

NYISO 2025-2029 ICAP Demand Curve Reset



ICAP Working Group Meeting

December 15, 2023



Proposed Technology Screening Criteria



- The following initial screening criteria, that are consistent with the 2021-2025 Installed Capacity Demand Curve reset (“DCR”), are proposed for the 2025-2029 DCR:
 - Standard resource technology - available to most market participants
 - Proven technology - operating experience at a utility power plant
 - Unit characteristics that can be economically dispatched
 - Ability to cycle and provide peaking service
 - Can be practically constructed in a particular location
 - Capable of meeting environmental requirements and regulations

Generation Technologies

Initial Recommended Technologies to be Evaluated

- H/J-class Simple Cycle Gas Turbine (“SCGT”)
 - SCGT designed to burn only fossil fuels and assumed to be retired in 2040 to account for the zero-emission energy requirement established by the Climate Leadership and Community Protection Act (“CLCPA”).
 - SCGT designed to burn fossil fuels, but assumed to be retrofitted in 2040 to burn 100% Hydrogen
 - In 2040, the SCGT is assumed to burn hydrogen as a proxy for a “zero-emissions” operating option.
 - Currently, there is no regulatory certainty regarding fuel/operating options that may qualify as an eligible “zero-emission” resource for compliance with the CLCPA.
 - Will continue to monitor developments in the ongoing NYPSC proceeding assessing options for compliance with CLCPA’s zero-emission energy requirement for 2040.
 - 100% hydrogen combustion is still an emerging technology that is not in commercial operation today. BMcD/AG continues to assess the commercial viability of this technology to qualify as an eligible peaking unit technology for the 2025-2029 DCR.
- 200 MW Battery Energy Storage System (“BESS”)
 - 4-hour Lithium-Ion BESS
 - 6-hour Lithium-Ion BESS
 - 8-hour Lithium-Ion BESS

Scope Assumptions

Preliminary Scope Boundaries - SCGT

- Generic site
 - Excludes demolition or removal of hazardous materials
- Inside the fence
 - Gas Turbine (“GT”), required emissions controls (including selective catalytic reduction [“SCR”]), and generator step-up (“GSU”) transformer procured by the facility Owner
 - Electrical scope up to the high-side of the GSU transformer
 - Raw water supply available at site boundary
 - Wastewater delivered to site boundary. No treatment included.
 - Pipeline quality natural gas supplied at site boundary. Gas pressure supply is being evaluated to determine if sufficient pressure or gas compressors required.
- Outside the fence
 - Switchyard and transmission interconnection
 - Any applicable System Deliverability Upgrade (“SDU”) costs will be determined based on NYISO’s deliverability analysis for DCR (based on tariff-prescribed level of excess conditions)
 - Raw water supply pipeline
 - Natural gas pipeline (lateral, metering, and pressure regulation and conditioning)

Preliminary SCGT Scope Assumptions

	Load Zone C - Central	Load Zone F - Capital	Load Zone G - Dutchess	Load Zone G - Rockland	Load Zone J - NYC	Load Zone K - Long Island
Fuel Capability †	Gas Only Or Dual Fuel	Gas Only Or Dual Fuel	Gas Only Or Dual Fuel	Gas Only Or Dual Fuel	Dual Fuel	Dual Fuel
GT Combustion NOx Controls	Gas: Dry Low NOx Combustors					
	Fuel Oil: Water Injection					
Post Combustion Controls ††	SCR	SCR	SCR	SCR	SCR	SCR



† Dual Fuel capability is still being evaluated for locations outside NYC and LI.

†† New Source Performance Standard (“NSPS”) requires SCR emissions controls for GTs with NOx emissions greater than 15 ppm and greater than 850 MMBtu/hr heat input.

Preliminary SCGT Scope Assumptions (cont.)

- SCR emissions controls technology and oxidation catalyst
 - Air dilution fan with additional duct work to allow for sufficient mixing
 - 19% aqueous ammonia
- Dual Fuel (if applicable)
 - Natural gas and ultra-low sulfur diesel (“ULSD”)
 - 96 hours of storage (4 days round-the-clock or on peak [16 hours per day] for 6 days)
- Piling included under GT, SCR emissions controls, stack, and tanks.
- Standard gas turbine package
 - Installed outdoors in OEM enclosures
 - Evaporative coolers
- Administrative building with control room and attached warehouse/shop
- Combined raw water / fire water tank

Preliminary SCGT Scope Assumptions (Future CLCPA Compliance)

- Future Hydrogen Combustion Upgrade
 - Fuel Piping to be replaced with stainless welded piping
 - GT combustor hardware to be replaced. Assume no changes to compressor, transition pieces and turbine section hardware.
 - GT controls are retuned
 - GT flame detection and gas detection instrumentation is replaced.
- Hydrogen Supply
 - BMcD preliminarily proposes to assume hydrogen delivery to site would be intermittent and not by a dedicated pipeline.
 - Pipeline costs would not be included.
 - Assume 96-hours of on-site hydrogen storage
 - Assume delivered hydrogen pressure is sufficient. No compression required.

Preliminary Scope Boundaries - BESS

- Generic site
 - Excludes demolition and removal of hazardous materials
- Inside the fence
 - Electrical scope up to the high-side of the Main Power Transformer (“MPT”)
 - Owner procured BESS equipment and MPT
 - Engineering, Procurement, and Construction (“EPC”) procured balance of plant equipment
- Outside the fence
 - Switchyard and transmission interconnection
 - Any applicable SDU costs will be determined based on NYISO’s deliverability analysis for DCR (based on tariff-prescribed level of excess conditions)

Preliminary Lithium-ion BESS Scope Assumptions

- Form factor: integrated, modular, purpose-built enclosure
 - Battery modules installed in enclosures at factory
 - Integrated HVAC, battery management system, smoke/fire detection
 - Single elevation
- Capital cost will account for reasonable project sizing assumptions
 - MW and MWh at Point of Interconnect (“POI”) to account for assumed system losses and efficiencies
 - Initial capacity overbuild will account for assumed allowance of capacity degradation (Years of overbuild TBD based on further consideration)
- Inverter and medium voltage transformer (34.5 kV)
- Main power transformer for step up to transmission voltage
- Auxiliary transformer and aux. power cabling
- Energy management system (site level controls)

Preliminary Lithium-ion Scope Assumptions (cont.)

- Land
 - Assume contiguous land parcels in all load zones
 - Energy density assumption will support total acreage estimate
 - Range of available technologies approximately 100 - 150 MWh per acre
 - Assumption TBD based on further consideration
 - Acreage estimate to include space for future augmentation
- Load Zone J will include external flame detection and external water suppression

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Technologies Screened



F-class SCGT	Commercial Operation in U.S.	ISO Capacity (MW)	HHV Heat Rate (Btu/kWh)	Initial Screening Cost (\$/kW)
GE 7F.05	✓	239	9,850	\$1050/kW
Siemens SGT6-5000F	✓	260	9,470	
G/H/J - Class SCGT	Commercial Operation in U.S.	ISO Capacity (MW)	HHV Heat Rate (Btu/kWh)	Initial Screening Cost (\$/kW)
GE 7HA.03	✓	430	8,750	\$750/kW
Siemens SGT6-9000HL	✓	440	8,770	
MPA M501JAC	✓	453	8,610	
GE 7HA.02	✓	384	8,890	\$800/kW
GE 7HA.01	✓	290	9,010	\$900/kW
Siemens SGT6-8000H	✓	310	9,390	
MPA M501GAC	✓	283	9,470	

Technologies Screened



	Commercial Operation in U.S.	ISO Capacity (MW)	HHV Heat Rate (Btu/kWh)	Initial Screening Cost (\$/kW)
Siemens SGT-A35	✓	33	9,510	\$2000/kW
GE LM6000PF+	✓	54	9,230	\$1800/kW
MPA FT8 SWIFTPAC 60	✓	61	10,300	
MPA FT4000 SWIFTPAC 70	✓	72	9,140	
GE LMS100PB	✓	107	8,850	\$1200/kW
Wartsila 18V50SG	✓	18	8,290	\$1,700