



2024 Preliminary PJM Load Forecast

Load Analysis Subcommittee
November 27, 2023

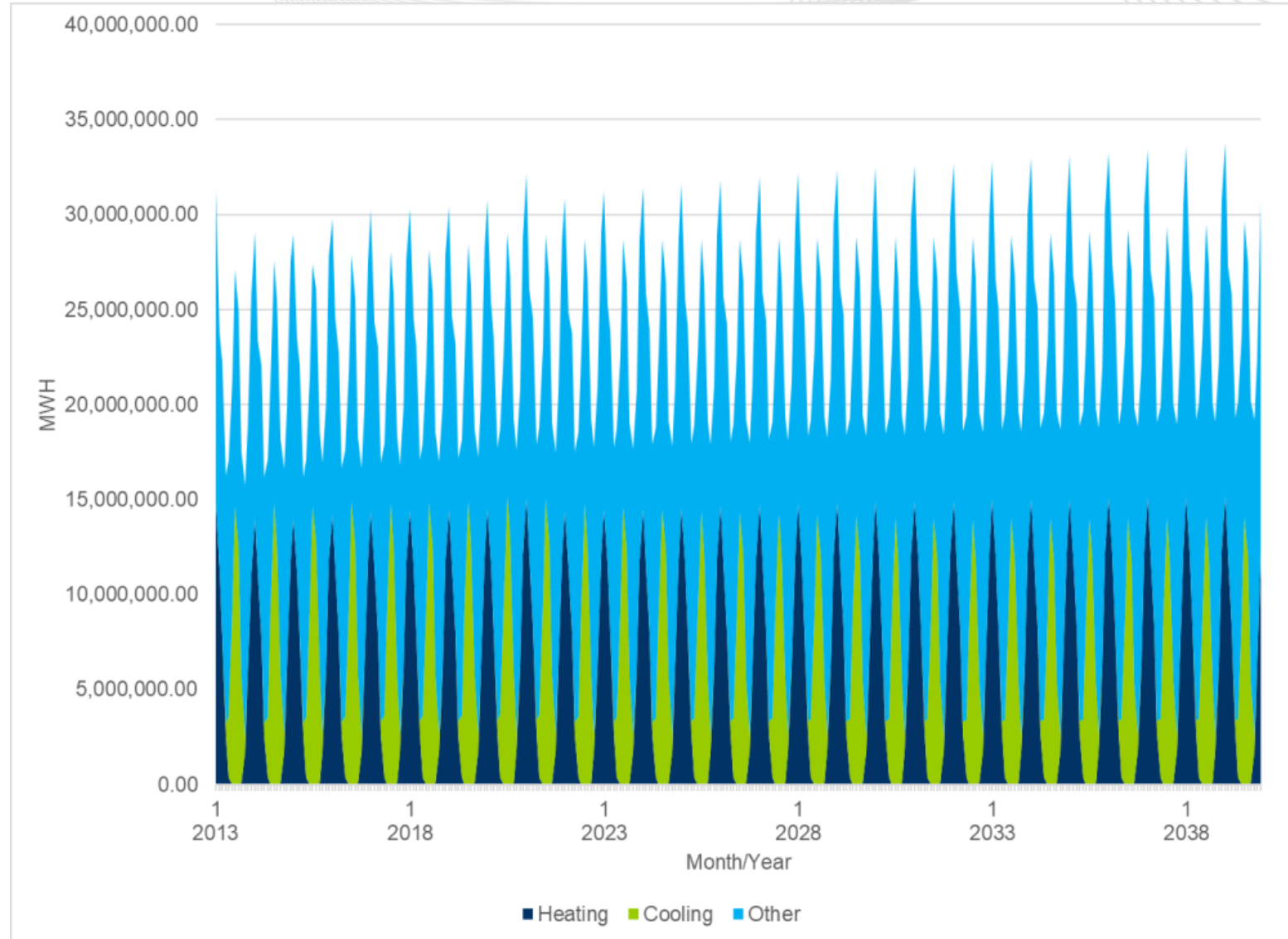
Molly Mooney
Resource Adequacy Planning

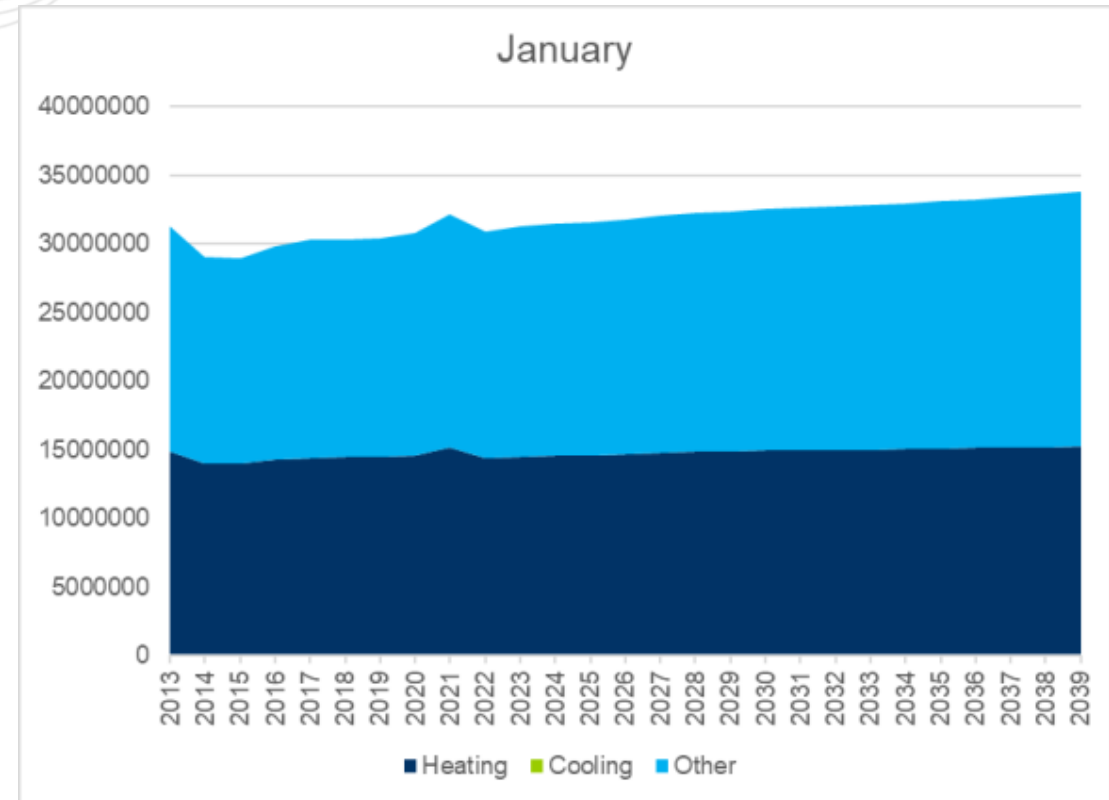
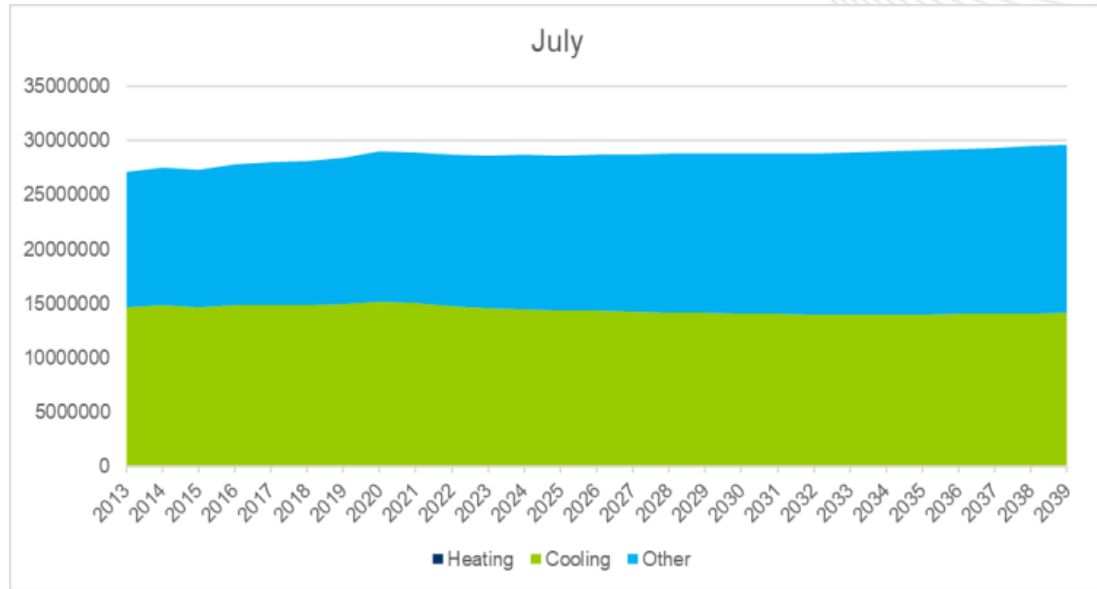
- Acquired and incorporated electric vehicle forecast from vendor S&P Global.
 - Light/Medium/Heavy Duty
- Added HD3 to capture more extreme winter weather
 - HD3 is an additional cold weather variable that allows the model to better calibrate at colder temperatures.
 - Model testing in Winter Storm Elliott showed some under-fit in some zones.

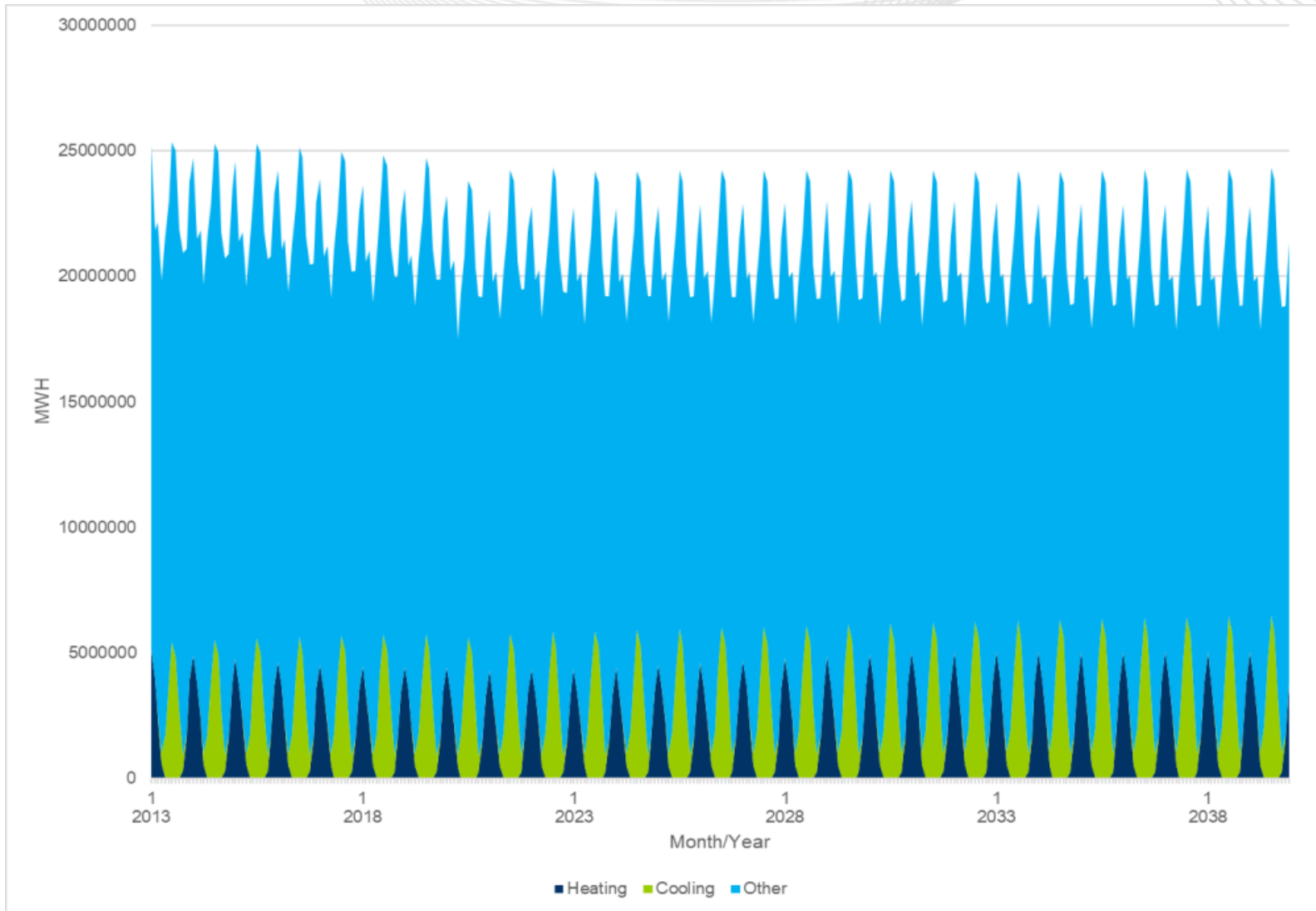
- Estimation Period: January 2014 through August 2023
- Weather Simulation: 1994 to 2022 (377 scenarios)
- Sector Models (2013-2022 Monthly from EIA 861 and EIA 861m)
 - End Use Data: Based on Itron's 2023 release
 - NJ Executive Order on Electrification
 - Economics: September 2023 vintage from Moody's Analytics
- IHS (S&P Global) Solar/Battery Forecast (zonal & peak allocation by PJM)
 - Production estimates by UL
- S&P Global - Plug-in Electric Vehicles (PEVs)
- Forecast Adjustments – Data Centers (AEP, APS, Dominion) Data Centers/Port Electrification (PS); Peak Shaving Adjustment (EKPC)

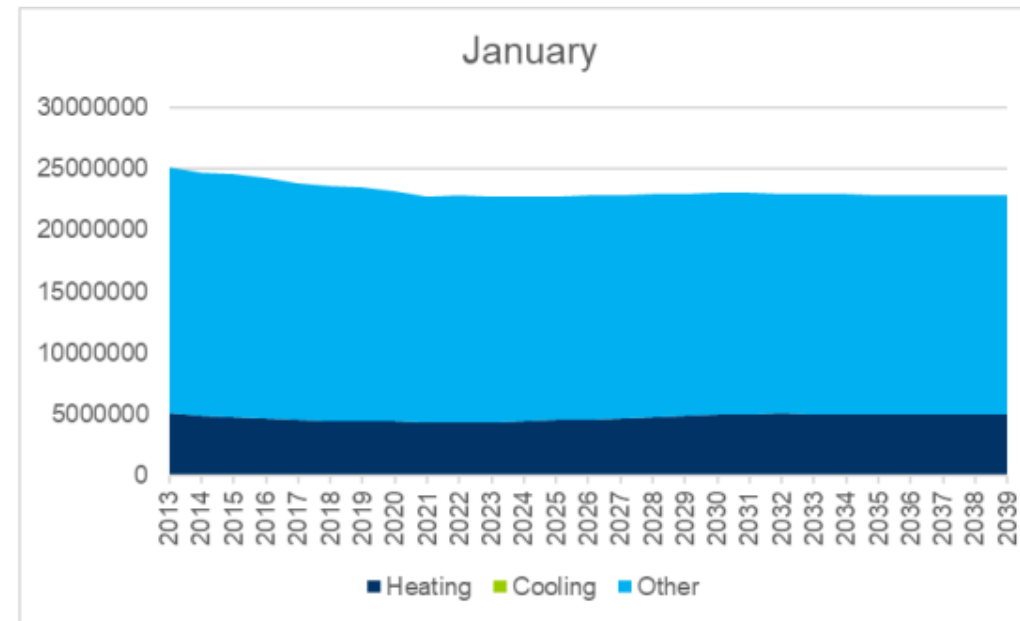
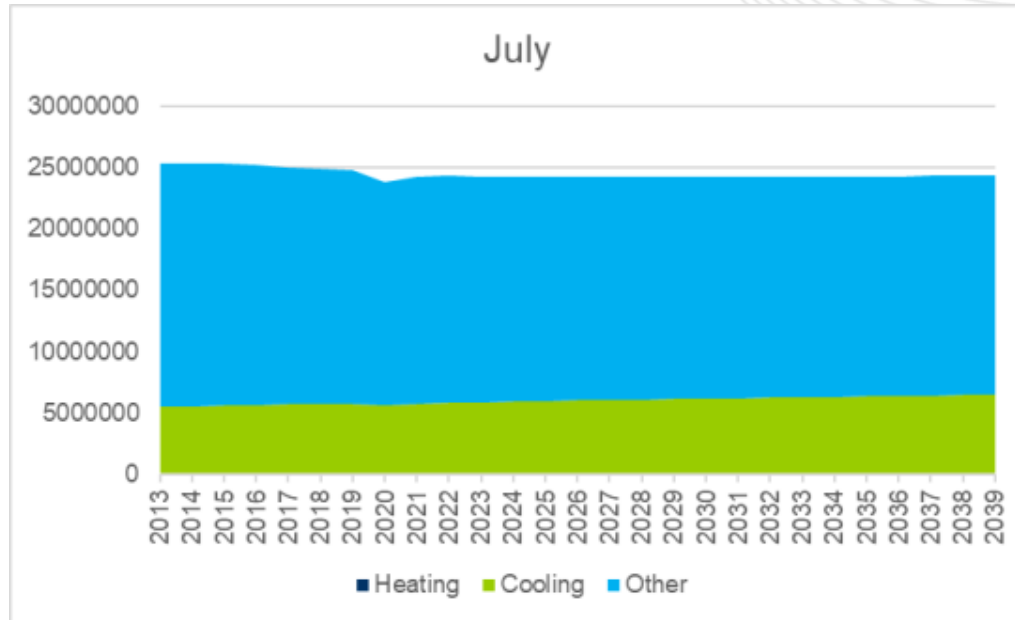
Heating/Cooling/Other

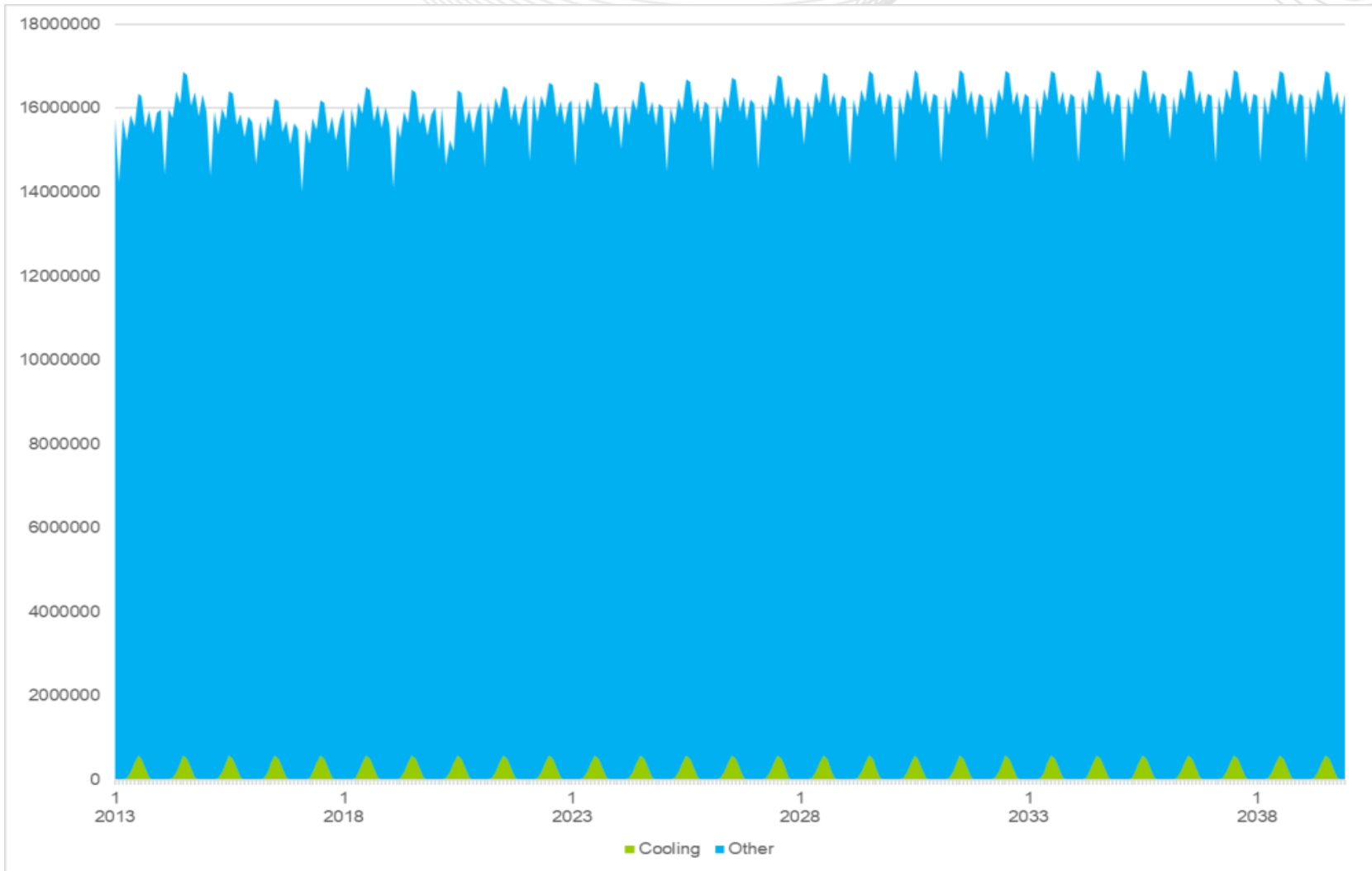
- Heat/Cool/Other are driven by Sector (Residential/Commercial/Industrial) models. Sector model results are influenced by two factors.
 - Economics
 - Residential – Households, Personal Income, Population per household
 - Commercial – Employment, Population, Output
 - Industrial - Output
 - End-use (saturation/efficiency/intensity)
 - Residential
 - Commercial
 - Industrial

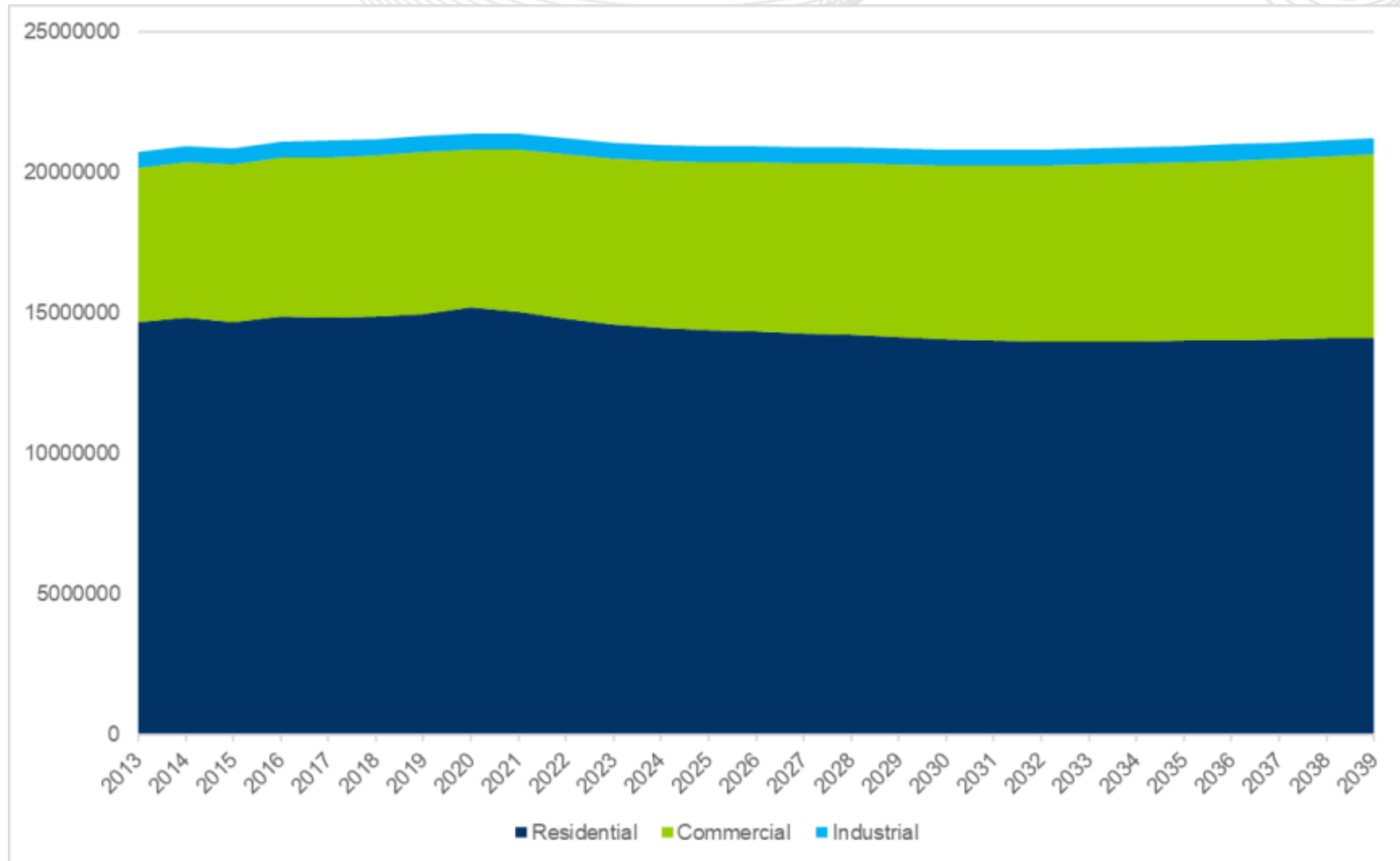


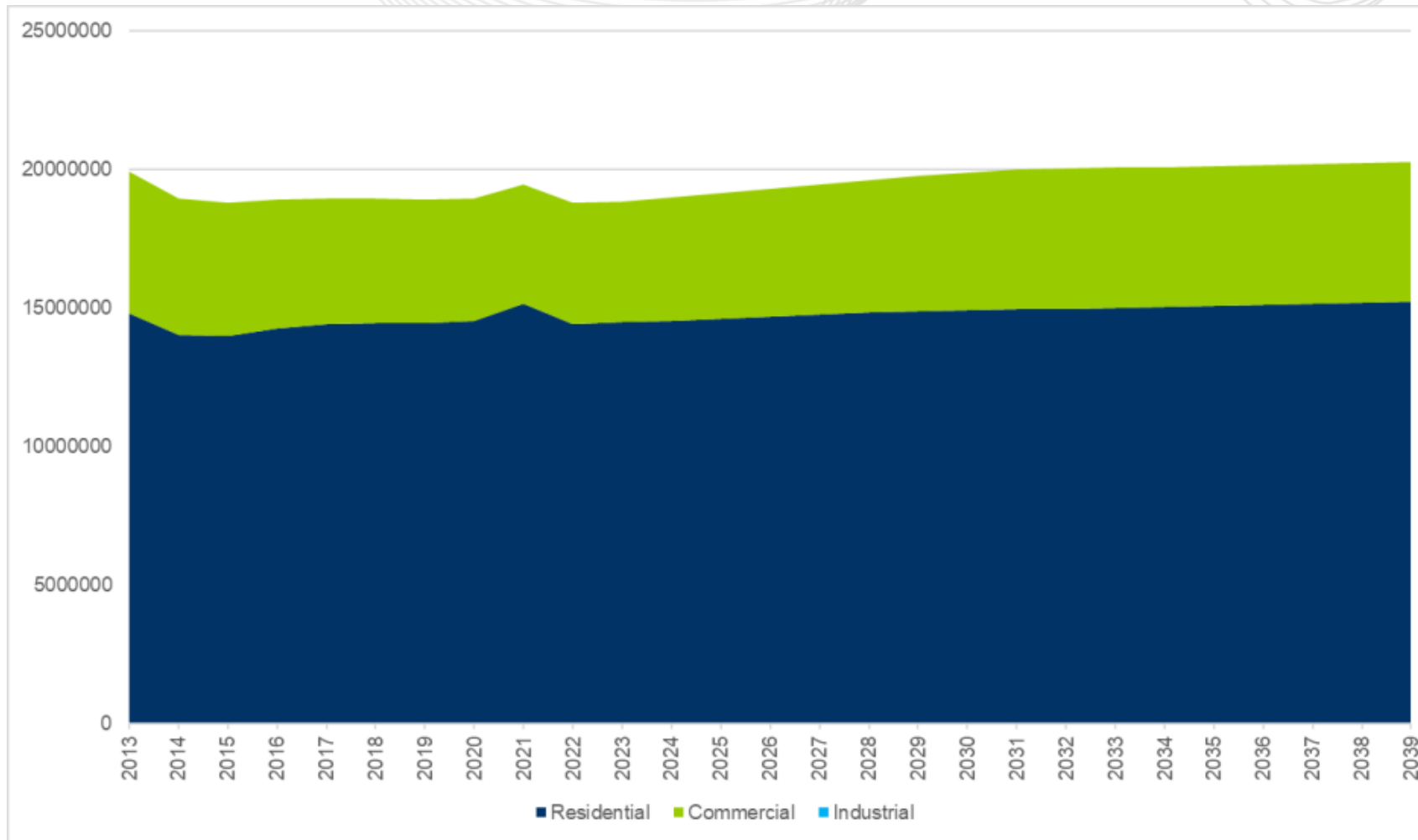


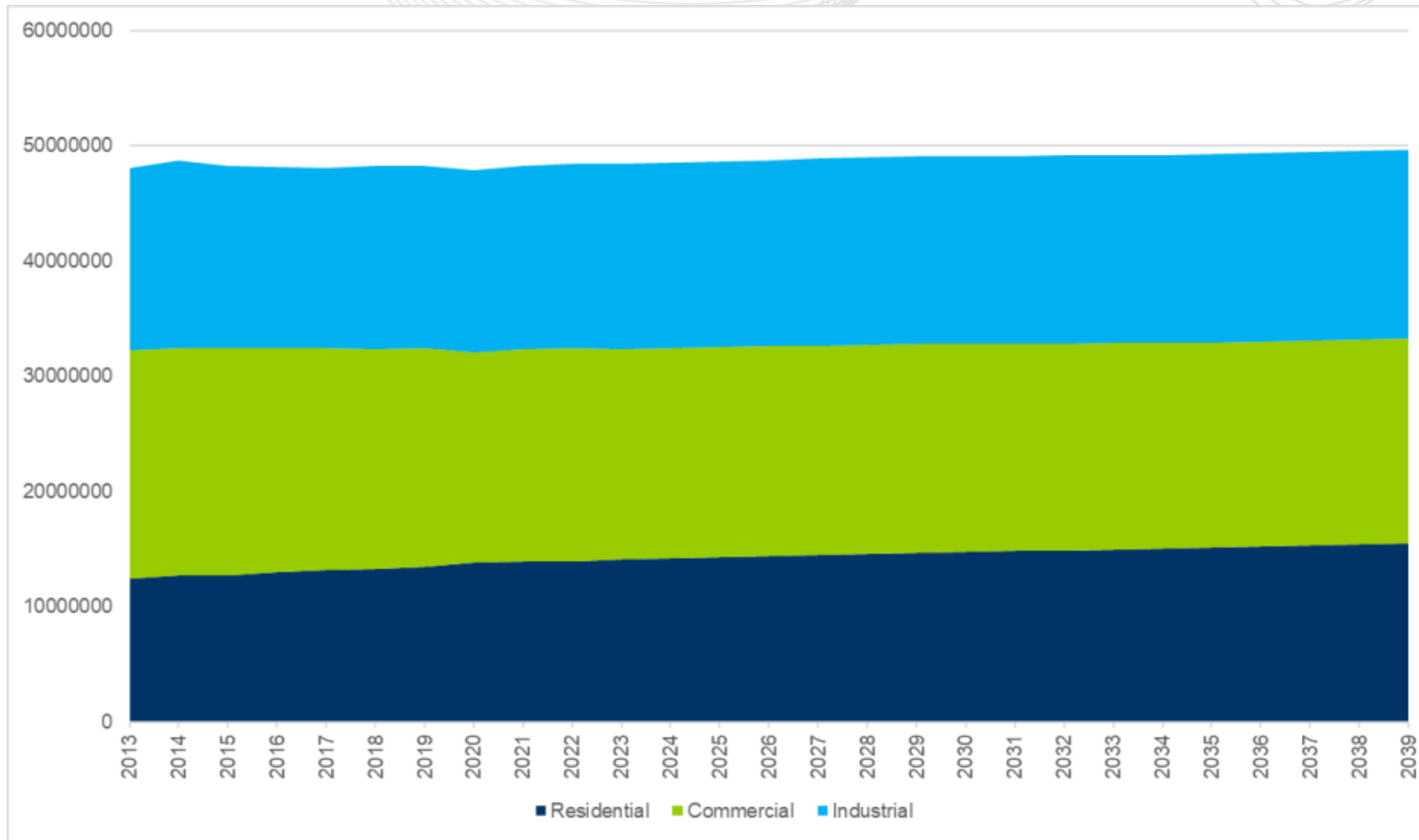






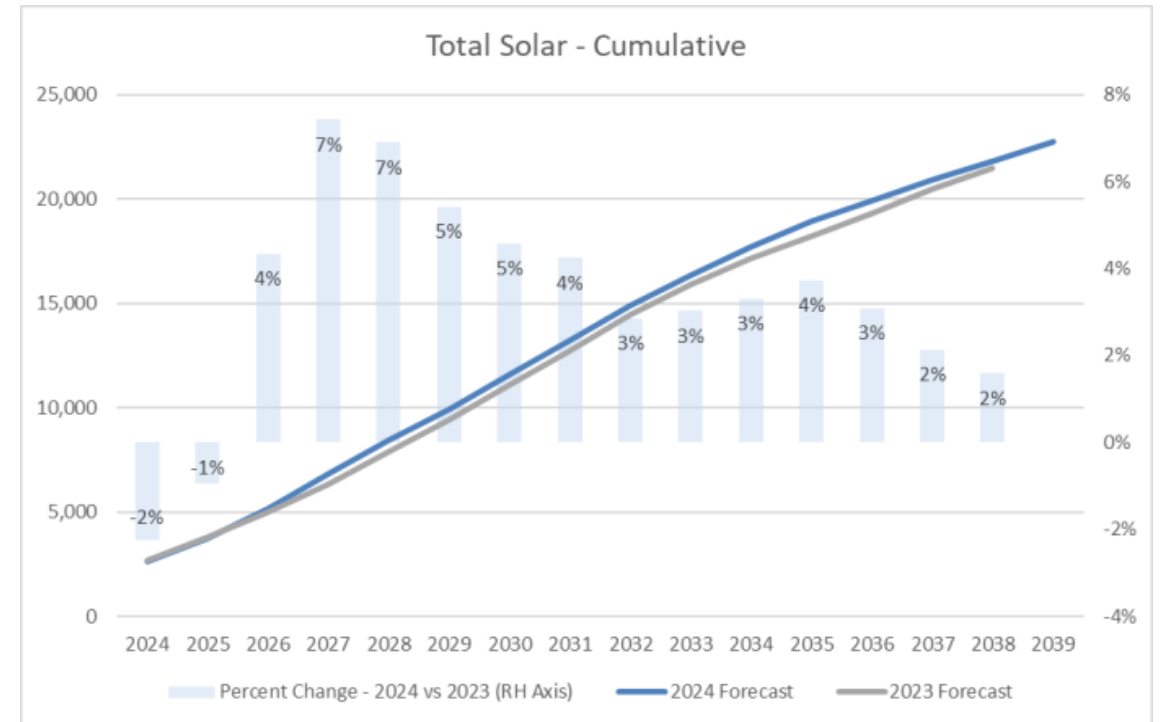
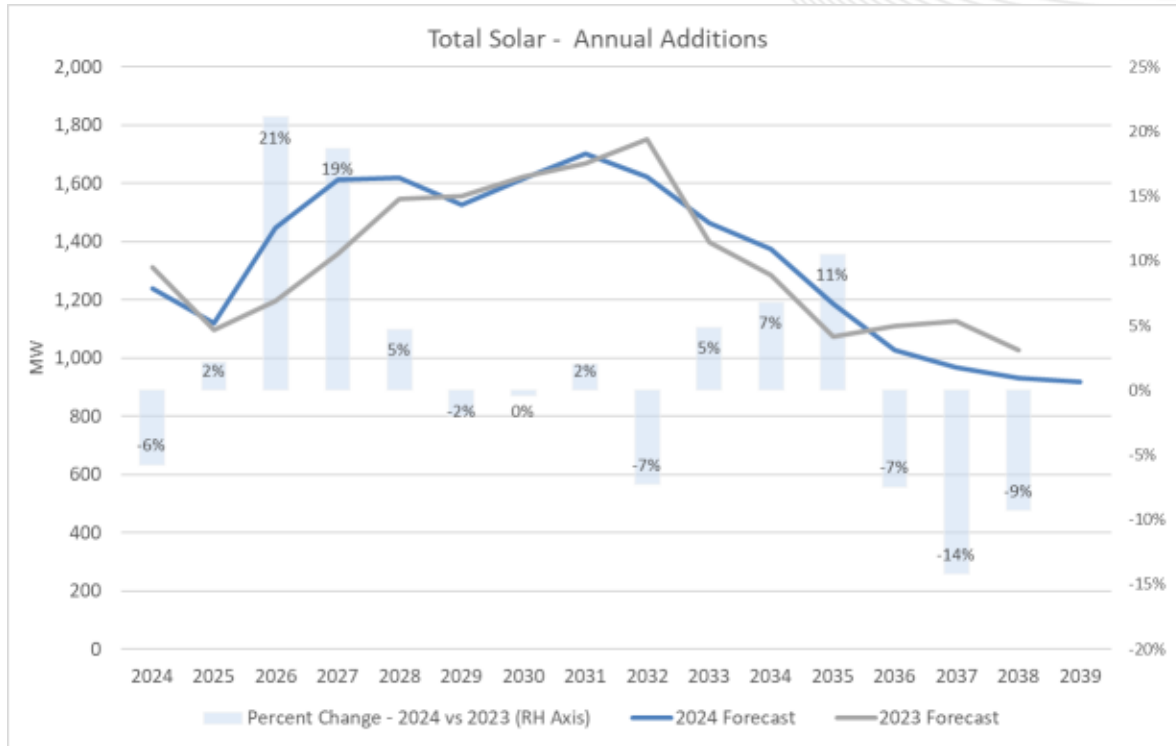






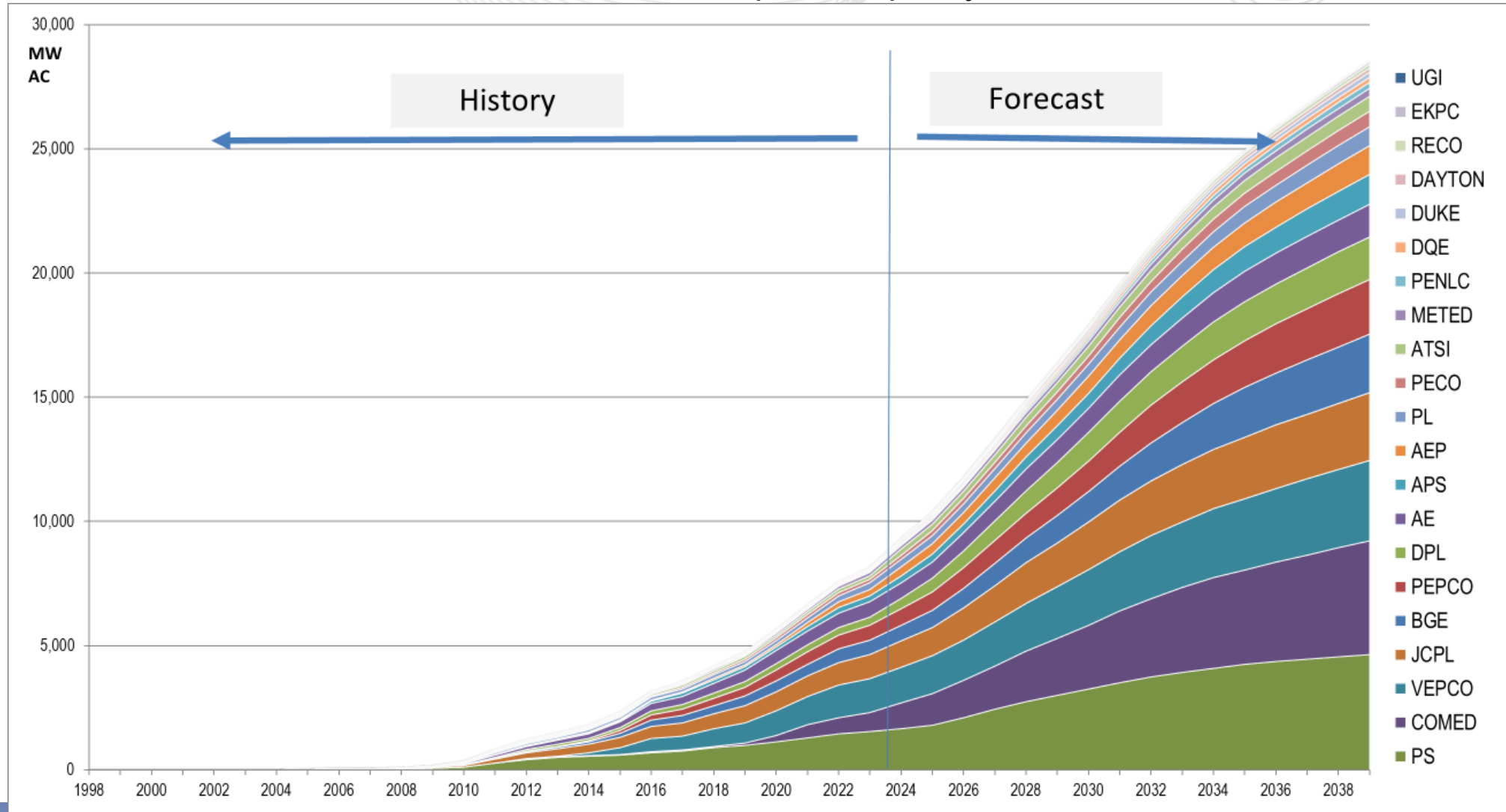


Distributed Solar and Battery Generation



Distributed Solar Generation 2024 Forecast by Zone

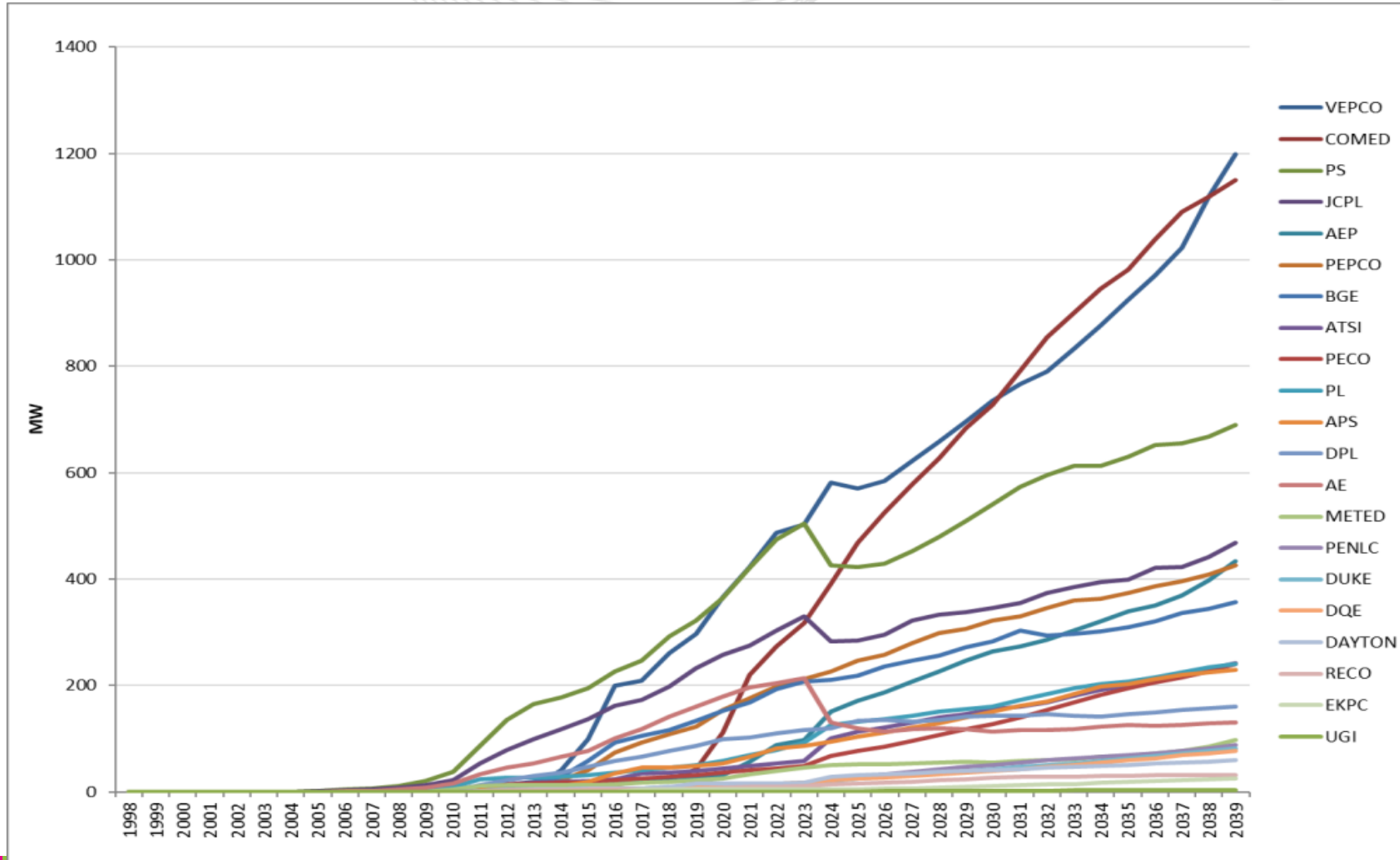
Cumulative Nameplate Capacity



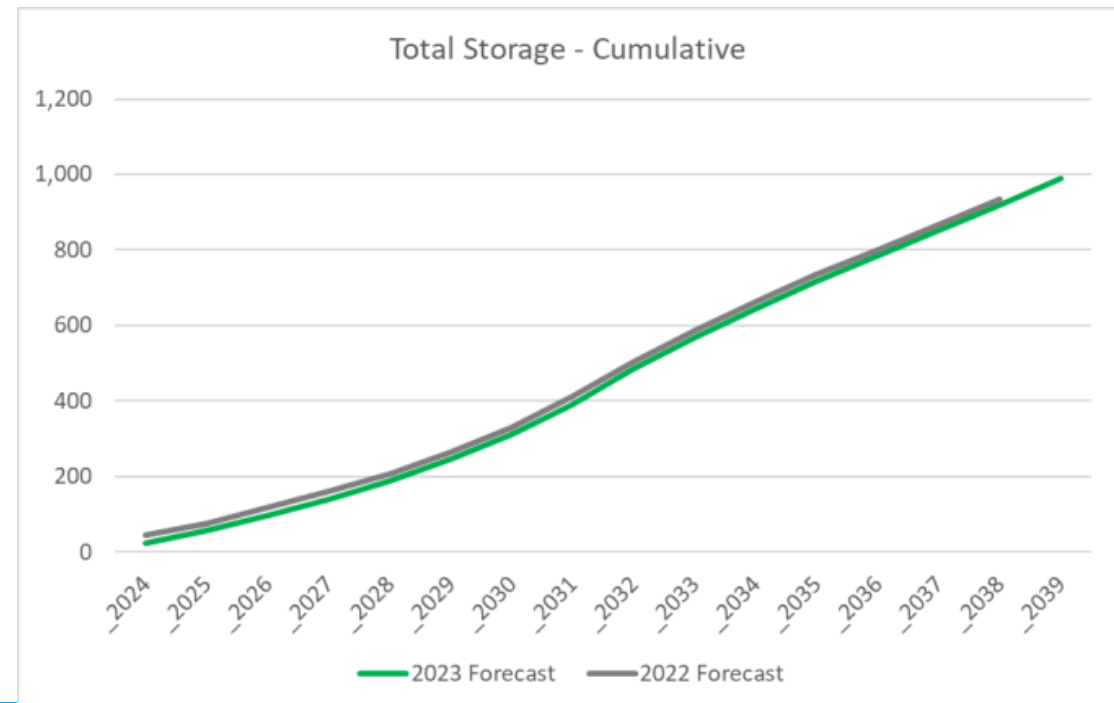


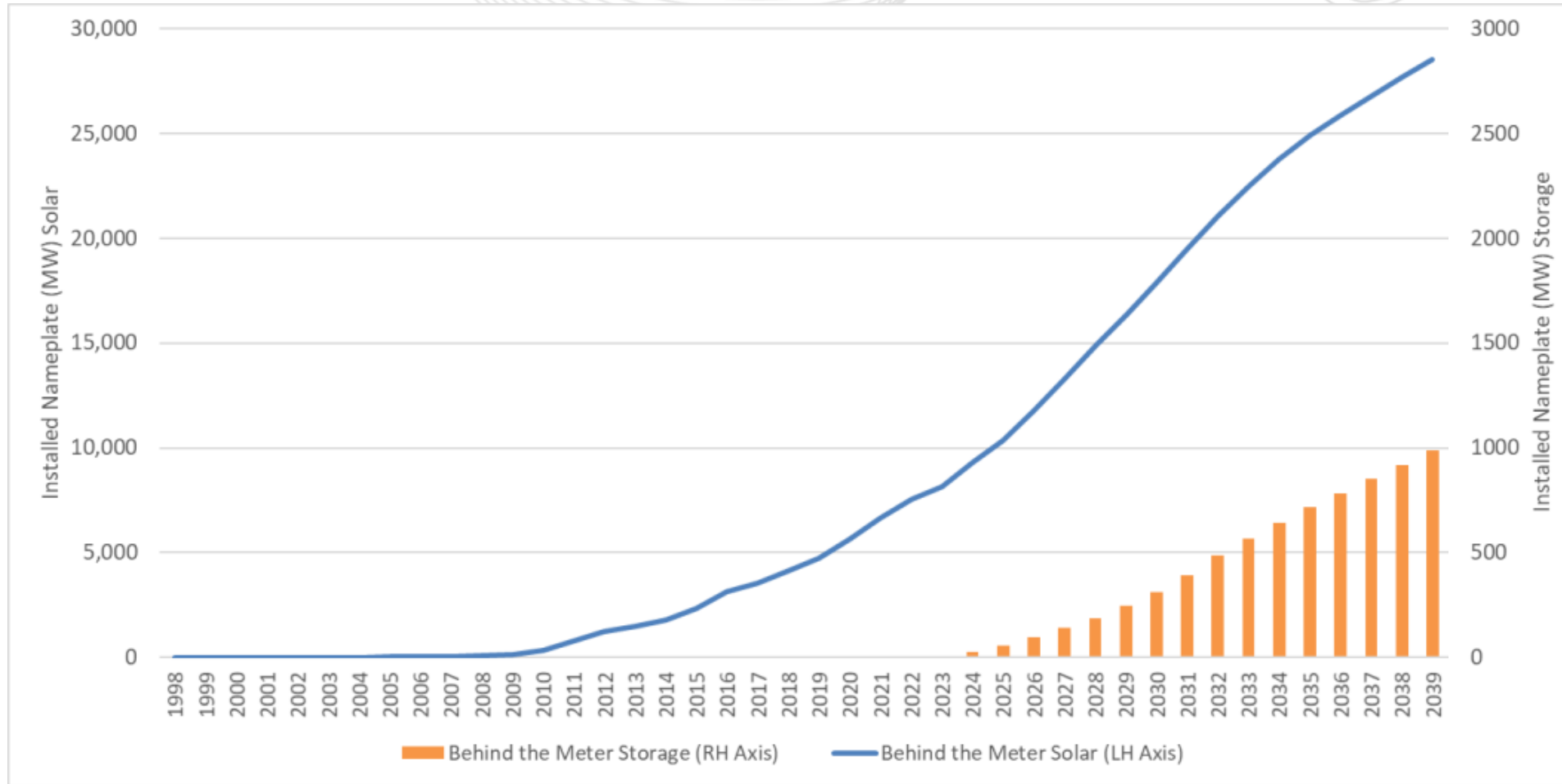
Distributed Solar Peak 2023 Forecast by Zone

Average Solar Value from Summer Peak Distribution



- Starting in the 2022 Load Report, PJM uses a battery forecast for use in conjunction with the distributed solar forecast.
- The full amount of battery forecast will be used when incorporating into the summer peak forecast – the assumption being the battery will be fully charged so it is available at peak.

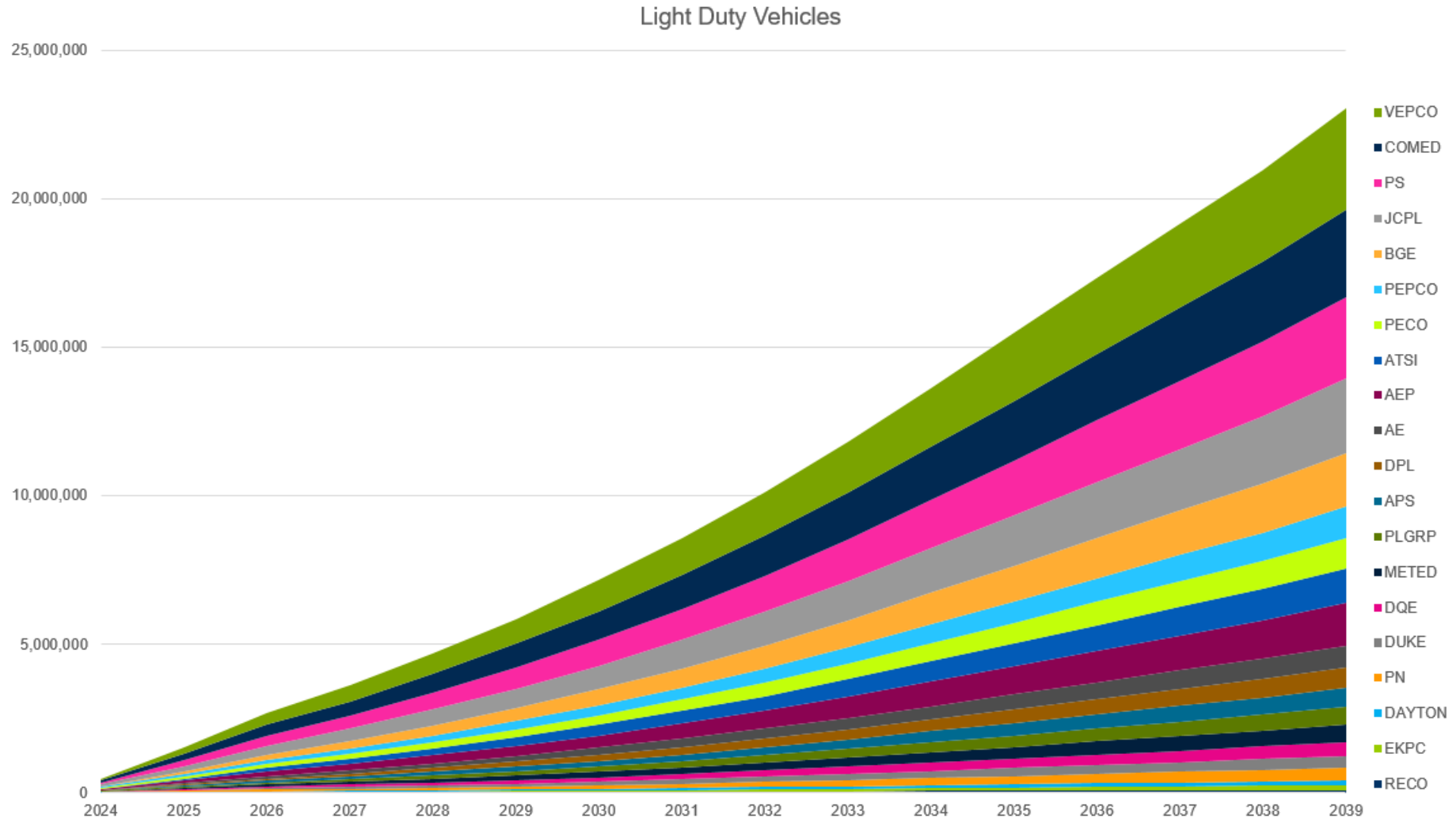




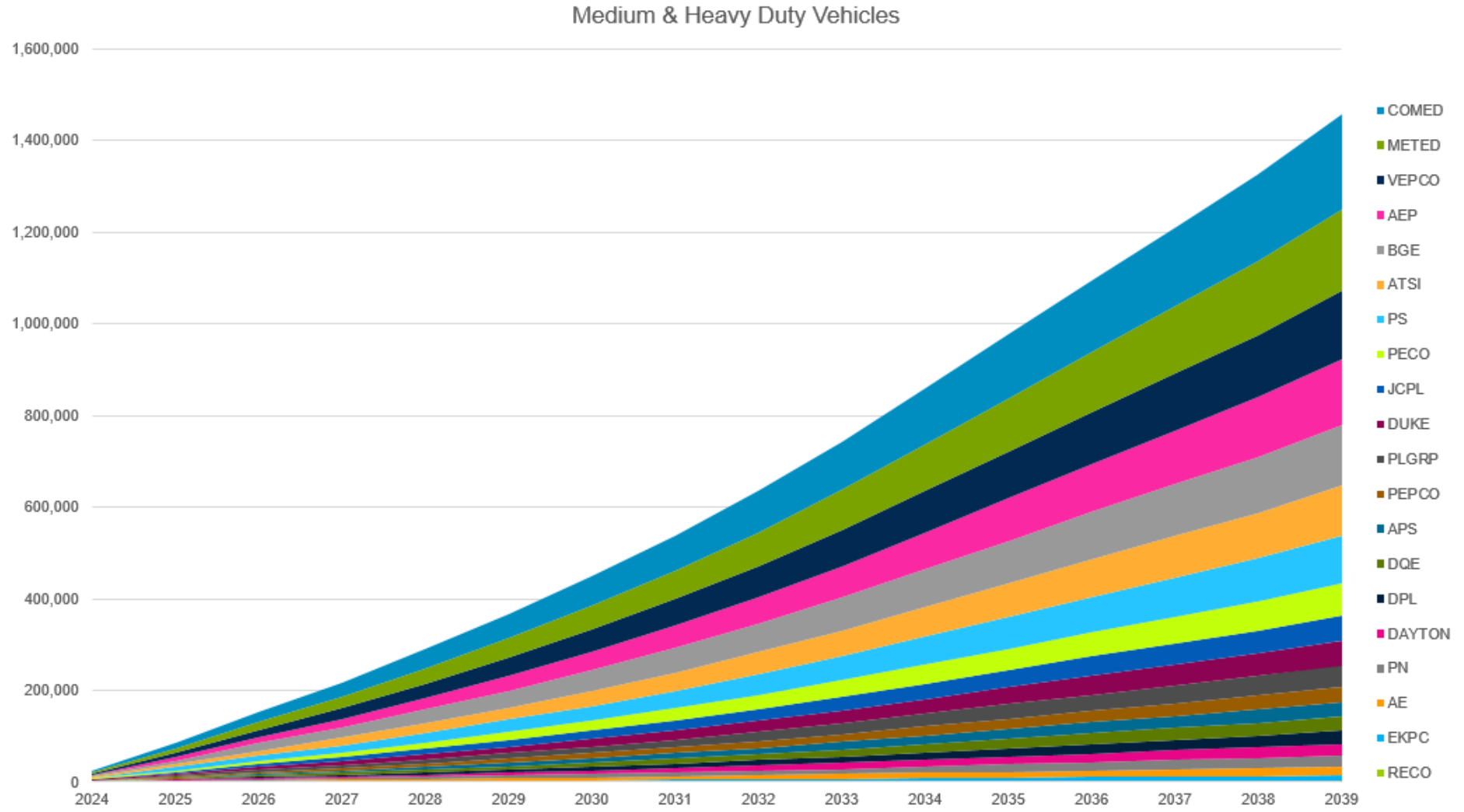


Plug-in Electric Vehicles

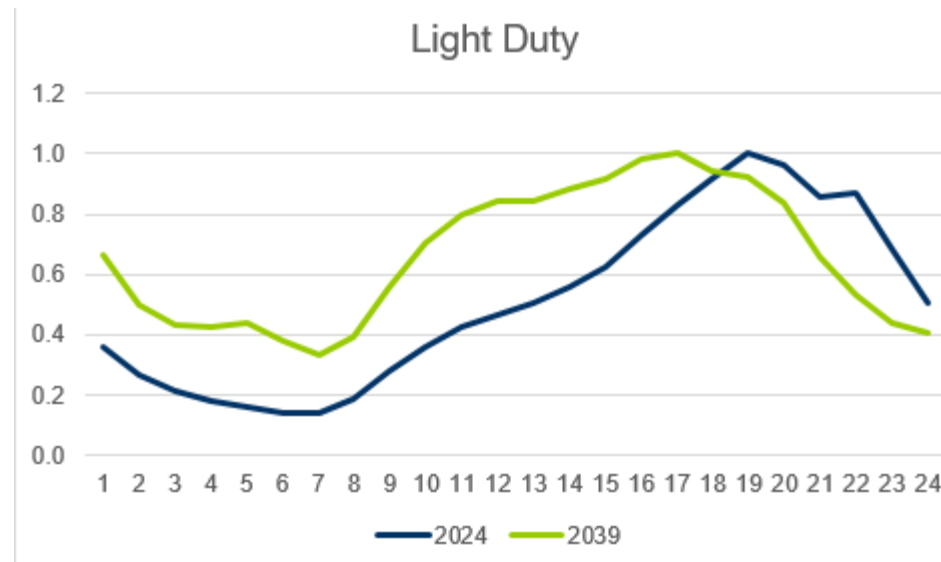
- PJM has contracted with S&P Global to produce an Electric Vehicle forecast for Light Duty and Medium & Heavy Duty
- S&P Global provided PJM with:
 - Zonal forecasts of vehicle counts by class
 - Zonal hourly charging by vehicle class for forecast horizon



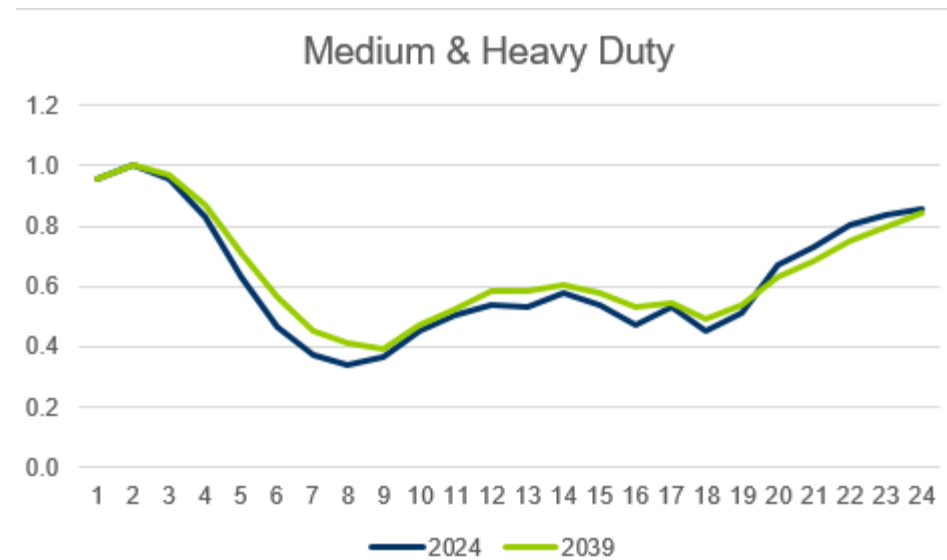
Medium & Heavy Duty Electric Vehicle Counts



- Total RTO Light Duty vehicle per-unitized charging shapes from summer weekdays



- Total RTO Medium & Heavy Duty per-unitized vehicle charging shapes from summer weekdays





Public Policy

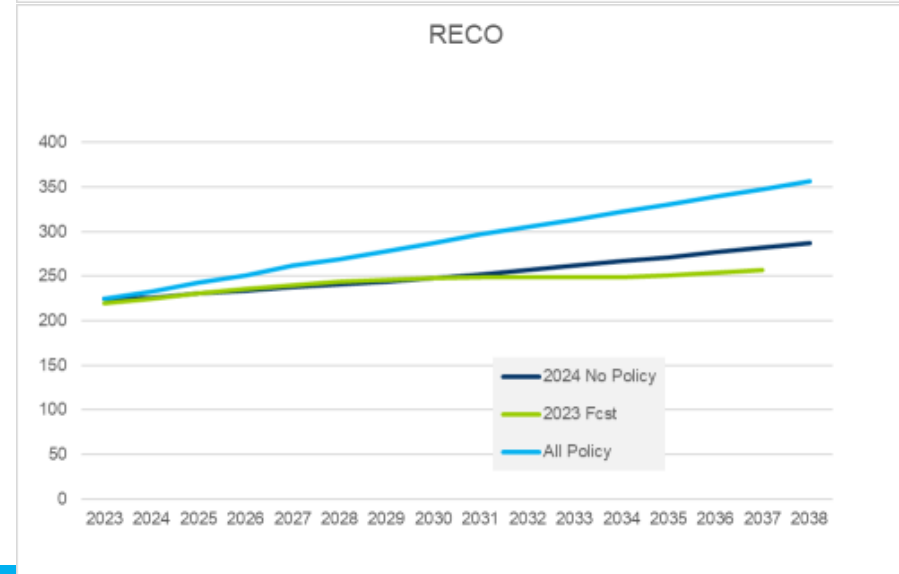
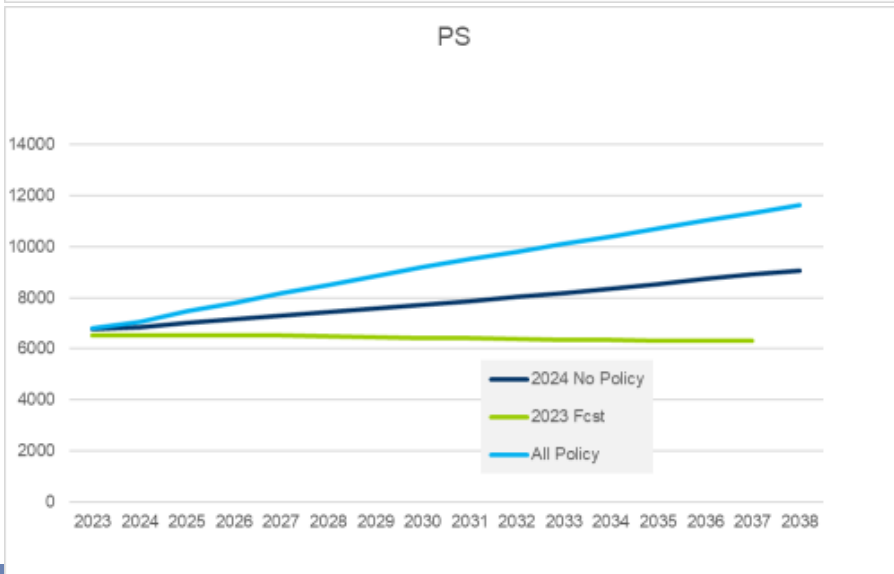
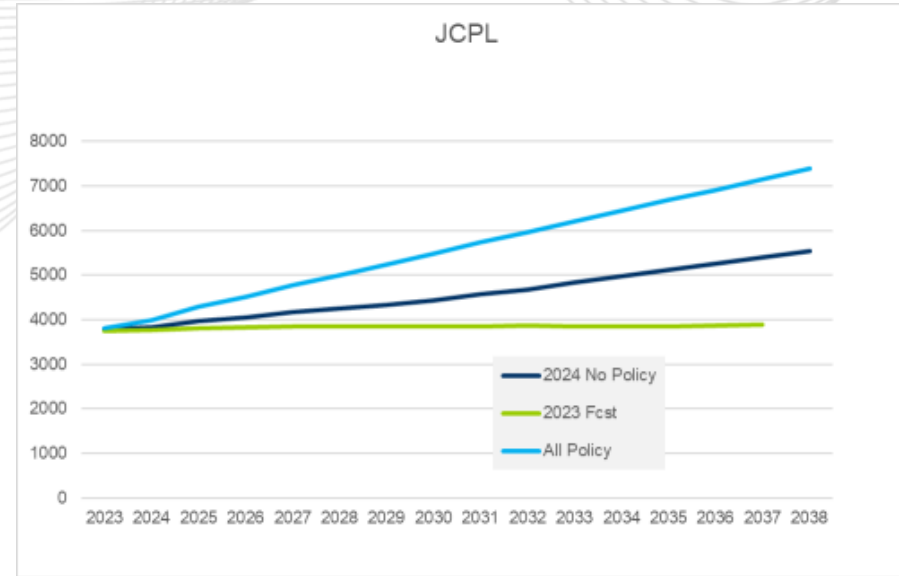
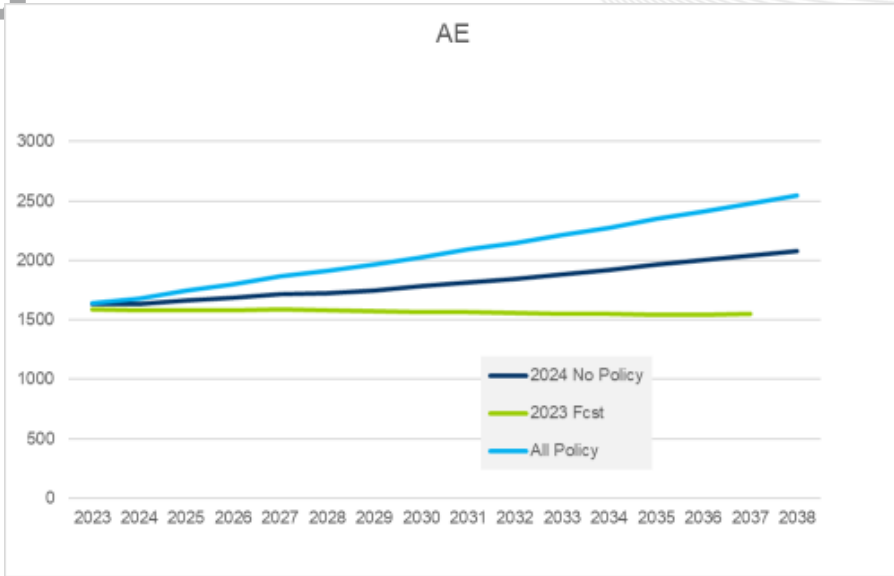
- PJM has conducted discussions with states and cities to provide public policies related to electrification. A lot of the discussion has been held at the Long Term Regional Transmission Planning (LTRTP) workshops.
- PJM has considered the following policies/plans/goals and their impact on water heaters and heat pumps in the Residential and Commercial sectors.



Electrification Policies/Plans Summary

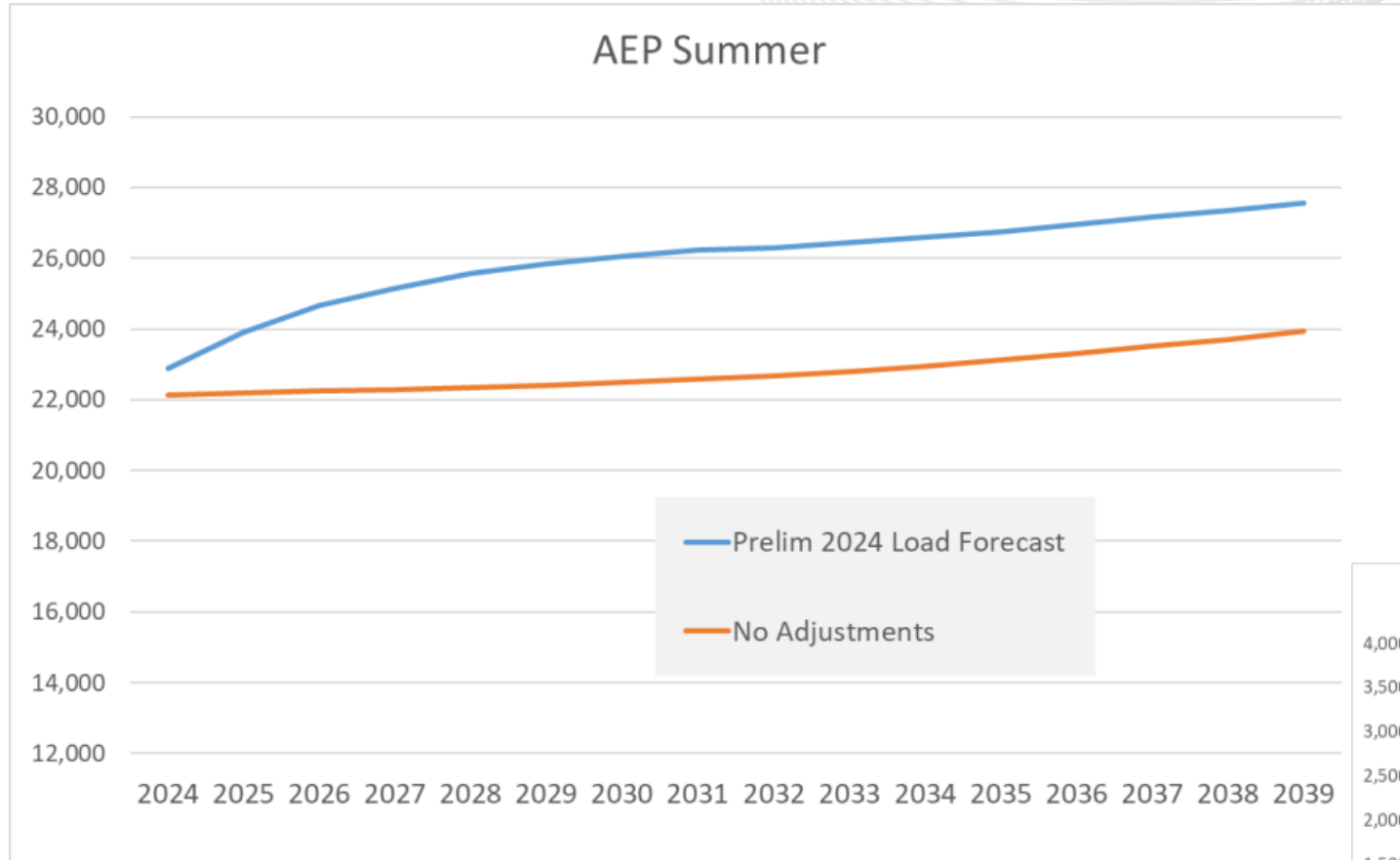
| Member Community | Electrification Objective | Policy Type | Zones Impacted | Sectors Impacted | Inputs Updated | 2024 Load Forecast or LTRTP? |
|--|--|-----------------|----------------------|--------------------------|---|------------------------------|
| State of New Jersey Executive Order No. 316 | 400,000 homes & 20,000 commercial buildings by 2030 | Executive Order | AE, JCPL, PS, & RECO | Residential & commercial | Electric heating & electric water heating | 2024 Load Forecast |
| State of Virginia | 40,000 households by 2030 | Plan/Goal | AEP & Dominion | Residential | Electric heating & electric water heating | LTRTP |
| City of Cincinnati, OH | 20,000 households by 2030 | Plan/Goal | Duke | Residential | Electric heating & electric water heating | LTRTP |
| City of Alexandria, VA | 49% of households by 2030, 65% by 2050 | Plan/Goal | PEPCO | Residential | Electric heating & electric water heating | LTRTP |
| Montgomery County, MD | All new buildings to be all electric | Plan/Goal | PEPCO | Residential & commercial | Electric heating & electric water heating | LTRTP |
| City of Chicago, IL | 30% of Residential buildings & 10% of commercial buildings by 2035 | Plan/Goal | COMED | Residential & commercial | Electric heating & electric water heating | LTRTP |

PJM has received other information on plans & goals, and will continue to evaluate future inclusion in LTRTP.

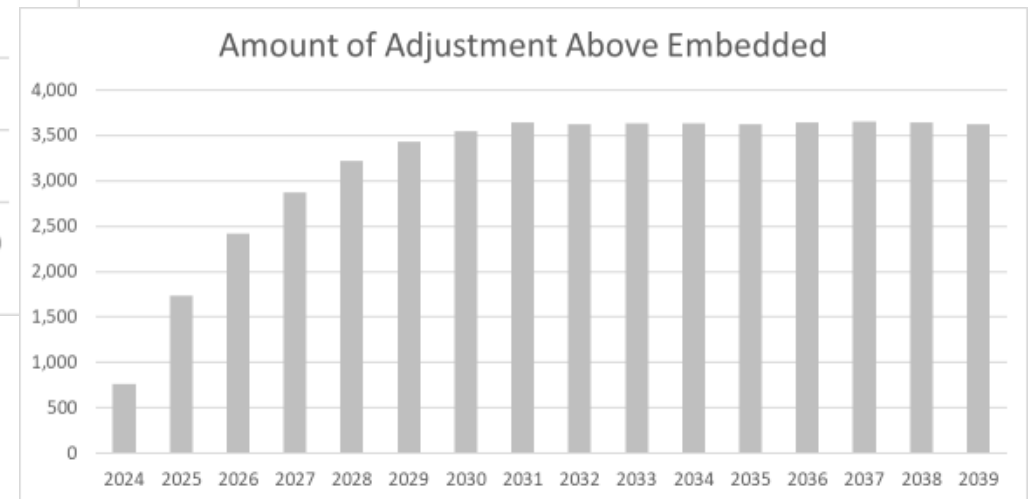


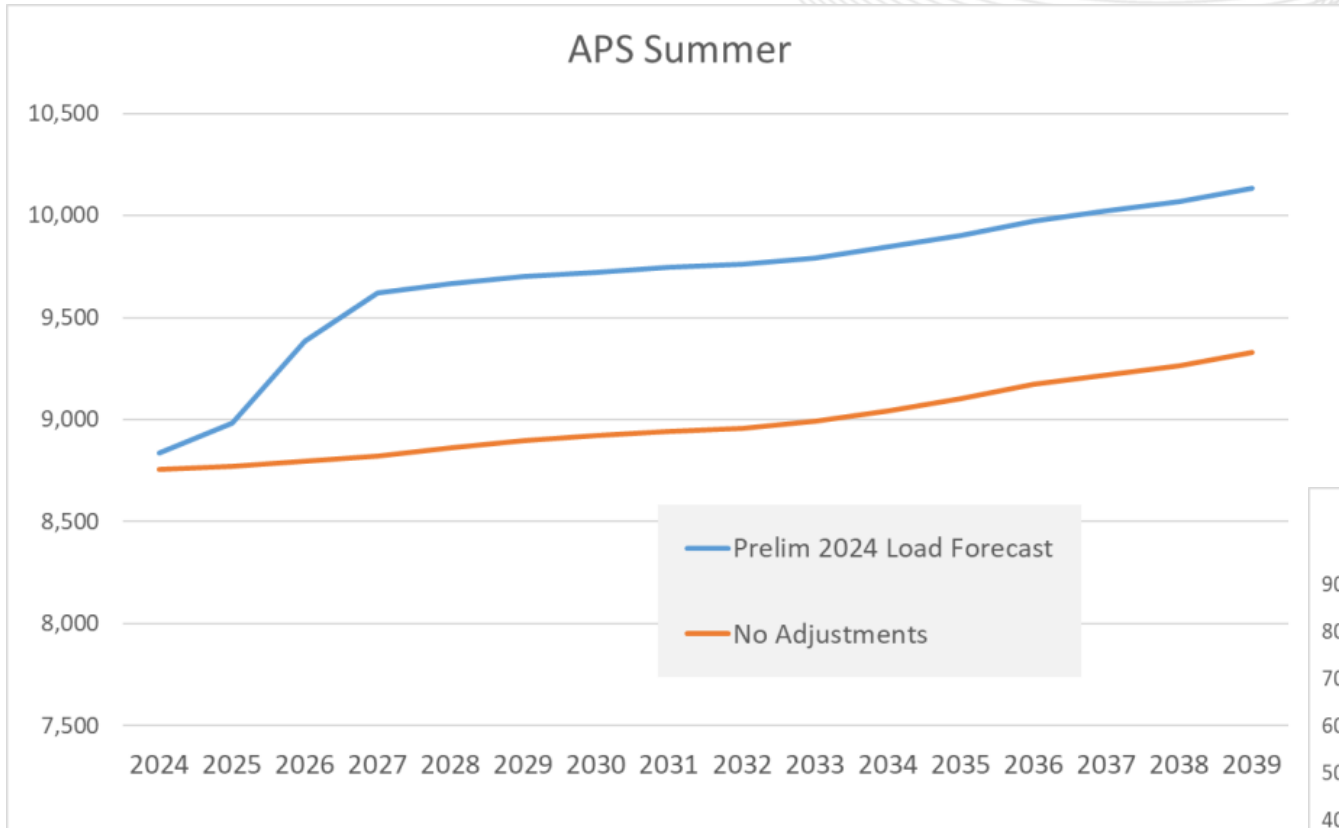
Forecast Adjustments

- EDCs are encouraged to provide PJM with information about large changes that may not be captured in the forecast process.
- We view requests through the lens of:
 - Is the request significant?
 - Is there risk of double counting?
 - Is the trend likely captured in the economic forecast?
 - Can the trend be removed from the history?

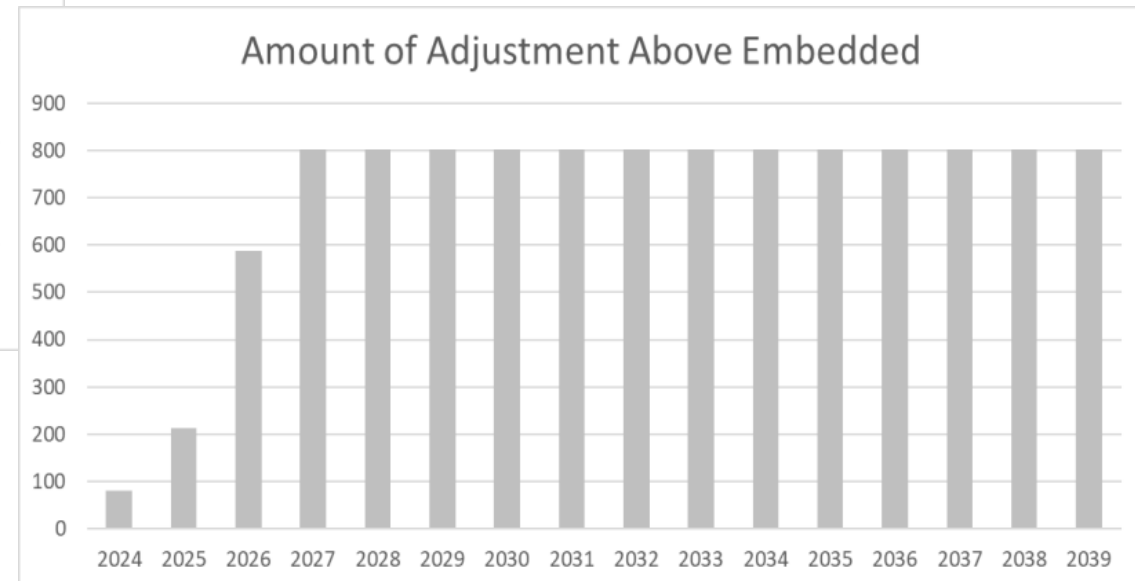


Adjustments: Data Centers and Intel plant

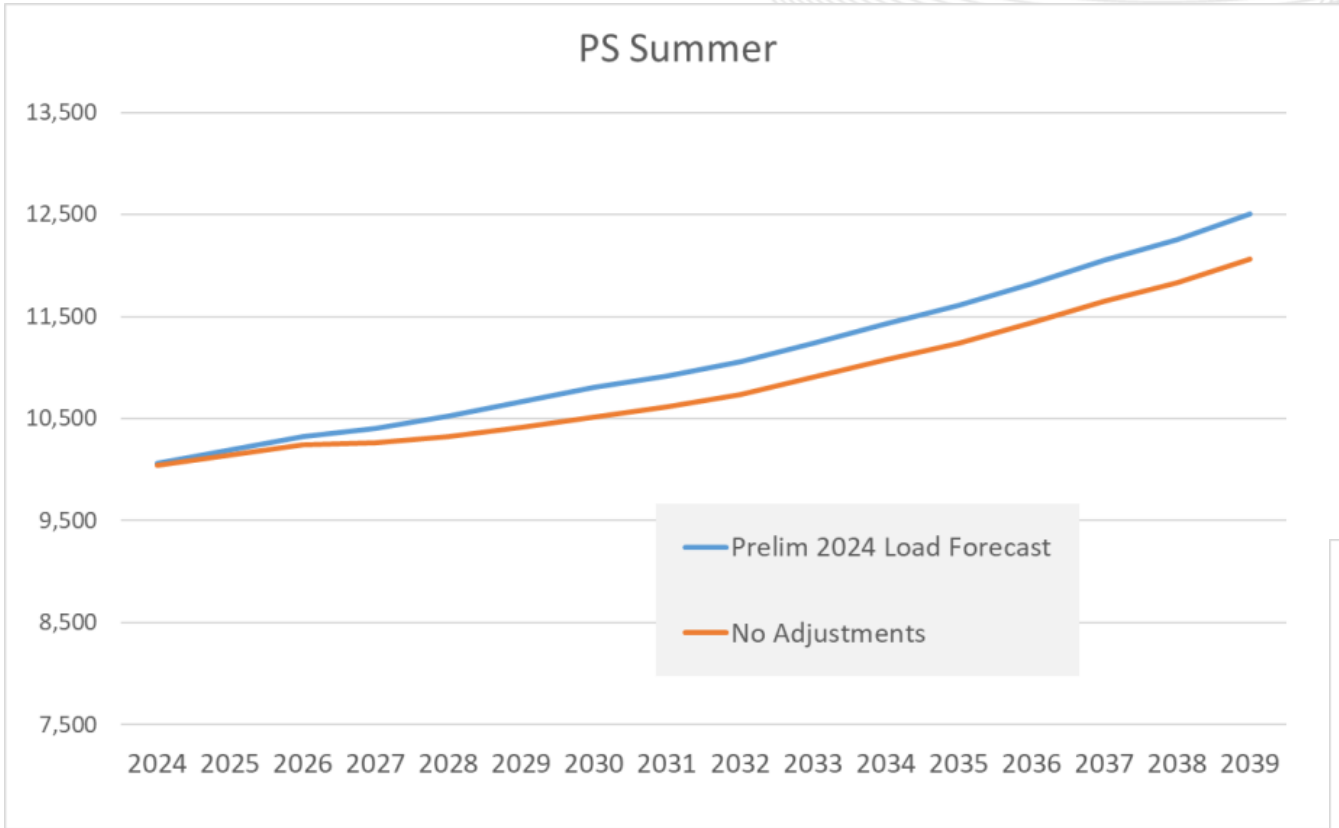




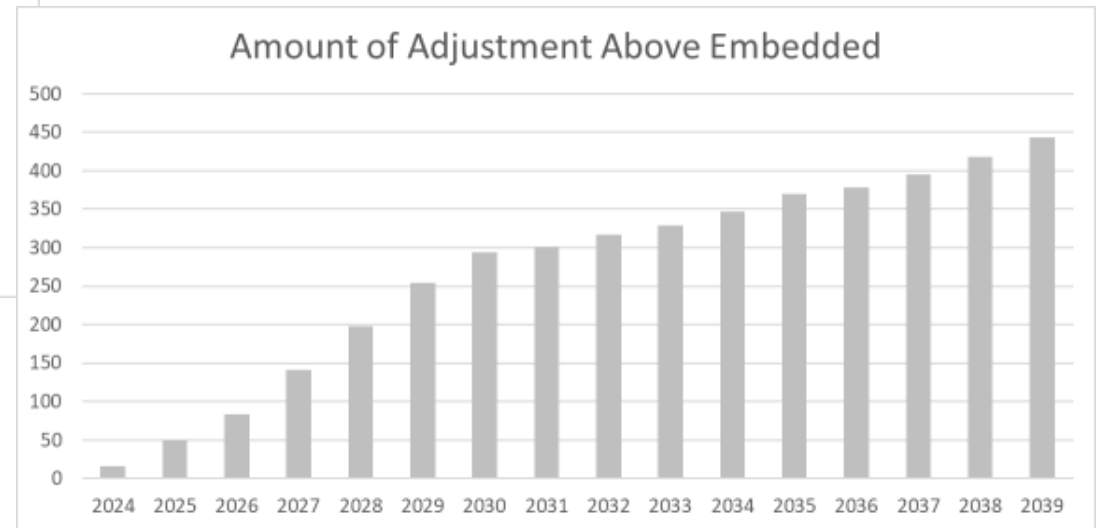
First Energy submitted adjustment requests that **were not included**
ATSI: Steel plant – in history
METED: Fabricated metal – captured in economics
APS: Bitcoin – Growth in history



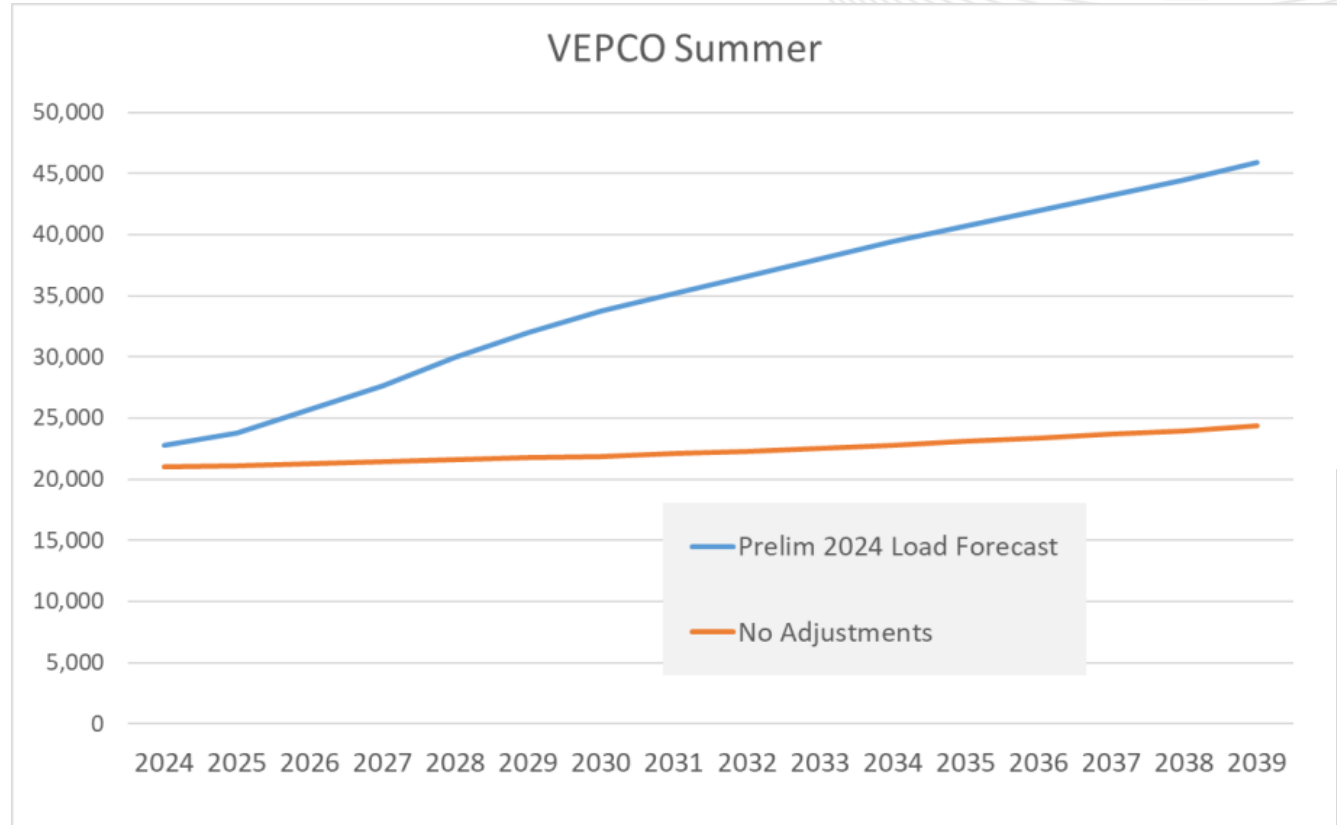
Adjustment: APS: Quantum Loophole – Data Center



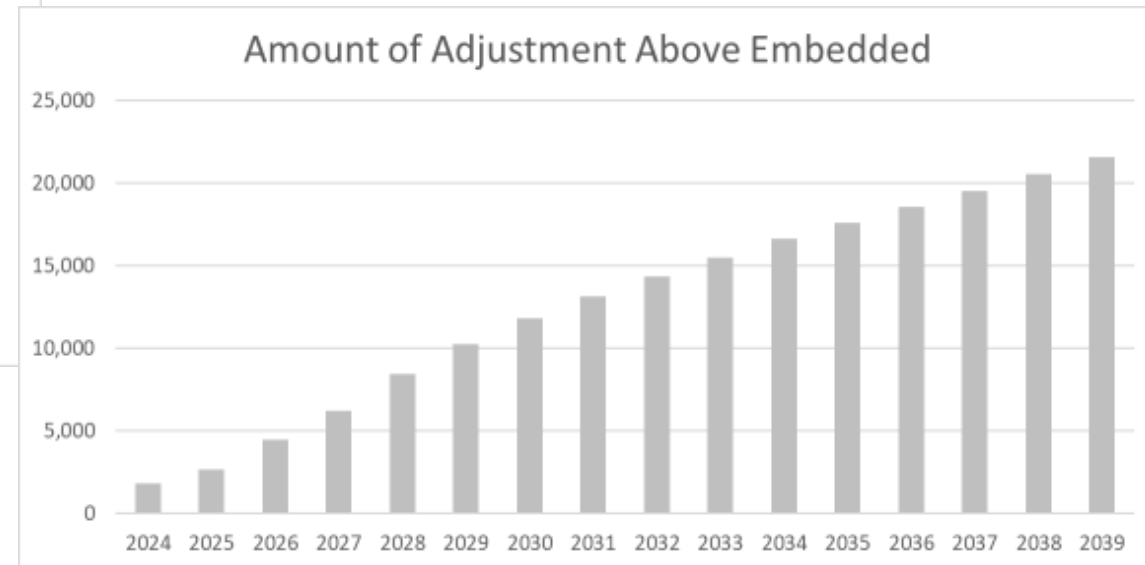
PS submitted adjustment requests that **were not included**
 EV: already included with consultant
 Other Large Load: captured in economics



Adjustments: Data Centers and Port Electrification



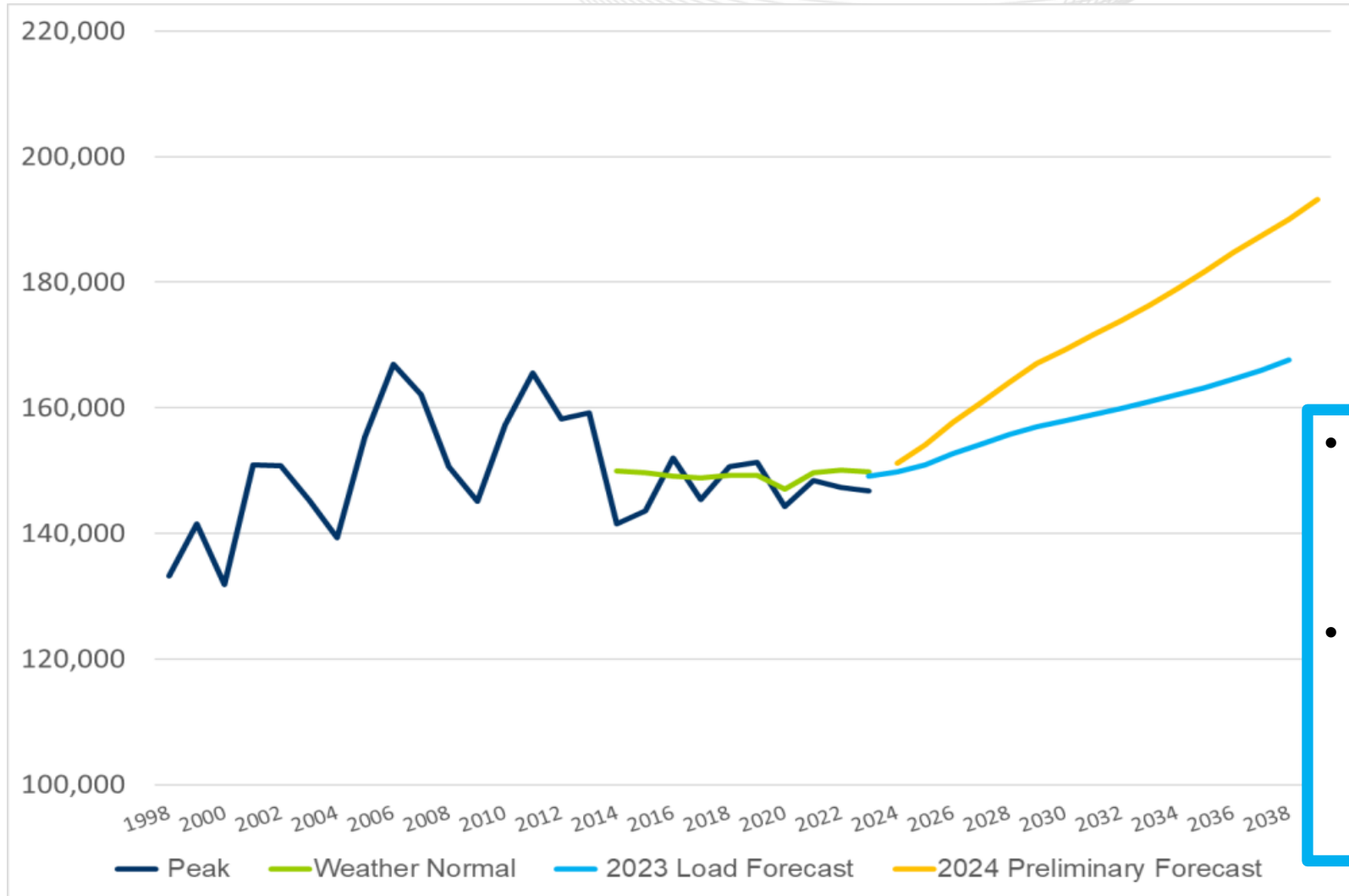
Adjustments: Data Centers





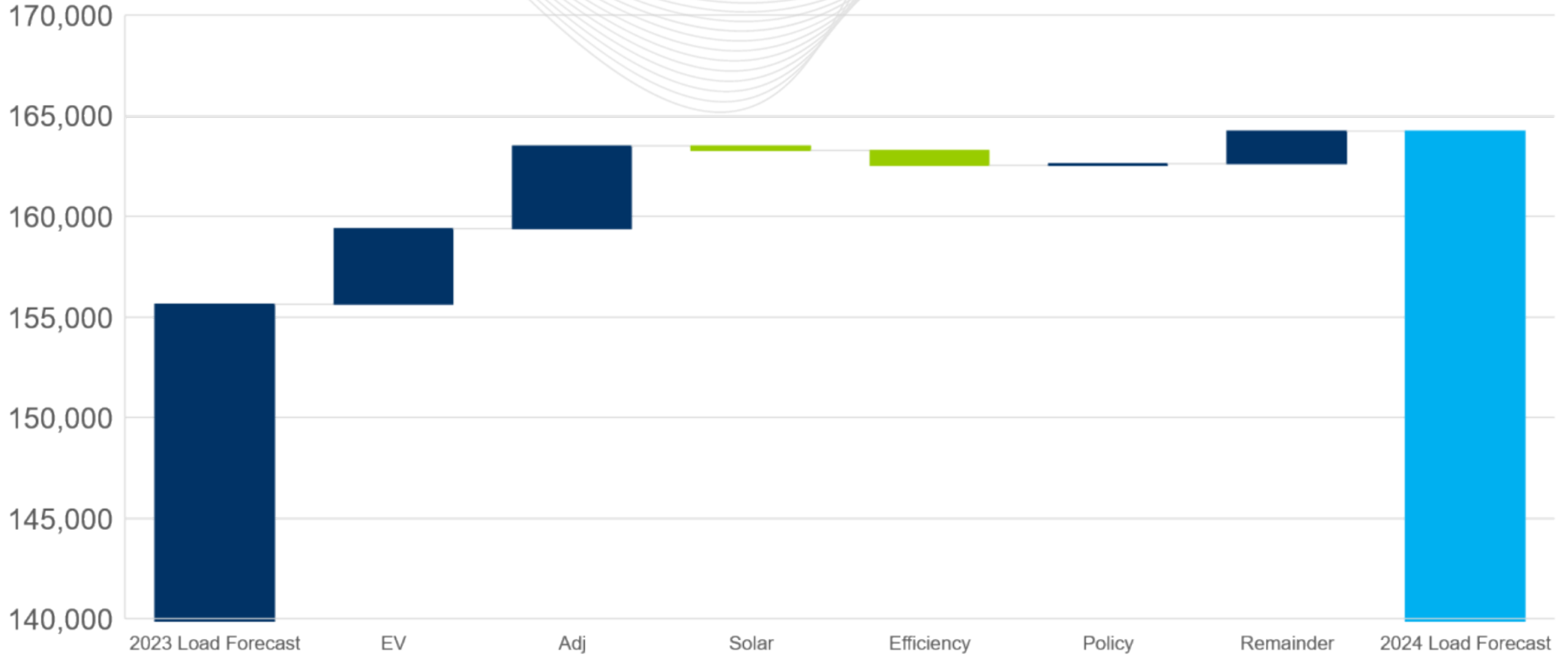
Preliminary Forecast

Summer Forecast Comparison 2023 vs 2024



- 15-year Annualized Growth Rate
 - 2023 Forecast: 0.8%
 - Prelim 2024: 1.6%
- Select year comparisons (Prelim 2024 vs 2023 Forecast)
 - 2027: +4.4% (~6,600 MW)
 - 2029: +6.6% (~10,000 MW)
 - 2038: +13.9% (~22,400 MW)

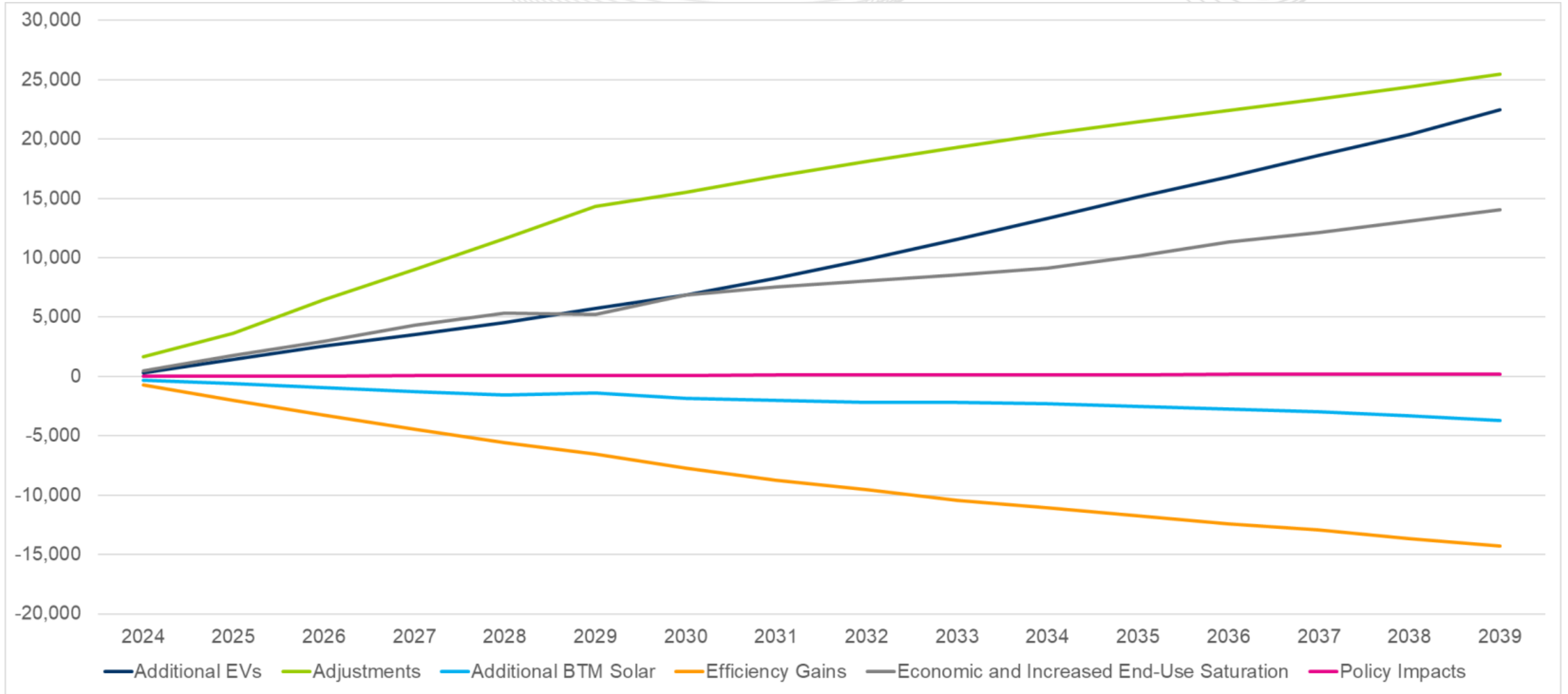
Summer 2028 Forecast Waterfall Comparison

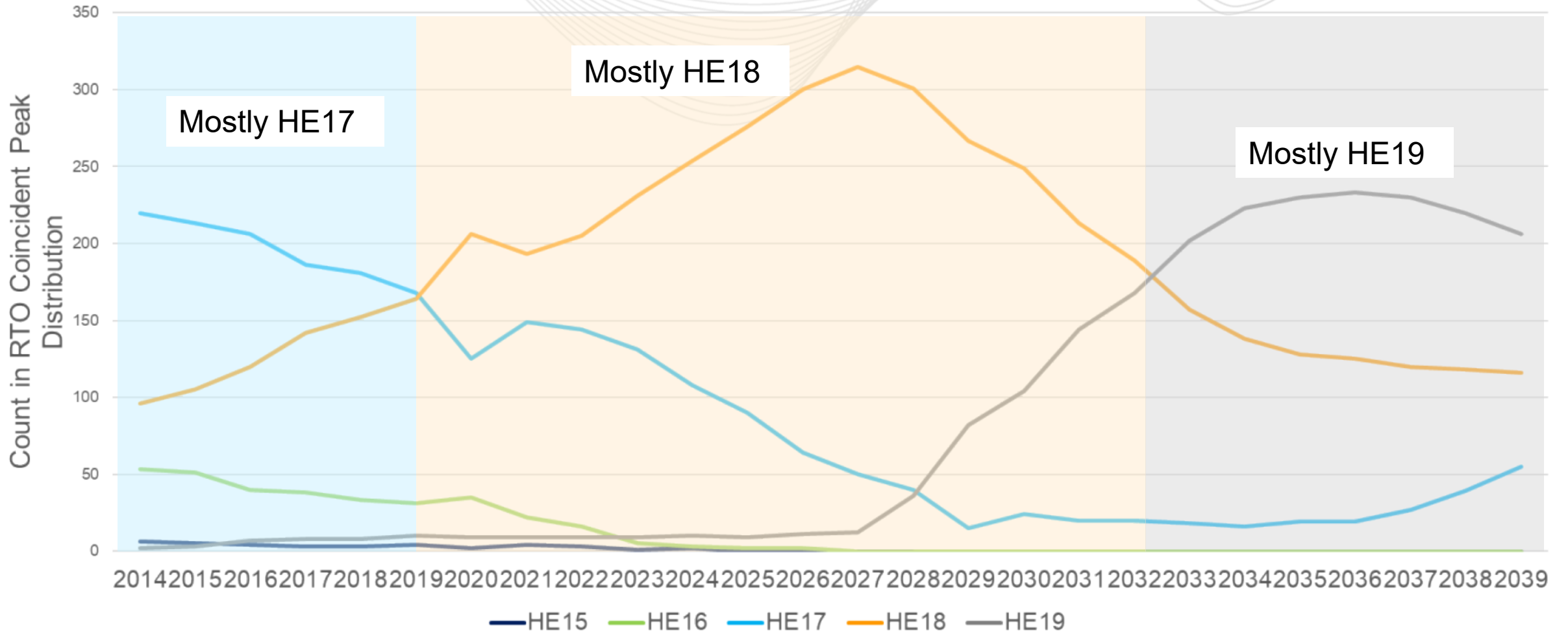


*Remainder is impact of re-estimation as well as new economics and end-use saturation



Summer Forecast Flow – Additions and Subtractions

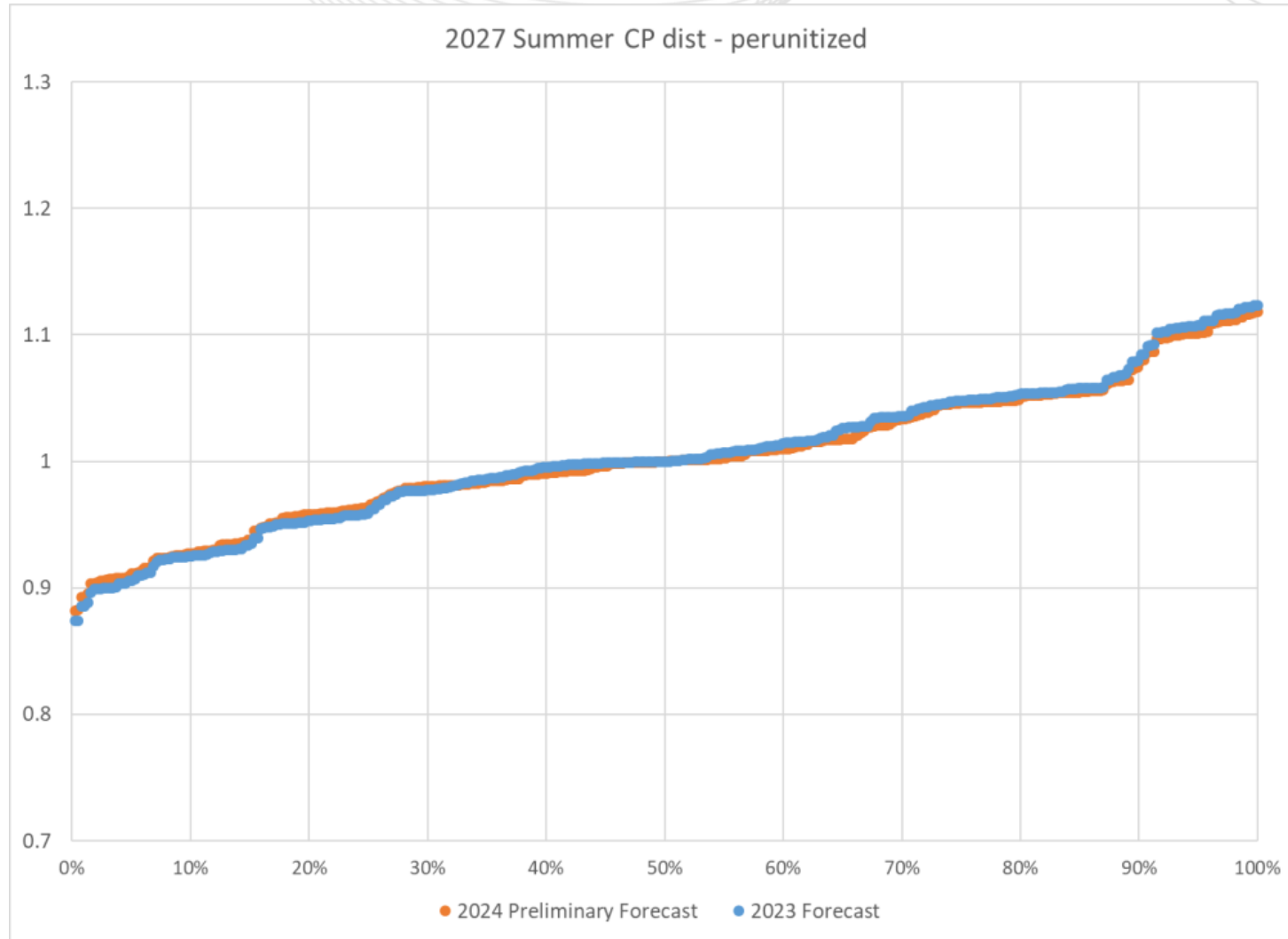






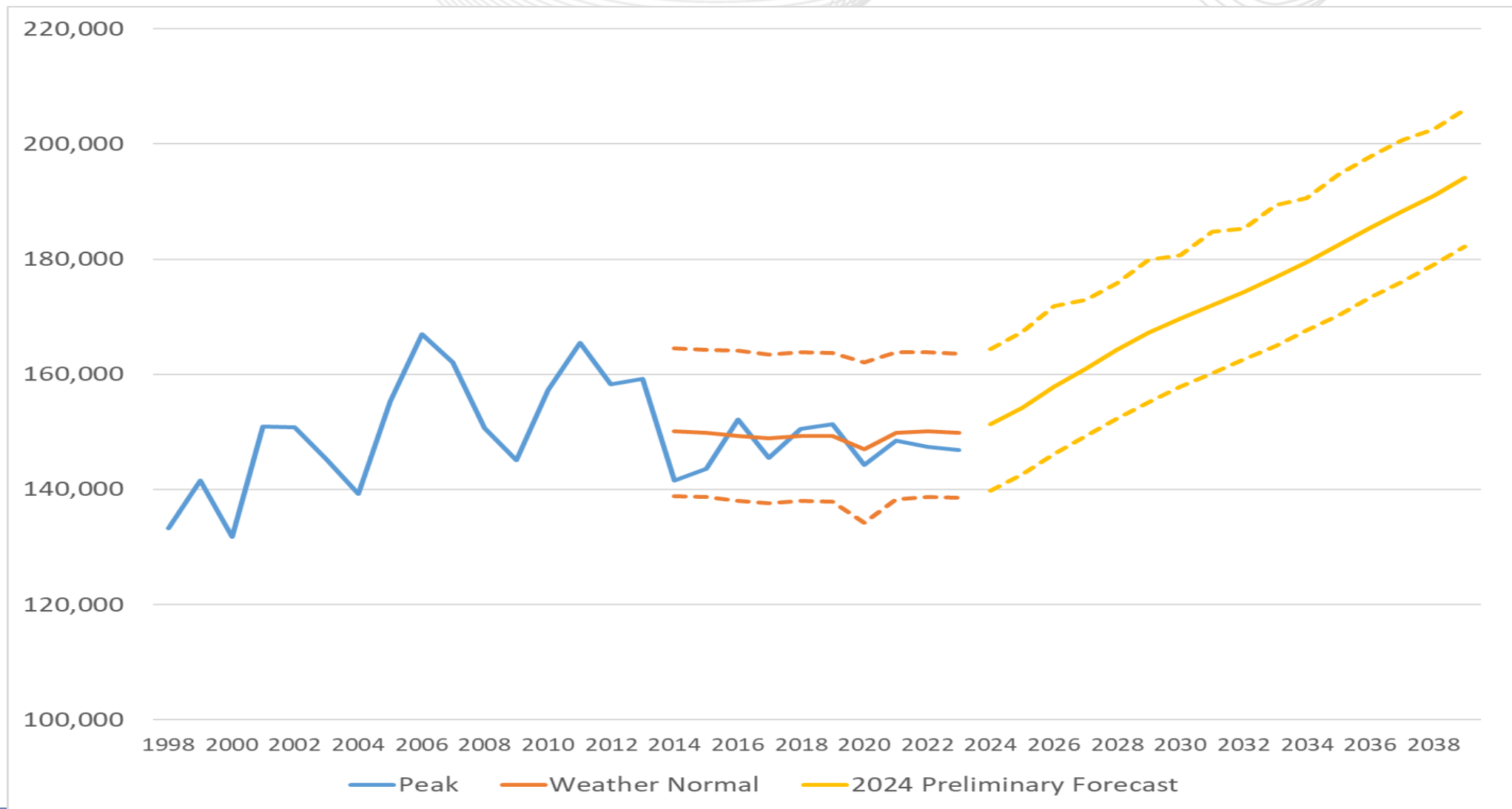
2027 Summer Peak Distribution Comparison

50/50 Forecast = 1.0

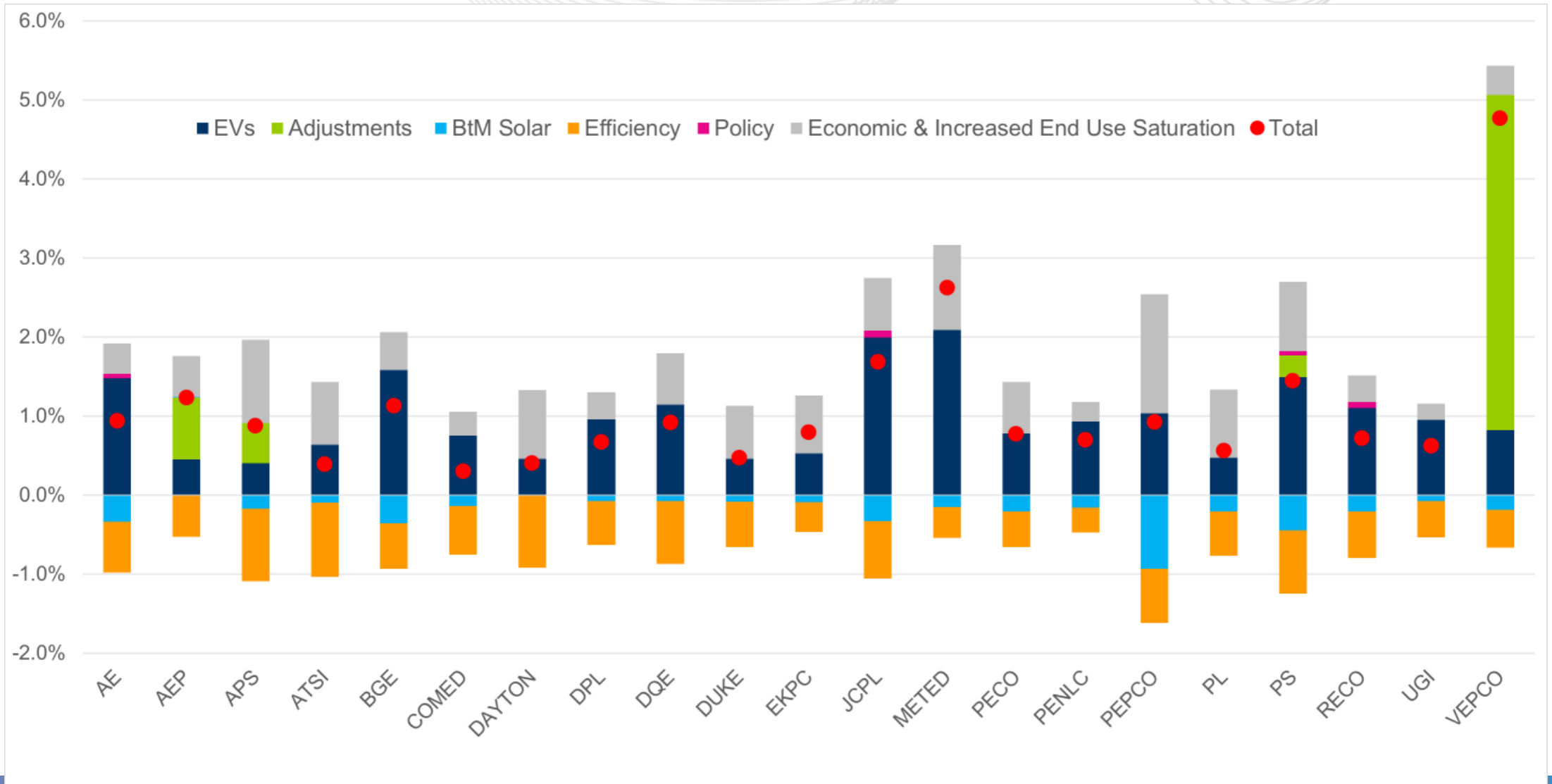


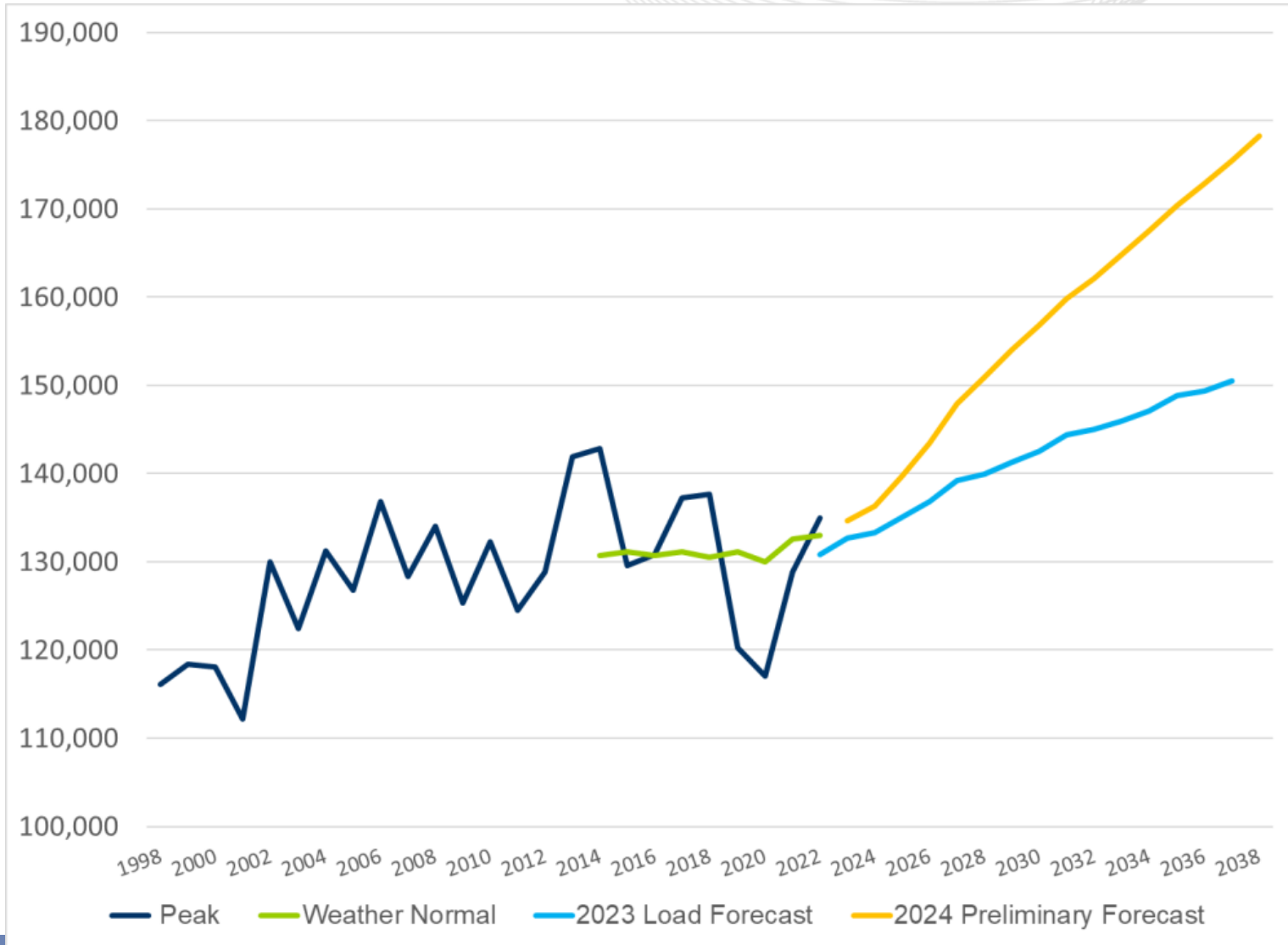


2024 Preliminary Summer Forecast w/ 10th and 90th Percentile Weather Bands



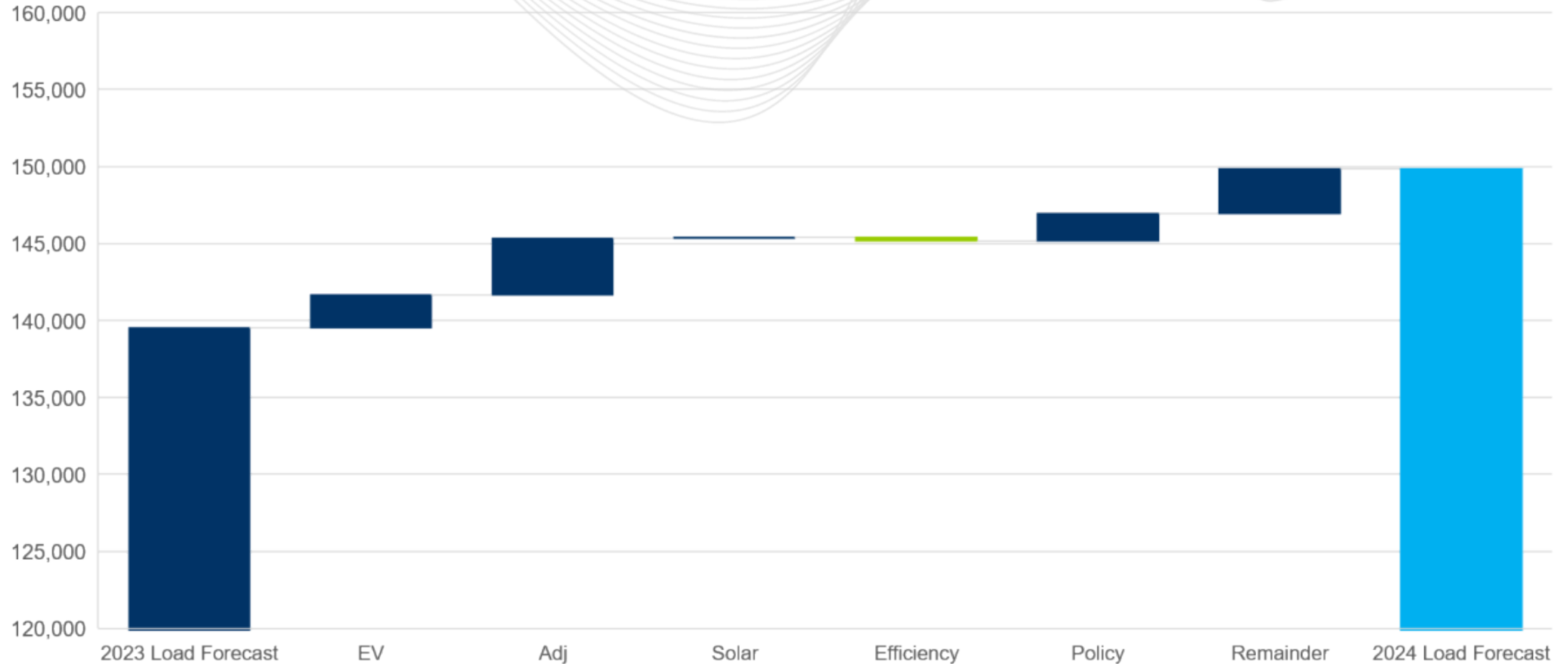
Summer Peak Average Annual Growth (2024-2039)





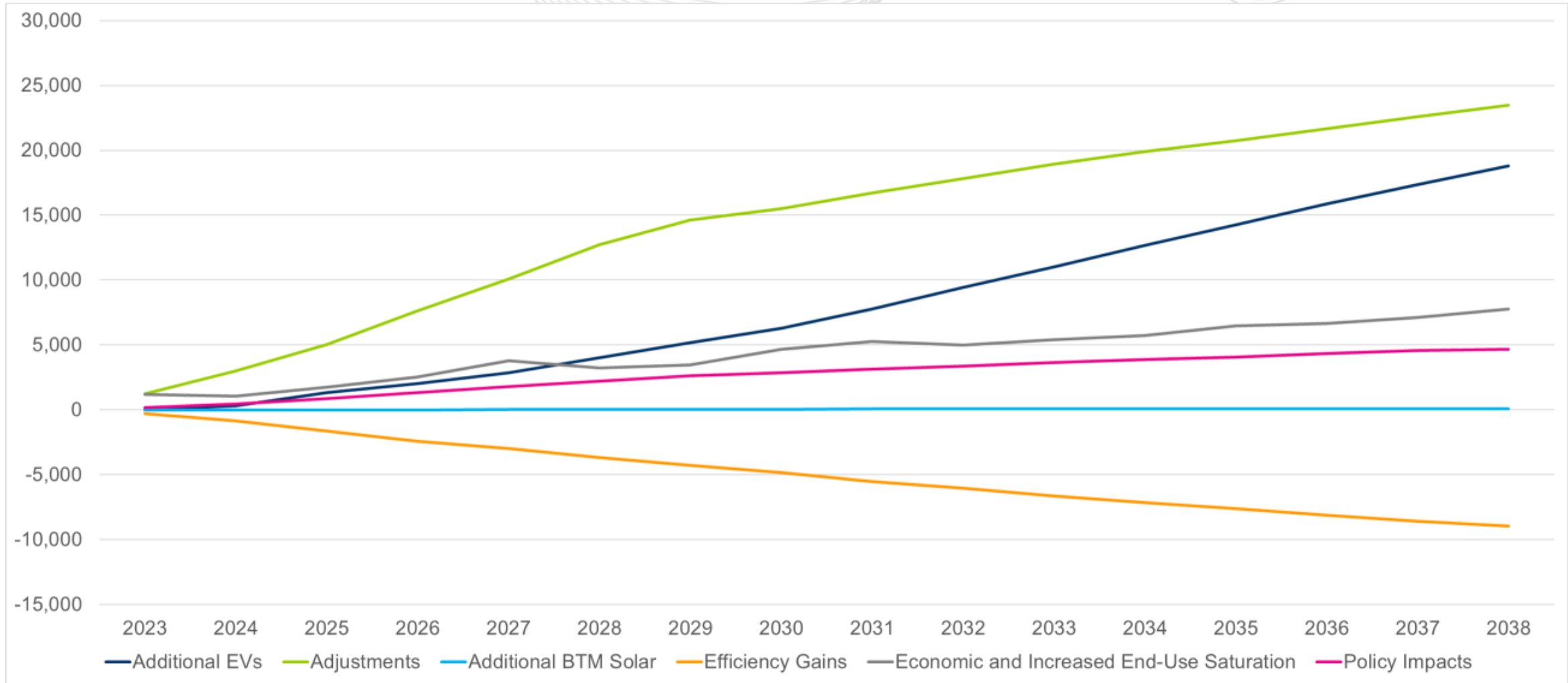
- 15-year Annualized Growth Rate
 - 2023 Forecast : 0.9%
 - 2024 Prelim : 1.9%
- Select year comparisons (2024 Prelim vs 2023 Forecast)
 - 2027: + 4.8% (~6,700MW)
 - 2029: + 7.8% (~11,000MW)
 - 2037: +16.5% (~25,000MW)

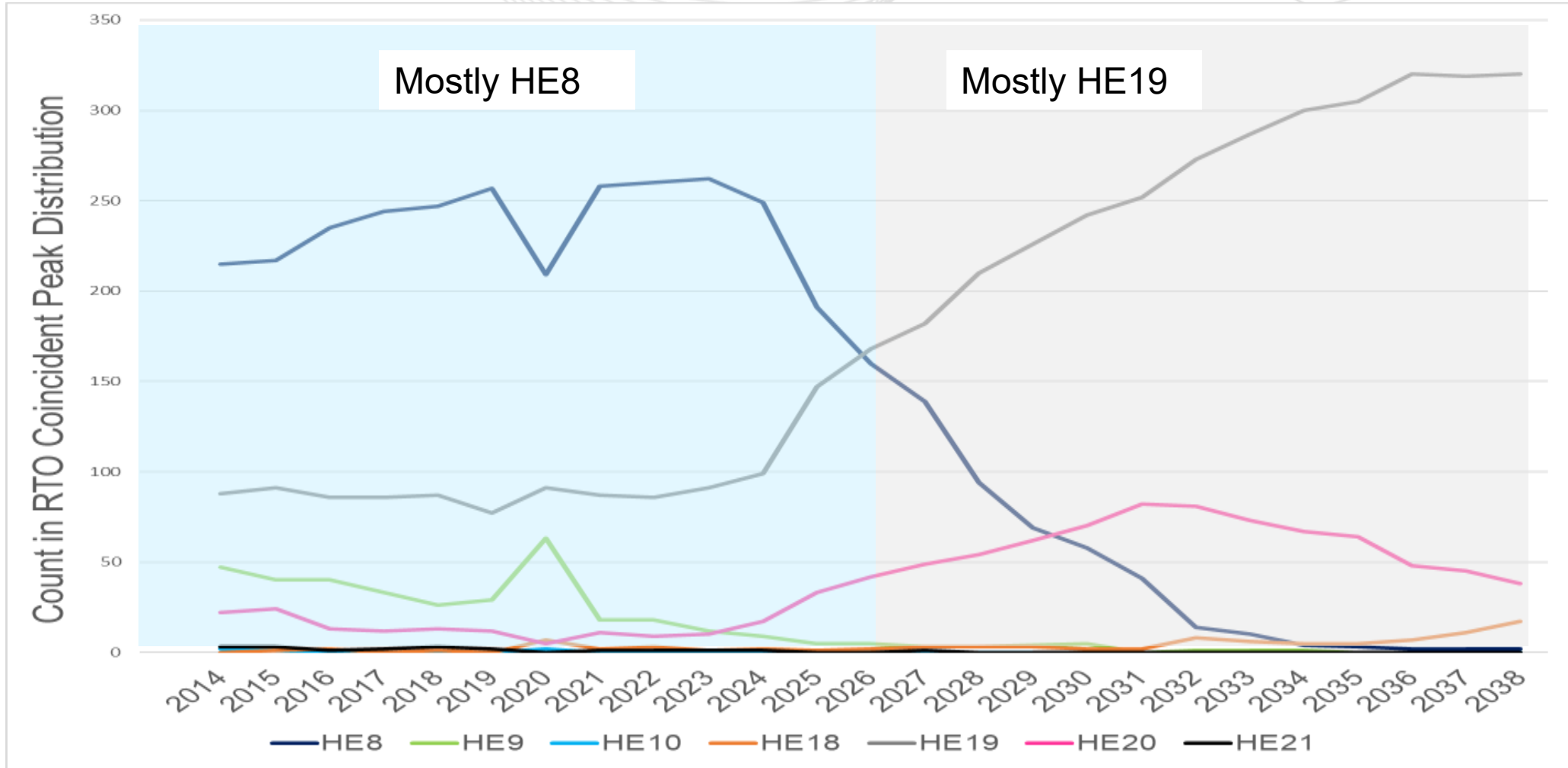
Winter 2027/2028 Forecast Waterfall Comparison



*Remainder is impact of re-estimation as well as new economics and end-use saturation

Winter Forecast Flow – Additions and Subtractions

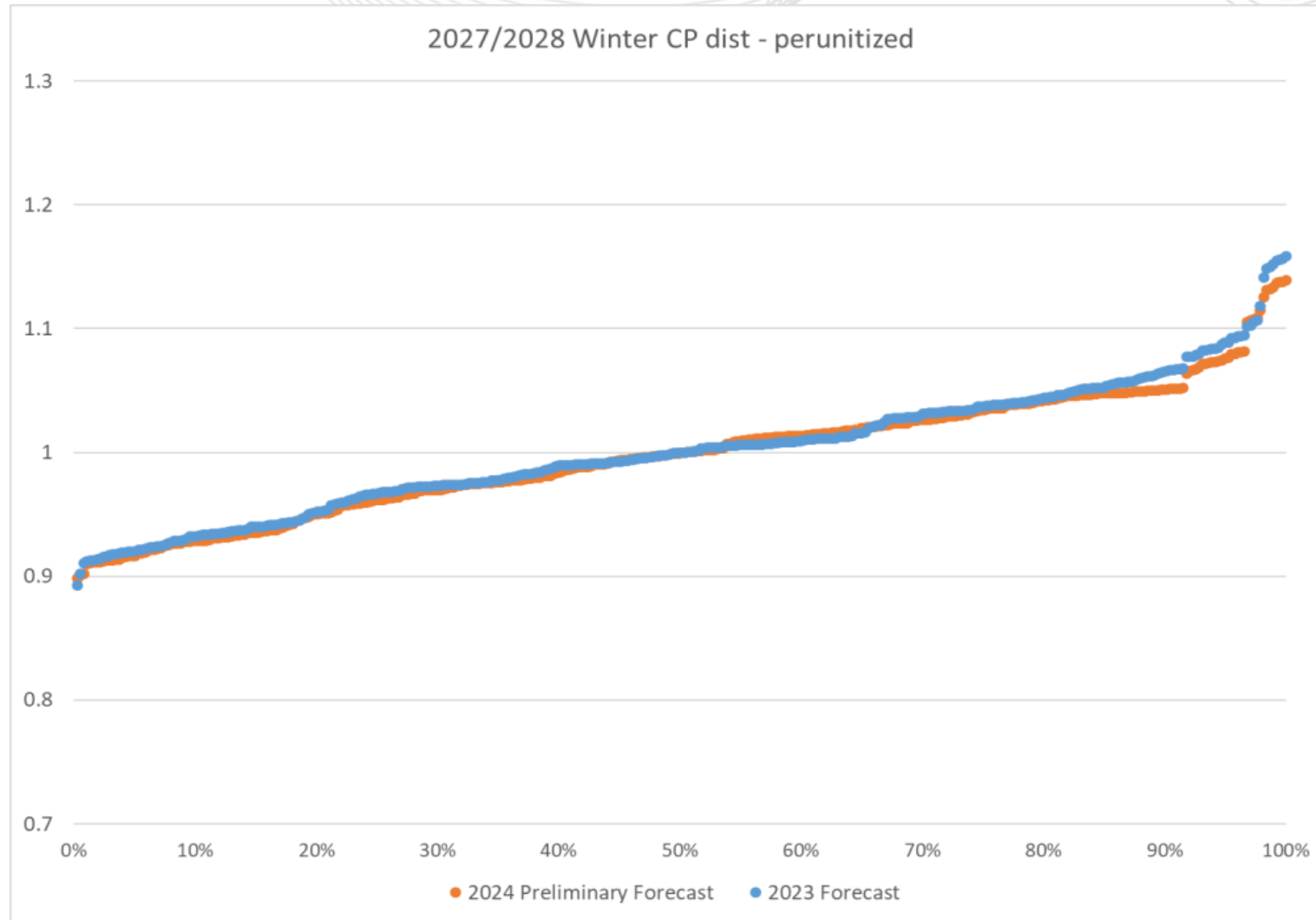






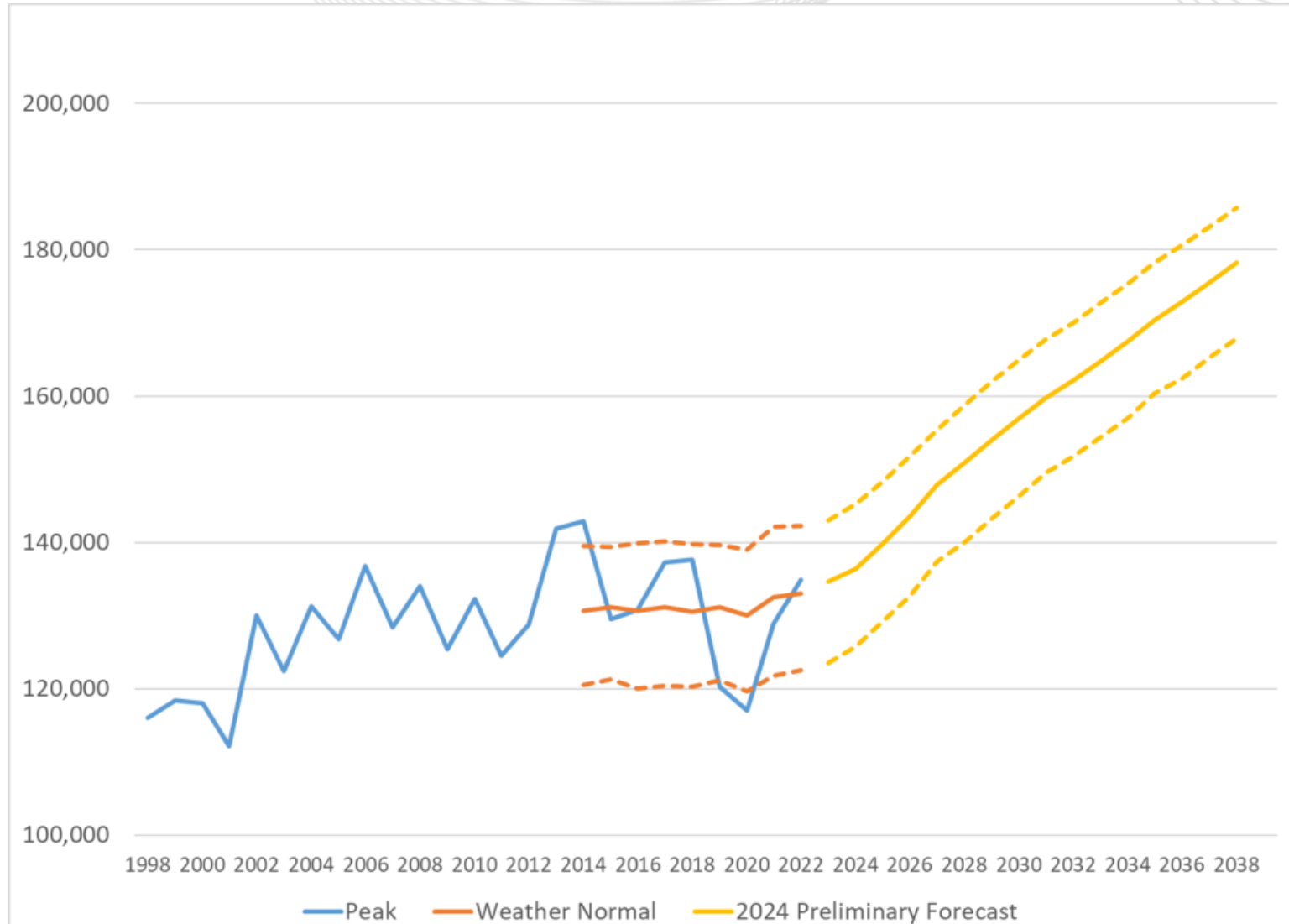
2027 Winter Peak Distribution Comparison

50/50 Forecast = 1.0

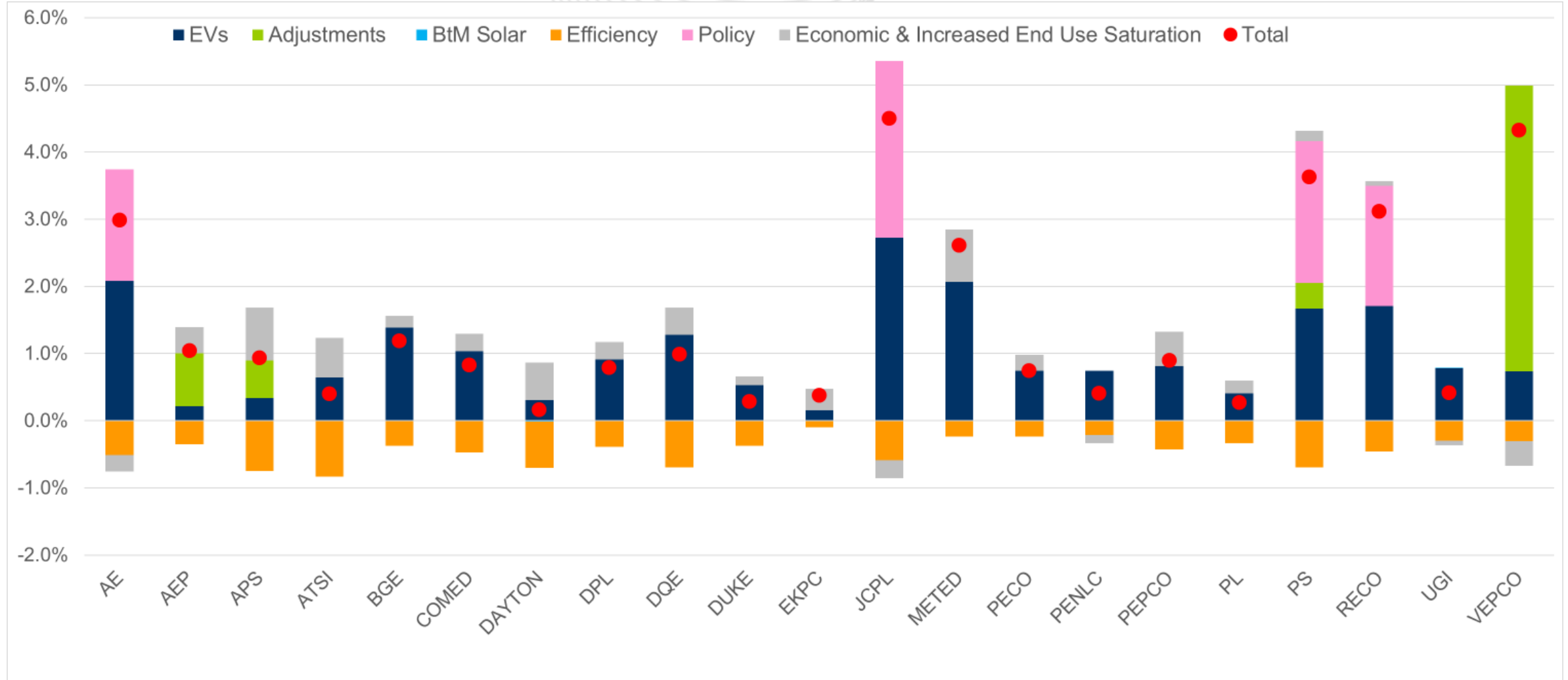




2024 Preliminary Winter Forecast w/ 10th and 90th Percentile Weather Bands



Winter Peak Average Annual Growth (2023-2038)



- Review with Planning Committee (12/5/2023)
- Internally review/finalize data such as:
 - Minor adjustments for NRBTMG (~21 MW)
- Publish final report in late December
 - Accompanying spreadsheets
 - Model Details Spreadsheets
 - End-Use Indices
 - Weather Variables
 - Statistical Appendix
 - Load Report Supplement

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2024 Preliminary Load Forecast



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Report suspicious email activity to PJM.
(610) 666-2244 / it_ops_ctr_shift@pjm.com

