

2023 Long Term Forecast Assumptions: Load Modifiers

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Demand Forecasting & Analysis – System & Resource Planning

LTF/ESPG

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Topics

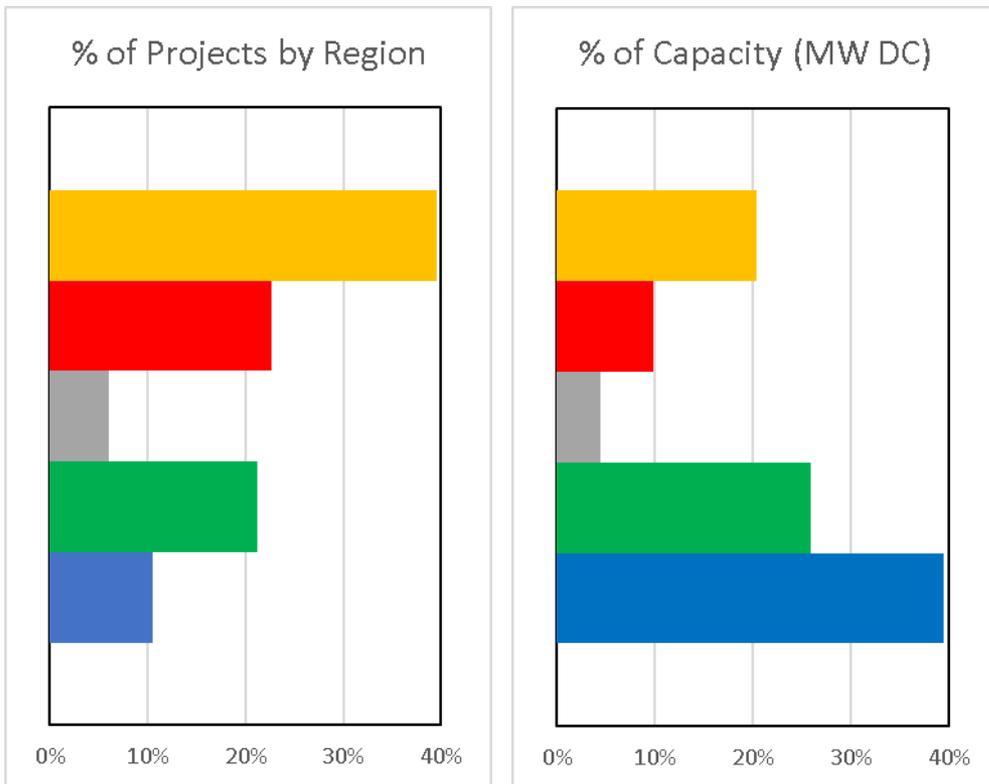
- **Behind-the-Meter (BTM) Solar**
- **Energy Efficiency**
- **Energy Storage**
- **Other Forecast Components**

Behind-the-Meter Solar Forecast

BTM Solar Forecast Background

- **The forecast focuses largely on distributed generation solar PV projects**
 - Projects that are typically 5 MW (AC) or less in capacity and are connected to the distribution system
- **The forecast does not consider market or policy drivers oriented towards grid connected projects (i.e., projects ≥ 20 MW)**
 - Select large solar projects participating as load modifying generation are factored into the BTM-PV forecast
- **Several factors influence the growth of BTM PV installations in the NYCA:**
 - Policy: State and Federal tax credits and incentives
 - Private investment in PV development
 - Costs: Electricity rates and pricing on installation and equipment
 - Number and size of projects in the utility interconnection queues

Cumulative BTM Totals



■ K ■ J ■ H & I ■ F & G ■ A - E

Summary of BTM Solar installations by NYCA region, December 2022

Region	Total Capacity (MW DC)	Total Capacity (MW AC)	Total # of Sites	AC/DC Ratio
A - E	1695	1304	19955	77%
F & G	1111	893	40055	80%
H & I	189	157	11375	83%
J	423	355	42707	84%
K	872	741	74648	85%
Total	4290	3451	188740	80%

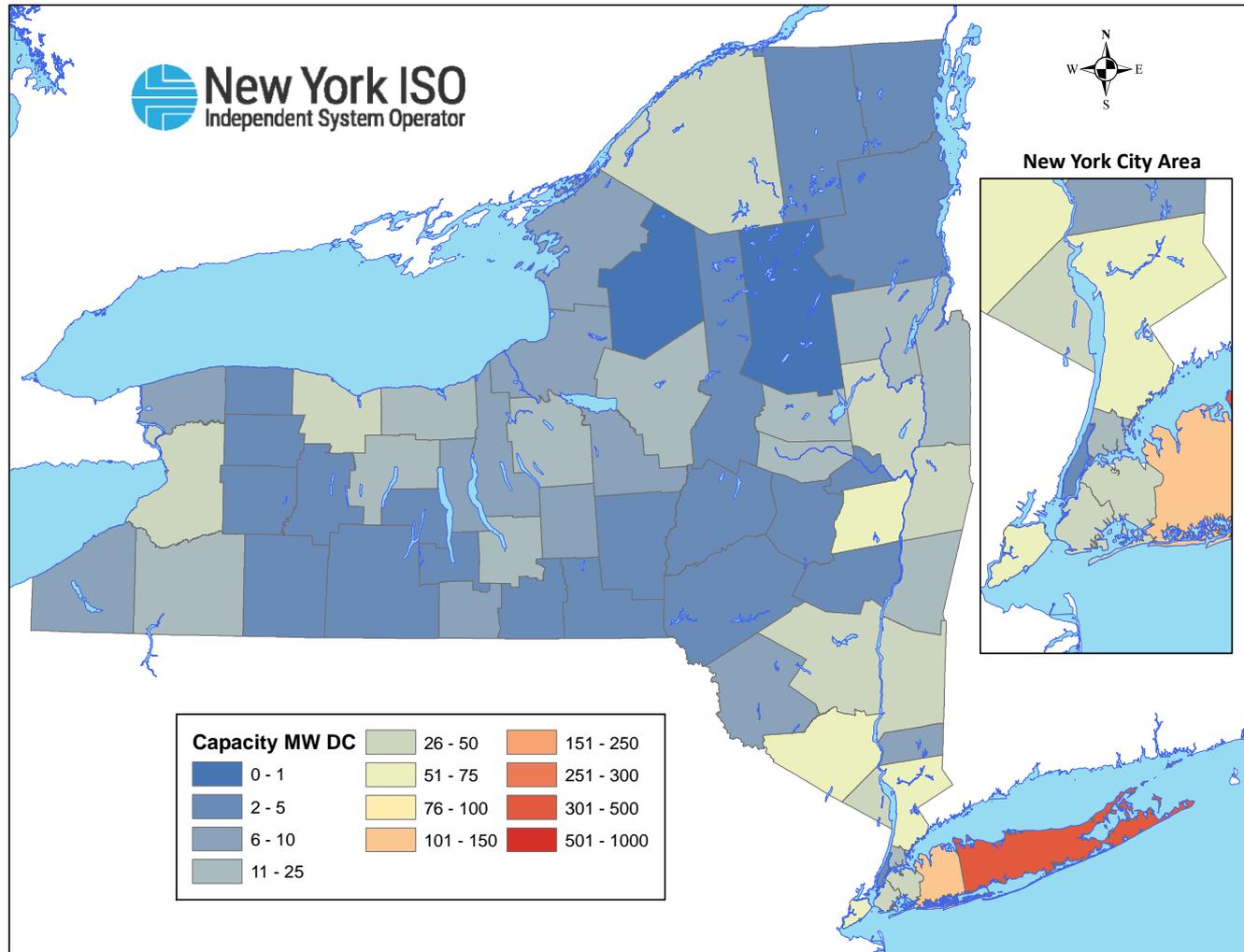
Source: NYS Department of Public Service and NY Utilities – Standard Interconnection Request (SIR) data

AC to DC Ratios were derived using information from the NYSEDA NYSun completed project and California Energy Commission (inverter attributes) data sets

BTM Solar Installed Capacity

2017

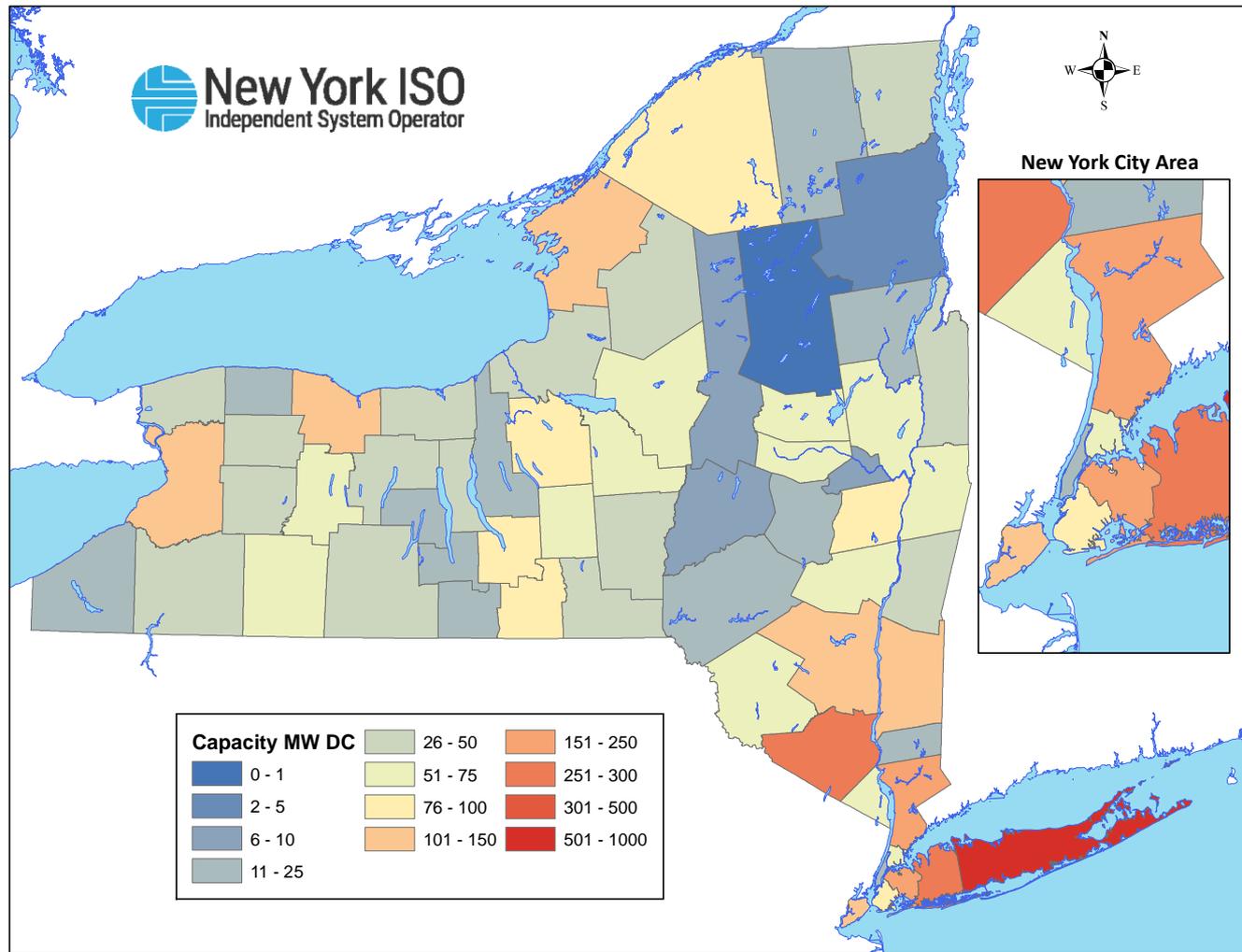
1282 MW DC



BTM Solar Installed Capacity

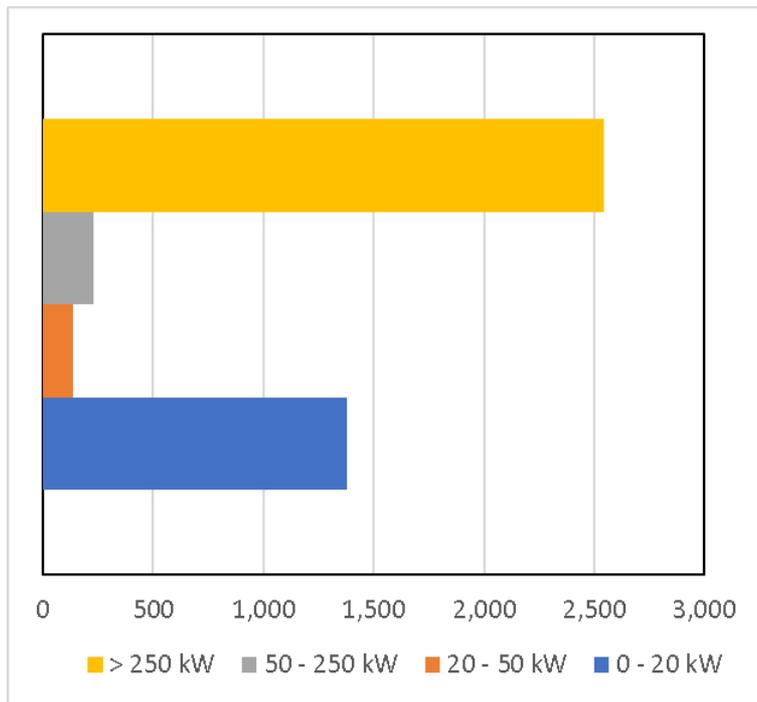
2022

4290 MW DC



BTM Solar Installed Capacity - 2022

Installations by size category (MW DC)



Size Category (MW DC)	# of Projects	Total Capacity (MW DC)	Total Capacity (MW AC)	AC/DC Ratio
0 - 20 kW	180,593	1,377	1,198	0.87
20 - 50 kW	4,791	138	120	0.87
50 - 250 kW	2,175	229	192	0.84
> 250 kW	1,181	2,545	1,940	0.76
NYCA	188,740	4,290	3,451	0.80

Source: NYS Department of Public Service and NY Utilities – Standard Interconnection Request (SIR) data

AC to DC Ratios were derived using information from the NYSERDA NYSun (completed projects) and California Energy Commission (module and inverter information) data sets

Recent Trends in BTM Solar Growth

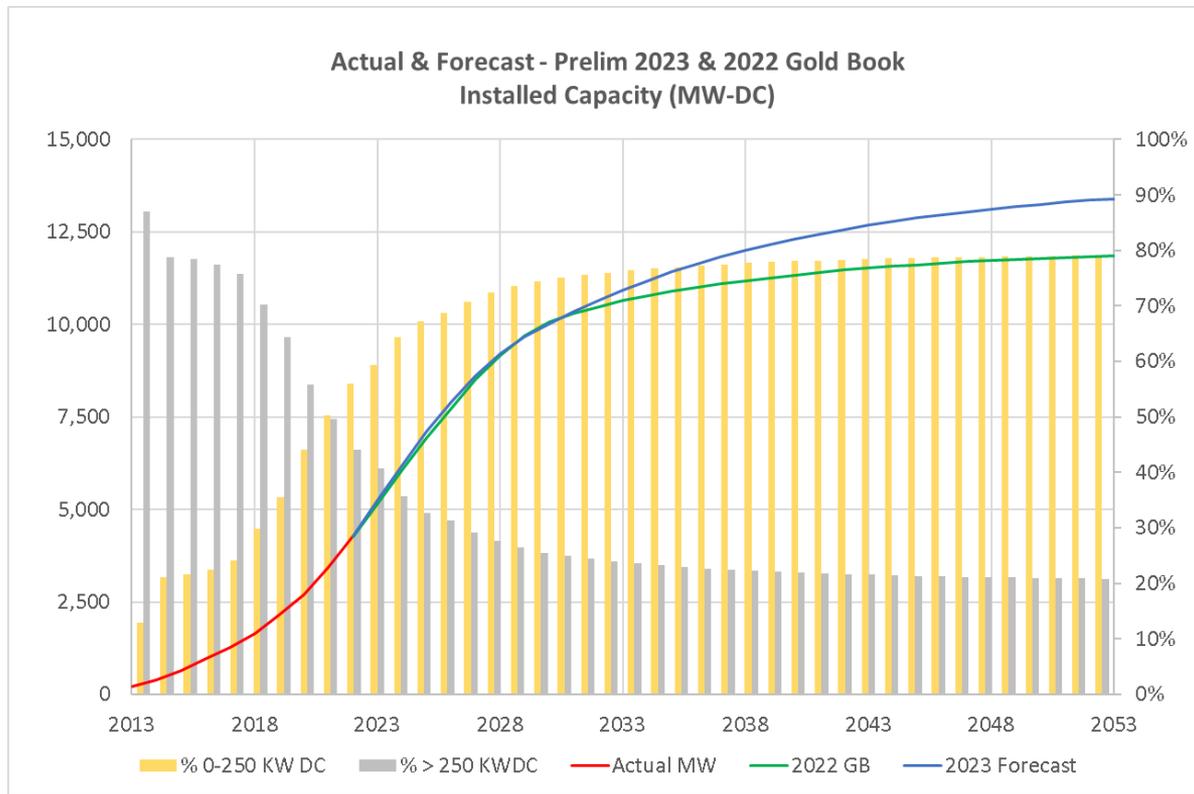
- Regional growth across the New York Control Area (NYCA) totaled 847 MWs in 2022
- Forecasted growth was 746 MWs, which is 101 MW lower than realized (2.4% of total year end installed capacity)

Region	2022 Forecasted Growth (MW DC)	2022 Actual Growth (MW DC)	Difference (MW)	% Difference vs. 2022 Total Capacity
A - E	510	486	24	1.4%
F & G	148	147	1	0.1%
H & I	16	42	-26	-13.8%
J	29	74	-45	-10.6%
K	43	98	-55	-6.3%
NYCA	746	847	-101	-2.4%

BTM Solar – Installed Capacity Forecast

- **The forecast is guided by NYISO independent analysis and input from Transmission Owners**
 - NY Utilities: SIR data set and projected deployment patterns/timelines
- **Historical growth rates across the NYCA are also used to inform forecast along with and state policy objectives and recent attainment of the policy objectives**
 - NYSERDA NY Sun Program Incentives: Trends in current and pipeline projects
- **Recent trends in BTM Solar growth can largely be attributed to policy programs developed by both New York state and Federal programs**

Preliminary Installed Capacity Forecast



- All actual and forecast values represent the end of year BTM Solar installed capacities
- Forecast includes strong capacity growth through 2030
 - >75% of 10GW 2030 NYS goal exists between complete and current pipeline projects
- Growth of the BTM resource after 2030 is reduced
 - Capacity growth is discounted due to a higher degree of uncertainty surrounding possible expansion of existing programs
- Significant grid connected solar is planned throughout 2030 (>15 GW of installed capacity in the latest NYISO interconnection queue)

BTM Solar – Preliminary Energy Forecast

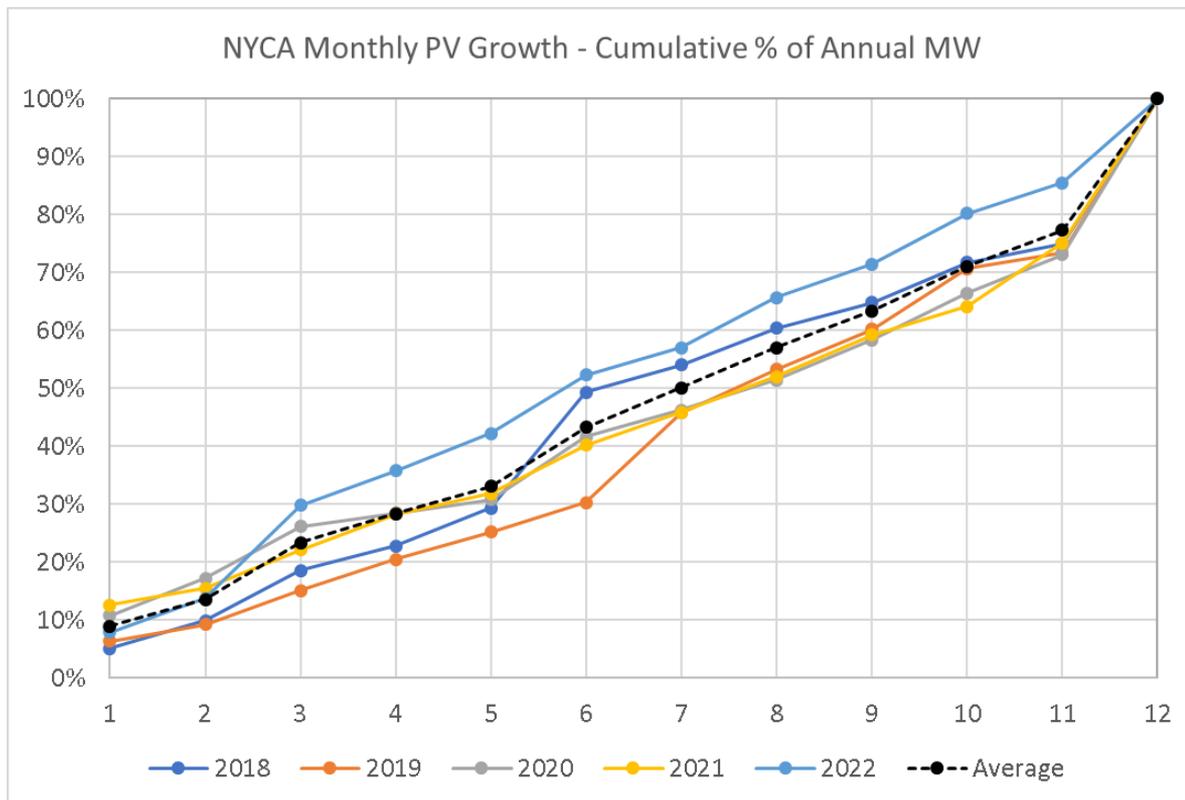
- Energy projections in the PV forecast factor in the incremental growth during a given year based on historical monthly deployment data (slide 13)
- BTM Solar energy forecast is developed at the zonal level using regional and zonal monthly capacity factor data
- Annual and monthly capacity factor estimates were developed from 5 years (2018-2022) of BTM PV solar generation estimates

Zone(s)	Annual Capacity Factor
A-E	12.1%
F&G	12.7%
H&I	13.1%
J	13.0%
K	13.4%

Source: NYISO Inverter data samples for 10,400 inverter data sites (1,400 MW DC capacity)

Capacity factor values are calculated based on MW AC generation values compared to MW DC installed nameplate amount

BTM Solar – Preliminary Energy Forecast

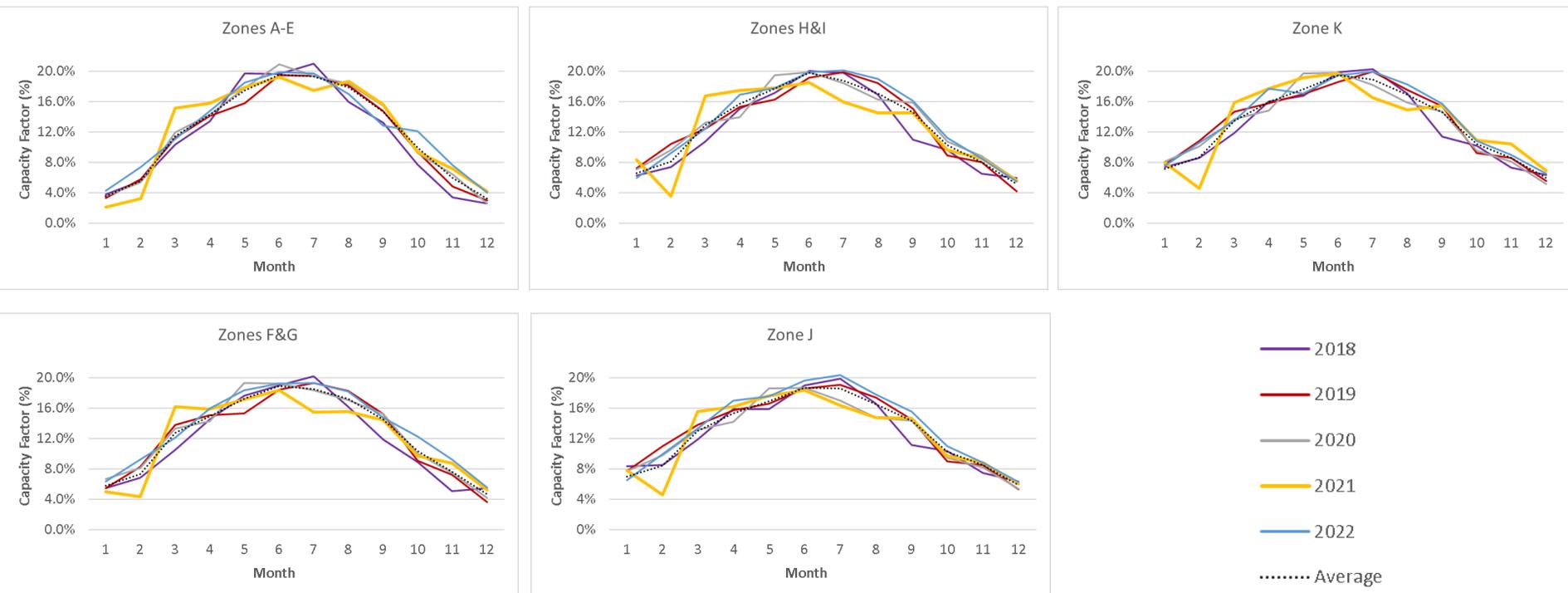


Month	% of Annual Capacity	Cumulative % of Annual Capacity
1	9%	9%
2	5%	14%
3	10%	23%
4	5%	28%
5	5%	33%
6	10%	43%
7	7%	50%
8	7%	57%
9	6%	63%
10	8%	71%
11	6%	77%
12	23%	100%

Source: NYS Department of Public Service and NY Utilities – Standard Interconnection Request data

BTM Solar – Preliminary Energy Forecast

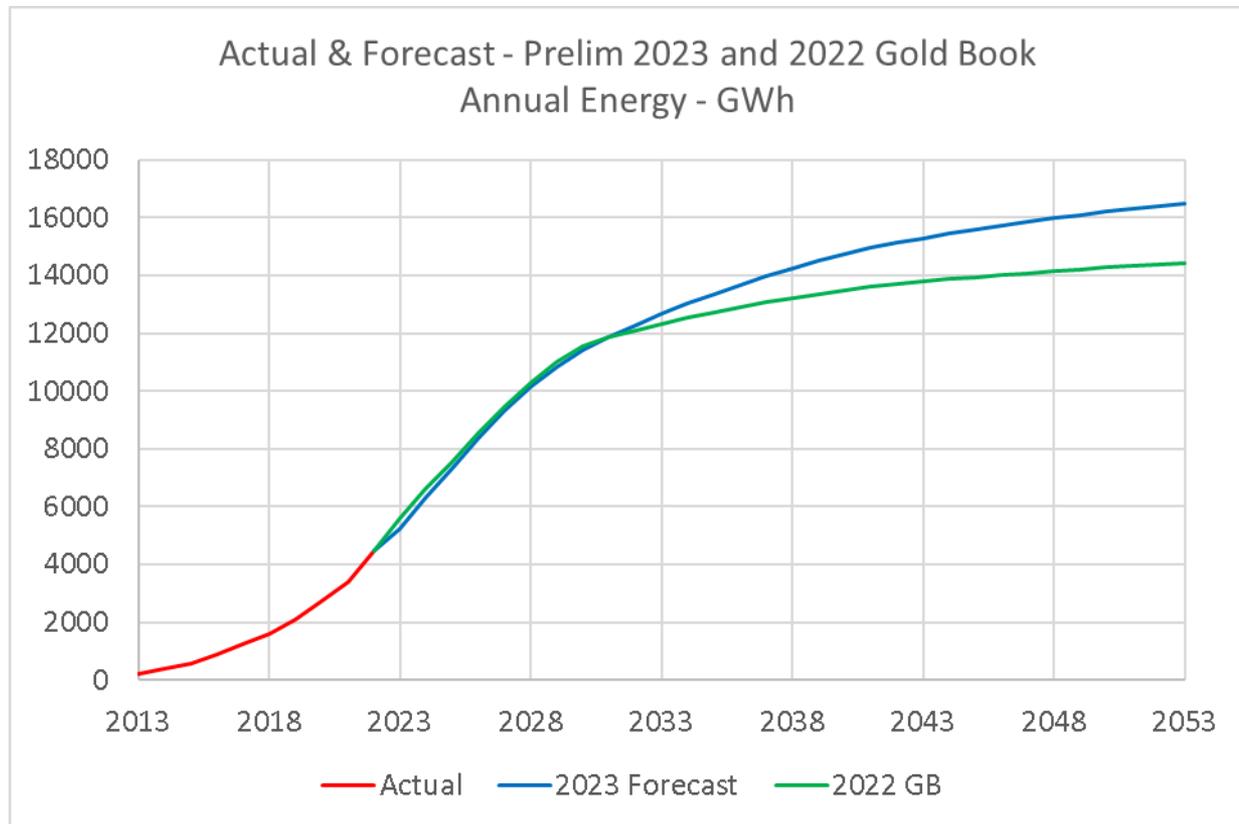
Monthly Capacity Factor Values by Region



Source: NYISO Real-time inverter data sampling

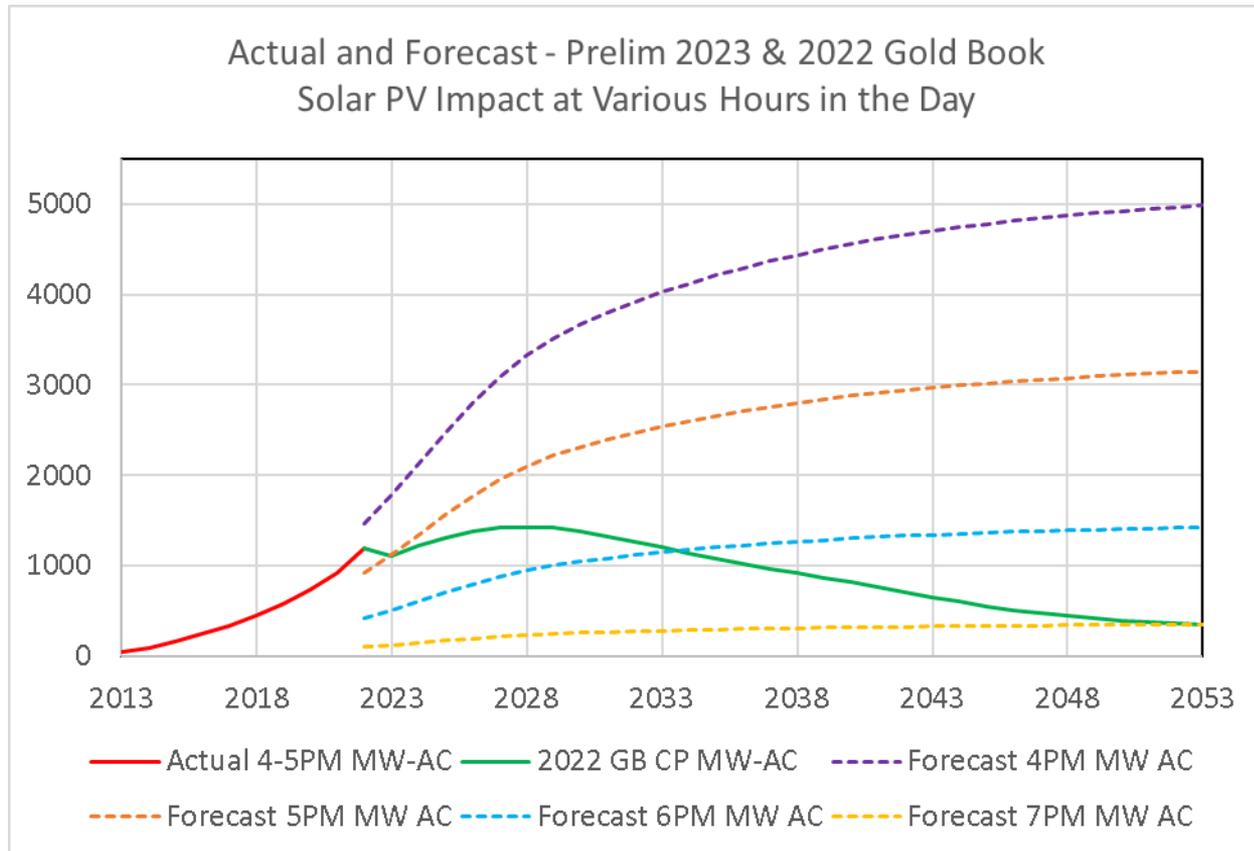


BTM Solar – Preliminary Energy Forecast



Energy values through 2030 have dropped slightly compared to last year's forecast

BTM Solar – Summer Peak Impact



The hour of the NYCA system coincident peak is expected to change in future years. The impact of Solar PV on the peak decreases as the hour of the peak moves later in the day.

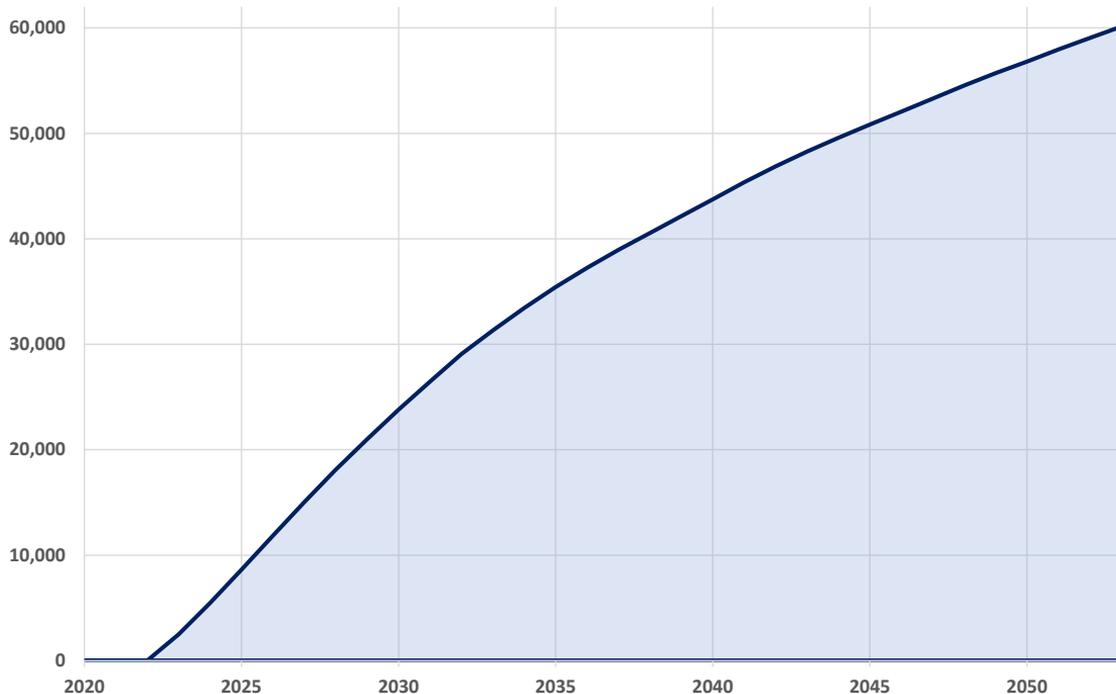
Energy Efficiency

Energy Efficiency and Codes & Standards Impacts

- **Primary data sources for historical energy savings estimates:**
 - Utility ETIP and Clean Energy Dashboard scorecards
 - DPS Energy Efficiency and Building Electrification Report (Dec 2022)
 - EIA annual energy efficiency reporting data
- **Primary forecast considerations:**
 - Programmatic energy savings driven by State energy efficiency policy targets
 - Building codes and appliance efficiency standards
 - Future heating and cooling load reductions from building shell improvements

Preliminary Energy Efficiency and Codes & Standards Forecast

Annual Energy Reductions Relative to 2022 - GWh



Seasonal Coincident Peak Reductions* - MW

Year	Summer Peak	Winter Peak
2025	1,300	1,200
2030	3,600	3,100
2035	5,500	4,700
2040	6,900	6,300
2045	8,000	7,900
2050	8,800	9,400

* Relative to 2022

These are preliminary estimates and subject to revision prior to the Gold Book forecast

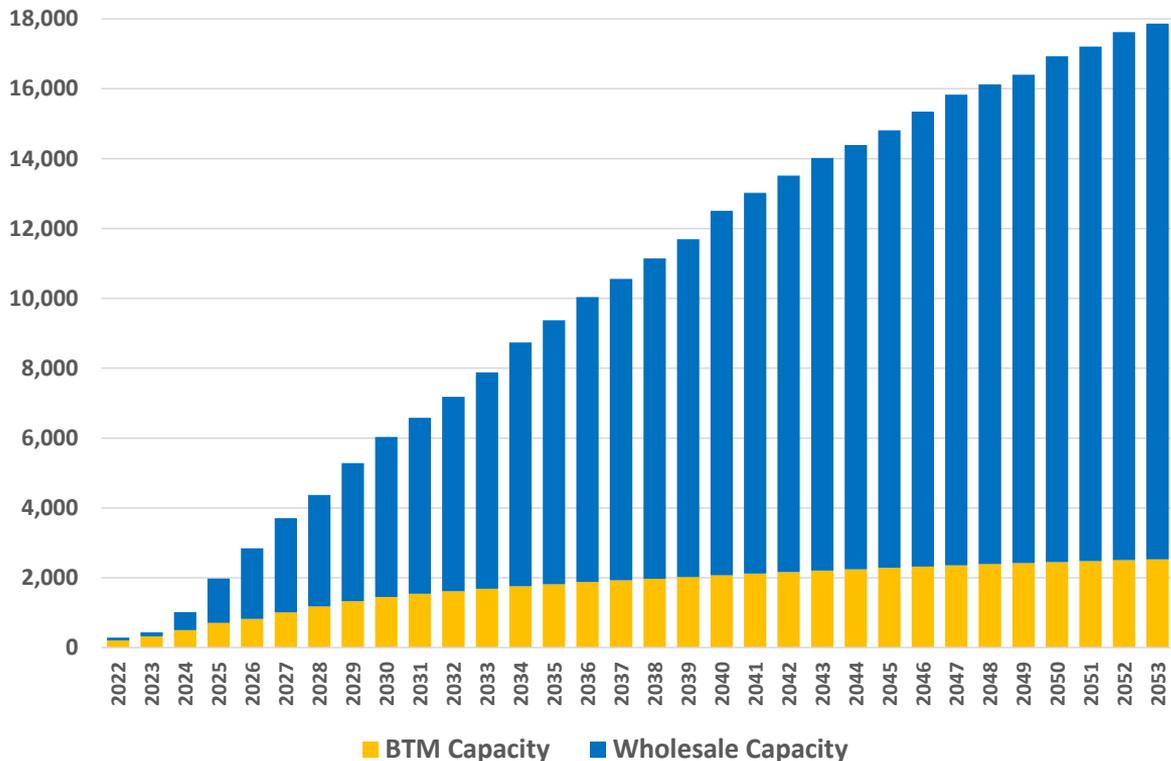
Energy Storage

Energy Storage Forecast

- Storage capacity forecast includes both wholesale market and behind-the-meter (BTM) storage
- Wholesale storage forecast considers storage resources listed on the NYISO Interconnection Queue
- BTM storage forecast considers storage resources included in the SIR database and information from Transmission Owners
- Both wholesale and BTM storage resources have relatively small net annual electricity consumption due to less than 100% round trip efficiency of the charging/discharging cycle
- A portion of installed BTM storage is expected to reduce system peak demand by injecting energy into the grid during the summer and winter peak hours

Preliminary Energy Storage Forecast

Energy Storage Nameplate Capacity (MW)



NYCA Energy Storage Impacts

Year	Net Energy Consumption (GWh)^	Peak Reductions (MW)*
2025	300	500
2030	900	1,000
2035	1,400	1,300
2040	1,800	1,500
2045	2,200	1,700
2050	2,500	1,800

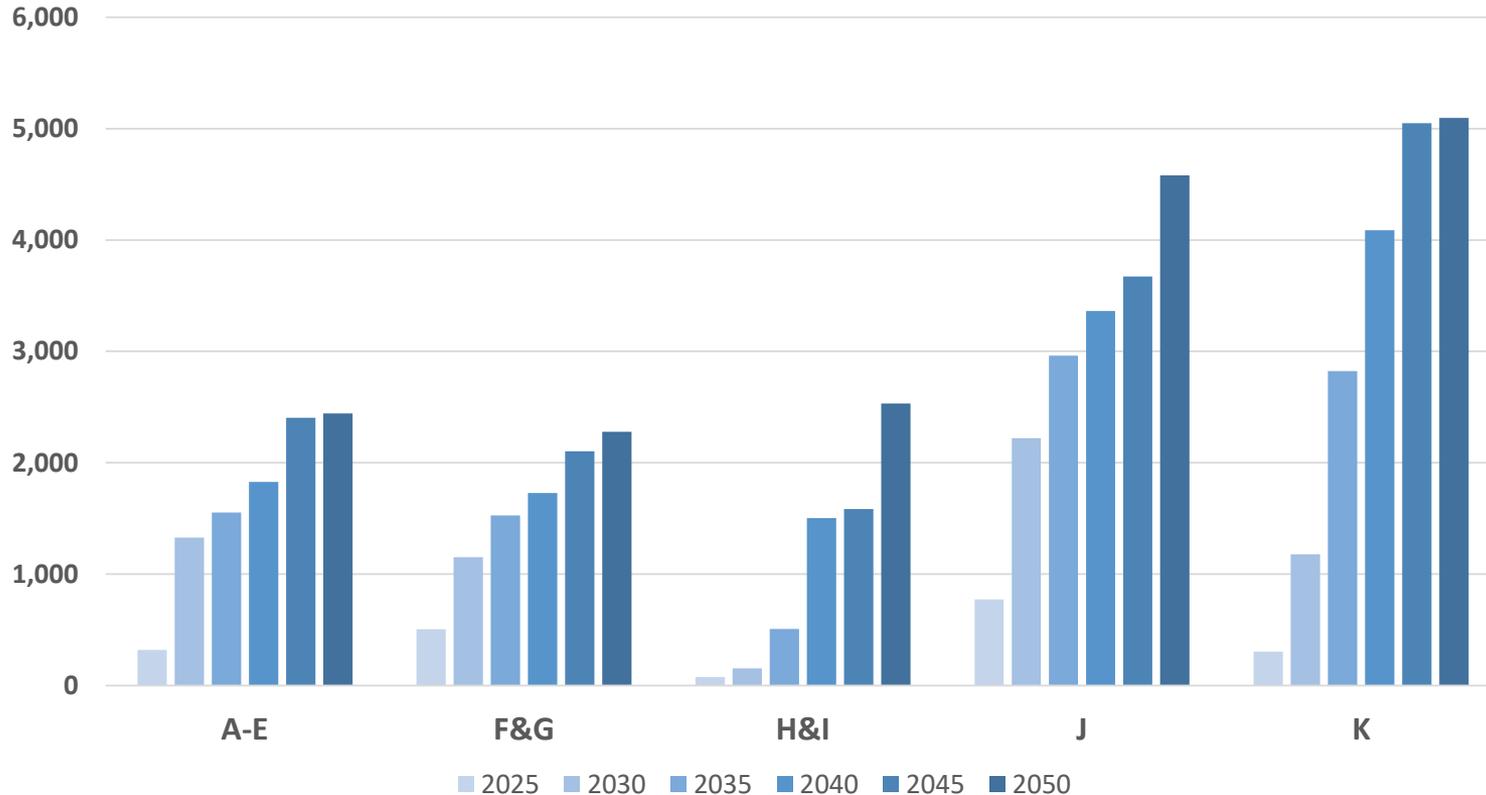
^Wholesale and BTM Storage

*BTM Storage only

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Preliminary Energy Storage Forecast

Regional Energy Storage Nameplate Capacity (MW, Wholesale plus BTM)



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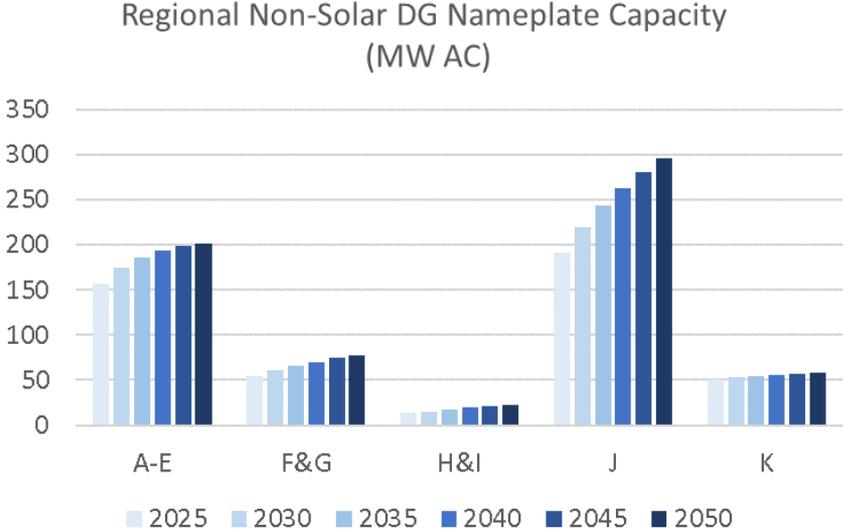
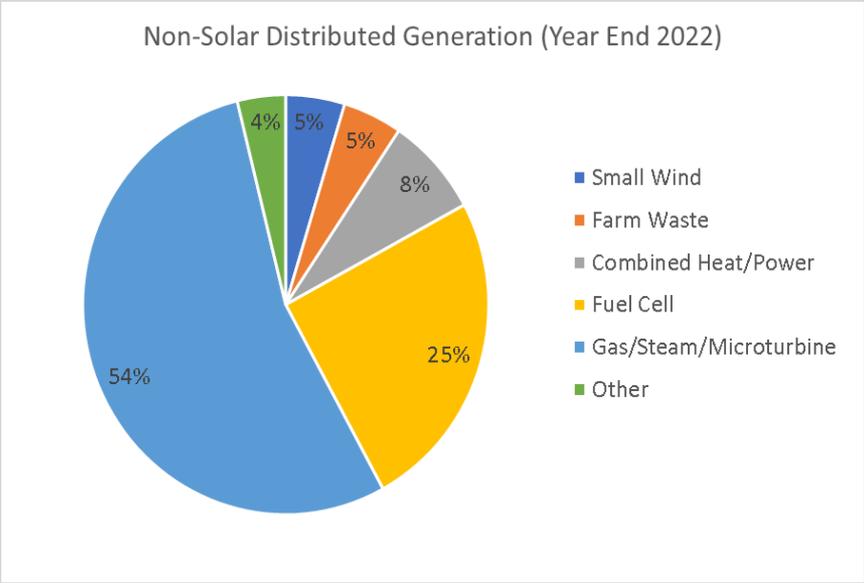
Other Forecast Components

Other Long-Term Forecast Components

- **Non-Solar Distributed Generation (DG)** - annual energy and seasonal peak reductions from non-solar generation resources. These include relatively minor impacts from combined heat and power (CHP), anaerobic digesters, fuel cell facilities, and other resources.
- **Large Loads** - annual energy and seasonal peak increases due to the projected timelines of interconnecting large load projects. Large load forecasts are reviewed with each connecting and affected transmission owner.

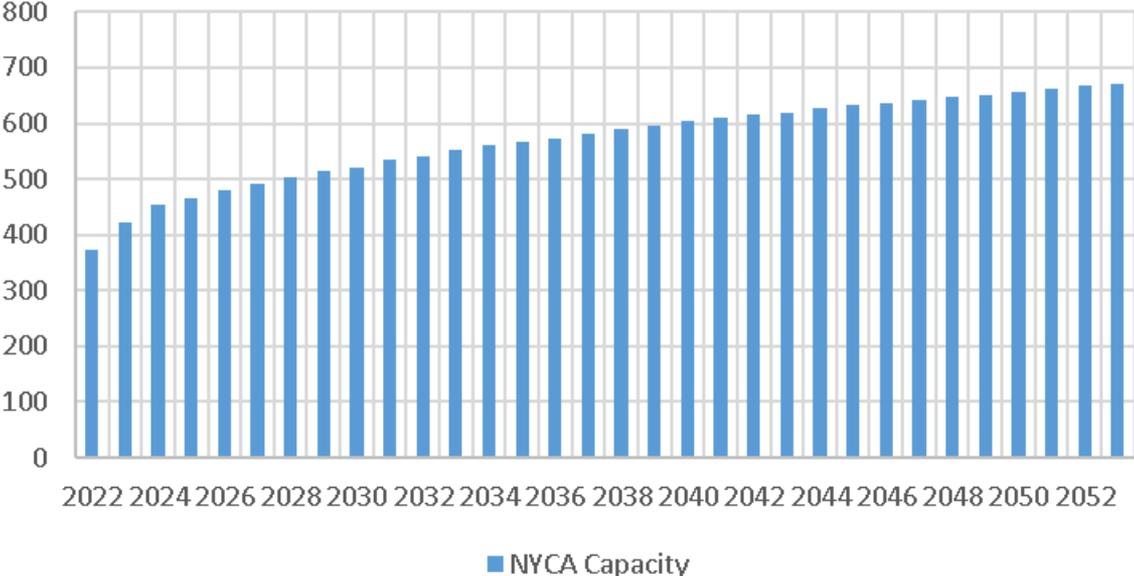
Non-Solar DG Forecast

The forecast considers non-solar generation resources included in the SIR database and information from Transmission Owners



Non-Solar DG Forecast

Non-Solar DG Nameplate Capacity (MW AC)



NYCA Non-Solar DG Impacts

Year	Energy (GWh)	Peak Reductions (MW AC)
2025	2,190	380
2030	2,450	420
2035	2,660	460
2040	2,820	490
2045	2,950	510
2050	3,040	530

These are preliminary estimates and subject to revision prior to the Gold Book forecast

Questions?

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