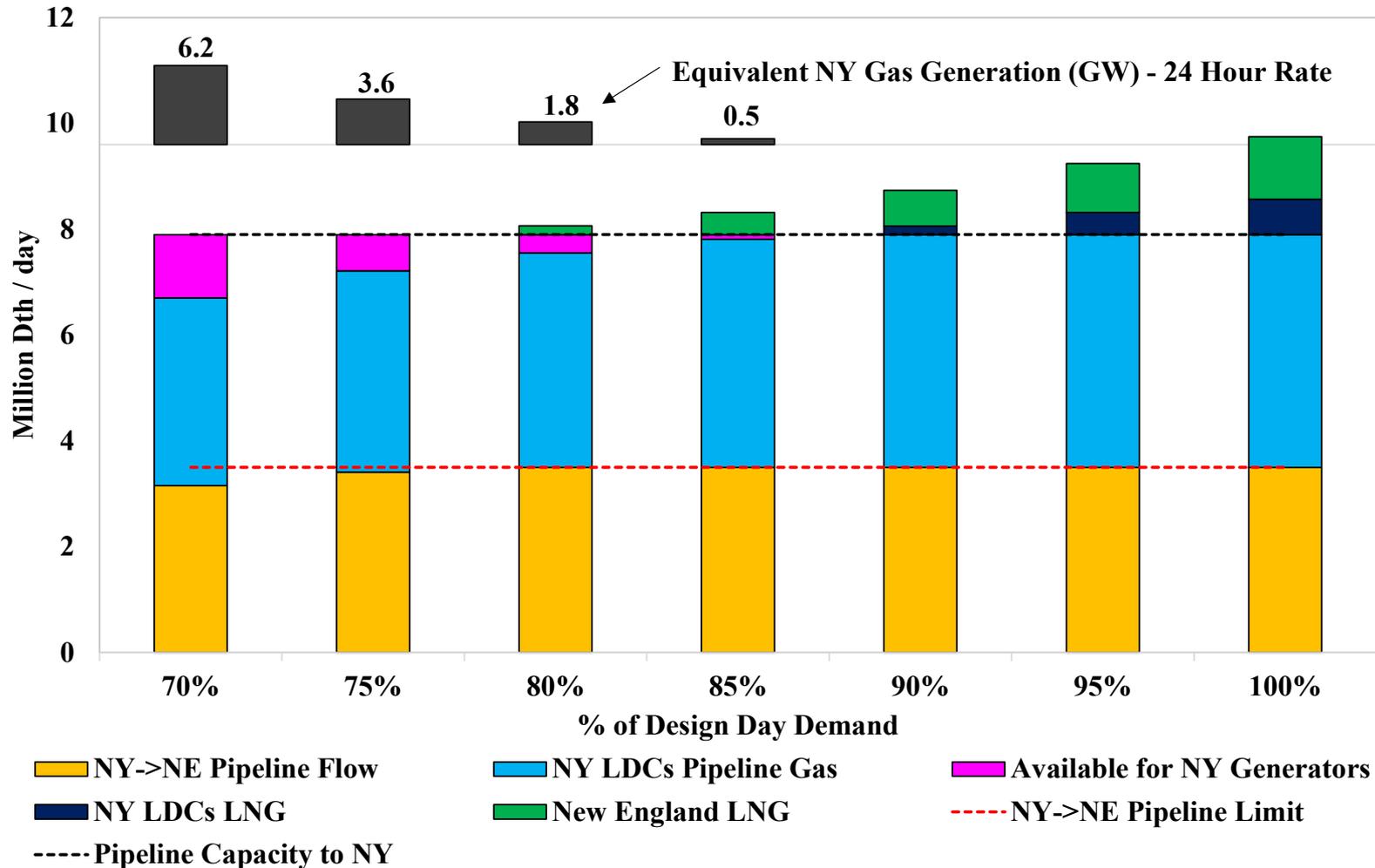


Illustration of Gas Available to Generators

- The following slide illustrates approx. gas available for NY generators as a function of winter weather.
 - ✓ We assume pipeline gas first satisfies LDCs' firm demand, then excess capacity is sold to generators.
 - ✓ We assume New England LDCs hold contracts for firm delivery across interstate pipelines through NY.
 - ✓ LDCs use stored/imported LNG if pipeline gas is insufficient.
- **In moderately cold weather, pipeline limits to New England cause some gas to be available to generators in eastern NY.**
- **In very cold weather, the entire region depends on LNG and no pipeline gas is available to NY generators.**



Illustration of NY->NE Constraints Impact





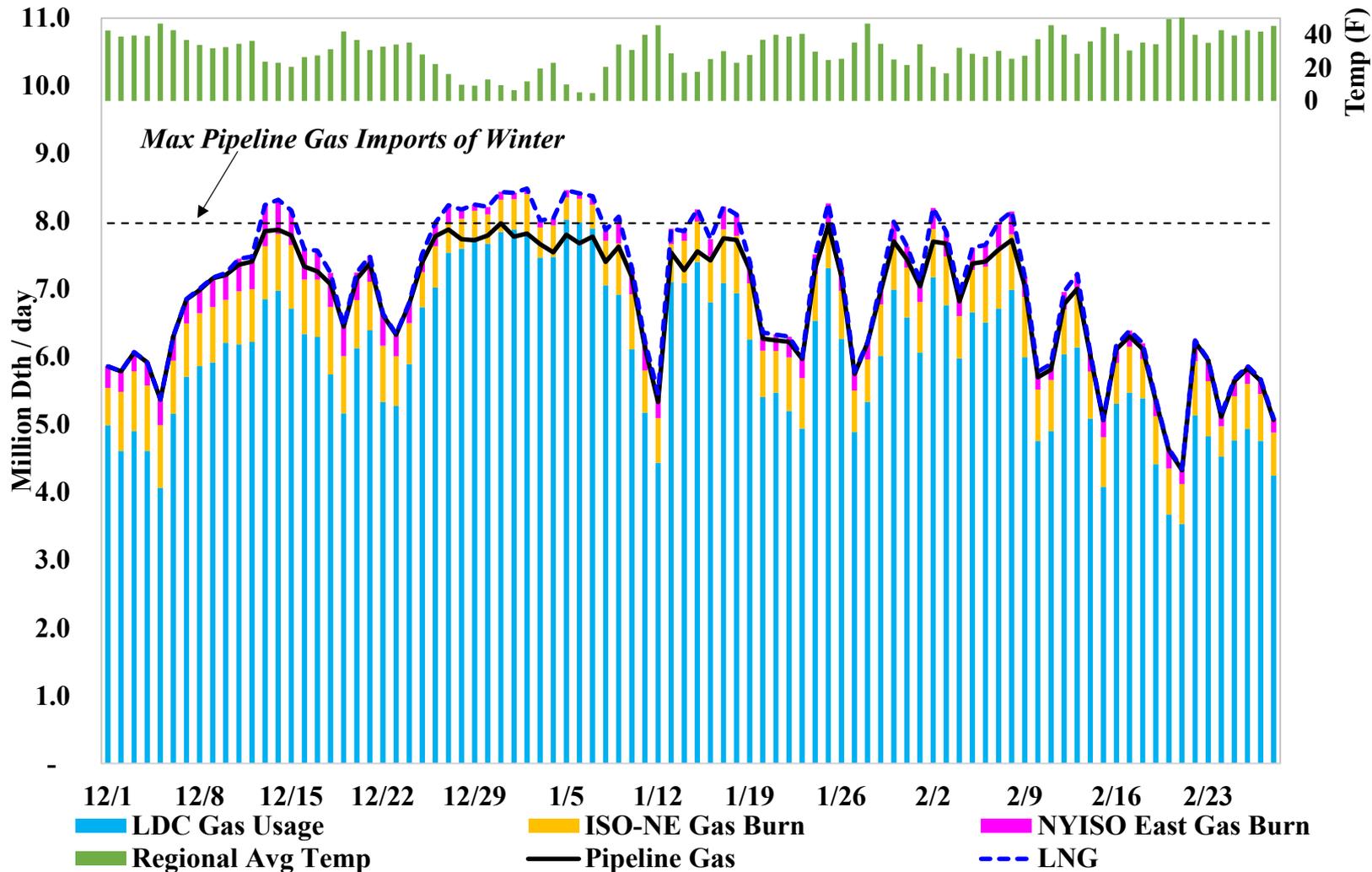
Historical Gas Imports and Generation

- Slides 23 to 27 show daily interstate pipeline imports, LNG imports* and gas consumption in the past five winters.
- Daily LDC gas usage is estimated as total regional imports minus gas burn of generators.
- **Key takeaways:**
 - ✓ In cold weather, pipeline gas hits ceiling and LNG imports increase.
 - ✓ Margin between pipeline imports and LDCs' consumption (e.g., gas available for generators) is small on cold days.
 - ✓ Gas-fired generation has been made possible by LNG imports in recent winters.

*LNG imports include Everett and Northeast Gateway facilities plus imports via Maritimes & Northeast pipeline (sourced from Saint John LNG)

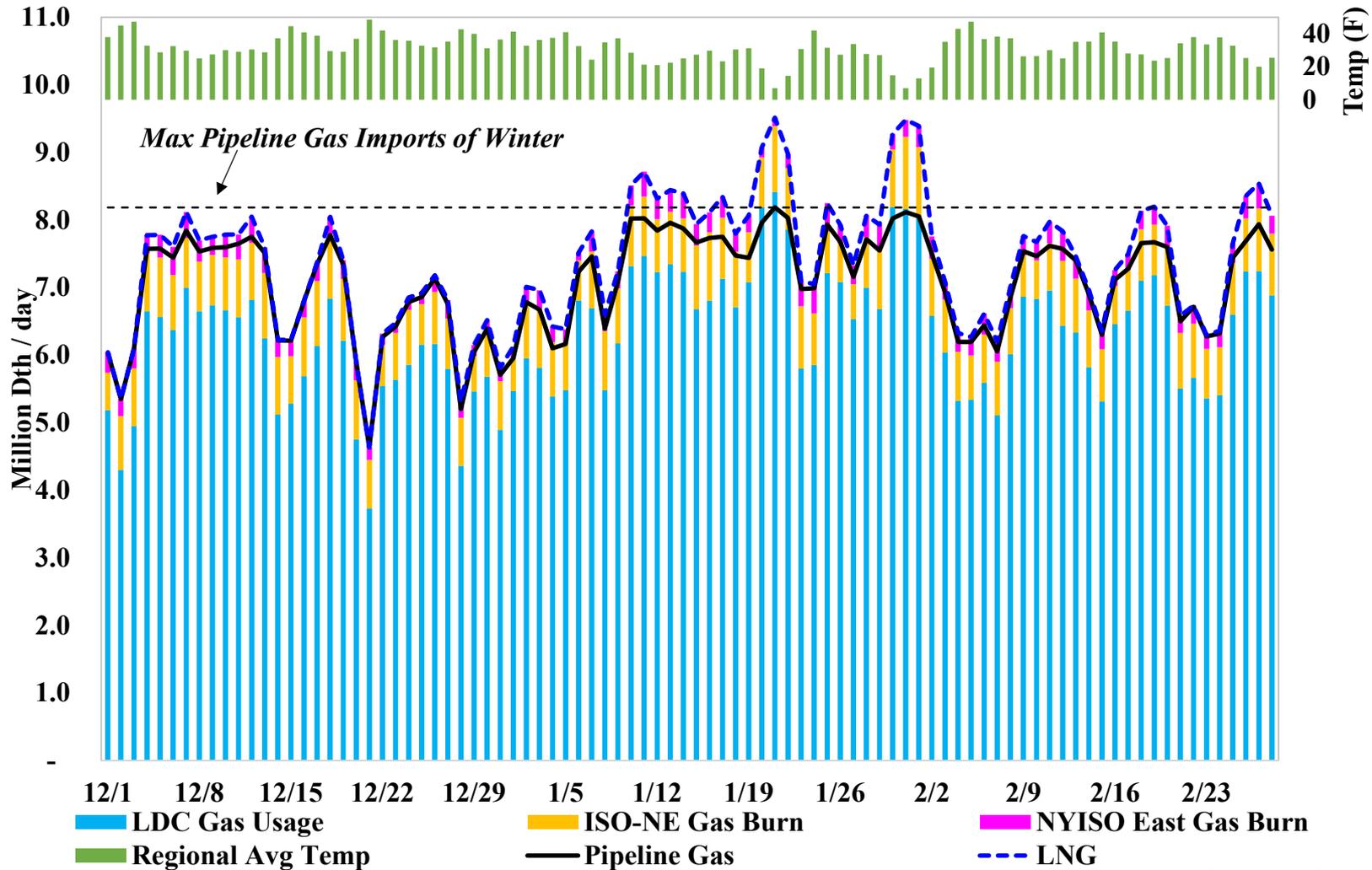


Regional Pipeline Gas and LNG Winter 2017-2018



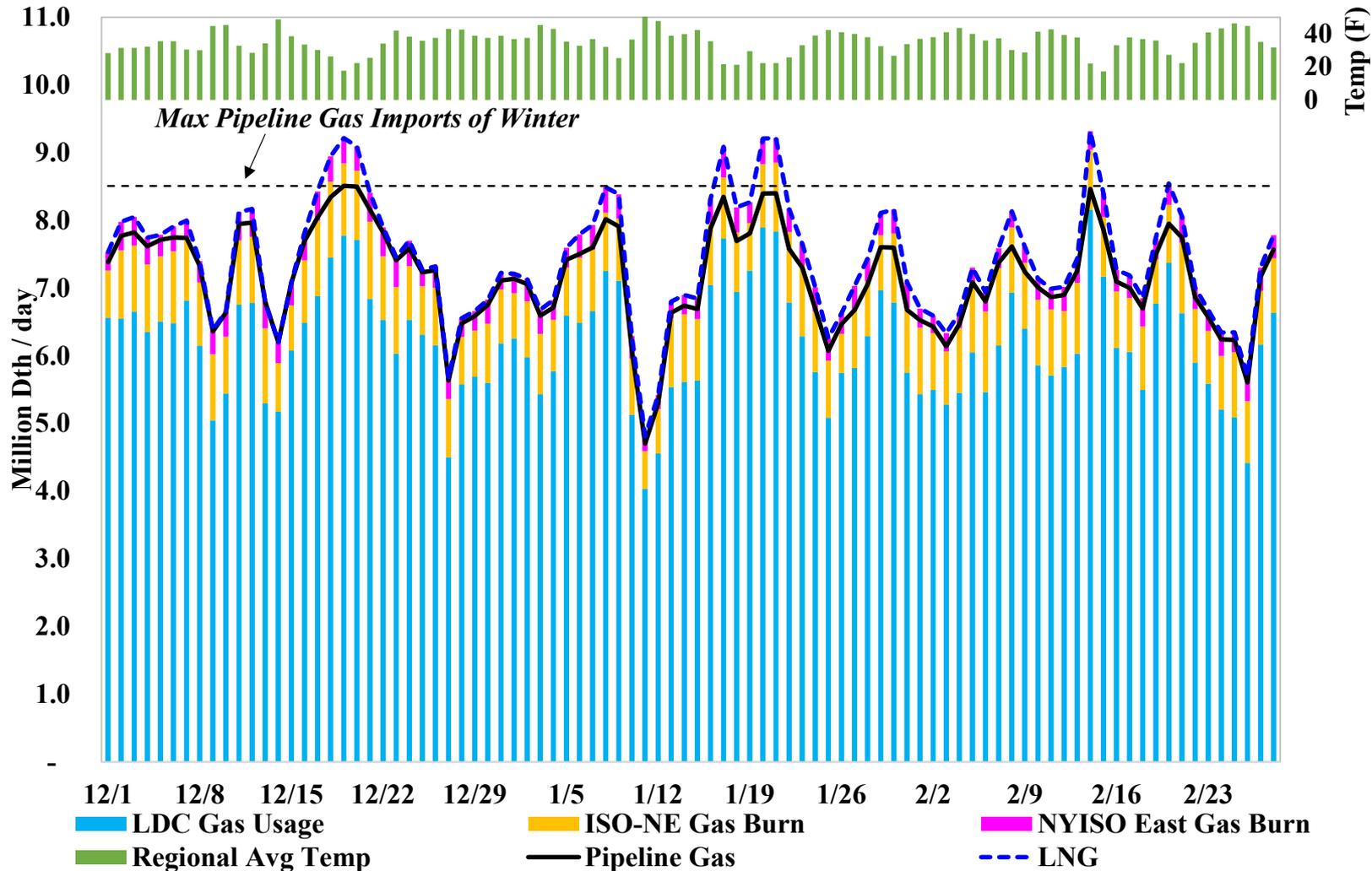


Regional Pipeline Gas and LNG Winter 2018-2019



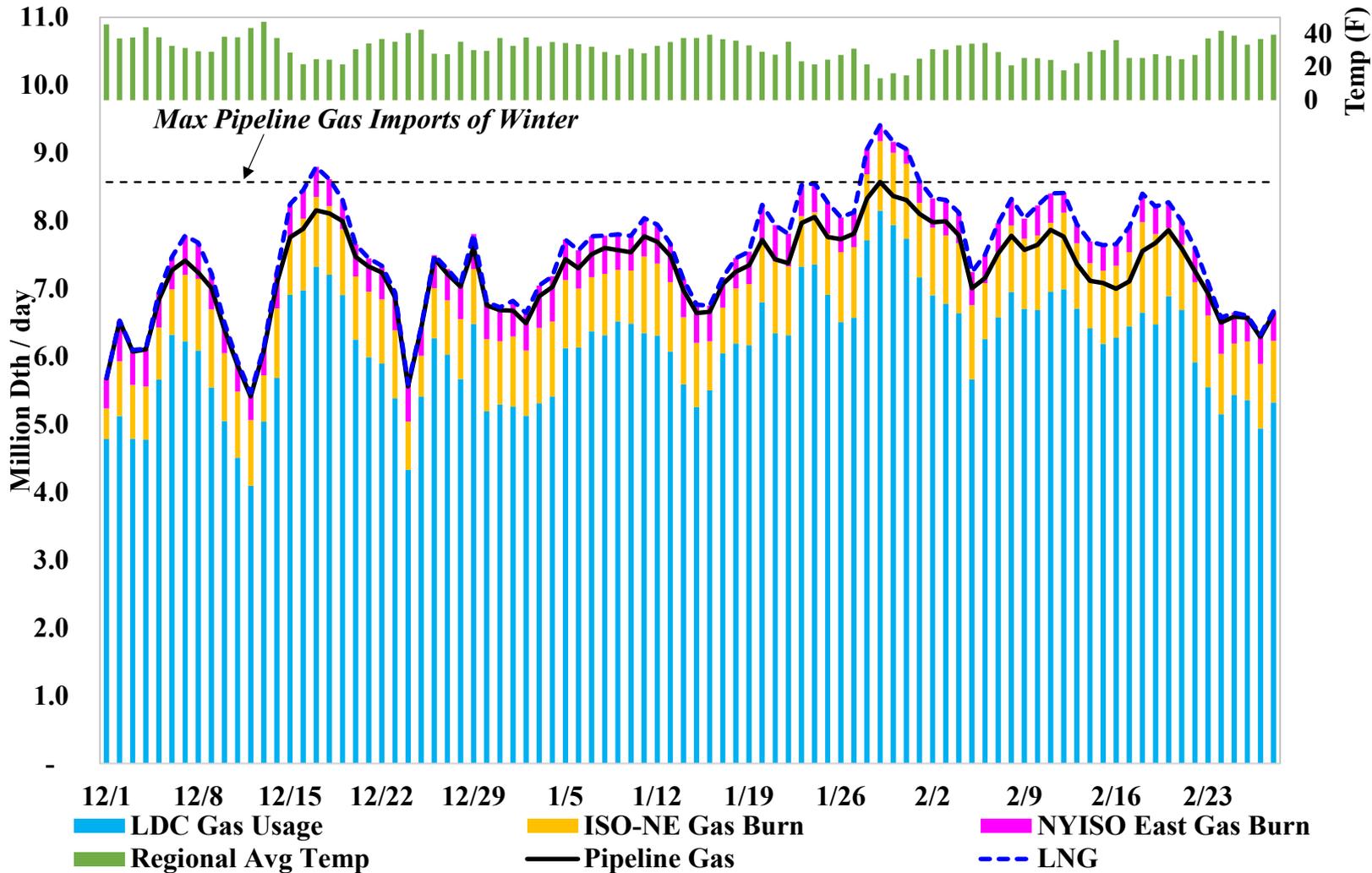


Regional Pipeline Gas and LNG Winter 2019-2020



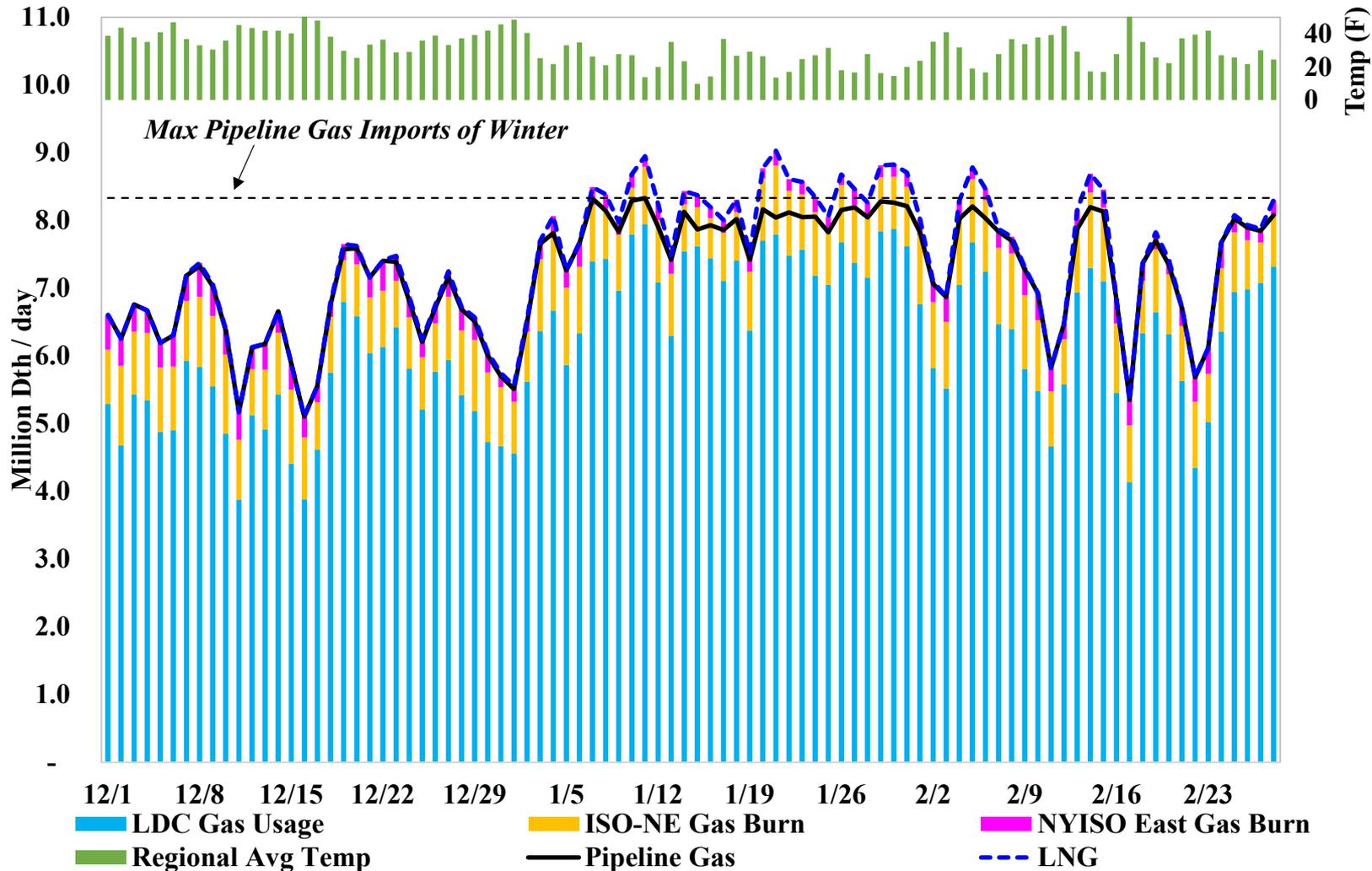


Regional Pipeline Gas and LNG Winter 2020-2021





Regional Pipeline Gas and LNG Winter 2021-2012



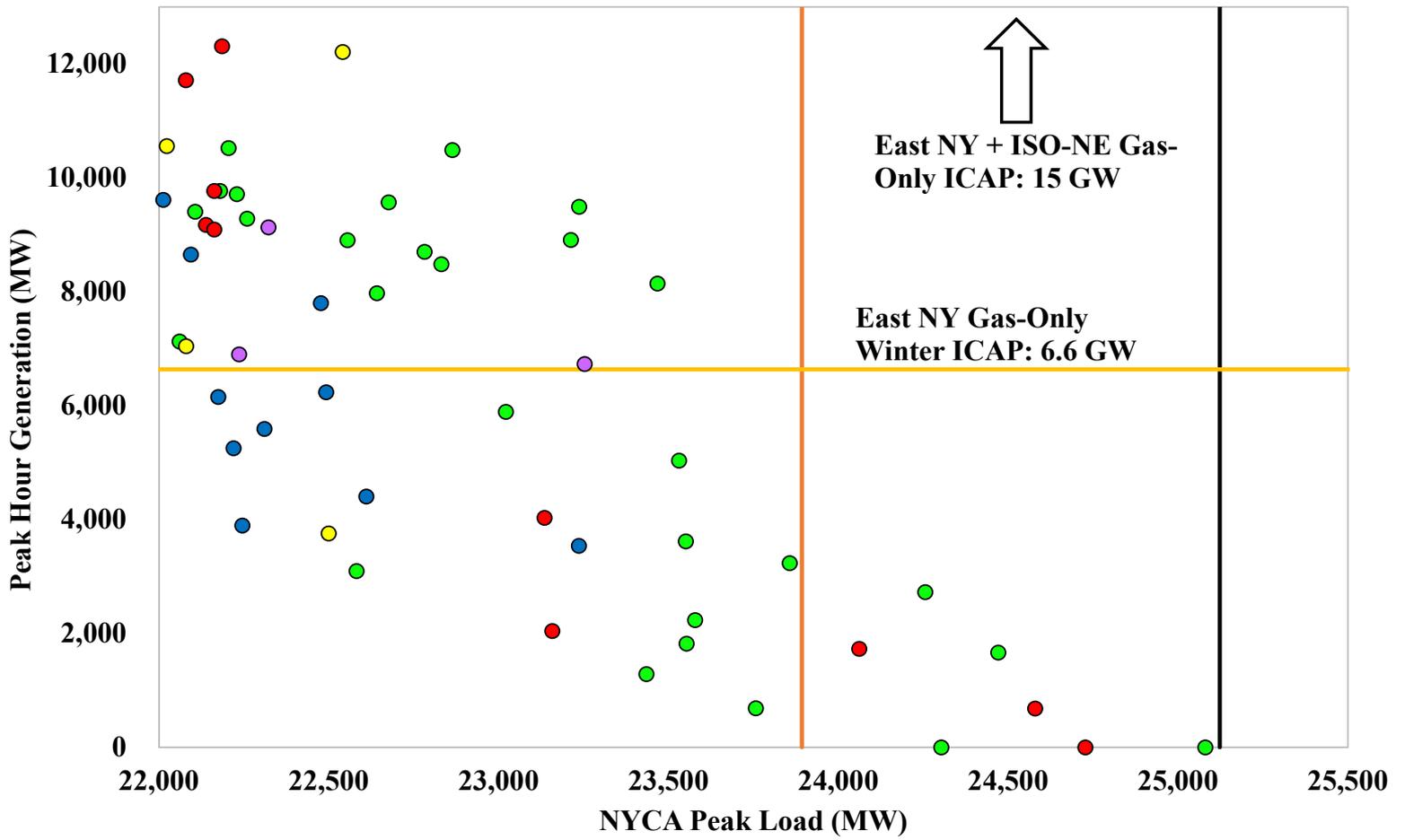


Analysis of Gas Generator Availability

- The following slide compares daily regional gas-fired generation to NYCA peak load in the past five winters.
- Includes all gas-fired generation in region, excluding certain units with dedicated fuel supplies (e.g. Mystic 8 & 9 in NE).
- Includes only pipeline gas generation
 - ✓ Regional LNG imports are netted out from generators' gas burn if pipeline inflows are at limit.
 - ✓ Excludes effect of generation made available by LNG for which generators lack contracts.

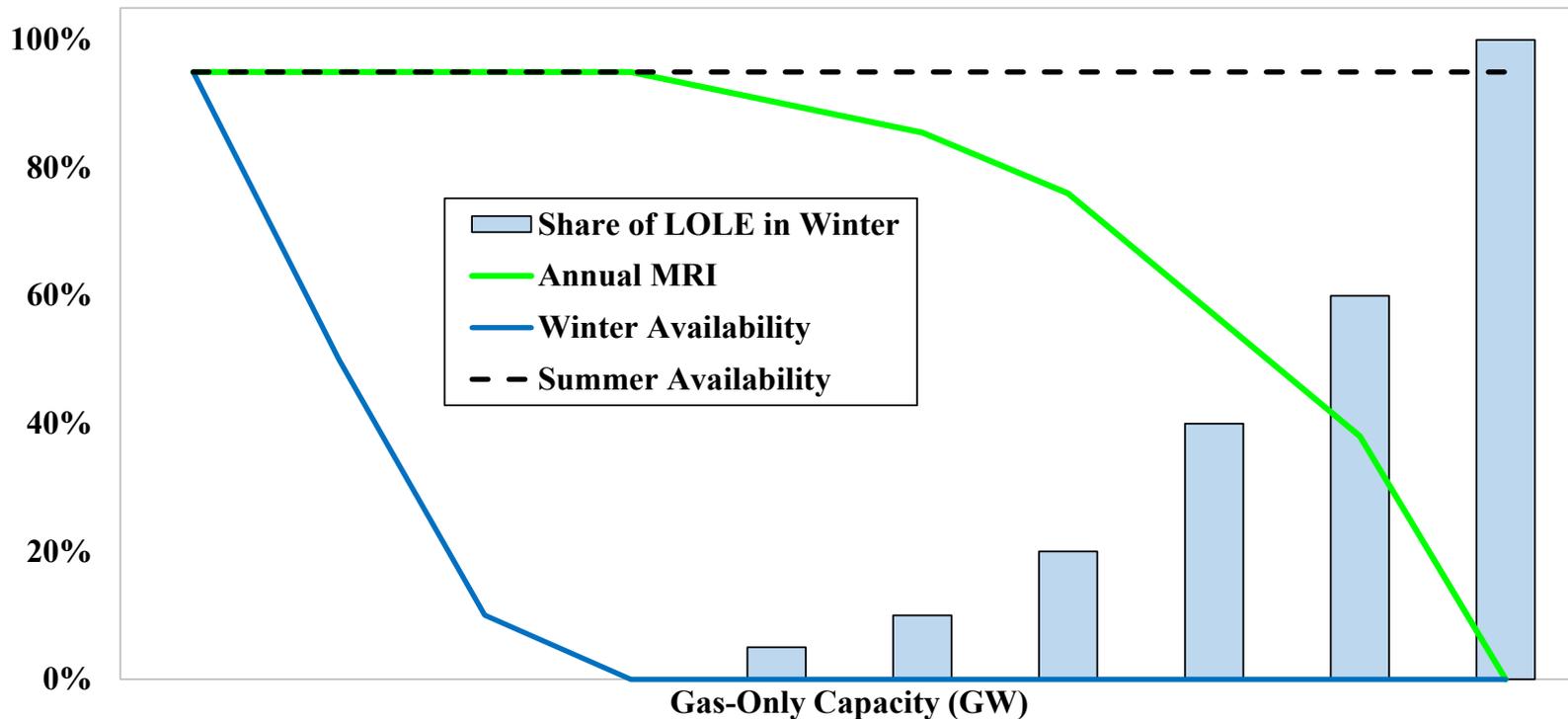


Regional Pipeline Gas Generation *Net of LNG on Constrained Days*



- 2017-2018
- 2018-2019
- 2019-2020
- 2020-2021
- 2021-2022
- 50/50 NYISO Peak
- 90/10 NYISO Peak

Illustration of Accreditation Impact

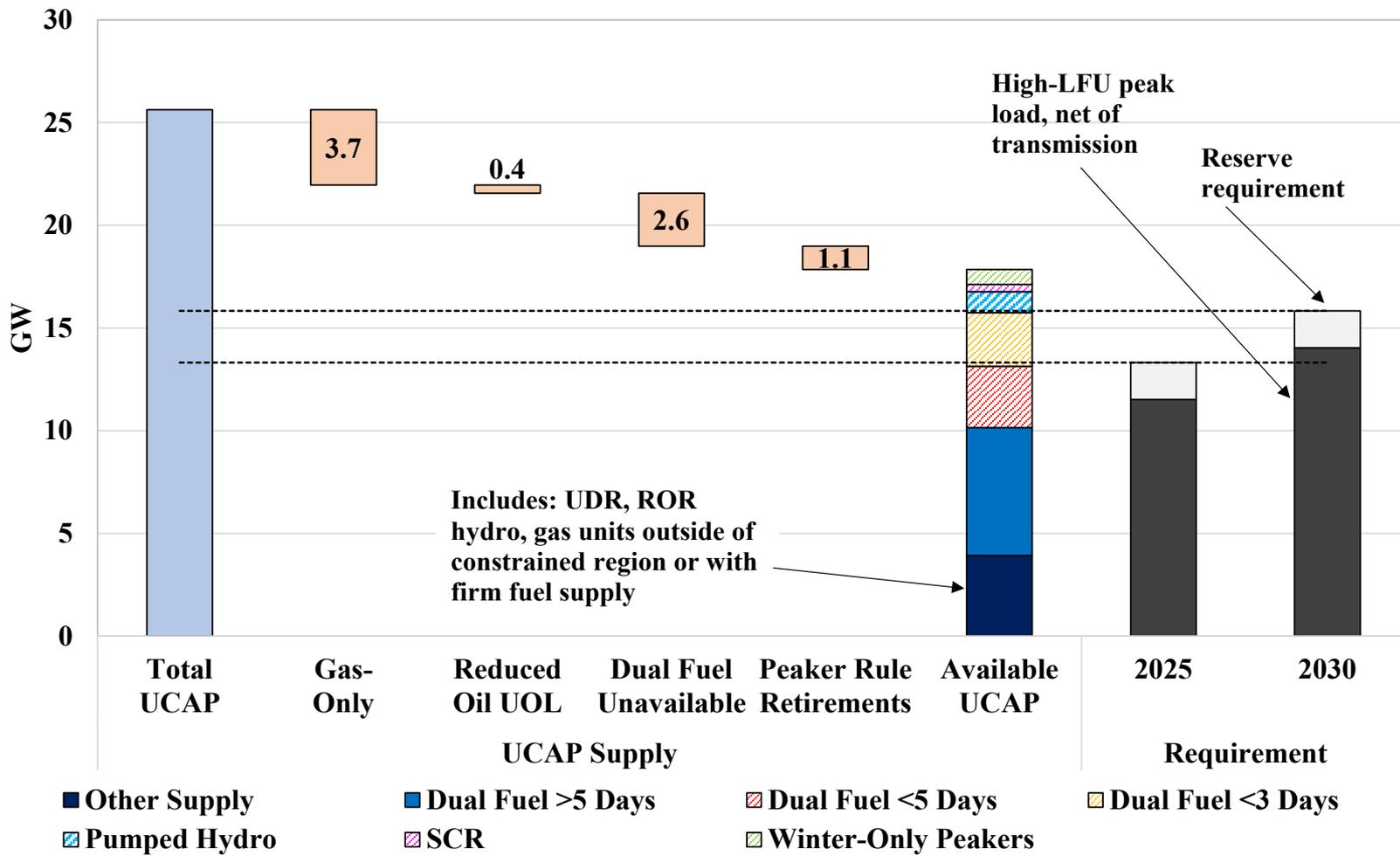


- Impact of gas limitations on accreditation outcomes depends on timing of reliability risk after considering seasonal supply.
- Summer peak load is much higher, so risk is concentrated in summer unless large amounts of supply are unavailable in winter.



Winter Peak Supply vs. Demand Eastern NY

Reserve margins in eastern NY highly dependent on oil units with limited tanks.





Conclusions

- Peak winter demand for gas exceeds pipeline capacity to Eastern New York and New England.
 - ✓ Gas LDCs reserve/procure vast majority of this capacity.
- On very cold days, gas will be available to generators only if:
 - ✓ Generator has firm transport contract, or
 - ✓ Imported LNG creates a surplus above LDCs' needs.
- NYISO's RA model should discount non-firm gas-only generators and external assistance from New England in winter
- Impact on capacity value depends on degree of winter reliability risk after appropriately discounting resources
 - ✓ Will also need to consider availability of oil-fired units with limited fuel storage and refueling capacity.