

Forecasts for Reliability Planning Studies

Max Schuler

Demand Forecasting & Analysis

ESPWG/TPAS/LFTF

August 6, 2024

Agenda

- **Light Load Forecast**

- Used for light load case in transmission security analyses

- **Gross Peak Forecast**

- Used in resource adequacy GE MARS modeling

- **Transmission Security Margin Demand Shapes**

- Projected load shapes during NYCA summer and winter peak days

Light Load Forecast

Light Load Forecast Background

- The light load forecast reflects a low midday net load hour with high BTM solar generation, approaching or equal to the overall NYCA annual minimum load hour
- NYCA-coincident forecast for hour beginning 12 (solar noon with largest BTM solar impacts)
 - The minimum load often occurs an hour or two later, in the early afternoon
- Assumes April/May weekend day
 - Maximum BTM solar impacts across the year
 - Weekend load levels are lower than weekday levels
- 4/7/2024 used as a starting point (recent spring weekend with low load and high solar)

Light Load Forecast Background

- **Gross light load day forecast accounts for:**
 - Base load growth driven by econometric trends, energy efficiency savings, and other impacts
 - Electric Vehicles projected spring weekend charging load
 - Electrification of non-weather sensitive building appliances
 - BTM Storage charging during the midday hours. Includes potential impacts from hybrid solar and storage resources
 - Projected Large Load impacts from existing and future interconnecting large loads
- **Light load hour BTM solar is deducted from the gross forecast**
 - From 2024 Gold Book Table I-9d – maximum hourly NYCA BTM solar generation
- **Midday minimum load forecast**
 - Calculated using the same shape analyses as the light load hour forecast (noon hour)
 - Selects the smallest net load hour from the projected load shape (1 or 2pm hour)

Light Load Forecast Buildup

2024 RNA NYCA Midday Light Load Forecast - MW

Year	(a) Base Gross Load	(b) (+) Large Loads	(c) (+) EV Charging	(d) (+) Building Electrification	(e) (+) BTM Storage Charging	(f) = a + b + c + d + e Final Gross Load	(g) (-) BTM Solar Generation	(h) = f - g Light Load Forecast	(i) Minimum Load Forecast
2025	15,203	470	126	15	26	15,840	4,393	11,447	11,233
2026	14,969	900	182	30	53	16,134	4,955	11,179	10,991
2027	14,777	1,220	266	50	84	16,397	5,482	10,915	10,753
2028	14,606	1,320	375	73	116	16,490	5,959	10,531	10,394
2029	14,468	1,440	503	102	148	16,661	6,372	10,289	10,170
2030	14,317	1,610	645	136	183	16,891	6,722	10,169	10,057
2031	14,282	1,700	801	175	219	17,177	7,008	10,169	10,062
2032	14,286	1,800	967	216	256	17,525	7,238	10,287	10,184
2033	14,299	1,890	1,138	261	292	17,880	7,419	10,461	10,362
2034	14,308	1,910	1,310	308	330	18,166	7,560	10,606	10,512

(a) - Base Gross Load - reflects projected load trends due to baseline impacts such as econometric growth, end-use saturations, energy efficiency, and BTM non-solar DER

(b) - Total large load impacts expected during the light load day (including existing load levels)

(c) - Electric Vehicle charging during the light load hour

(d) - Building Electrification impacts during the light load hour

(e) - BTM storage charging during the light load hour, including potential storage charging from hybrid solar/storage systems

(f) - Final Gross Load - represents total demand

(g) - BTM Solar Generation - reflects solar generation during the NYCA midday light load hour and maximum BTM solar hour (2024 GB Table I-9d)

(h) - Light Load Forecast (Net Load) - represents metered load to be served by the wholesale market during Hour Beginning 12 on the light load day

(i) - Minimum Load Forecast - minimum hourly metered load served by the wholesale market during the light load day (Hour Beginning 13 or 14)

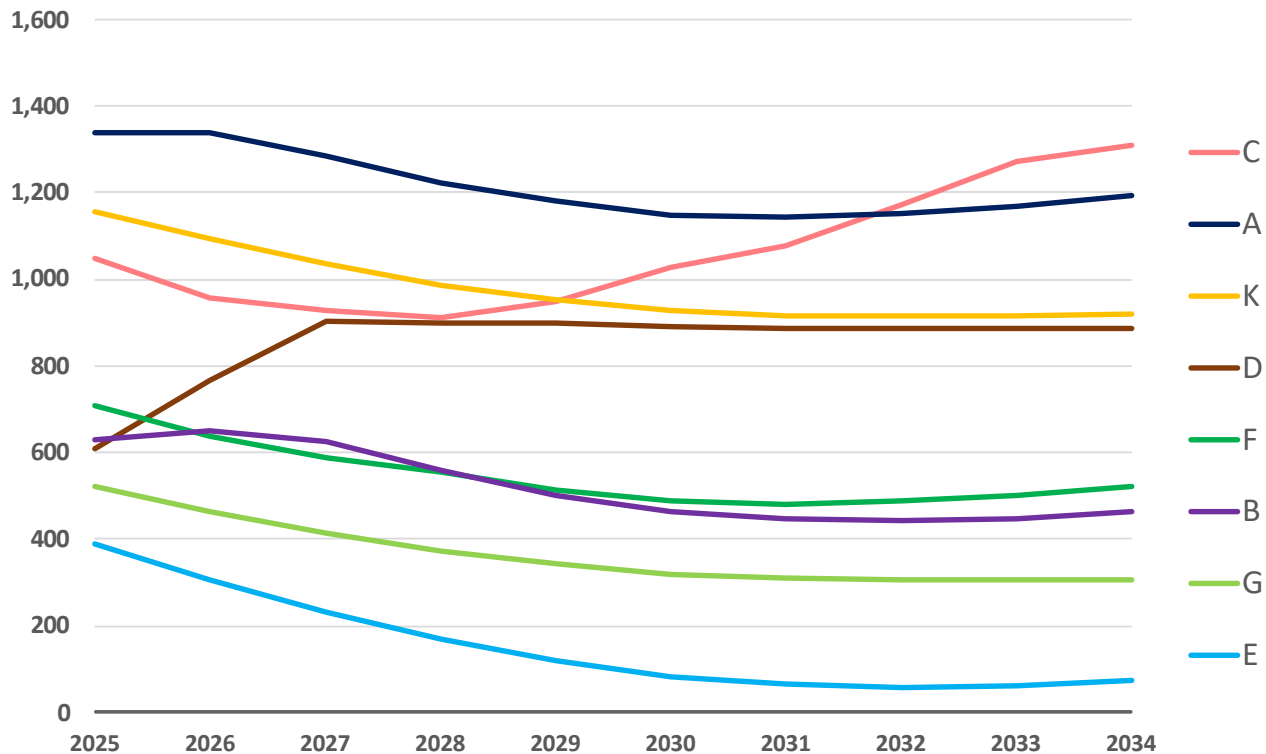
Zonal Forecast Values

2024 RNA NYCA Midday Light Load Forecast - Net Load

Net Load by Zone - MW

Year	A	B	C	D	E	F	G	H	I	J	K	NYCA
2025	1,337	631	1,047	609	389	708	520	227	455	4,367	1,157	11,447
2026	1,339	649	956	767	307	636	462	216	442	4,311	1,094	11,179
2027	1,283	625	927	903	233	588	412	210	437	4,263	1,034	10,915
2028	1,224	557	910	899	170	554	371	203	429	4,227	987	10,531
2029	1,179	503	950	897	120	514	342	201	427	4,203	953	10,289
2030	1,149	463	1,026	892	84	487	319	200	429	4,192	928	10,169
2031	1,144	446	1,079	888	64	482	311	203	433	4,205	914	10,169
2032	1,151	441	1,174	886	59	487	306	207	439	4,223	914	10,287
2033	1,169	449	1,271	886	61	501	306	211	446	4,244	917	10,461
2034	1,193	462	1,311	887	72	520	306	218	454	4,264	919	10,606

Zonal Light Load Forecast (MW)

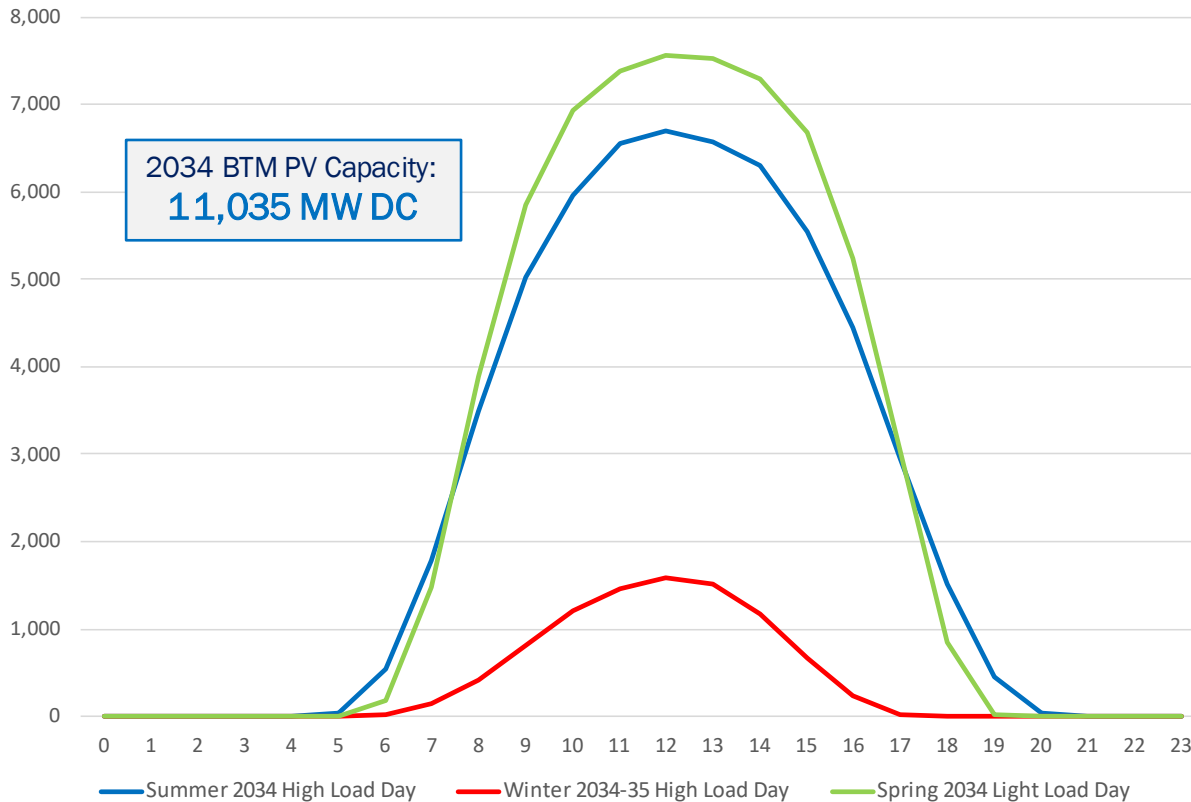


2034 Light Load Hour - Percent of Gross Load Served by BTM Solar

A	B	C	D	E	F	G	H	I	J	K
30%	63%	47%	10%	92%	61%	77%	40%	30%	15%	59%

Projected BTM Solar Shapes

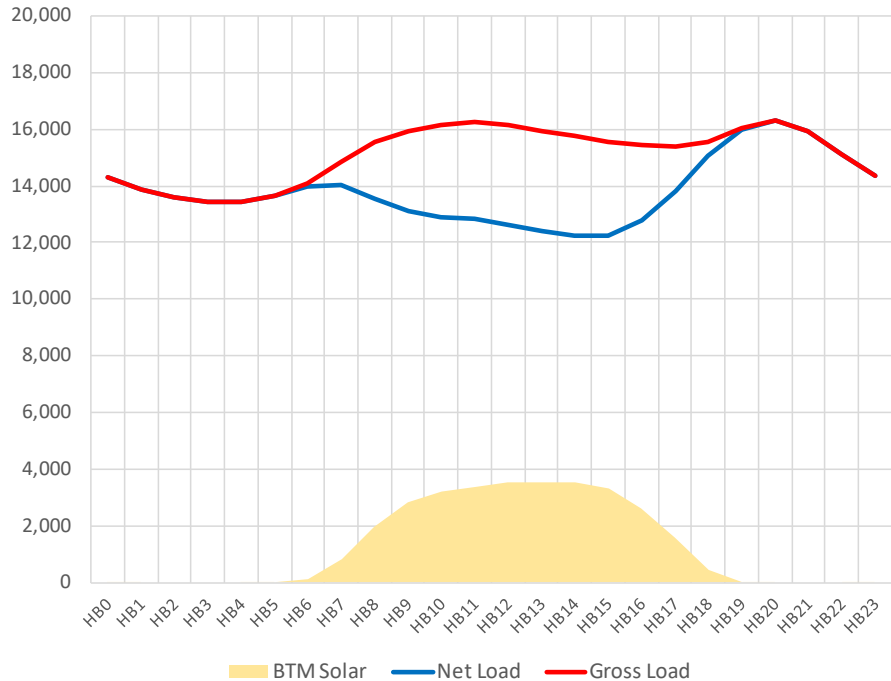
2034-35 BTM PV Load Shape Projections - MW AC



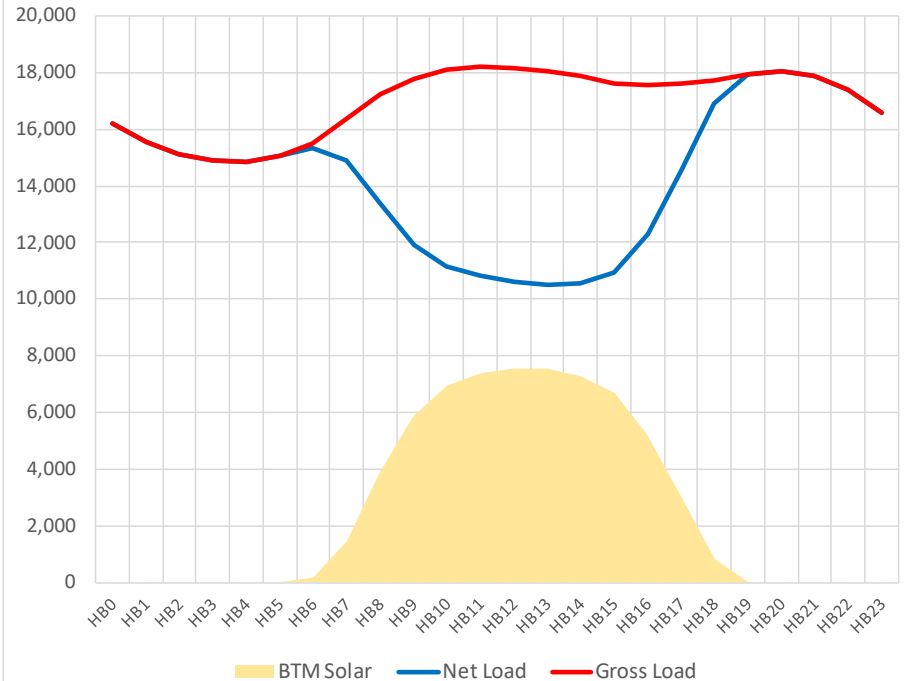
- Representative shapes showing potential BTM solar impact in 2034-35
- Summer representative shape used for the gross peak forecast
- Winter representative shape from the 2024 Gold Book supplemental graphs
- Spring representative shape based primarily on estimated actual 4/7/2024 shape, scaled up to the 2034 maximum BTM solar generation forecast

NYCA Light Load Day Shapes

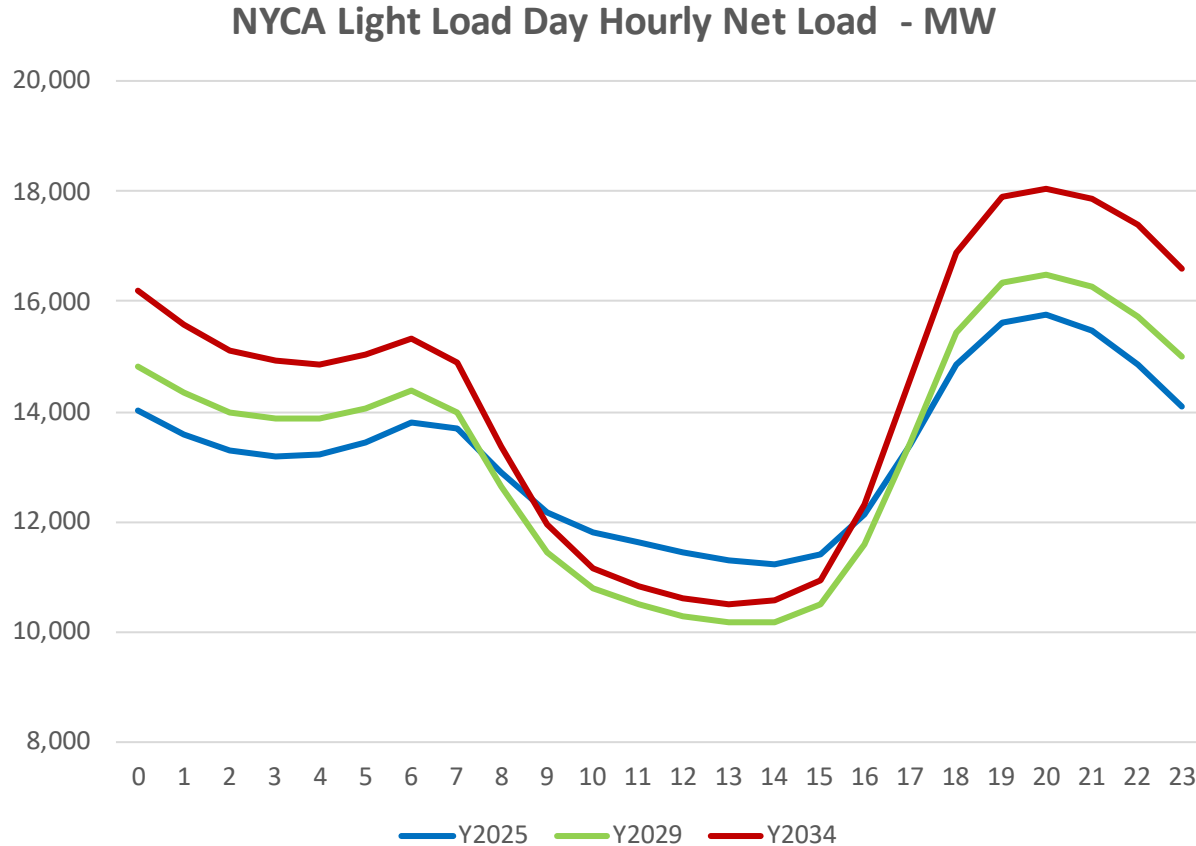
NYCA Load on 4/7/2024 (MW)



Projected 2034 NYCA Light Load Day (MW)



NYCA Light Load Day Shape Evolution



Gross Peak Forecast

Gross Peak Forecast Background

- The gross peak forecast was developed for use in planning resource adequacy simulations
- 2025 to 2034 forecast horizon
- The forecast reflects the projected maximum gross demand (measured load plus BTM solar generation) for each summer
- Provides maximum demand targets for GE MARS modeling, as BTM solar is modeled as a resource on the supply side (via random selection from five historical solar shapes) rather than as an adjustment to the load
- Winter gross peak forecast matches the Gold Book net peak forecast. The gross and net peak hours are the same, as the projected gross peak demand hour occurs after sunset during the winter peak day

Gross Peak Forecast Methodology

- **Generate projected NYCA peak day net load, BTM solar, and gross load shapes**
 - BTM solar projections are based on historical sampled inverter data, solar capacity schedule forecast, and projected BTM solar site mix and characteristics
- **Calibrate these shapes to reflect 2025 conditions, including 2025 forecast net peak load and the projected 2025 solar capacity level**
- **Produce annual peak day solar profiles for 2025 through 2034 reflecting increasing capacity levels from the 2024 Gold Book**
- **Calculate 2025-2034 projected peak day net and gross load shapes**
 - Net load peaks match the 2024 Gold Book peak forecast
 - The divergence in the net and gross shapes increases over time as BTM solar penetration increases
 - Gross load shapes account for shape impacts of increasing electrification over time
- **The NYCA Gross Peak forecast is the maximum value from the gross load shape**
- **Zonal Forecast Derivation:**
 - Starting point in each zone is the 2024 Gold Book net peak forecast
 - BTM solar generation is apportioned to the zones via shares of expected BTM solar generation at 4 pm during a July peak-type load day (the expected gross peak hour is 4 pm)

Baseline Coincident Peak Forecast

Table I-3a-G: Gross Baseline Summer Coincident Peak Demand Forecast

Includes Impacts of Energy Saving Programs, Electrification, & Large Loads

Coincident Summer Peak Demand by Zone - MW

Gross Forecast (Load plus BTM Solar Generation)

Year	A	B	C	D	E	F	G	H	I	J	K	NYCA
2025	2,954	2,155	2,828	708	1,510	2,498	2,384	648	1,379	11,136	5,297	33,497
2026	2,993	2,197	2,884	892	1,481	2,460	2,404	654	1,388	11,172	5,302	33,827
2027	2,981	2,199	2,911	1,071	1,452	2,469	2,428	660	1,399	11,207	5,321	34,098
2028	2,950	2,180	2,948	1,073	1,443	2,462	2,460	668	1,412	11,230	5,338	34,164
2029	2,924	2,168	3,106	1,077	1,445	2,464	2,507	679	1,430	11,243	5,367	34,410
2030	2,910	2,164	3,264	1,077	1,448	2,474	2,548	689	1,446	11,276	5,393	34,689
2031	2,923	2,169	3,372	1,079	1,456	2,489	2,594	701	1,464	11,328	5,437	35,012
2032	2,949	2,181	3,519	1,081	1,467	2,514	2,642	714	1,481	11,419	5,495	35,462
2033	2,986	2,203	3,639	1,084	1,490	2,552	2,707	729	1,504	11,509	5,569	35,972
2034	3,017	2,213	3,688	1,088	1,510	2,582	2,757	744	1,524	11,589	5,632	36,344

Zonal Baseline Non-Coincident Peak Forecasts

Table I-4a-G: Gross Baseline Summer Non-Coincident Peak Demand Forecast

Includes Impacts of Energy Saving Programs, Electrification, & Large Loads

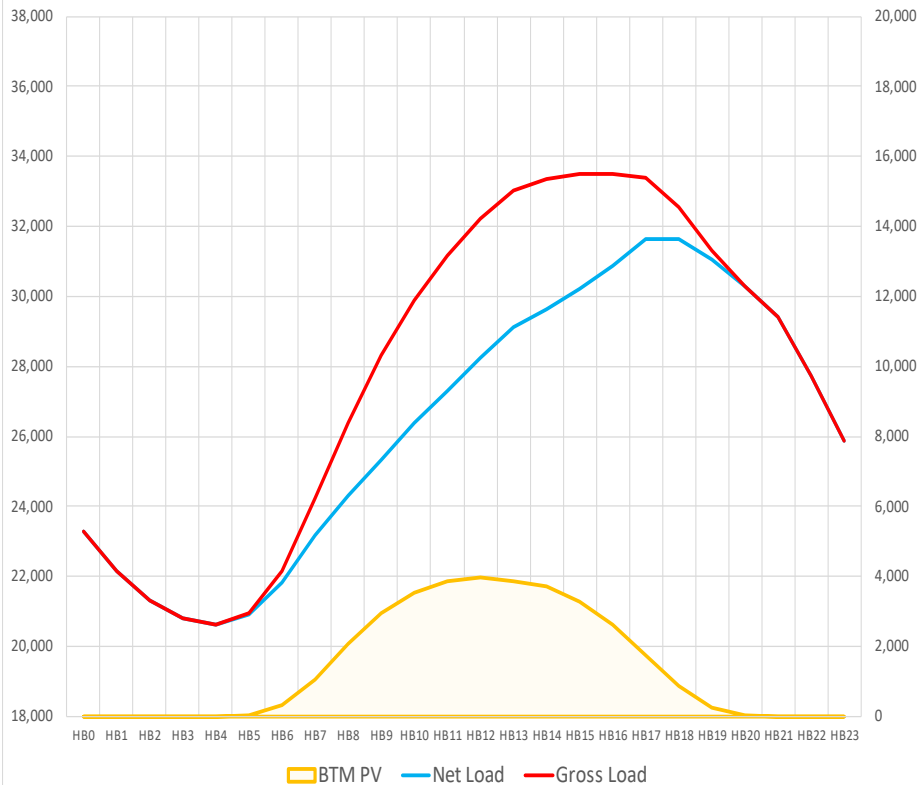
Non-Coincident Summer Peak Demand by Zone - MW

Gross Forecast (Load plus BTM Solar Generation)

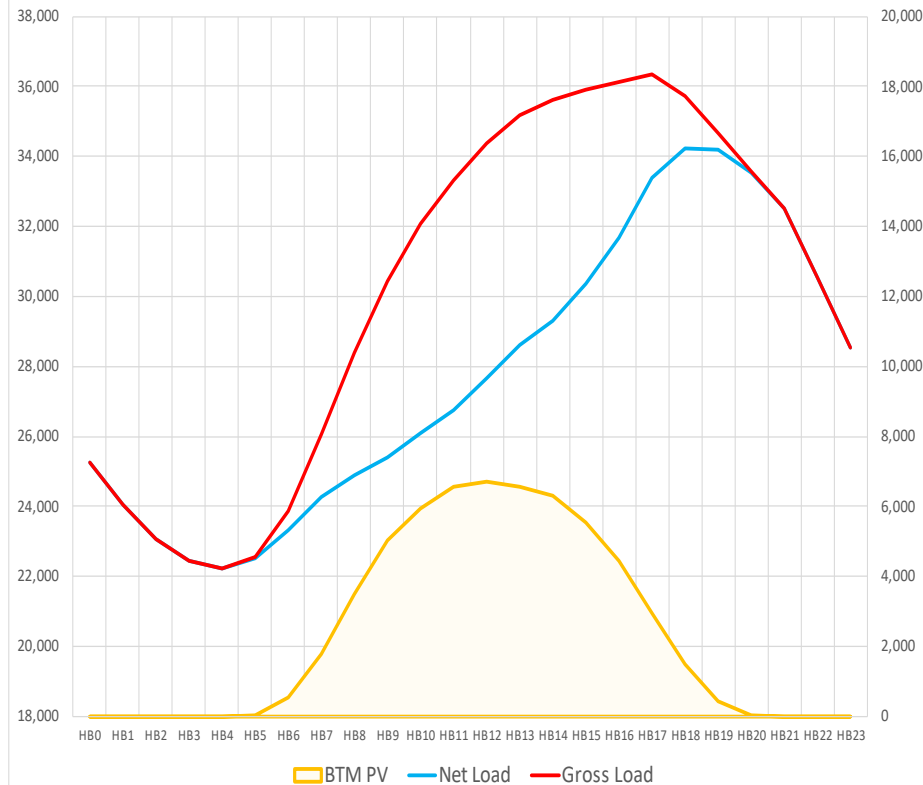
Year	A	B	C	D	E	F	G	H	I	J	K
2025	3,059	2,199	2,898	727	1,547	2,543	2,431	662	1,409	11,386	5,377
2026	3,099	2,242	2,955	915	1,517	2,505	2,451	668	1,418	11,422	5,382
2027	3,087	2,244	2,982	1,099	1,487	2,514	2,475	674	1,429	11,457	5,401
2028	3,054	2,224	3,020	1,101	1,477	2,507	2,508	682	1,443	11,480	5,419
2029	3,027	2,212	3,182	1,105	1,479	2,509	2,556	693	1,461	11,493	5,448
2030	3,013	2,208	3,344	1,105	1,482	2,519	2,598	704	1,477	11,526	5,474
2031	3,026	2,213	3,455	1,107	1,490	2,534	2,645	716	1,496	11,578	5,519
2032	3,053	2,225	3,606	1,109	1,501	2,559	2,694	729	1,513	11,669	5,578
2033	3,091	2,248	3,729	1,113	1,525	2,598	2,760	745	1,537	11,759	5,653
2034	3,124	2,258	3,779	1,117	1,546	2,629	2,811	760	1,557	11,849	5,717

Peak Day Net and Gross Shapes (MW)

2025 Projected NYCA Peak Day Load Shape - MW

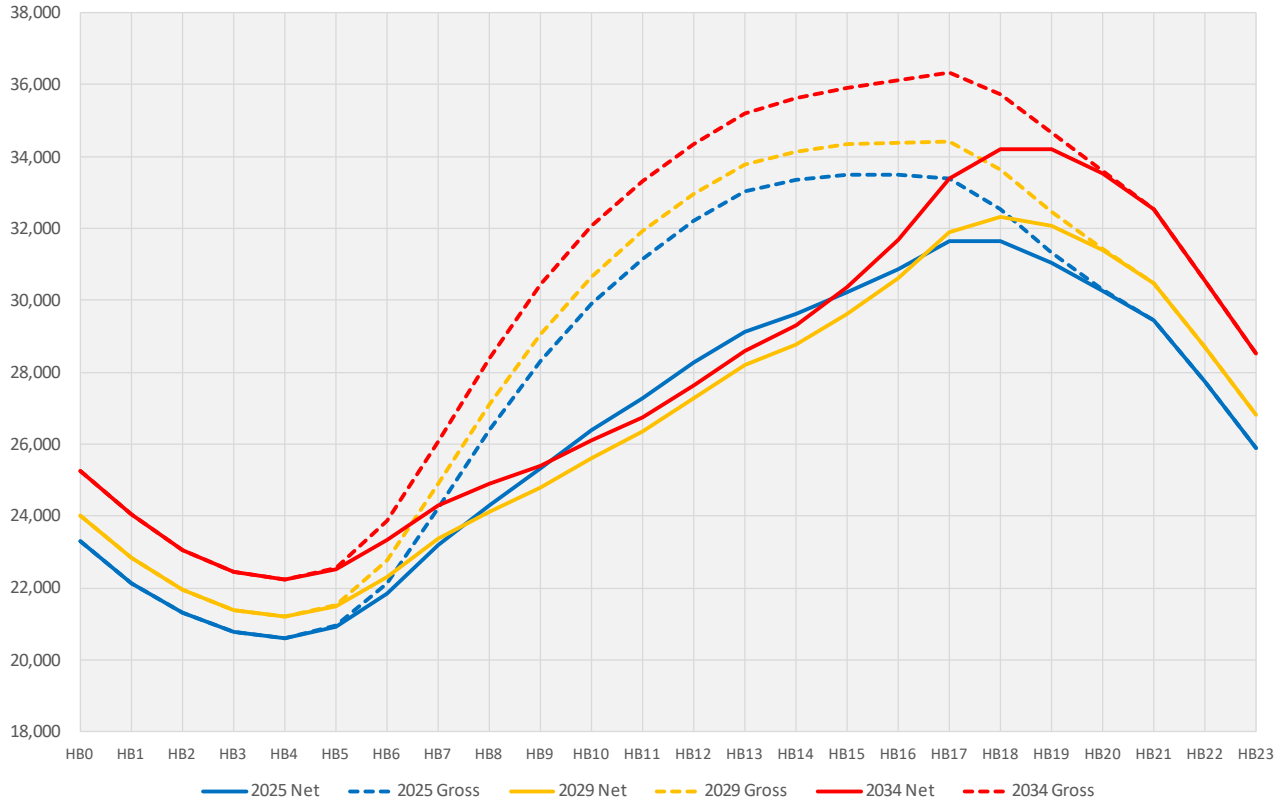


2034 Projected NYCA Peak Day Load Shape - MW



Peak Day Shape Trends

Net and Gross Load Shapes (MW)



Year	2025	2029	2034
Gross Peak Hour	HB 15	HB 17	HB 17
Gross Peak MW	33,497	34,410	36,344
Net Peak Hour	HB 17	HB 18	HB 18
Net Peak MW	31,650	32,340	34,210
Noon BTM Solar MW	3,959	5,694	6,701
Delta MW*	1,847	2,070	2,134

*Gross Peak less Net Peak

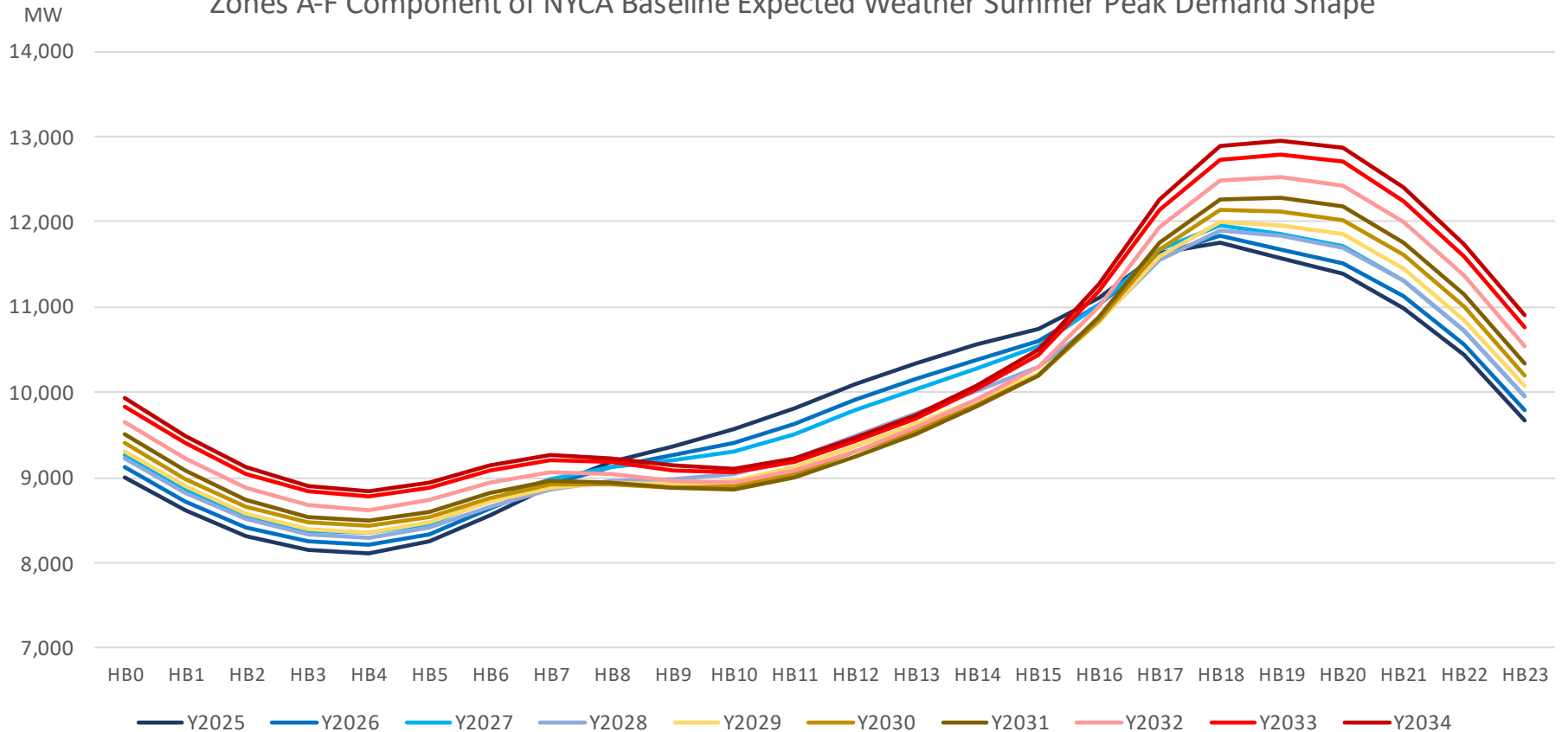
Transmission Security Margin Demand Shapes

Transmission Security Margin Demand Shapes

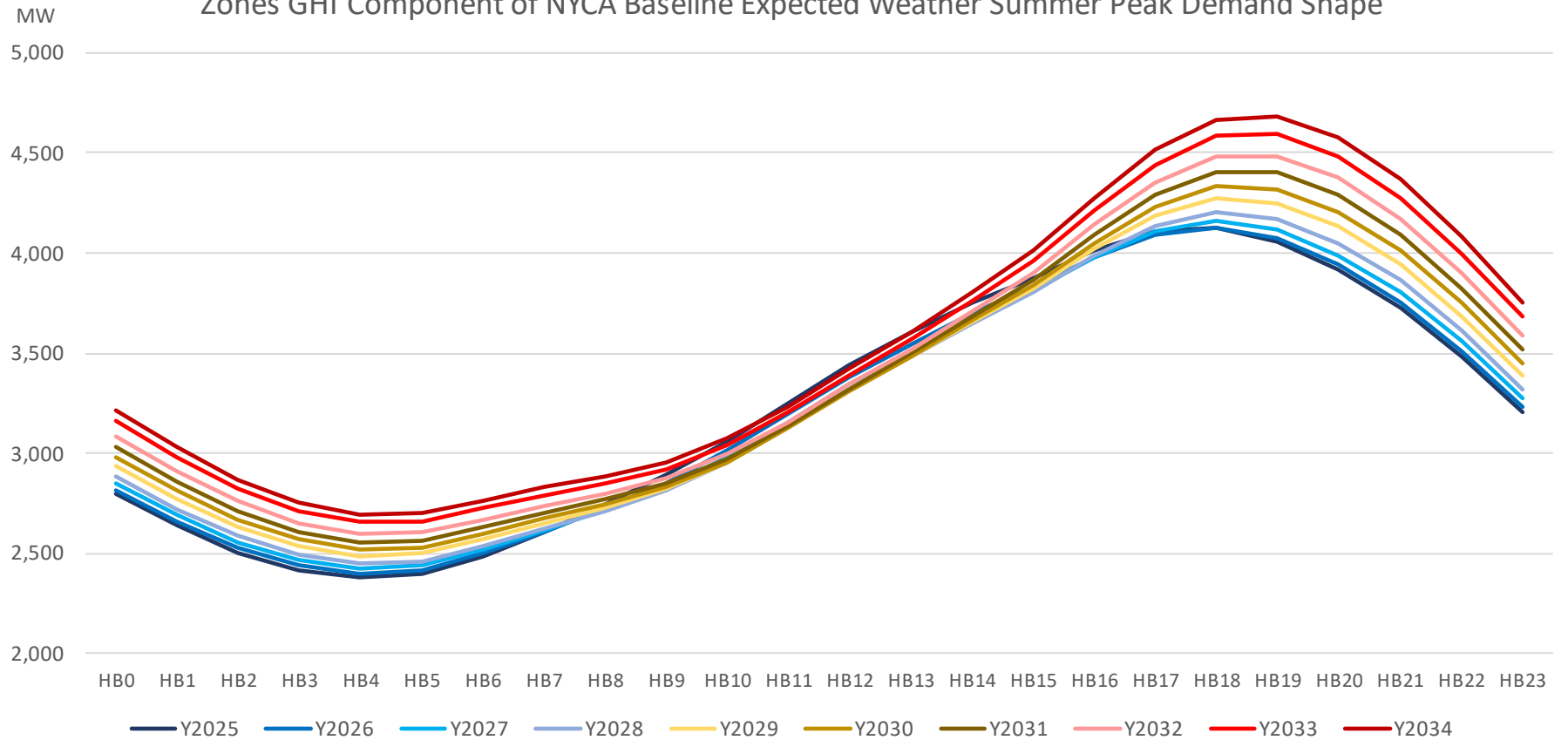
- **Summer and winter peak day load shapes were developed for purposes of transmission security margin analyses**
 - Regional demand shapes during the NYCA baseline summer peak day (corresponding to the Localities)
 - NYCA summer peak day demand shapes (baseline expected weather, 90th and 99th percentile weather, and higher demand scenario)
 - NYCA winter peak day demand shapes
- **These shapes account for the projected load shape impacts of increasing BTM solar, EV charging and building electrification**
 - Summer peak building electrification is largely driven by the electrification of non-weather sensitive appliances such as water heaters and stovetops. The impacts of building electrification on the summer peak load shape are relatively minor
 - EV charging impacts become more significant in the outer years, peaking around the 7pm hour
- **The combination of BTM solar reductions and EV charging push the NYCA baseline summer peak out to the 6pm hour starting in 2026**

Regional Demand Shapes during the NYCA Summer Peak Day

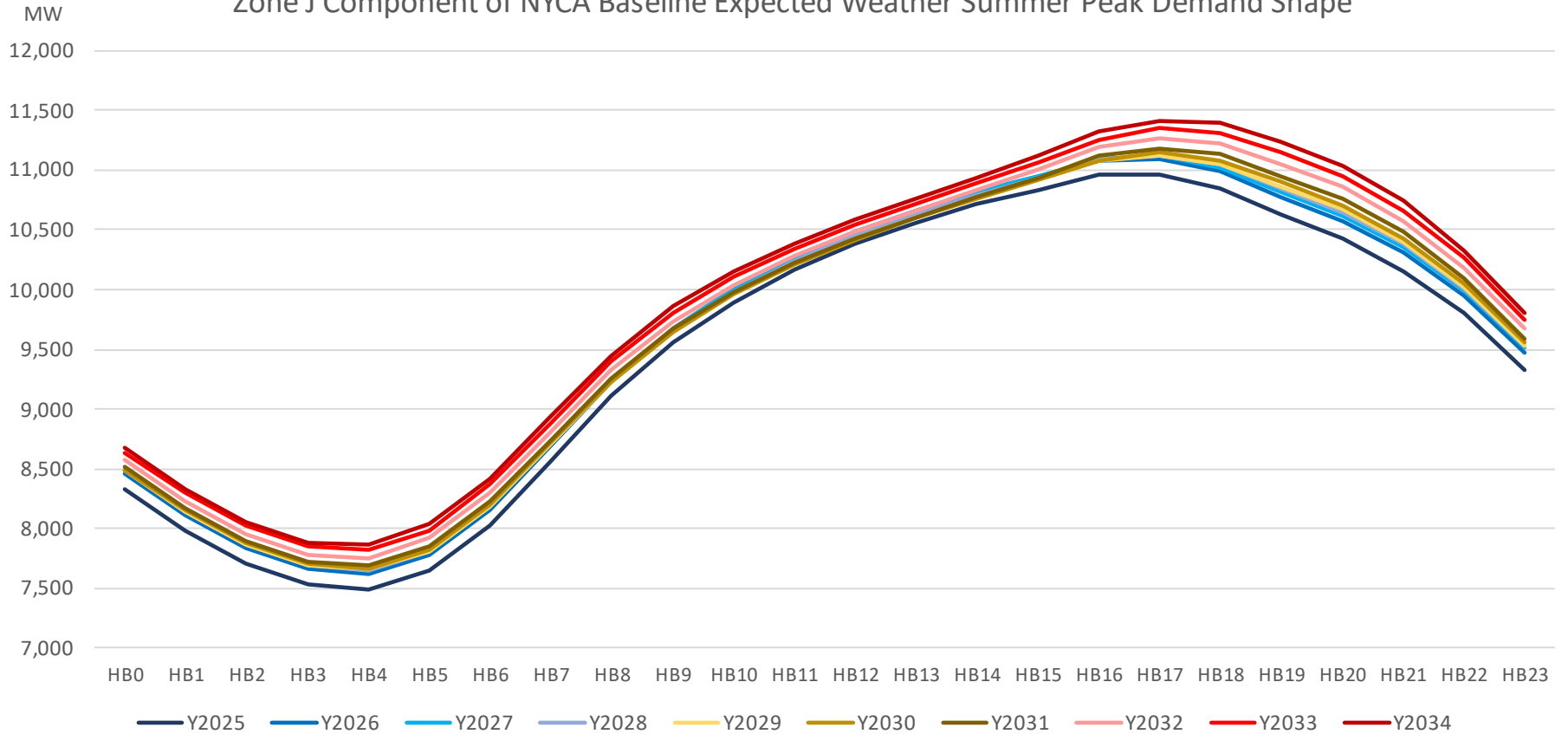
Zones A-F Component of NYCA Baseline Expected Weather Summer Peak Demand Shape



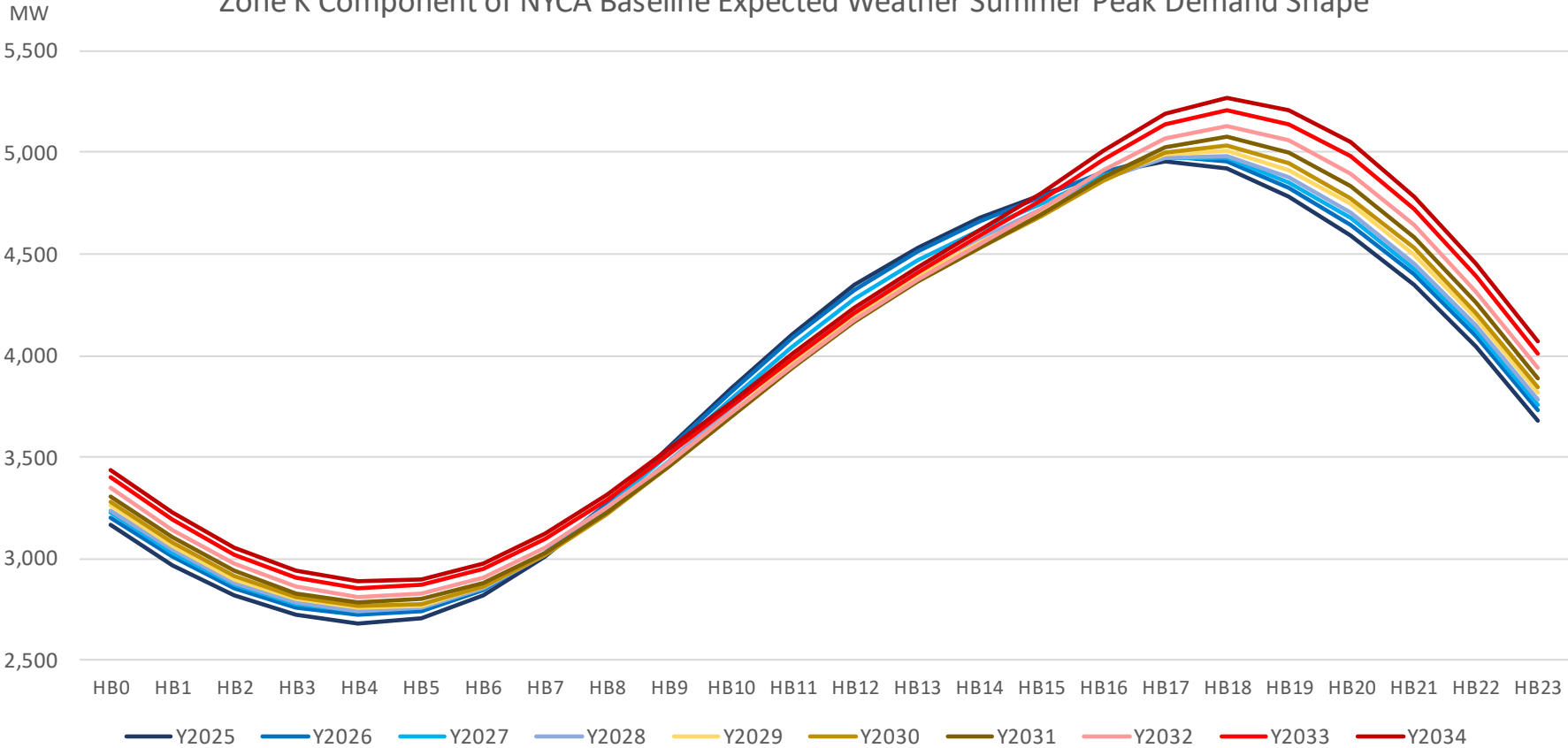
Zones GHI Component of NYCA Baseline Expected Weather Summer Peak Demand Shape



Zone J Component of NYCA Baseline Expected Weather Summer Peak Demand Shape

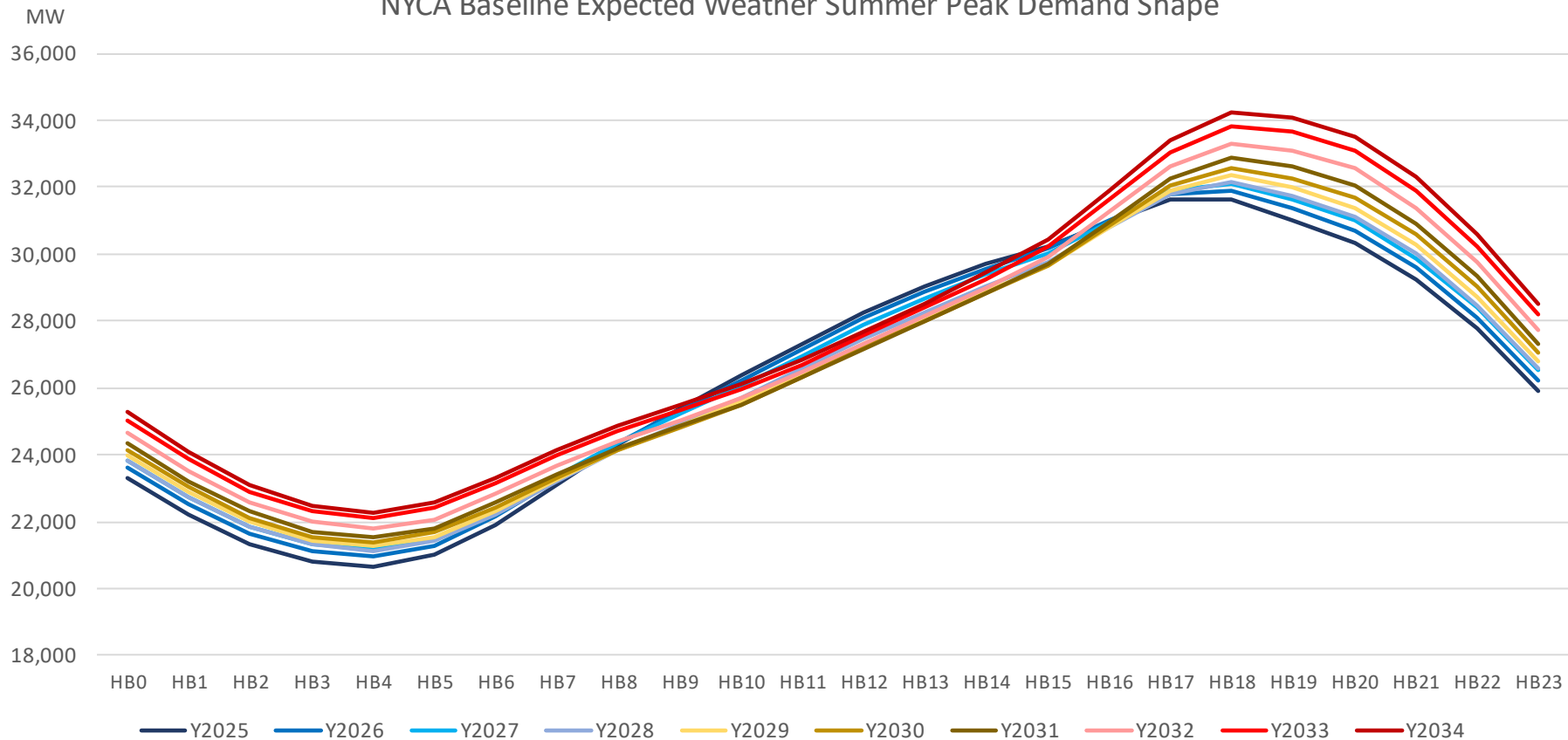


Zone K Component of NYCA Baseline Expected Weather Summer Peak Demand Shape

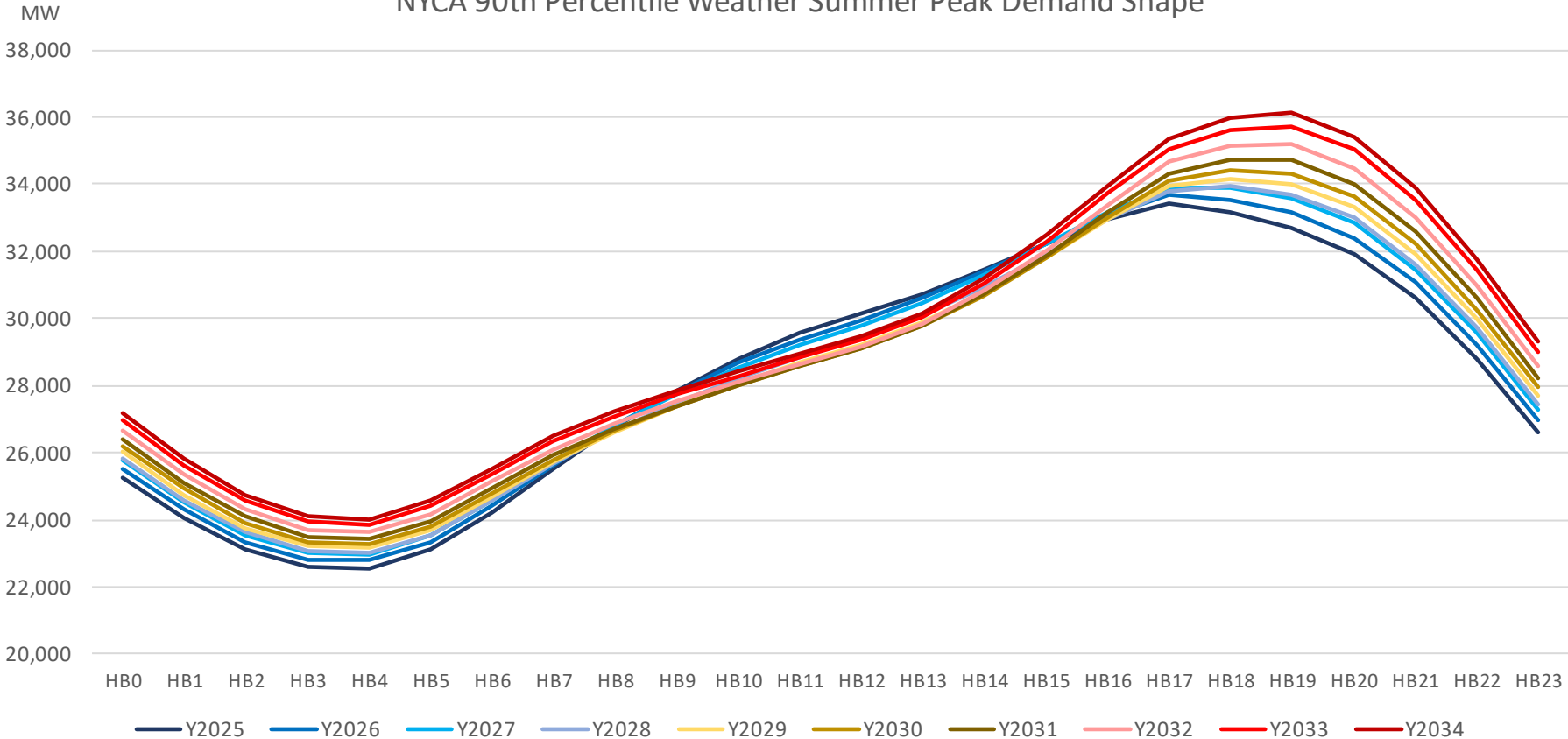


NYCA Summer Peak Day Demand Shapes

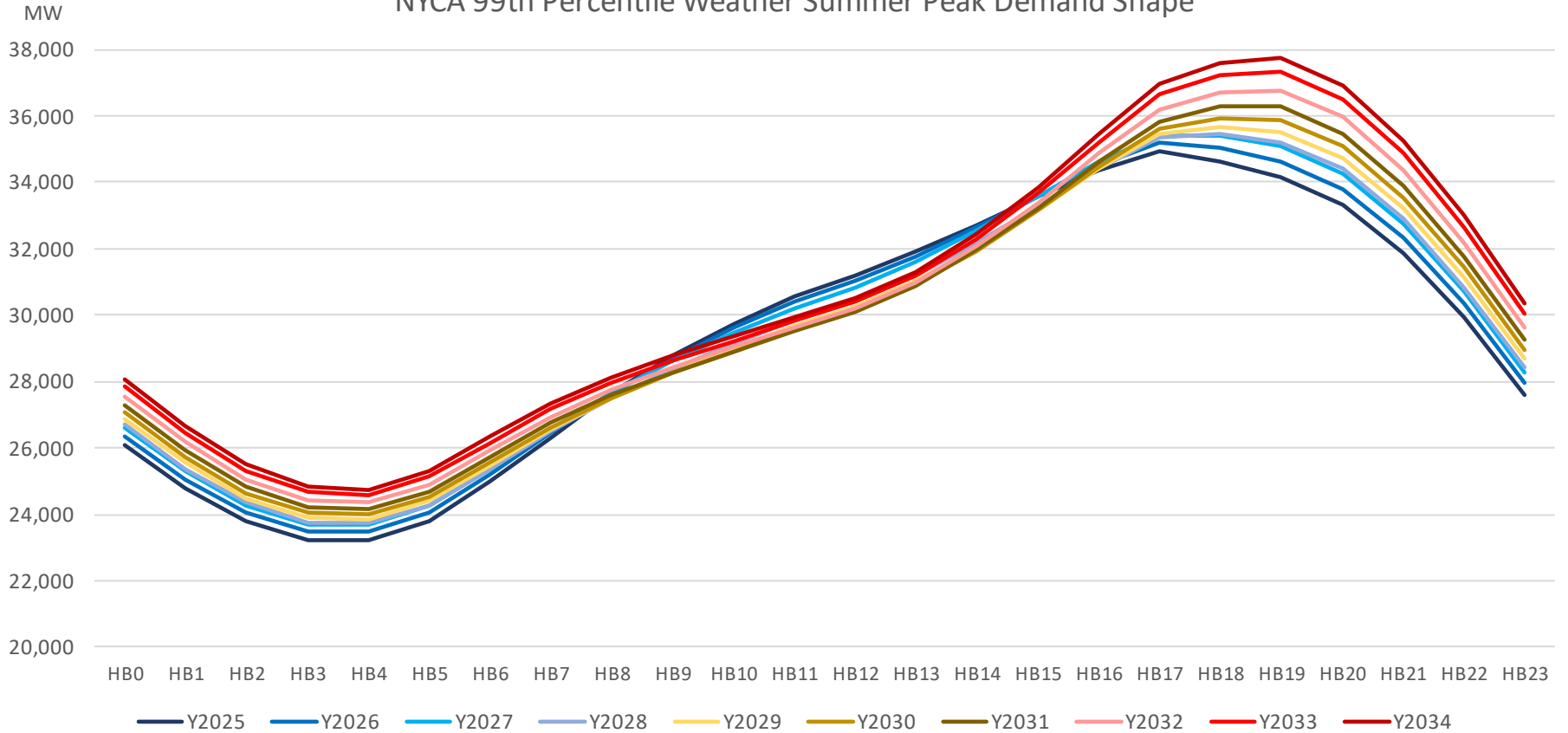
NYCA Baseline Expected Weather Summer Peak Demand Shape



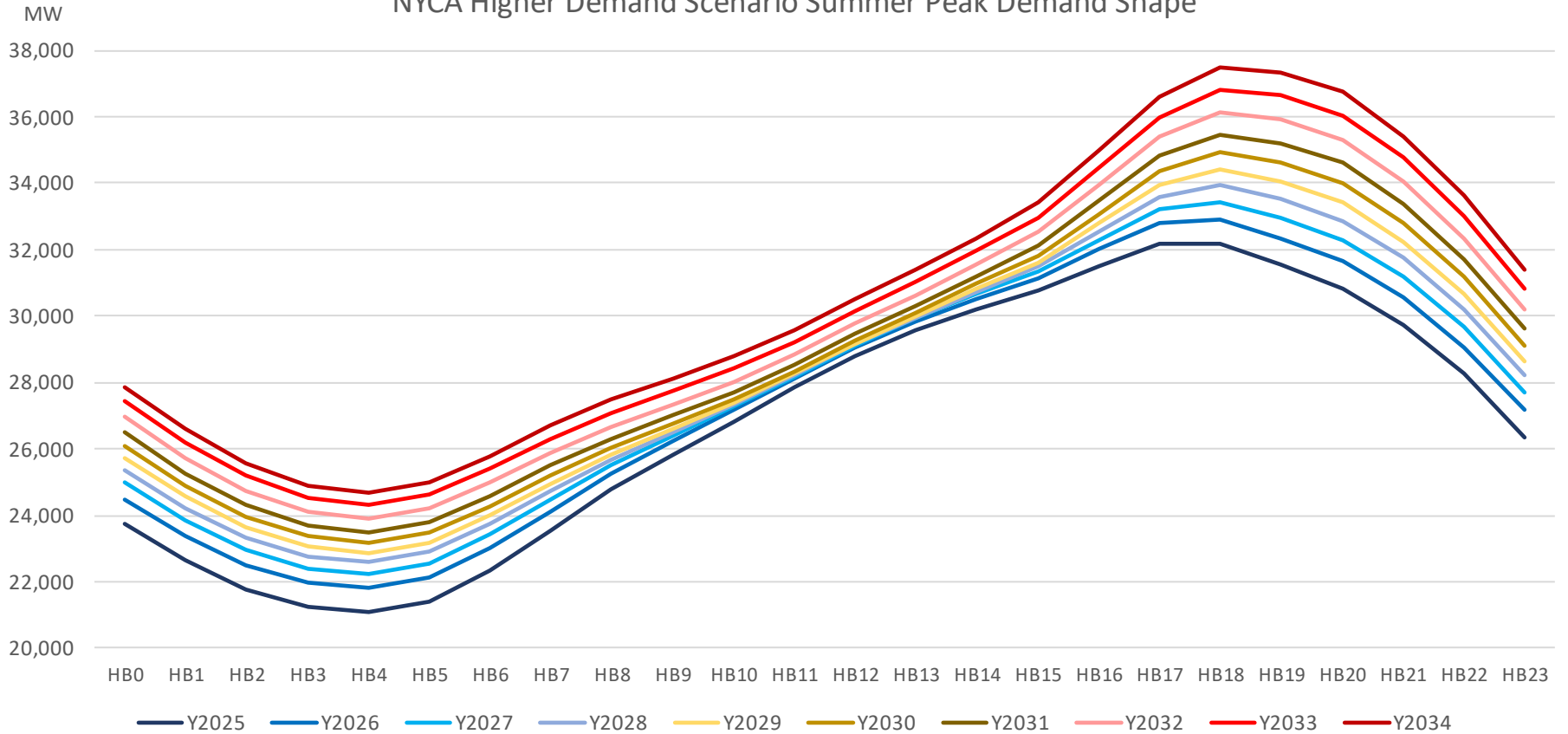
NYCA 90th Percentile Weather Summer Peak Demand Shape



NYCA 99th Percentile Weather Summer Peak Demand Shape

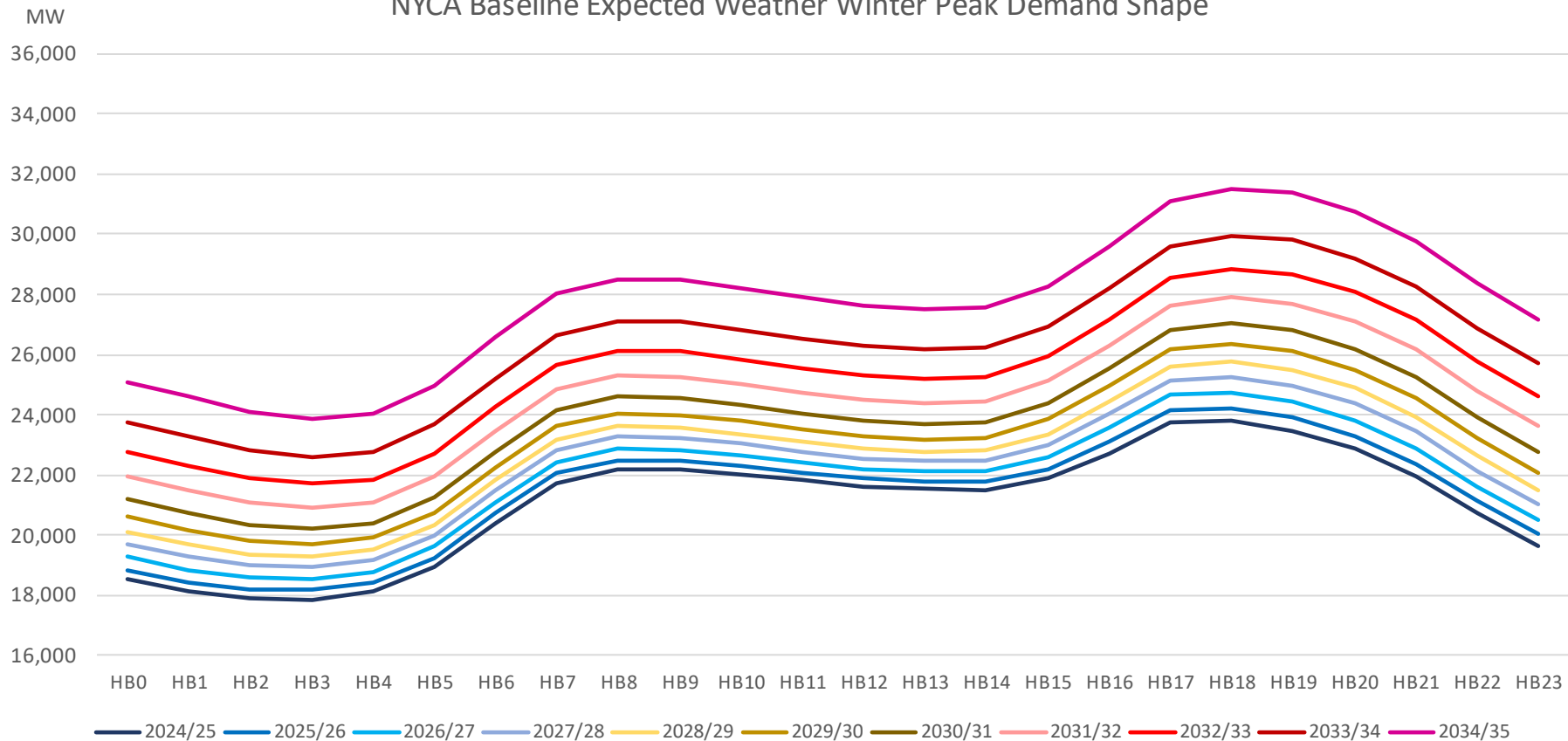


NYCA Higher Demand Scenario Summer Peak Demand Shape

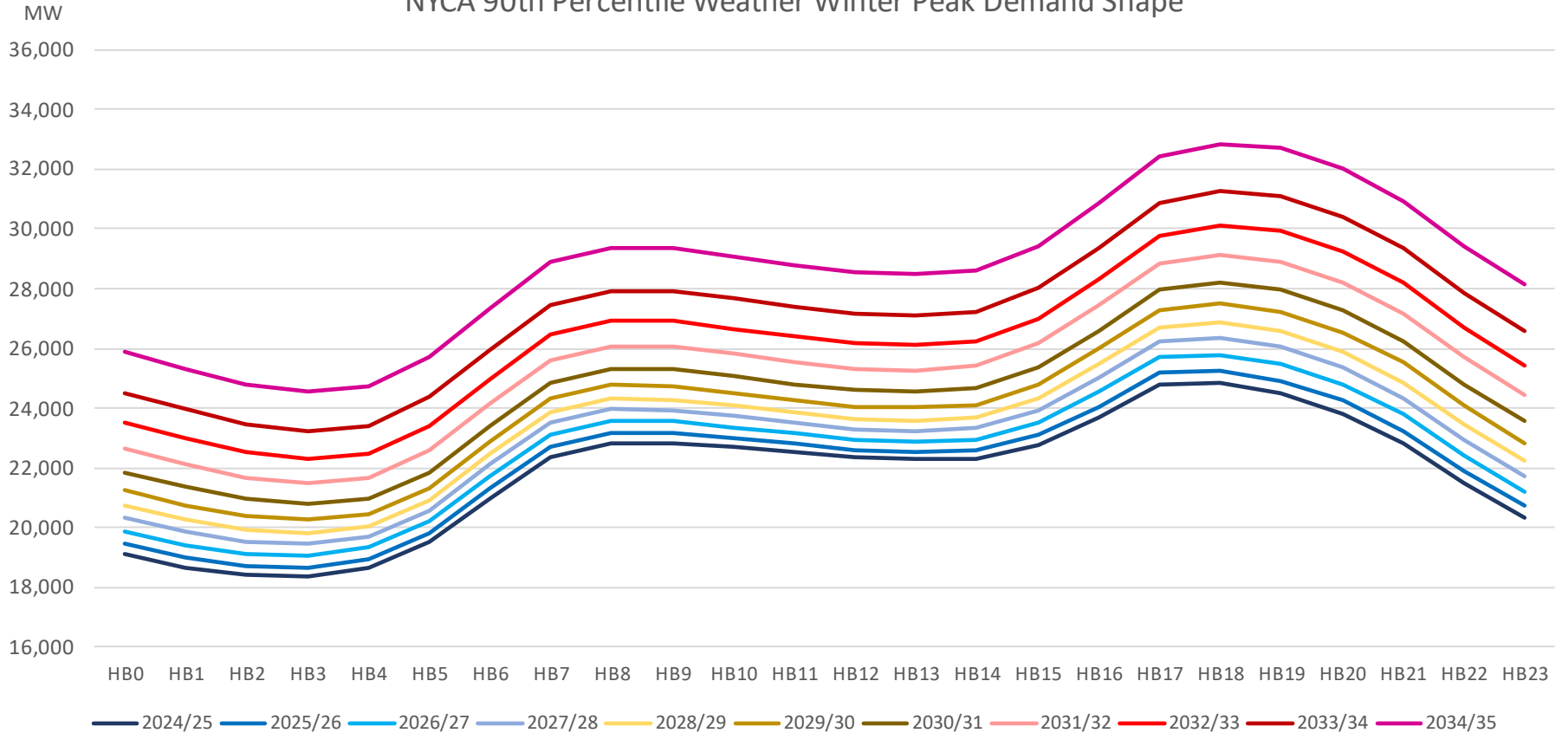


NYCA Winter Peak Day Demand Shapes

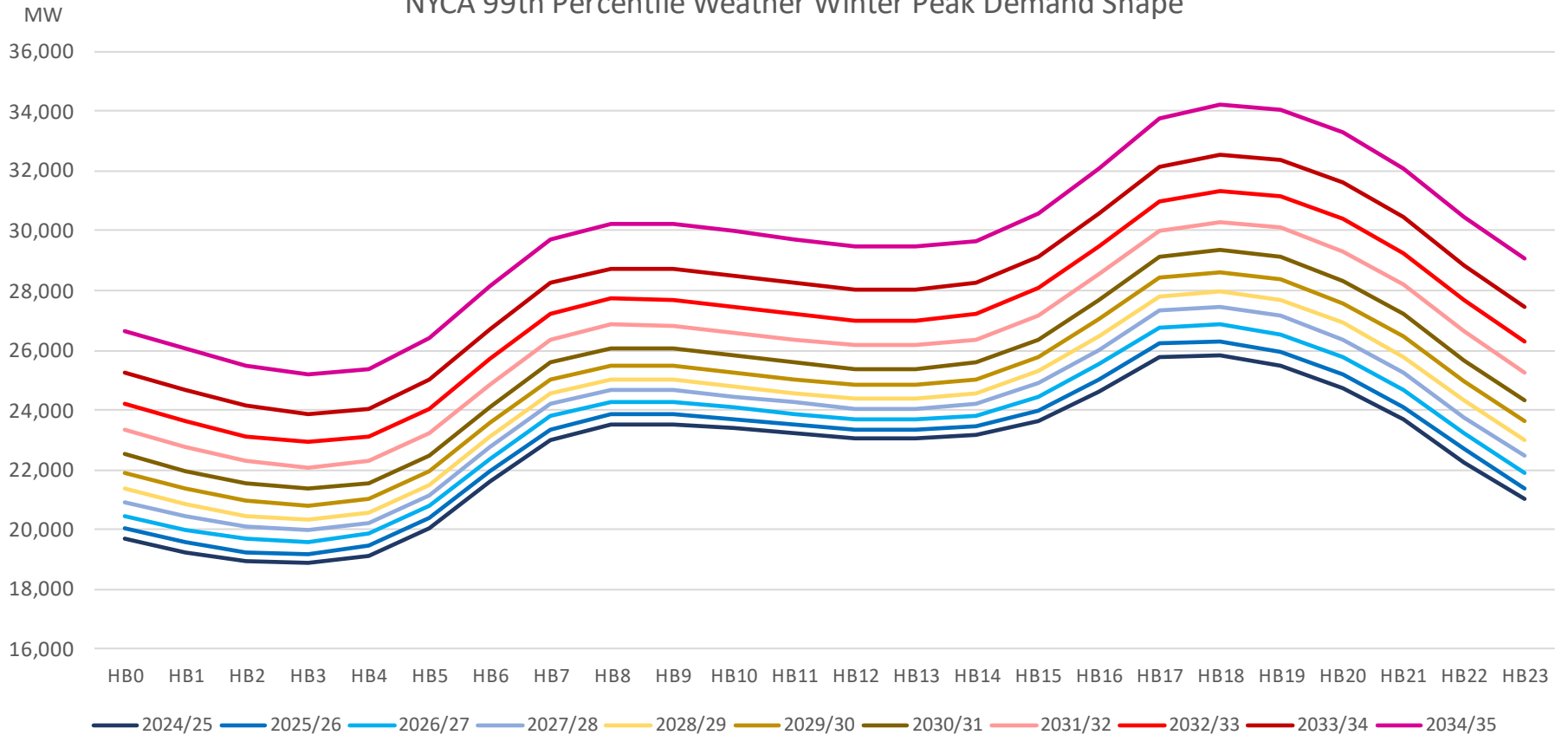
NYCA Baseline Expected Weather Winter Peak Demand Shape



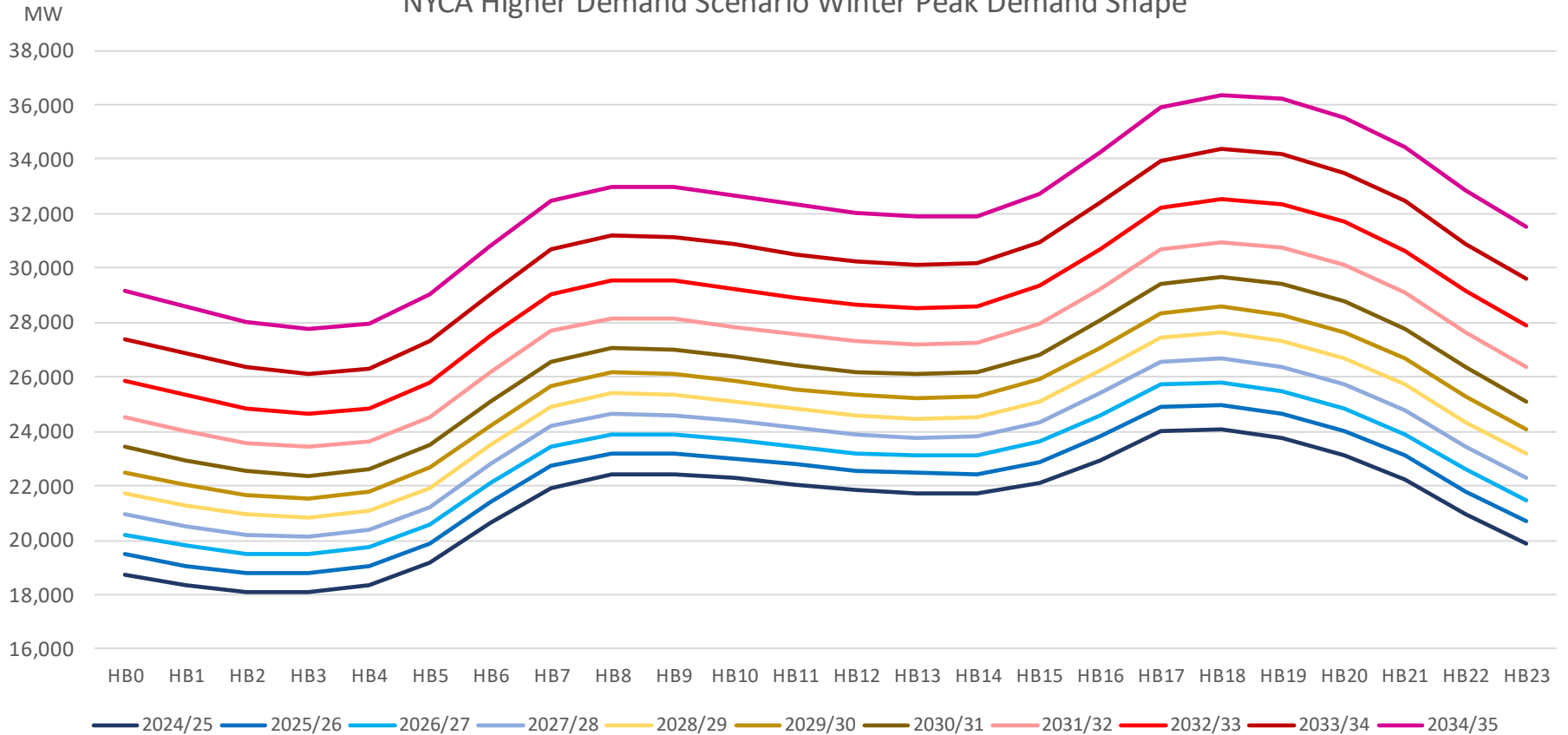
NYCA 90th Percentile Weather Winter Peak Demand Shape



NYCA 99th Percentile Weather Winter Peak Demand Shape



NYCA Higher Demand Scenario Winter Peak Demand Shape



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