

2023-24 Winter Assessment & Winter Preparedness

Aaron Markham

Vice President of Operations

New York State Reliability Council Executive Committee

December 8, 2023, NYISO

Agenda

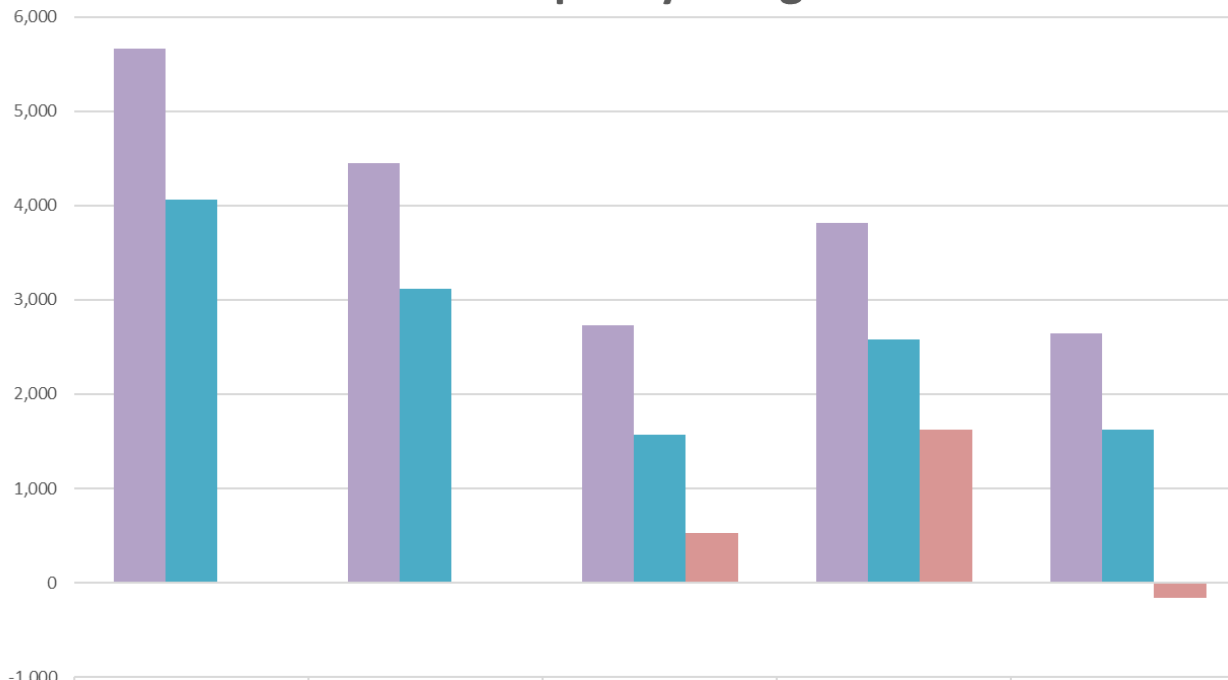
- **Key Observations**
- **Winter 2023-24 Capacity Assessment**
- **Winter 2023-24 Preparedness**
- **Infrastructure Updates**
- **Appendix A: Regional and Local Fuel Inventories & Fuel Prices**
- **Appendix B: Near Term Fuel and Energy Security Assessment**
- **Appendix C: 2023 Fuel & Energy Security Study**

Key Observations – 2023-24 Winter Capacity Assessment

- The NYISO expects sufficient capacity margins for 50-50 peak forecast conditions, and possible use of emergency operating procedures in extreme weather conditions assuming only firm fuel generation* available.
 - 2,641 MW - capacity margin for 50-50 peak forecast conditions
 - 1,625 MW - capacity margin for 90-10 peak forecast conditions
 - -161 MW - capacity margin for 99-1 peak forecast conditions
- Winter capacity margins assuming only firm fuel generation available has declined significantly. (2,443 MW reduction since Winter 2019-20)
- Continued future reductions in winter capacity margins, disruptions in fuel supplies or other winter operational concerns may result in operational challenges given the reliance on firm fuel generation during extreme cold weather events.

*Non-firm fuel generation includes gas-only fired generation without firm gas transportation contract arrangements. All other generation types are considered firm.

Winter Capacity Margins



	19-20	20-21	21-22	22-23	23-24
50/50 - Only Firm Fuel	5,668	4,447	2,730	3,812	2,641
90/10 - Only Firm Fuel	4,067	3,118	1,566	2,583	1,625
99/1 - Only Firm Fuel			525	1,619	-161

2022-23 & 2023-24 Winter Capacity Assessment & Comparison

Line	Item	2022-23			2023-24		
		Baseline Forecast	90th Percentile Forecast	99th Percentile Forecast	Baseline Forecast	90th Percentile Forecast	99th Percentile Forecast
1a	Winter Generation Capacity ¹	40,393	40,393	40,393	39,668	39,668	39,668
1b	SCR - ICAP Values	694	694	694	802	802	802
1c	Net Purchases & Sales	2,097	2,097	2,097	1,589	1,589	1,589
1	Total Capacity Resources	43,184	43,184	43,184	42,058	42,058	42,058
2	Assumed Unavailable Capacity (Gen+SCR) ²	-6,375	-6,375	-6,375	-6,083	-6,083	-6,083
3 = 1 + 2	Net Capacity Resources	36,809	36,809	36,809	35,975	35,975	35,975
4	Peak Load Forecast	23,893	25,122	26,086	24,220	25,236	27,022
5	Operating Reserve Requirement	2,620	2,620	2,620	2,620	2,620	2,620
6 = 4 + 5	Total Capacity Requirement	26,513	27,742	28,706	26,840	27,856	29,642
7 = 3 - 6	Capacity Margin	10,296	9,067	8,103	9,135	8,119	6,333

1. Reflects the 2023 Gold Book existing capacity with projected and actual deactivations and additions during 2023-24
2. Derates: 1,754 MW for wind, 395 MW for Hydro, 2,355 MW for thermal units, 224 MW for other renewables, 327 MW for SCRs

- 2022-2023 actual peak load was 23,369 MW on February 3 HB 17
- The all-time winter peak was 25,738 MW, set on January 7, 2014

2023-24 Winter Capacity Assessment – Firm Fuel Scenarios

Line	Item	Baseline Forecast	90th Percentile Forecast	99th Percentile Forecast
1a	Installed Capacity Resources	39,668	39,668	39,668
1b	SCR - ICAP Values	802	802	802
1c	Net ICAP External Imports	1,589	1,589	1,589
1	NYCA Resource Capability	42,058	42,058	42,058
2	Total Projected Capacity Outages	-6,083	-6,083	-6,083
3 = (1-2)	Net Installed Capacity Resources	35,975	35,975	35,975
4	Load Forecast	24,220	25,236	27,022
5	Operating Reserve Requirement	2,620	2,620	2,620
6 = (3-4-5)	Capacity Margin	9,135	8,119	6,333
7a	Subtract All Gas Only Units and Duct Burner Capabilities ^{1,2}	-8,993	-8,993	-8,993
7 = (6-7a)	Capacity Margin, Loss of Gas	142	-874	-2,660
8a	Add Back Units with Firm Gas Contracts	2,499	2,499	2,499
8 = (7-8a)	Expected Capacity, Loss of Non-Firm Gas Case	2,641	1,625	-161

1. Loss of Gas values may change, values shown based upon partial results of 2023-24 Fuel Survey
2. Duct Burner derates account for approximately 500 MW
3. 732 MW of non firm gas capability is in Zones A-E where 5762 MW is in Zones F-K

- Based on partial results of the 2023-24 Fuel Survey, additional firm fuel generation could be unavailable at temperatures corresponding with high load forecasts:
90-10 daily average temperature (5 deg F): 114 MW 90-10 daily minimum temperature (0 deg F): 707 MW
99-1 daily average temperature (-2 deg F): 707 MW 99-1 daily minimum temperature (-8 deg F): 3,441 MW



2023 Emergency Operating Procedures

Procedure	Effect	2023 MW Value
Emergency Demand Response Programs	Load Impact	1
Voltage Reductions	Load Impact	611
Voluntary Industrial Curtailment	Load Impact	267
General Public Appeals	Load Impact	74
Emergency Purchases	Additional Resources	As Available
Thirty Minute Reserves to Zero	Allow Operating Reserve to Decrease to Largest Single Contingency	1,310
Total Emergency Operating Procedures		2,263

* The Emergency Operating Procedures above do not reflect an exhaustive list of operator actions available to avoid load shed.

Winter 2023-24 Operational Preparedness

- ISO Operations is monitoring regional fuel supplies as indications are some could be limited in supply this winter. US Energy Information Administration (EIA) indicates oil inventories both regionally and throughout the United States are on the low end of historical values.
- Seasonal and weekly fuel surveys indicate oil and dual fuel capability generation have sufficient start-of-winter oil inventories (but lower than December 2022 inventories). See Appendix B “Total weekly oil inventory in MWh”
- ISO Operations has surveyed most generating stations to discuss past winter operations, preparations for the upcoming winter, including last dual fuel operation, cold-weather preventative maintenance, fuel procurement arrangements, and fuel switching capabilities.
- ISO Operations’ coordination of transmission and generation maintenance outages helps mitigate the reliability impact of such outages during extreme cold weather periods.

Winter 2023-24 Operational Preparedness

- Participated in various communications and coordination efforts with NERC, state agencies (DPS, NYSEDA), other ISOs/RTOs, and the natural gas industry, including Interstate Natural Gas Association of America (INGAA), Natural Gas Supply Association (NGSA), Northeast Gas Association (NGA), NY pipelines, and NY LDCs
- NERC Project 2019-06 Cold Weather was completed and approved resulting in changes to the EOP-011, IRO-010, and TOP-003 Standards, effective April 1, 2023
- NERC Project 2021-07 Extreme Cold Weather Grid Operations, Preparedness, and Coordination is a 2 phase project looking to address the key recommendations from the *Federal Energy Regulatory Commission (FERC), NERC, and Regional Entity Joint Staff Inquiry into the February 2021 Cold Weather Grid Operations* resulting in changes to the EOP-011, EOP-012, and TOP-002 Standards expected to go into effect April 1, 2024.

Winter 2023-24 Operational Preparedness

- The NYISO continues to monitor and evaluate important events and ongoing industry actions in response to potential winter reliability concerns such as the *FERC, NERC, and Regional Entity Joint Inquiry into the December 2022 Winter Storm Elliott Grid Operations*. The following factors enhanced reliability in NY during the event:
 - diverse fuel/energy resource mix in NY including dual fuel capability
 - low temperature conditions were aligned with NYISO's forecast design criteria for the winter capability period and reasonable load forecast performance along with responsible coordination efforts of NYISO, generators and transmission owners
 - interconnections with neighboring control areas allowed for the import/export of energy
- NYISO led a review of load shedding processes/procedures and coordination of the gas-electric critical infrastructure survey with the New York Transmission Owner Planning Working Group (TOPWG)
- Defined and implemented Tariff modifications to support Critical Electric System Infrastructure Load (CESIL) being excluded from NYISO Demand Response Programs
- The NYISO responded to and collected data associated with the *NERC Level 3 Alert on Cold Weather Preparations for Extreme Weather Events III* issued on 5/15/23 in anticipation of standard implementation April 2024

Gas-Electric Coordination

- **A communications protocol is in place with NY state agencies to improve the speed and efficiency of generator requests to state agencies for emissions waivers if needed for reliability**
 - Protocol was leveraged in January 2018 and proved effective in facilitating communications between parties
- **An emergency communications protocol is in place to communicate electric reliability concerns to pipelines and gas LDCs during tight electric operating conditions**
 - Cooperative process with interstate pipelines and LDCs for providing OFO information to the NYISO
- **FERC Order No. 787**
 - The NYISO modified its Code of Conduct (ISO OATT Att F) per the Order to accommodate pipeline requests for reliability information

Situational Awareness

- **Formation of the Energy Security team in the Grid Transition department**
- **Control Room gas-electric support**
- **Video boards**
 - Northeast interstate pipeline system is displayed
 - Operational Flow Orders are displayed with readily detectable visualization techniques
 - Continuously enhancing weather displays to analyze potential impacts on NY generation and loads
- **A web-based, fuel survey “portal” provides generator fuel information to the operators**
 - Updated weekly by generators
 - Updated daily during cold weather conditions, upon request by the NYISO

Other Winter Operational Challenges

- **Intra-day Gas Procurement-** Gas only fired generating resources are likely to be unavailable for operation if not scheduled in the ISO's day-ahead energy market due to the difficulty in procuring intra-day gas
- **Alternate Fuel Replenishment-** Generator burn rates of alternative fuels can exceed replacement rates during extreme cold weather conditions
- **Emissions Limitations-** Use of alternate distillate fuels by oil or dual fuel capable generation may be further restricted by emission limits
- **Retail Gas LDC Priority -** Gas Local Distribution Company (LDC) retail gas demand has priority over electric power generation

Generation Deactivations*

Station Name	Nameplate MW
Astoria House 2	-186
Astoria House 3	-186
Astoria House 4	-186
74th St GTs 1 & 2 <i>(Local Reliability Only)</i>	-37
Ravenswood 01	-19
Ravenswood 10	-25
Total	-639

* Since the 2022-2023 Winter Assessment

Generation Additions*

Station Name	Nameplate MW
Homer Solar Energy Center	90
South Fork Wind I & II	136
East Point Solar	50
Puckett Solar	20
Regan Solar	20
Grissom Solar	20
Total	336

* Since the 2022-2023 Winter Assessment and forecasted to be in service by mid-December. An additional 224 MW of Solar generation is expected to come into service by the end of Winter 2024.

Transmission Operations

Equipment	Voltage (kV)	Status
Hudson-Farragut B3402	345	Out-of-Service
Marion-Farragut C3403	345	Out-of-Service
Warren-Falconer 171	115	Operated Normally Open
Sprain Brook/Dunwoodie Series Reactors	345	Bypassed
Marcy South Series Capacitors	345	Bypassed
Moses-Willis MW1	230	Out-of-Service (24-hour recall)
Edic-Princetown 351 & 352	345	Expected in Service

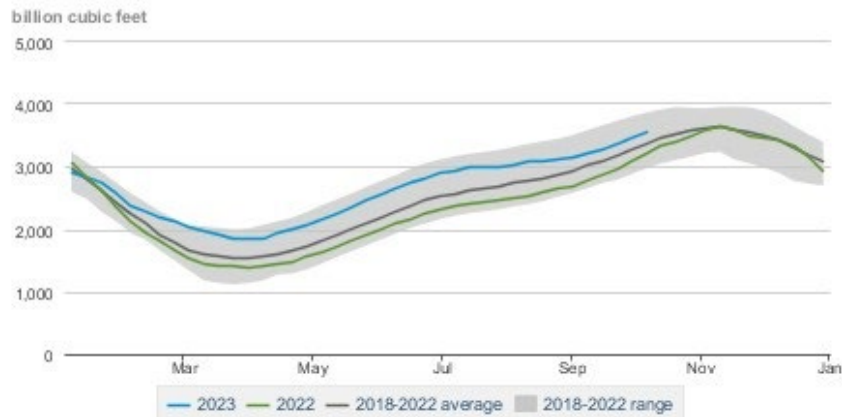
Appendix A

Regional and Local

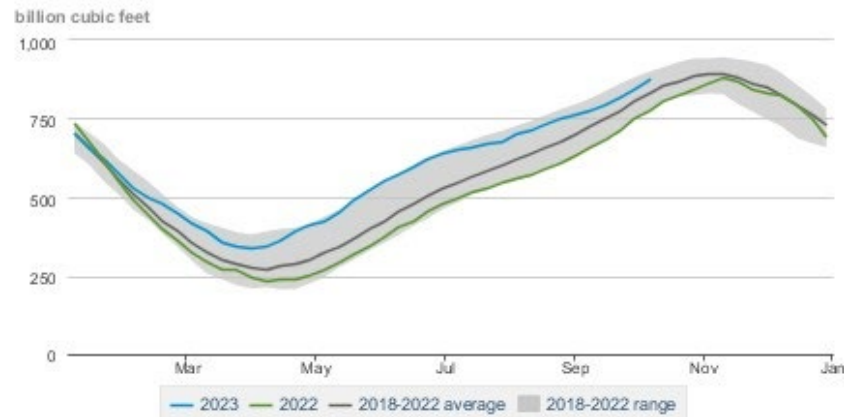
Fuel Inventories

Natural gas underground storage levels

Lower 48 weekly working gas in underground storage



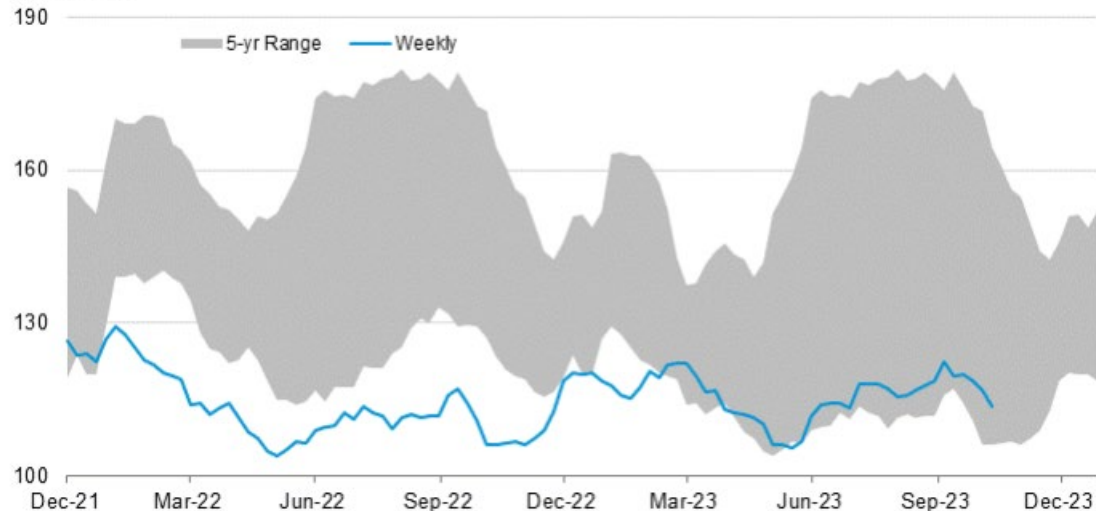
East region weekly working gas in underground storage



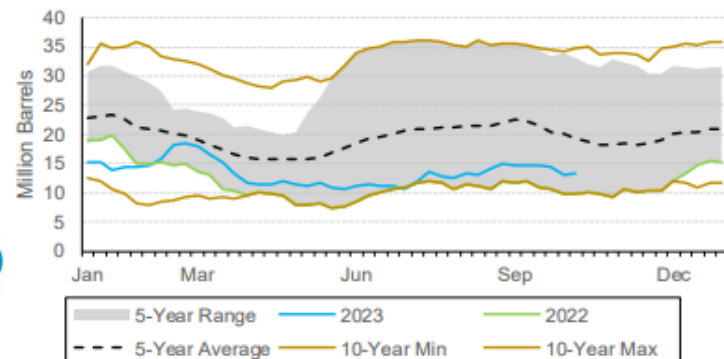
Distillate Inventories

Distillate stocks (*million barrels*) and days of supply

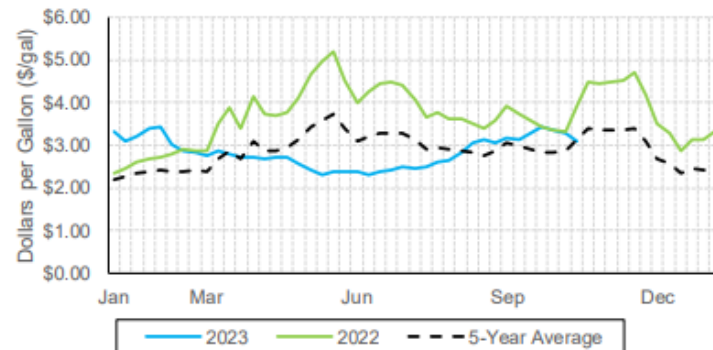
U.S. distillate stocks
million barrels



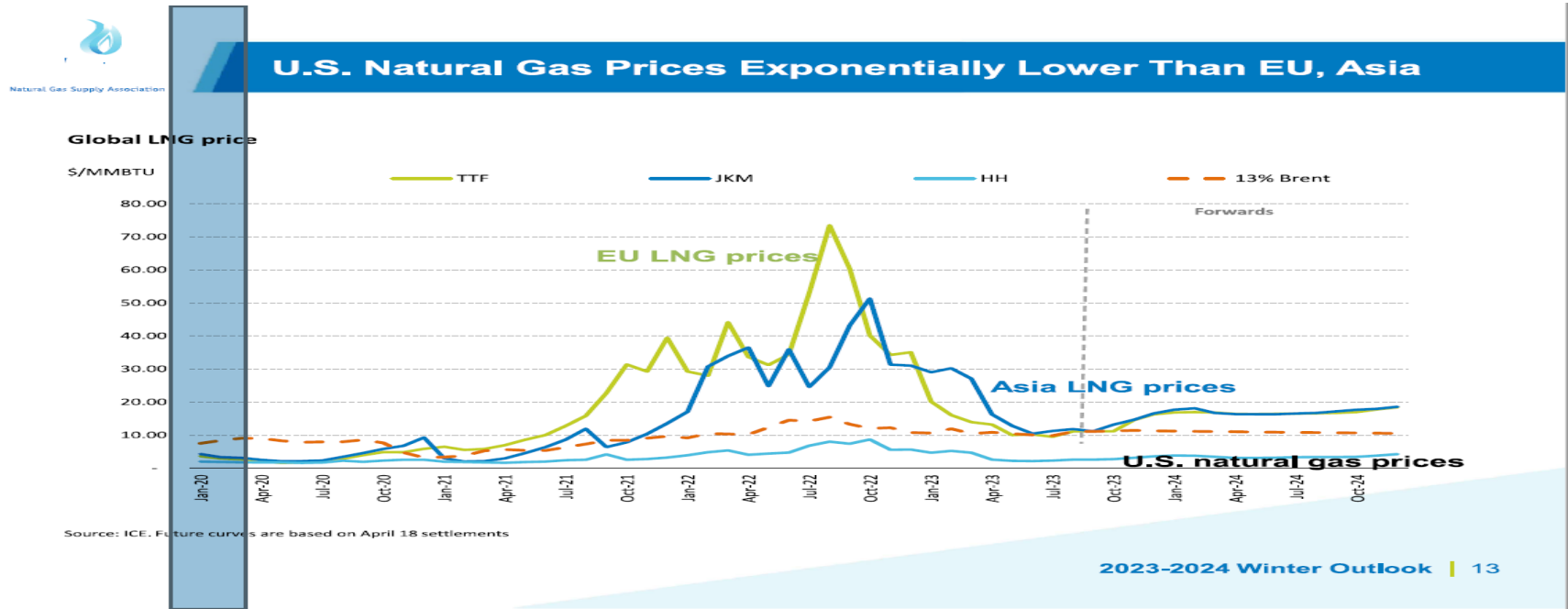
PADD 1B: Distillate (0 - 15 ppm S) Weekly Stocks



Ultra-low Sulfur Diesel New York Harbor
Average Weekly Spot Prices

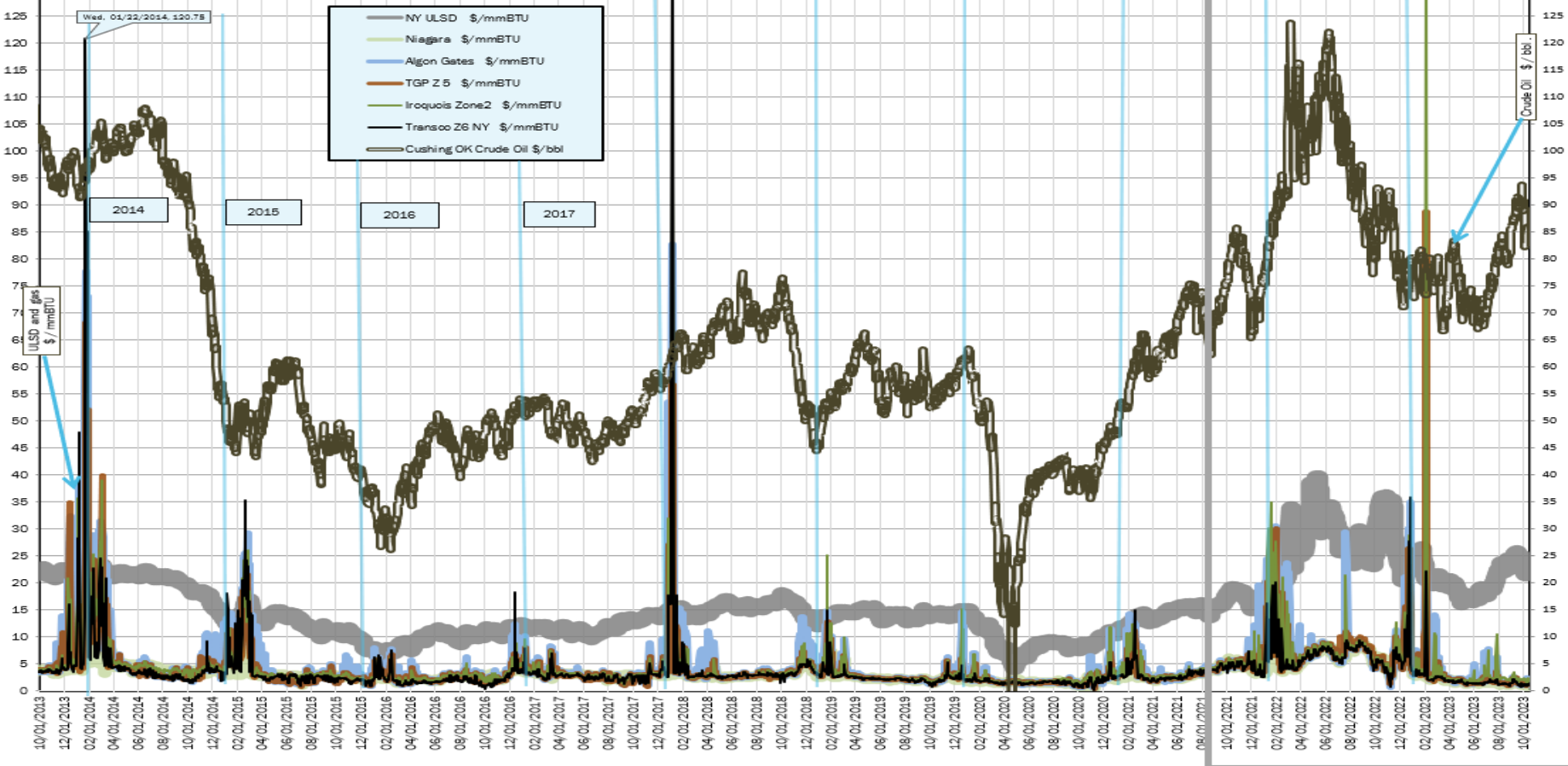


LNG export capability exposing domestic natural gas markets to global dynamics



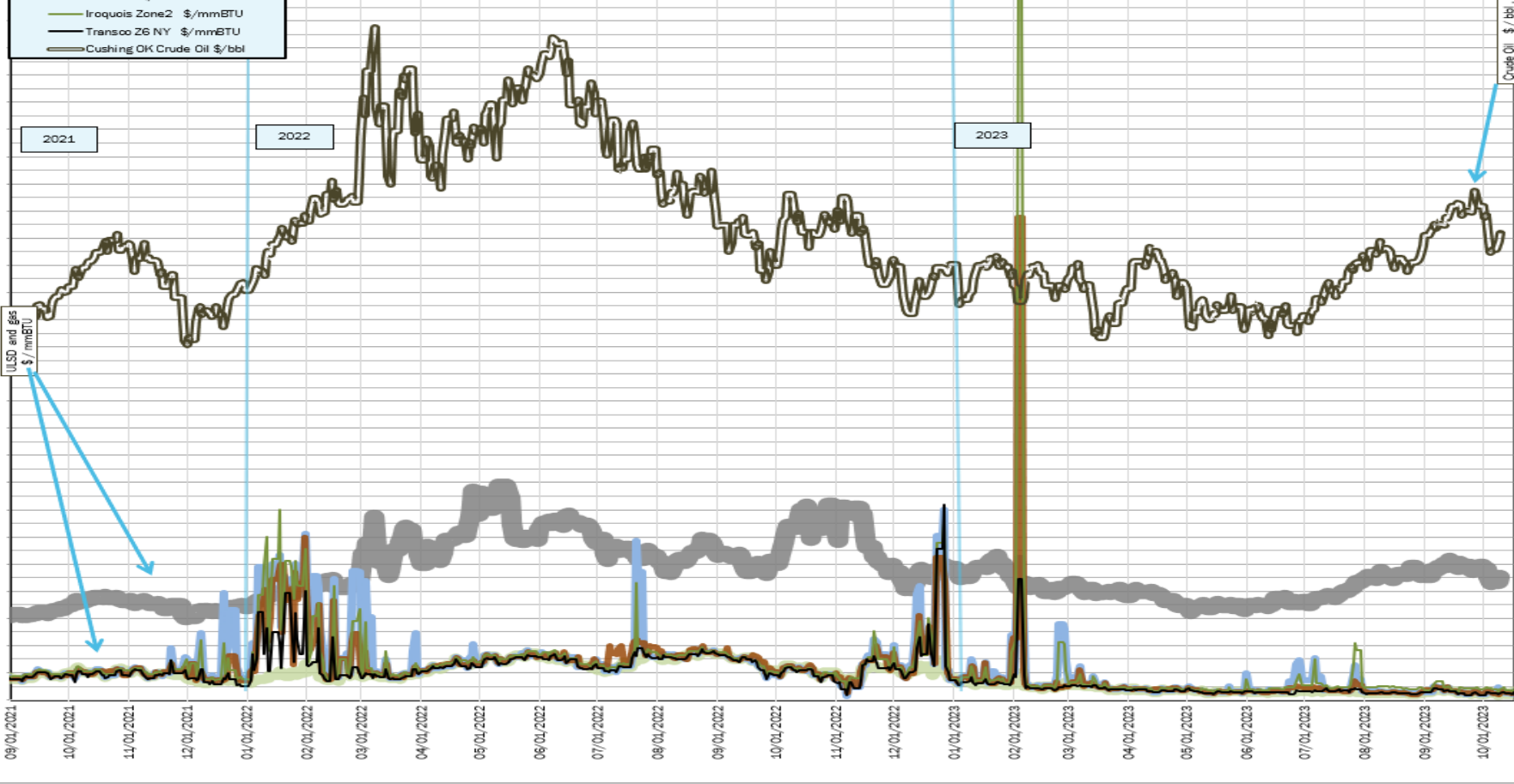
NYISO Fuel Prices October 2013 thru October 17, 2023

Including Crude Oil price, data sources: SNL and EIA (oils thru 10/10/2023)



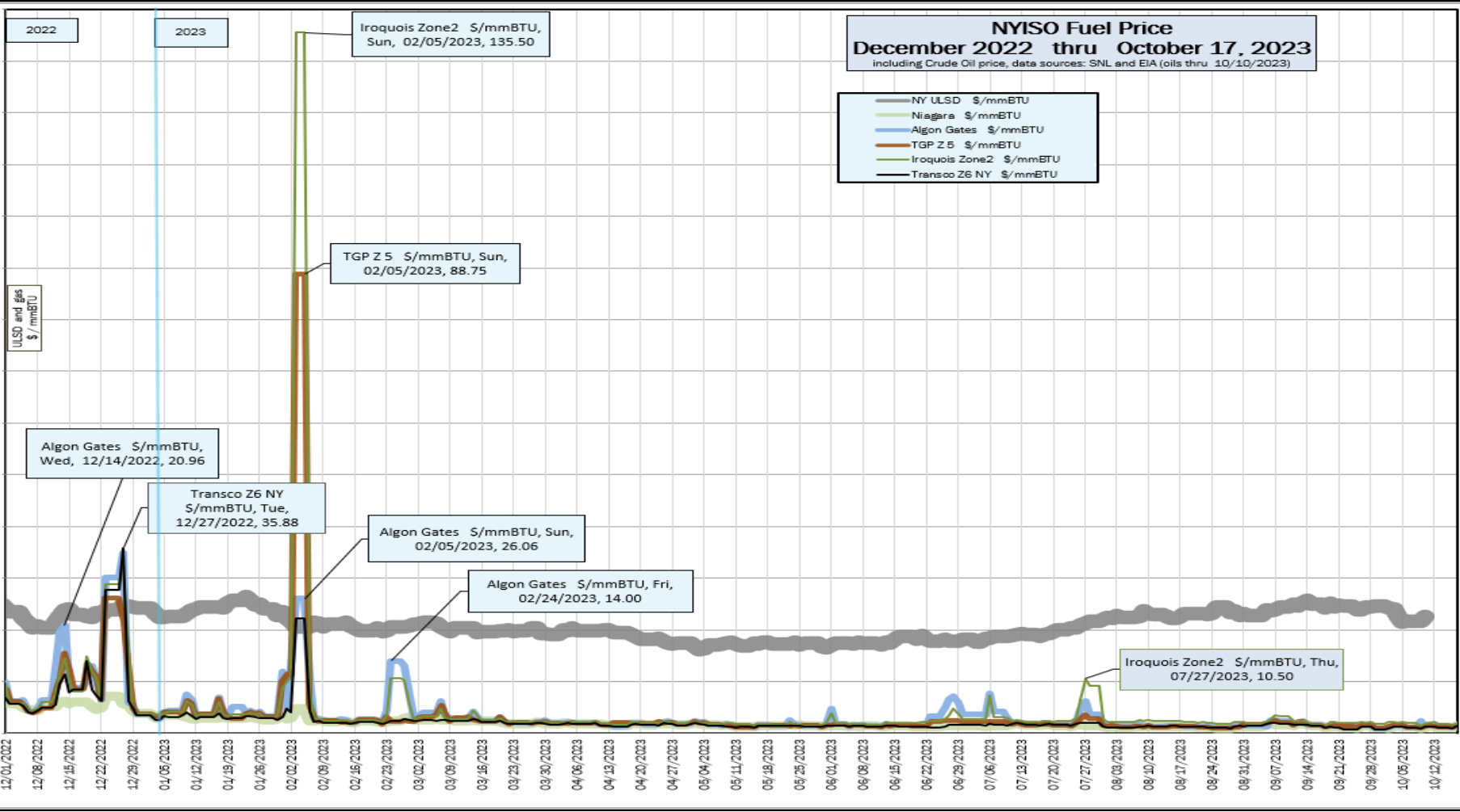
NYISO Fuel Prices September 2021 thru October 17, 2023

including Crude Oil price, data sources: SNL and EIA (oils thru 10/10/2023)

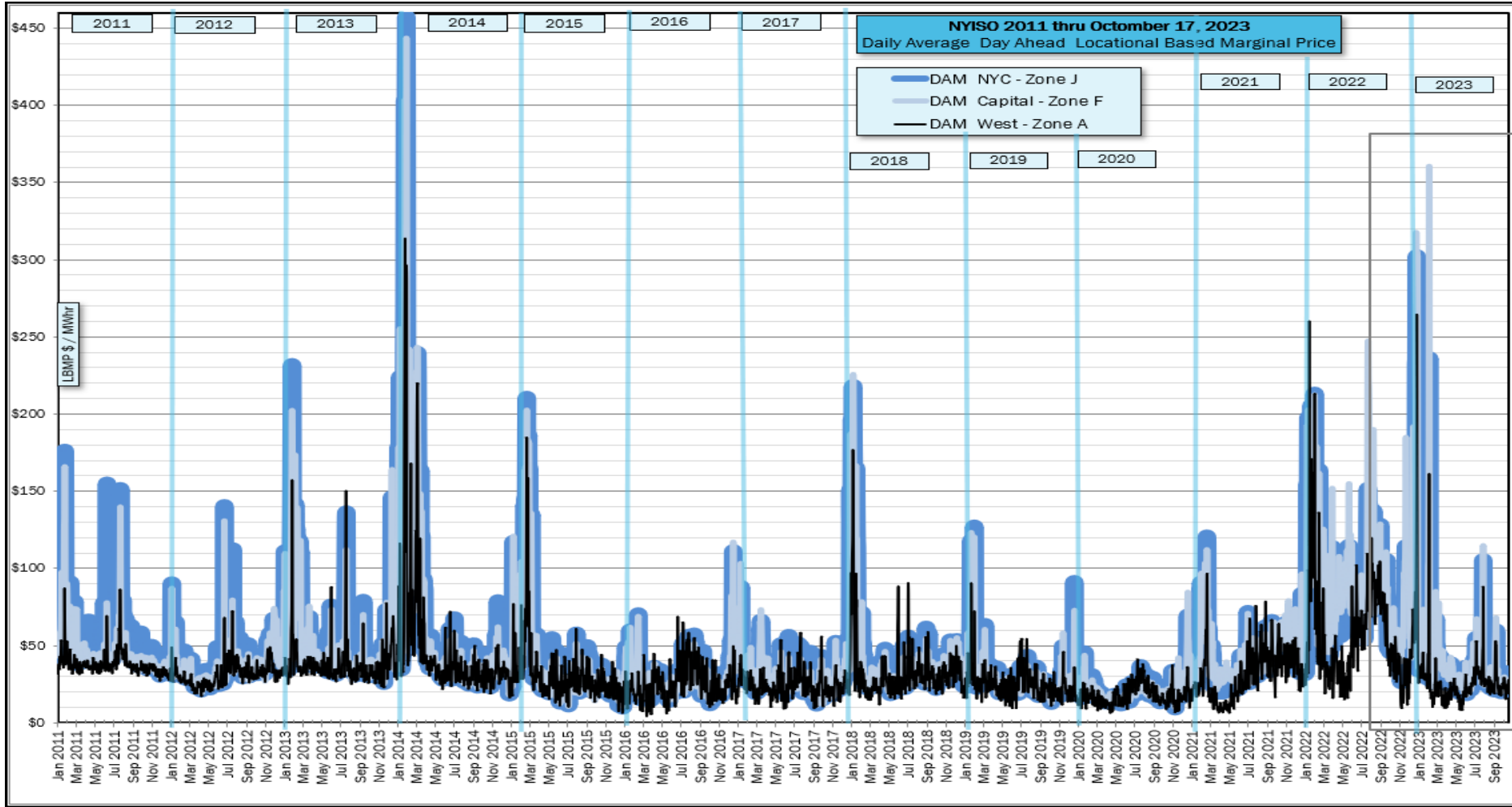


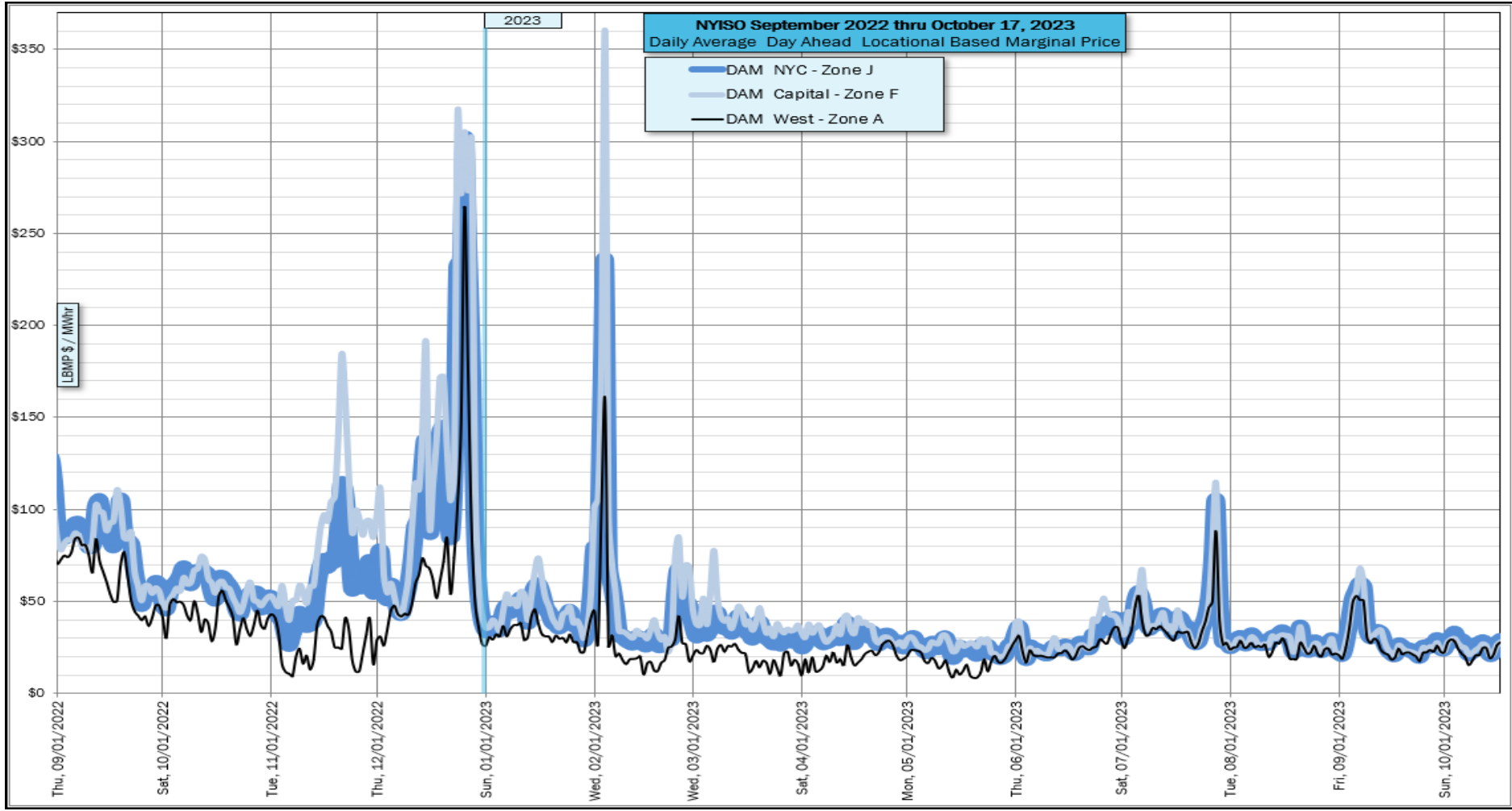
NYISO Fuel Price December 2022 thru October 17, 2023

including Crude Oil price, data sources: SNL and EIA (oils thru 10/10/2023)



- NY ULSD \$/mmBTU
- Niagara \$/mmBTU
- Algon Gates \$/mmBTU
- TGP Z 5 \$/mmBTU
- Iroquois Zone2 \$/mmBTU
- Transco Z6 NY \$/mmBTU





Appendix B

Near Term Fuel and

Energy Security

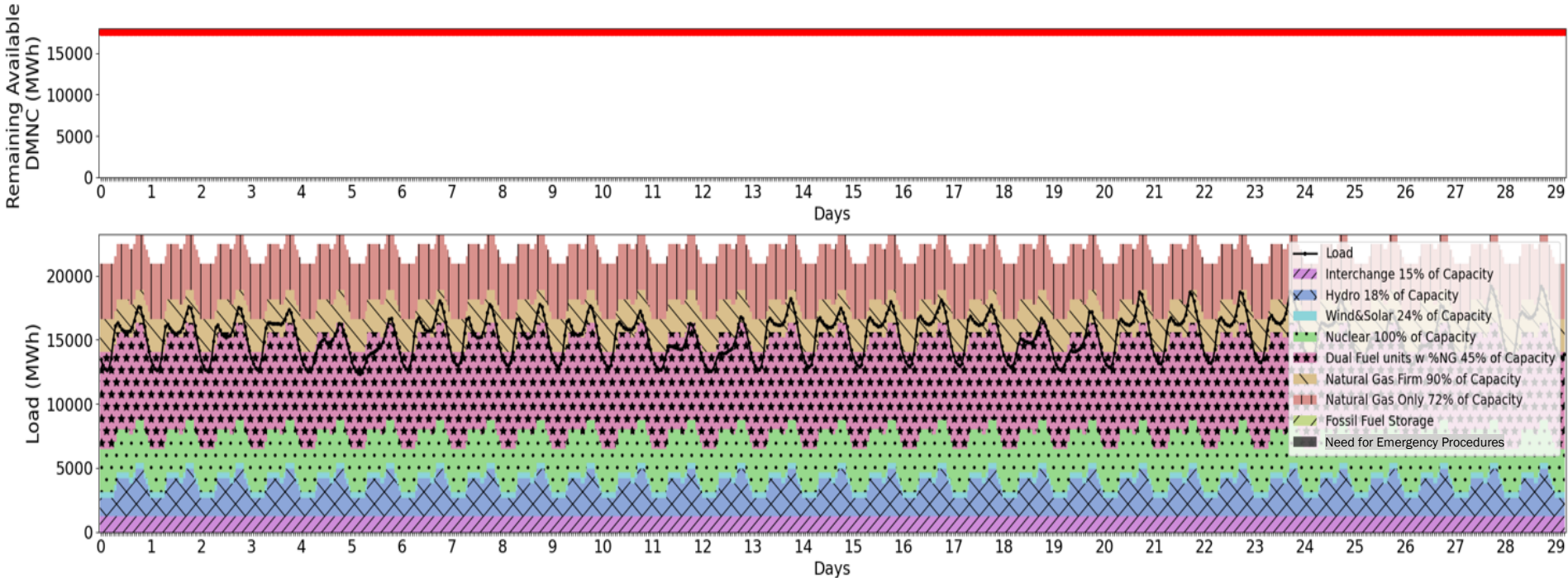
Assessment

Operations Internal Energy Assessment Tool

- **Different from the Analysis Group (“AG”) Fuel and Energy Security model, this Internal Energy Assessment tool gives NYISO the ability to:**
 - Observe the reported fuel inventory levels and scheduled replenishments
 - Monitor the load forecast up to 30 days in the future
 - Apply commitment/dispatch assumptions to monitor fuel/energy shortfalls
 - Model scenarios and disruptions similar to the FES studies

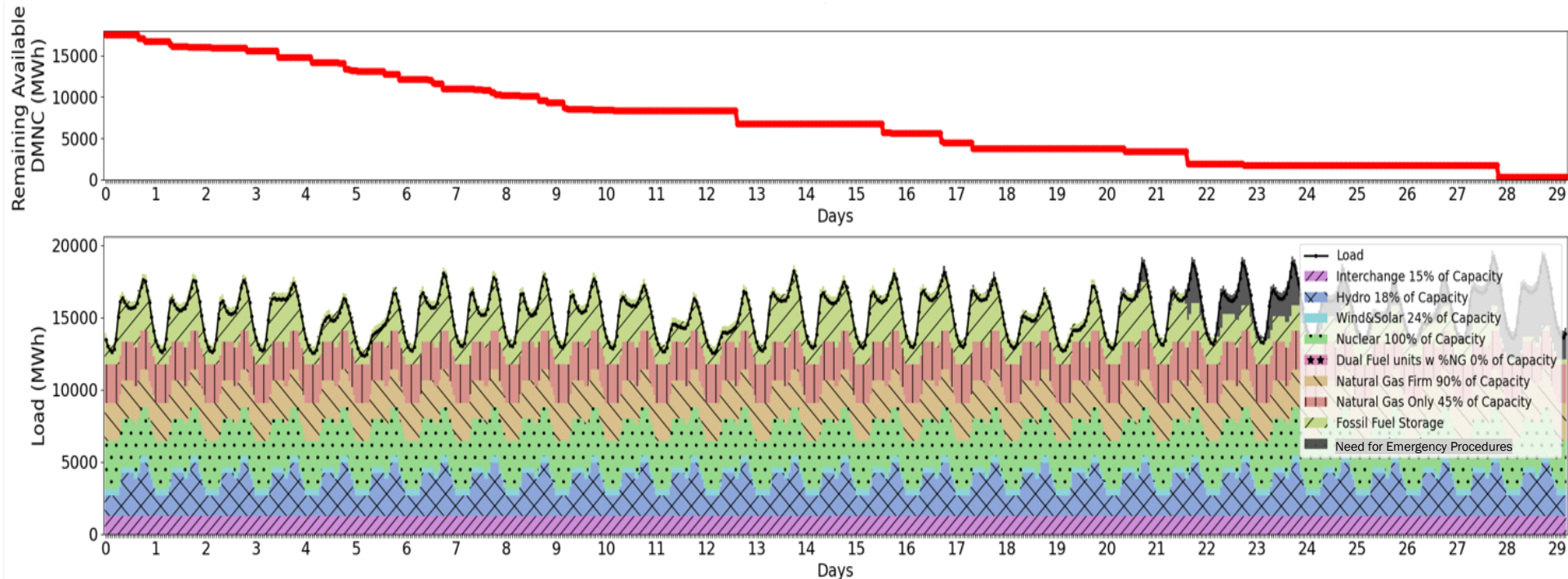
Internal Energy Assessment Tool – Forecast (Typical Spring or Fall Day)

- No/minor scheduled deliveries (1.75 million MWh)
- Low shoulder season loads (Peak hourly demand = 19,615 MW)
- Gas available for firm and gas only units, 50% dual fuel capable MWs from gas



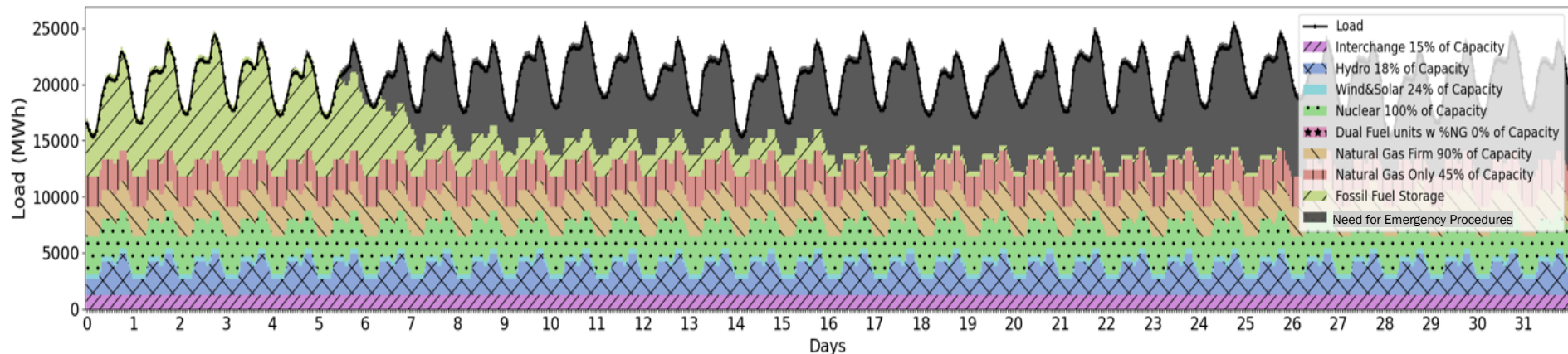
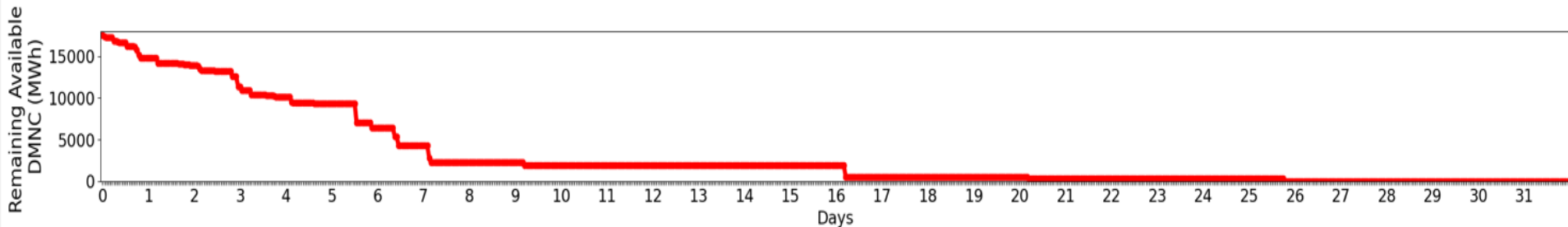
Internal Energy Assessment Tool – Forecast, limited gas availability

- No/minor scheduled deliveries (1.75 million MWh)
- Low shoulder season loads (Peak hourly demand = 19,615 MW)
- **Limited gas only generation (4,500 MW), no gas for dual fuel units**



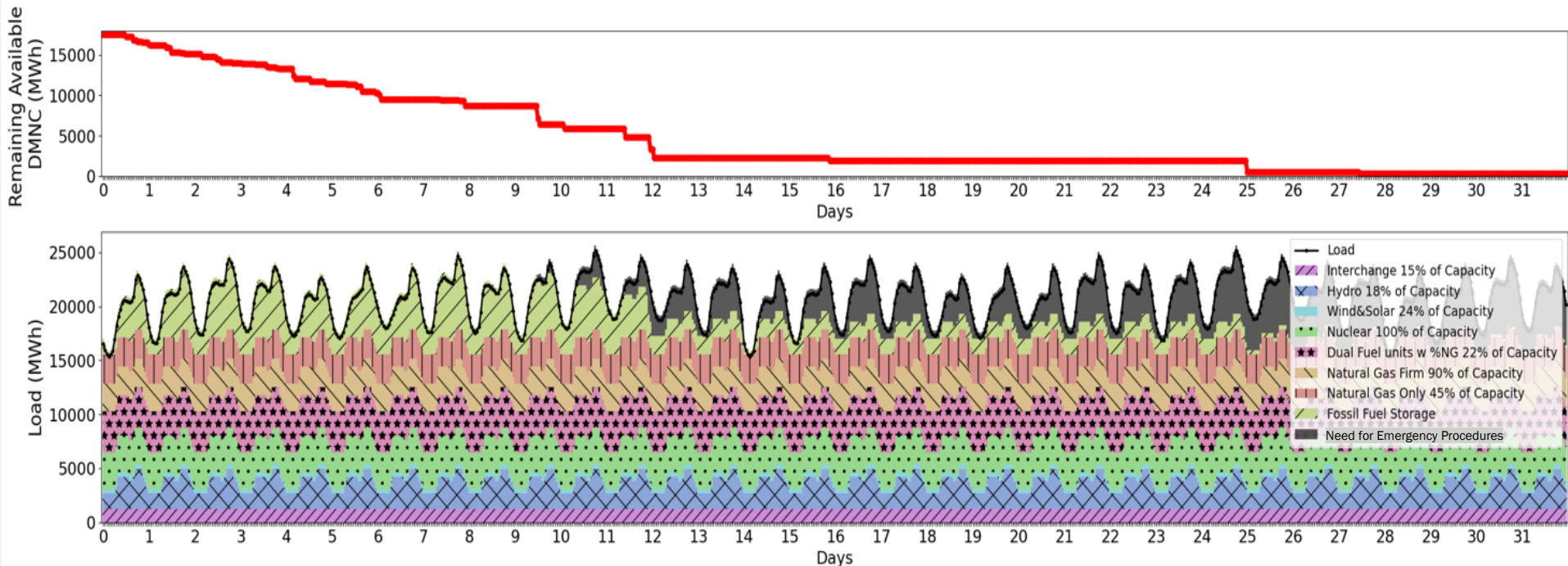
Internal Energy Assessment model – Extreme Cold, limited gas availability

- No/minor scheduled deliveries (1.75 million MWh)
- **Extreme Cold Weather Load Forecast (Similar to 17-18, - 25,200 MW)**
- Limited gas only generation (4,500 MW), no gas for dual fuel units



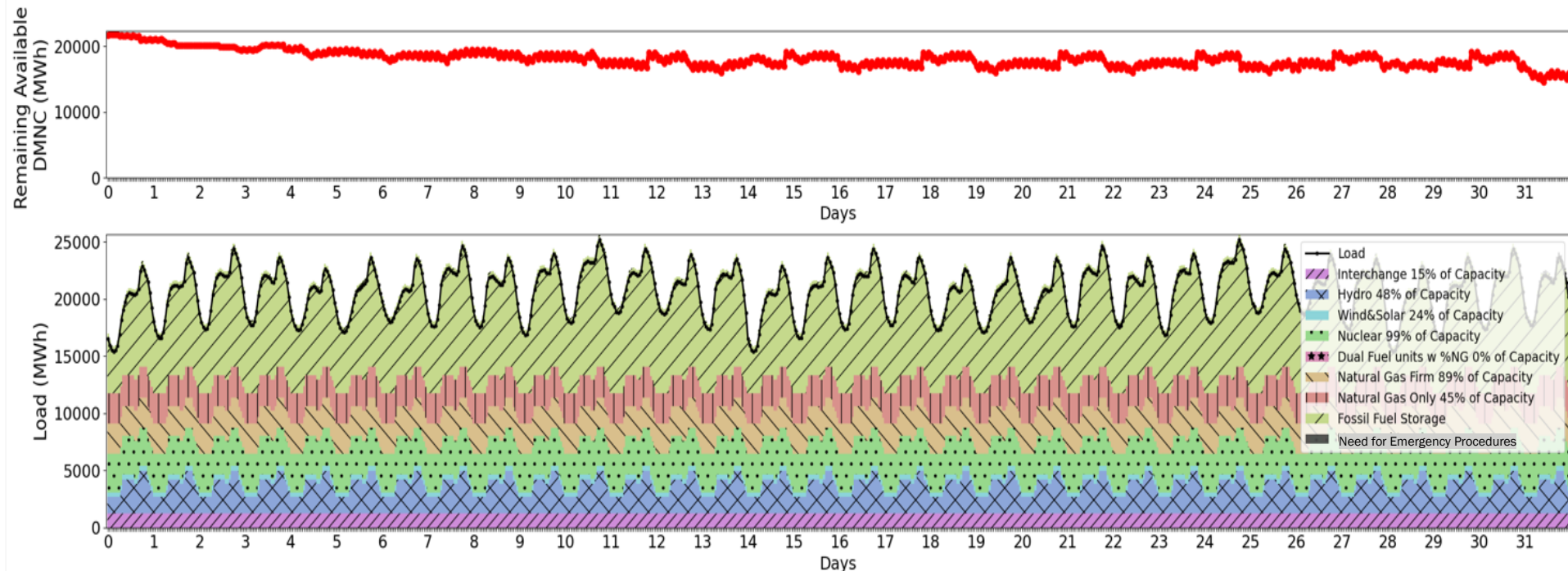
Internal Energy Assessment model – Extreme Cold, some gas for DF units

- No/minor scheduled deliveries (1.75 million MWh)
- Extreme Cold Weather Load Forecast (Similar to 17-18, - 25,200 MW)
- Gas available for firm and gas only units, 25% dual fuel capable MWs from gas

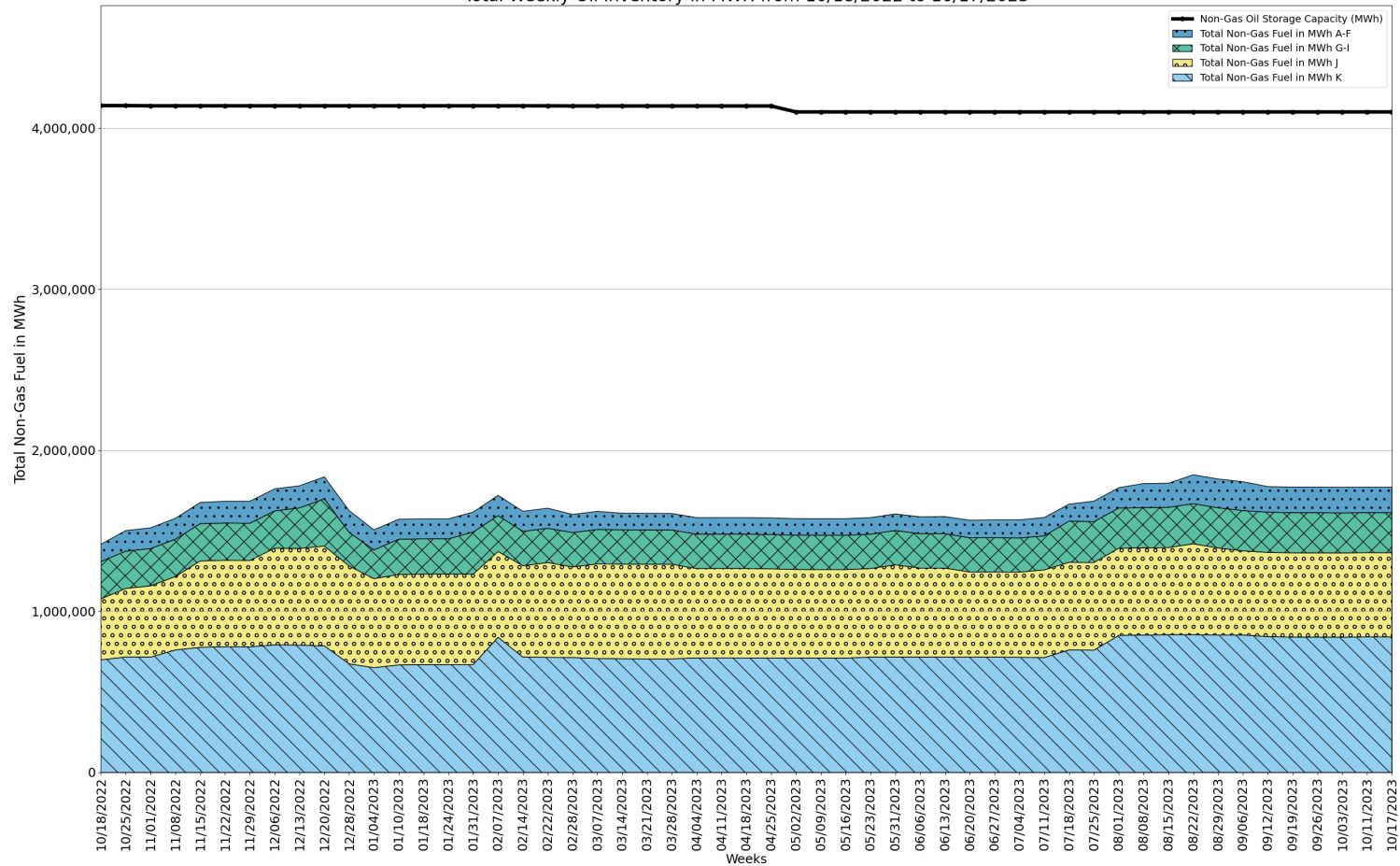


Internal Energy Assessment model – Extreme Cold, limited gas availability

- **GFER survey refill assumptions similar to AG FES models**
- **Extreme Cold Weather Load Forecast (Similar to 17-18, - 25,200 MW)**
- **Limited gas only generation (4,500 MW), no gas for dual fuel units**



Total Weekly Oil Inventory in MWh from 10/18/2022 to 10/17/2023



Appendix C

2023 Fuel & Energy Security Study

2023 Fuel & Energy Security Study (FES)

- In 2019, Analysis Group (AG) completed a winter fuel security study for NYISO, examining a 17-day cold period in winter 2023/2024
- In 2023, AG was tasked with refreshing the 2019 study to assess winter fuel/energy security under various assumptions for Winter 2023/24, Winter 2026/27, Winter and 30/31
- Below is a list of the stakeholder meetings where the 2023 FES was presented to stakeholders. Next steps consist of posting the report.
 - <https://www.nyiso.com/icapwg?meetingDate=2023-09-26>
 - <https://www.nyiso.com/icapwg?meetingDate=2023-08-08>
 - <https://www.nyiso.com/icapwg?meetingDate=2023-06-14>
 - <https://www.nyiso.com/icapwg?meetingDate=2023-05-08>
 - <https://www.nyiso.com/icapwg?meetingDate=2023-04-21>

Our Mission & Vision



Mission

Ensure power system reliability and competitive markets for New York in a clean energy future



Vision

Working together with stakeholders to build the cleanest, most reliable electric system in the nation

Questions?