New York ISO
Independent System Operator

Appendix B: Production Cost Assumptions Matrix

2023-2042 System & Resource Outlook

A Report from the New York Independent System Operator

July 22, 2024

Appendix B: Assumptions Matrix for 2023-2042 System & Resource Outlook Production Cost Model

Parameter	Base Case	Contract Case	Policy Cases
Lock Down Date	**10/15/2023**	**10/30/2023**	**11/15/2023**
NYCA System Model			
Peak Load & Energy Forecast	Based on 2023 Load & Capacity Data Report ("Gold Book") Baseline Forecast of Non-Coincident Peak and Energy Demand, including impacts of statewide Energy Efficiency programs. Removal of impact from energy storage resources, BTM Solar generation and large loads. Energy storage resources, BTM Solar, and large loads are modeled explicitly as resources.		Forecasts for Peak and Energy consistent with assumptions for each Policy Case scenario. See Appendix C: Capacity Expansion Assumptions Matrix for additional detail.
Load Shape Model	Hourly Load Shape for each study year (2025, 2030, 2035, 2040, and 2042). Load shape based on 2018 weather year.		
Generating Unit Capacities	Updated to reflect 2023 Gold Book winter and summer DMNC values.		
New Resources	Updated as per 2023 Gold Book. (Application of inclusion rules identified in Reliability Planning Process Manual, Section 3.2 and NYISO procedures)		
		Generation projects with financial awards, including state sponsored programs, included. Includes projects awarded under the 2022 REC and OREC solicitations.	
			Generation resources to support achievement of policies included per capacity expansion model and consistent with each respective capacity expansion scenario results.

Land-Based Wind and Utility-Scale Solar Modeling	Units and capacities updated as per 2023 Gold Book and other relevant sources. Hourly shapes for base and awarded wind and solar generators based on 2018 data at the generator/county level from the DNV database developed for the NYISO.		
			New candidate units are sited at an interconnection point within the county/zone. Candidate units are assigned a profile from the nearest site in the same county from the DNV database developed for the NYISO.
Land-Based Wind and Utility-Scale Solar Placement	Utilize actual point of interconnection (POI) for each base and awarded future units. If a POI is not available for a future unit in the powerflow, utilize the next adjacent available bus.		
			For candidate units, leverage the interconnection queue for near-term study years (2025 and 2030). For later years, utilize interconnection queue, supply curve analysis, and optimized placement logic to place resources based on available transmission headroom.
Offshore Wind Resource Modeling	The hourly shapes for OSW generators are based on DNV methodology & data.		Offshore wind capacities consistent with capacity expansion model results. Offshore wind unit shapes selected from DNV database.
Offshore Wind Point of Interconnections	EHAMP-69 kV	EHAMP-69kV GOWANUS-345 kV BCEH- 345 kV RAINEY-345 MOTT HAVEN-345 kV HOLBROOK-138 kV LIOTTA-138 kV E.G.C.-345 kV	EHAMP-69 kV GOWANUS-345 kV BCEH- 345 kV RAINEY-345 MOTT HAVEN-345 kV HOLBROOK-138 kV LIOTTA-138 kV E.G.C.-345 kV Additional POI for candidate OSW projects NY City: FARRAGUT E-345 kV FARRAGUT W-345 kV W 49 ST-345 kV FRESH KILLS-345 kV GOETHALS-345 kV Long Island: RULND RD-345 kV SHORE RD-138 kV

Hydro Resources Modeling	Model all New York Hydro resources (except Niagara) as hourly modifiers with 2018 hourly shapes for each unit. Model Niagara as Pondage Unit with monthly energy targets from 15-year average EIA generation. Utilize historical 15-year average annual generation from EIA 923 for annual energy targets for all other hydro units.	
External Capacity – Purchases and Wheel-Through	Flows across non-scheduled transmission lines are based on economics. Scheduled flows are based on historical flow patterns.	
Facility Deactivation and Retirements	Updated as per 2023 Gold Book and latest STAR study assumptions (Application of inclusion rules identified in Reliability Planning Process Manual, Section 3.2 and NYISO procedures).	
		Deactivations from each respective capacity expansion scenario are modeled. See Appendix C: Capacity Expansion Assumptions Matrix for additional detail.
Generator Outages	Scheduled to levelize reserves, as per the maintenance schedules in long term adequacy studies.	
Gas Turbine Ambient Derate	Modeling utilizes summer and winter DMNC ratings from 2023 Gold Book for all units.	
Environmental Modeling and Emission Allowance Price Forecasts	CO_2 emission allowance price forecasts based on future program design and market expectations. See slide 10 of the October 24, 2023 ESPWG presentation for additional detail. SO_2 and NOx Allowance Prices reflect CSAPR markets.	
Commitment and Dispatch Options	Each Balancing Authority commits separately. Hurdle Rates are employed for commitment and dispatch. See *2021 Benchmark Results presentation slides 11-12* for the hurdle rates assumed as well as additional detail on the methodology.	
Operating Reserves	Operating Reserves as per NYCA requirements.	

Fuel Price Forecast	Annual base prices updated to more heavily weight recent trends. Seasonality and spikes based on five-year history (2018-2022). Calculated natural gas price forecasts based on blends of hub price forecasts for four hubs (A-E, F-I, J and K). Utilized unit capacities and reported pricing hubs to weight price forecasts. Fuel oil and coal price forecasts are developed utilizing the EIA's annual forecast of national delivered prices. See Reference Case Input Assumptions	
Cost Curve Development (including heat rates and emission rates)	Unit heat rates (and emission rates) developed from vendor supplied data, US EPA CAMPD fuel input and emissions data matched with NYISO production data for NYCA and US EIA production data for non NYCA units.	
		New technology heat and emission rates developed based upon vendor or publicly available data. See Appendix C: Capacity Expansion Assumptions Matrix for additional detail.
Local Reliability Rules	Local Reliability Requirements modeled as per NYSRC Reliability Rules and SCUC LRR for NY City. NOx bubble and voltage reliability rules are applied if applicable.	
Energy Storage	Stand-alone battery energy storage resources dispatched optimally using zonal net load on a daily basis. Co-located battery energy storage resources dispatched optimally using associated resource profile on a daily basis. External optimizer utilized to generate hourly charging and discharging pattern for each unit.	Candidate expansion battery energy storage resources were scheduled against the NYCA zonal load profile on a weekly basis. The model endogenously optimizes the charging and discharging of the candidate expansion battery resources.
Pumped Storage Hydro	Existing pumped storage hydro resources scheduled against NYCA load profile on a weekly basis.	
Renewable Energy Certificates (REC) Bid Modeling	Awarded land-based wind, offshore wind, and solar projects per NYSERDA large scale renewables database specified REC contract price and duration. Index RECs adjusted to equivalent fixed REC (*i.e.*, renewable attribute only) by technology type. See slide 27 of the November 2, 2023 ESPWG presentation for additional detail.	Candidate expansion OSW, LBW, and UPV generators include negative bid adders consistent with aggregate fixed REC price by technology type. LBW - $22 OSW - $49 UPV - $20

Transmission System Model		
Powerflow Cases	2022 RNA base case powerflow used as reference with modifications.	
Interface Limits	Internal NYCA line, interface and contingency limits updated consistent with planning processes and market and grid operation practices. See slide 12 of the October 24, 2023 ESPWG presentation for additional detail.	
Monitored-Contingency Pairs	Contingency pairs are expanded to include monitored constraints and contingencies either observed in historical market operation or identified in planning and operation studies. Coordinate with the Transmission Owners to incorporate the Transmission Owners' Local Transmission Owner Plans and model the non-BPTF portion of the New York State Transmission System.	
Nomograms	Data from the results of external planning studies, vendor-supplied data, operational voltage studies, operational limits, and transfer limit analysis for critical interfaces utilized to update transmission model for external regions, as required.	
New Transmission Capability	Updated as per 2023 Gold book (Application of Baseline Case inclusion rules) New transmission projects included (negative limit, positive limit): NYPA Northern New York Priority Transmission Project (0 MW, +1,327 MW on Moses-South Interface) – modeled as in-service in 2026 Champlain Hudson Power Express (CHPE) (0 MW, 1,250 MW) – modeled as in-service in 2026 with a fixed profile Long Island OSW Public Policy (0 MW, +3,000 MW) – modeled three new 345 kV AC lines from Long Island as in-service in 2030	
		Clean Path New York (CPNY) (0 MW, +1,300 MW) – modeled HVDC line as in-service in 2027 Phase 1 and 2 Projects – modeled 62 local transmission projects in Upstate NY, including Brooklyn Clean Energy Hub (BCEH), as in-service in 2030
Internal Controllable Lines (PARs, HVDC, VFT)	Optimized in simulation consistent with operating protocols and agreements, as appropriate. CHPE modeled as fixed 1,187 MW injection into Astoria 345kV bus (Zone J).	
		CPNY modeled as internal HVDC from Fraser 345 kV (Zone E) to Rainey 345 kV (Zone J) bus with economic based flow.

External System Model		
Fuel Forecast	Linked with NYCA fuel price forecast. See Reference Case Input Assumptions	
External Area Models	Power flow data from RPP and/or STRP; "production" data developed by NYISO with vendor and neighboring systems' input.	
External Capacity	Neighboring systems updated in August 2023. PJM generation fleet updated based on PJM New Services Queue. ISO-NE generation fleet updated based on CELT filings. IESO generation fleet based on publicly available reports.	External region generation fleet consistent with assumptions in the capacity expansion model. See Appendix C: Capacity Expansion Assumptions Matrix for additional detail.
Demand Forecast	Neighboring systems' peak and energy forecast updated utilizing publicly available load forecast data from PJM, ISO-NE, and IESO. External loads are extended to 2042 by applying growth rates to publicly available forecast data from each neighboring system as applicable.	External demand forecast consistent with capacity expansion model assumptions. See Appendix C: Capacity Expansion Assumptions Matrix for additional detail.
System Representation	HQ modeled as fixed hourly schedule, synchronized with all other external injections. Full representation for the following regions: ISO-NE IESO PJM Classic + AP, AEP, CE, DLCO, DAY, EKPC Proxy bus injection: HQ-NYISO, HQ-NE-ISO, NB-NE-ISO, HQ-IESO Transmission only/Zeroed out generation and demand: MECS, FE, SPP, MAR, NIPS, OVEC, TVA, FRCC, SERC, ERCOT, WECC	Imports from HQ modeled as hourly schedule to levels consistent with assumptions in the capacity expansion model. PJM, ISO-NE, and IESO system representation consistent with assumptions in the capacity expansion model.

External Controllable Lines (PARs, HVDC, VFT, Radial Lines)	PJM – NYISO Ties: • PAR B and PAR C modeled as out-of-service. Current JOA modeled under these outage conditions. • Western ties to carry 46% of PJM-NYISO AC Interchange + 20% of RECO Load • 5018 line to carry 32% of PJM-NYISO AC Interchange + 80% of RECO Load • PAR A to carry 7% of PJM-NYISO AC Interchange • PAR J-K to carry 15% of PJM-NYISO AC Interchange • Neptune (0 MW, +660 MW) modeled as fixed flow. • HTP (0 MW, +660 MW) • Linden VFT (-315 MW, +315 MW) ISO-NE – NYISO Ties: • Northport - Norwalk (-200 MW, +200 MW) • Cross Sound Cable (0 MW, +330 MW) • PV 20 Line (0 MW, +150 MW) IESO – NYISO Ties: • L33 and L34 PARS (-300 MW, +300 MW)