2022 Preliminary PJM Load Forecast

Load Analysis Subcommittee
December 6, 2021

Andrew Gledhill
Sr. Analyst
Resource Adequacy Planning

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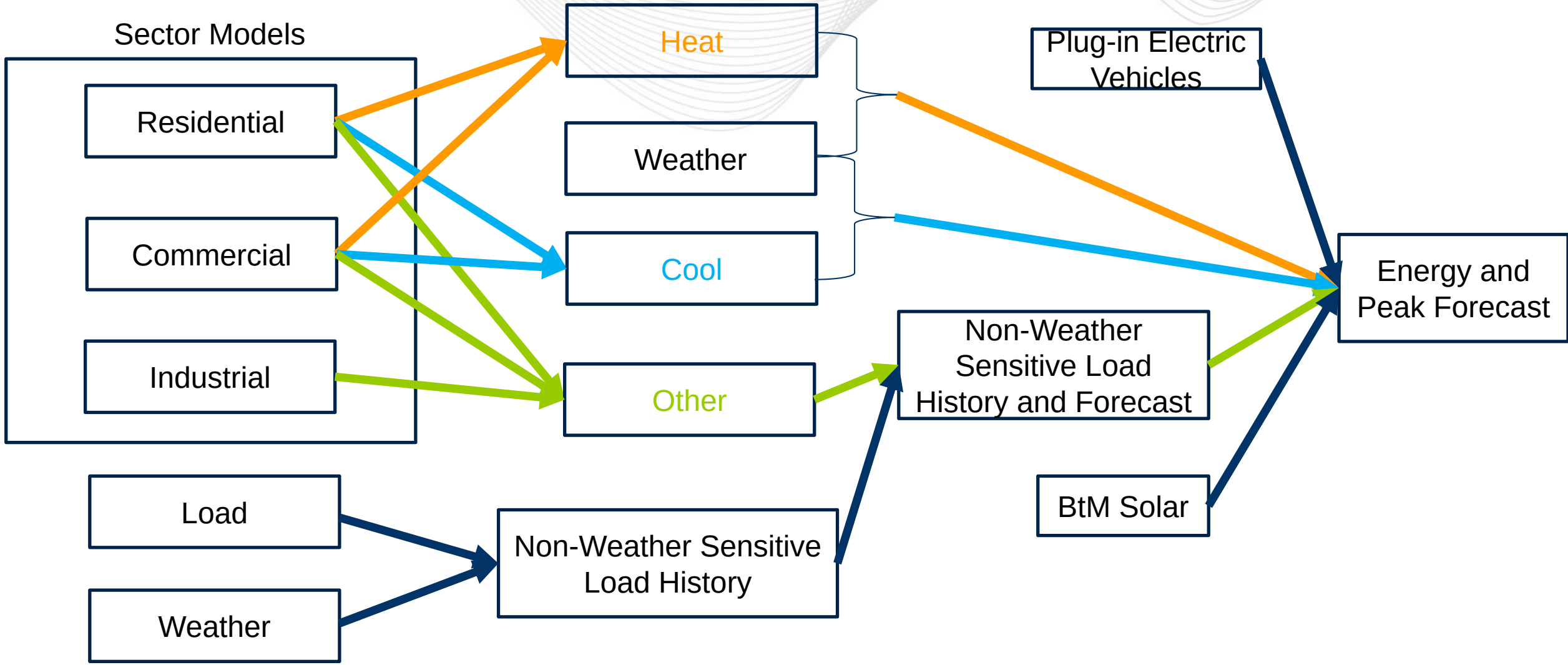
Load Forecast Model Flow



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Model Parameters

- Estimation Period: January 2012 through August 2021
- Weather Simulation: 1994 to 2020 (351 scenarios)
- Sector Models (1998-2020 Annual Data from EIA 861)
  - End Use Data: Based on Itron's 2021 release
  - Economics: September 2021 vintage from Moody's Analytics
- IHS Solar/Battery Forecast (zonal & peak allocation by PJM)
  - Production estimates by AWS
- PEVs
  - State targets and EIA 2021 AEO sales for non-target states
- Forecast Adjustments – APS, ATSI, COMED, Dominion

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COVID-19

- History has been influenced by COVID-19. This impacts:
  - Sector results
  - Non-weather sensitive load results

- Variable introduced to the model “The Back-to-Normal Index”
  - https://www.cnn.com/business/us-economic-recovery-coronavirus
  - Allows model to calibrate to COVID-19 historical impacts that are not captured by sector or non-weather sensitive load

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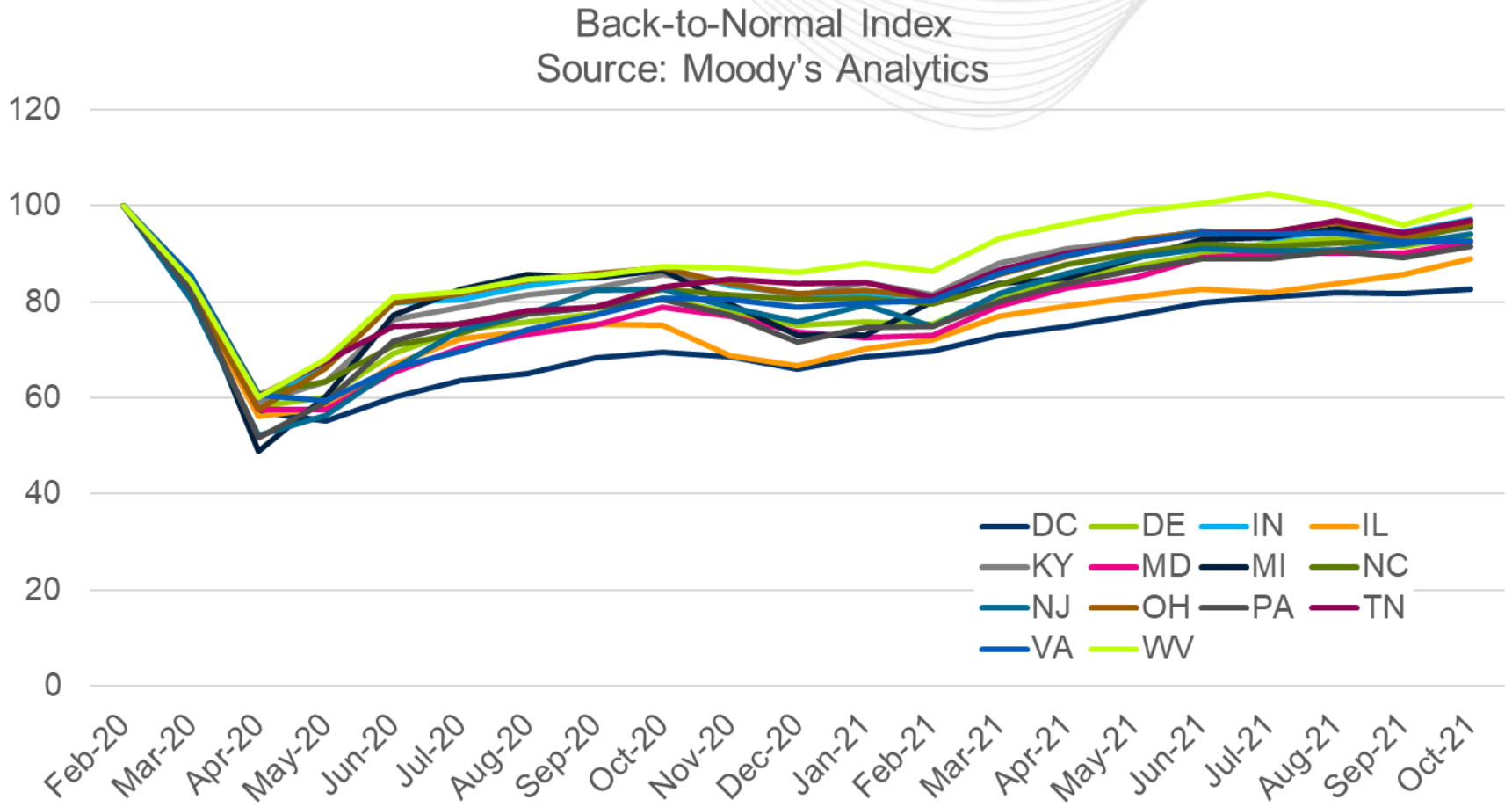
Back-to-Normal



- Values are set to 100 in February 2020 and earlier and November 2021 and later
- Zone values are produced using a weighted combination of state values

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Sectors, Use Indexes, and Non-Weather Sensitive Load

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- 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

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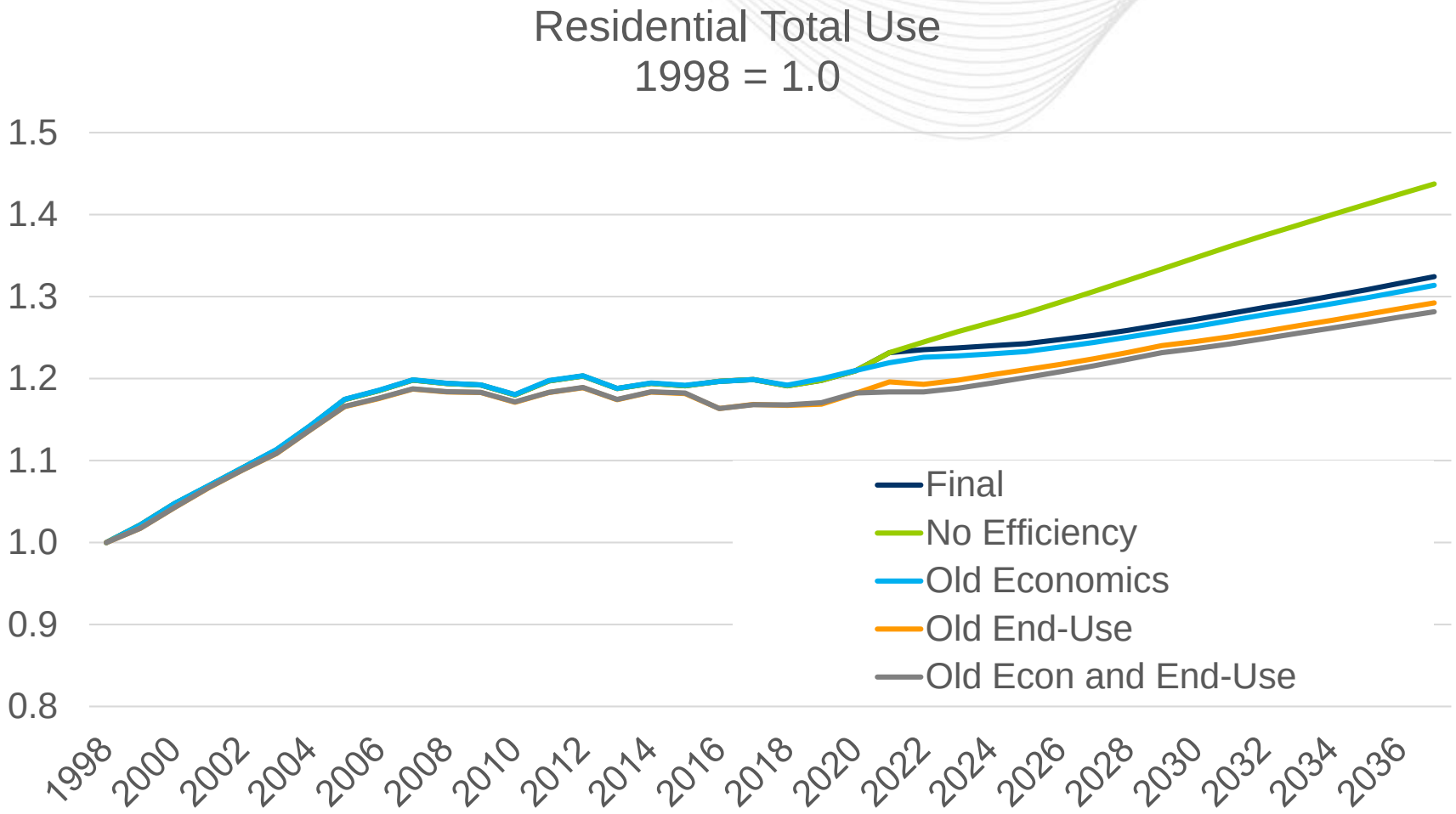
Residential



- Efficiency gains take away half of anticipated growth.
- Economic trend is not substantively different.
- New end-use forecast has slightly more efficiency than the past forecast.

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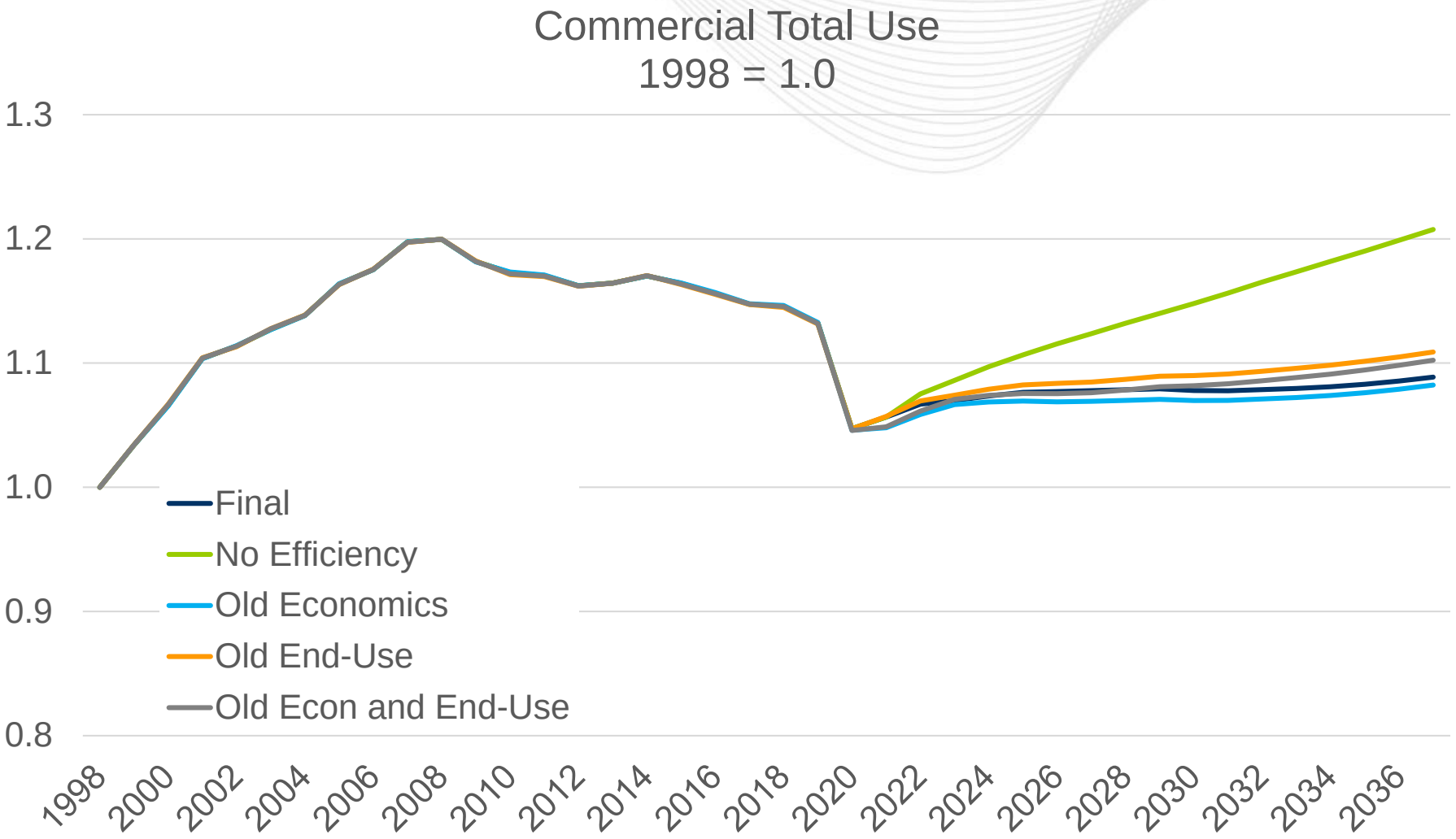
Commercial



- Efficiency gains take away most of anticipated growth
- Economics are stronger than the past forecast.
- New end-use forecast has slightly more efficiency than the past forecast.

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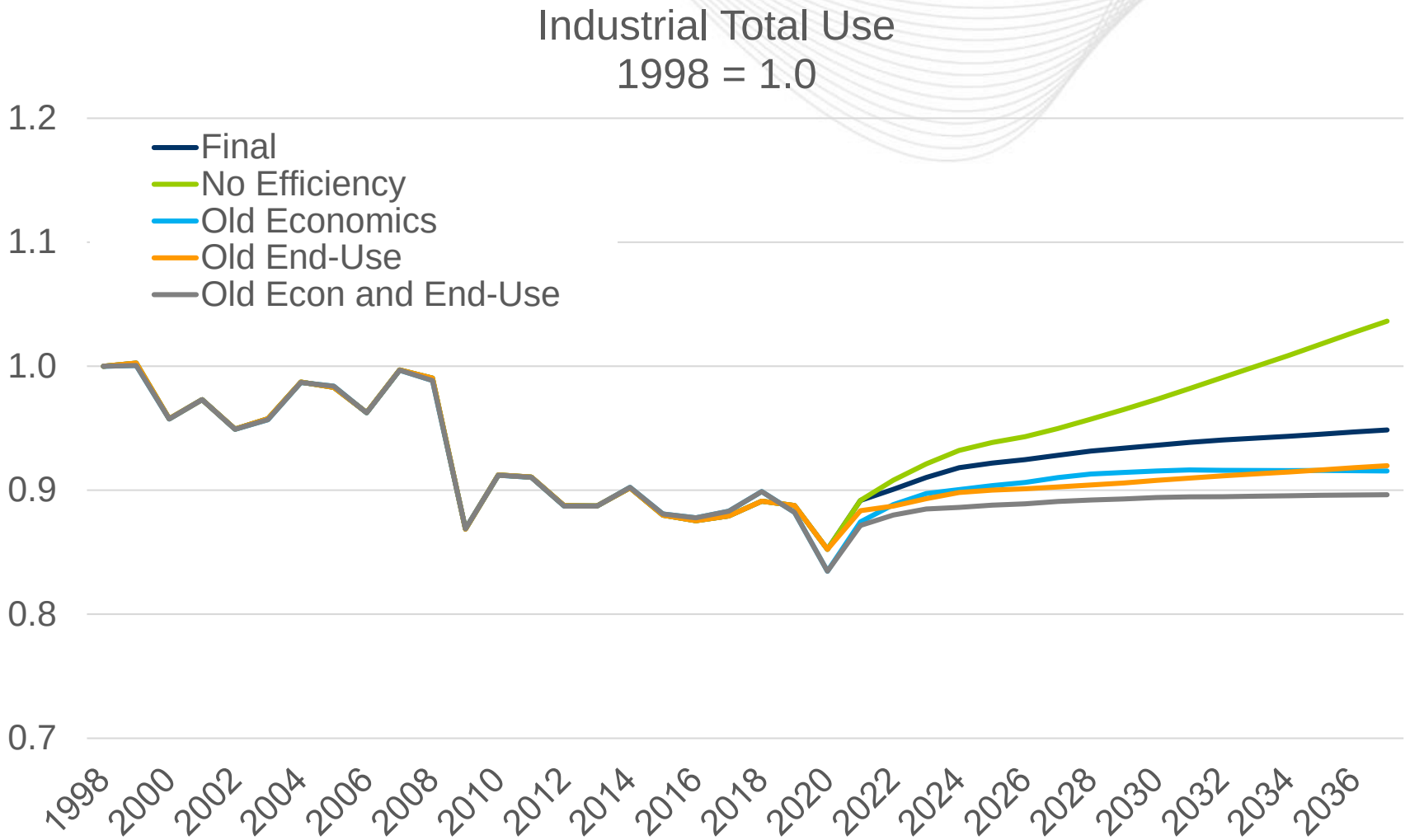
Industrial



- Efficiency gains take away a little more than half of anticipated growth
- Economics are stronger than the past forecast.
- New end-use forecast has slightly less efficiency than the past forecast.

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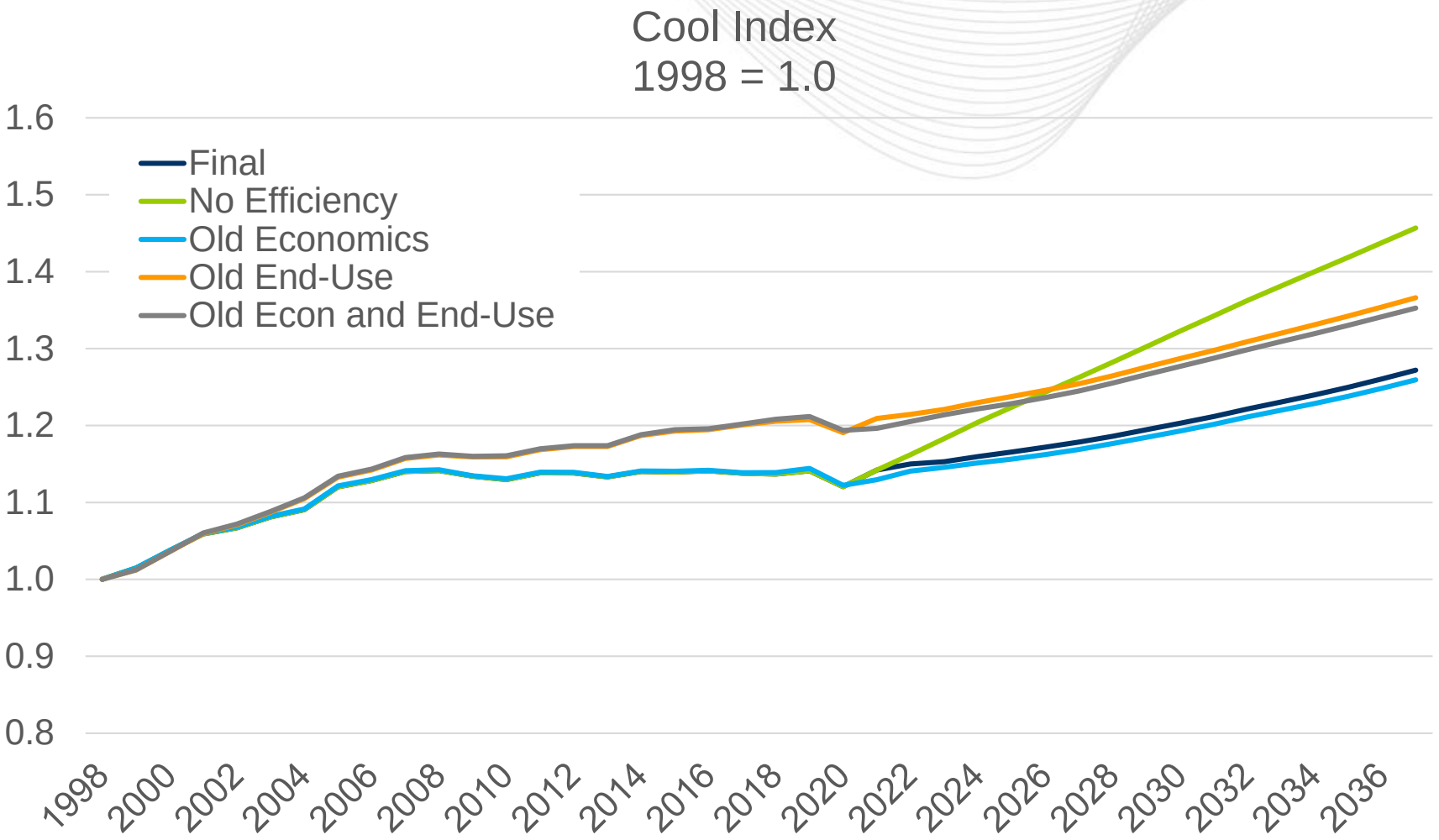
Cool Index



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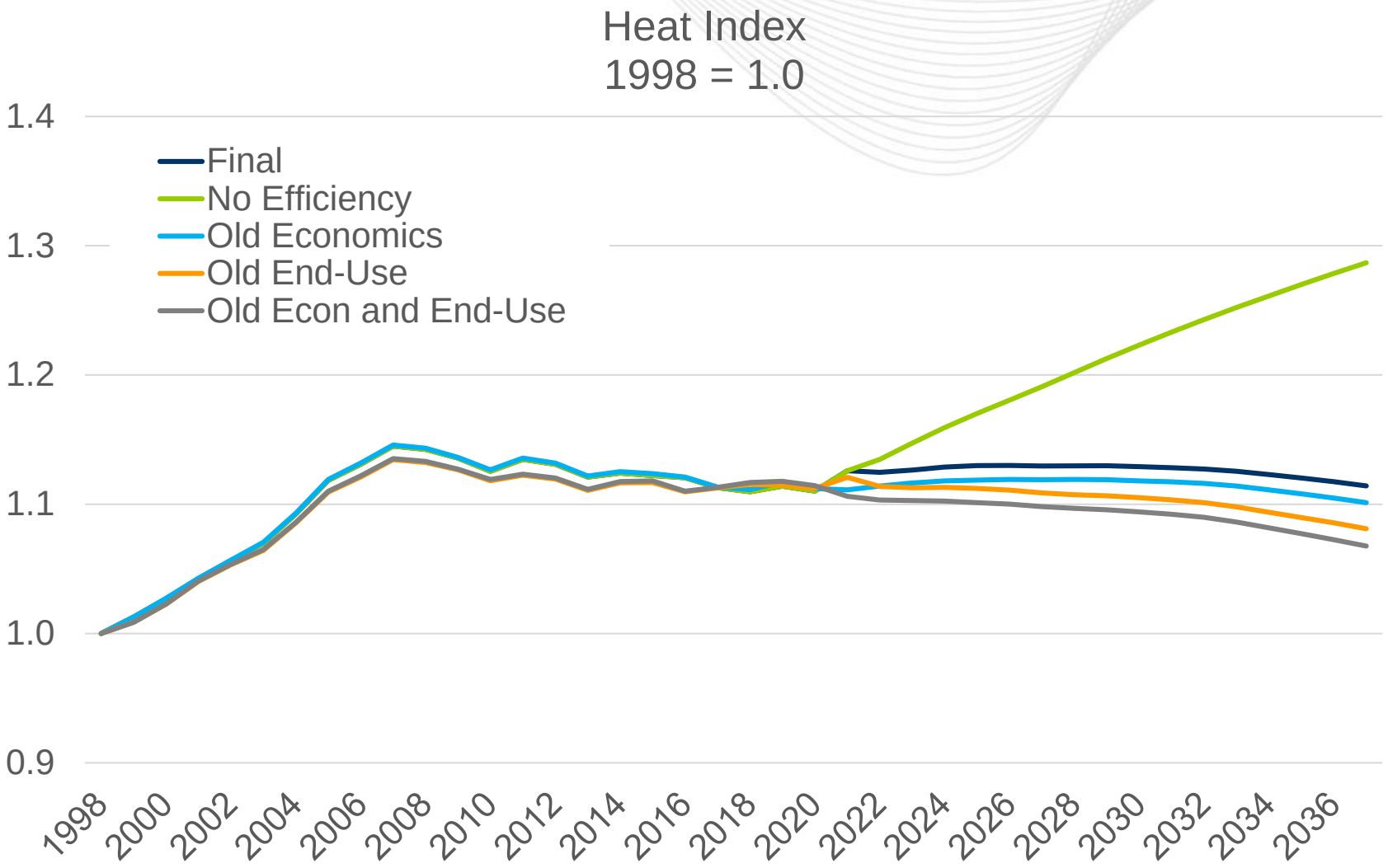
Heat Index



- Efficiency gains take away all of the growth. No push towards electrification.
- Economic trend is not substantively different.
- New end-use forecast has slightly less efficiency than the past forecast.

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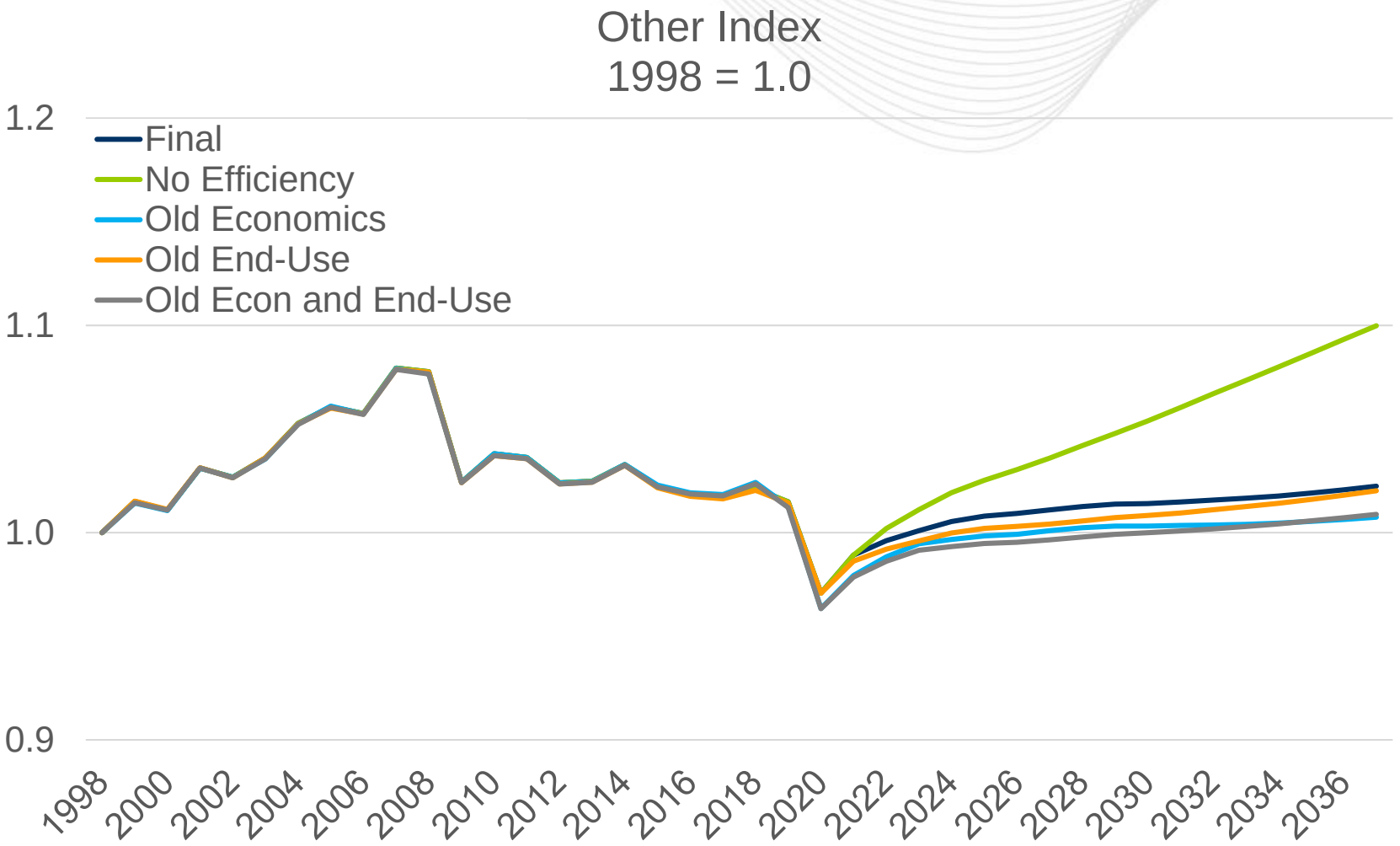
Other Index



- Efficiency gains take away two-thirds of the growth.
- Economic growth is modestly stronger.
- New end-use forecast has similar efficiency to past forecast.

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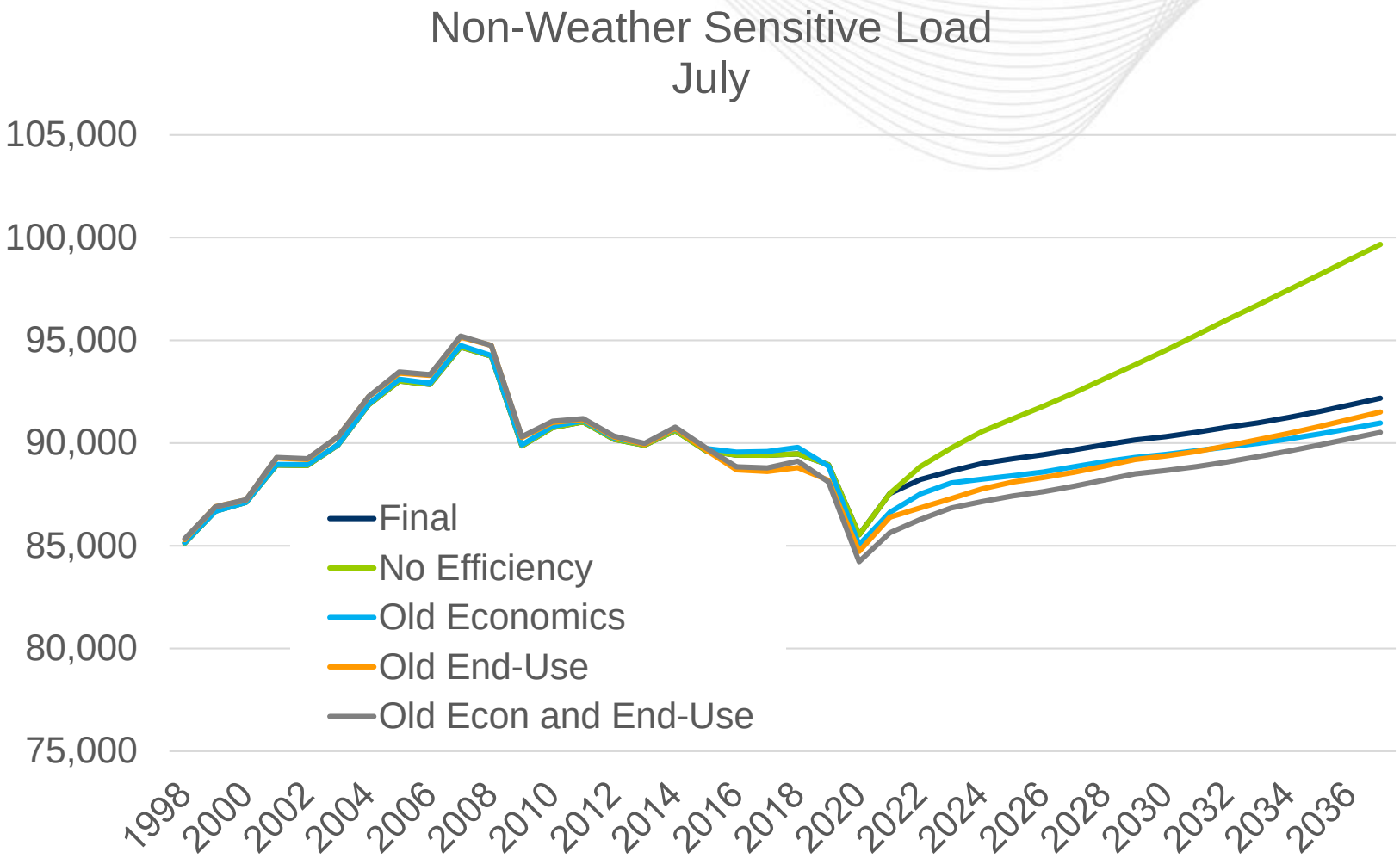
Non-Weather Sensitive Load



- Efficiency gains take away more than half of the growth.
- Economic growth is modestly stronger.
- New end-use forecast has slightly more efficiency to past forecast.

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Plug-in Electric Vehicles

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State Targets

District of Columbia	25% of registrations by 2035
Illinois	1 Million EVs by 2030
Maryland	300k EVs by 2025
New Jersey	2 million EVs by 2035; 85% of sales in 2040
Virginia	8% of sales in 2024; 22% in 2025

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PEV Forecast Method

- In states with targets, the target drives the forecast

- States without targets are pushed forward based on EIA 2021 AEO
  - Assumption of 4% of vehicle sales being EVs by 2030 and 8% by 2040

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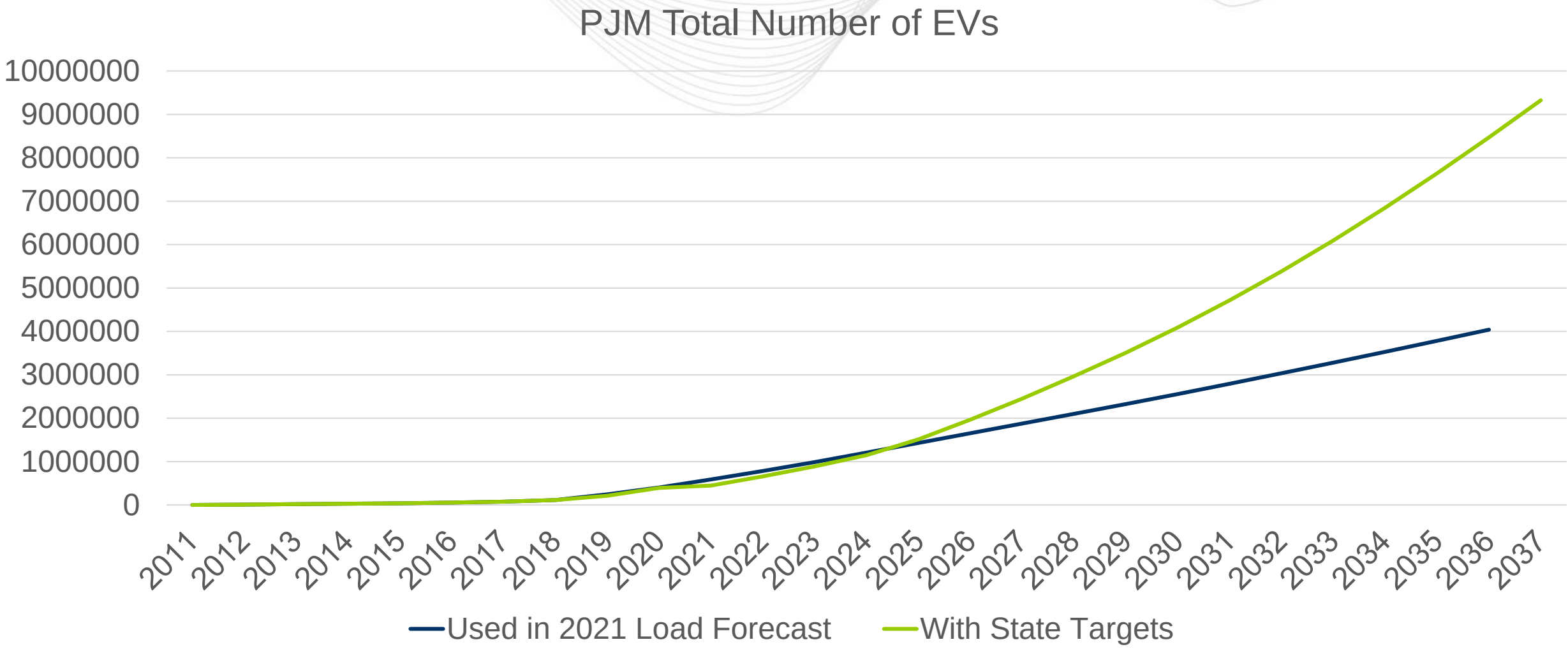
PJM Total Number of EVs
10000000
9000000
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2000000
1000000
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2036
2037
Used in 2021 Load Forecast
With State Targets

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Translating to Peak

- Assumptions
  - Future charging shifts increasingly towards off-peak on weekdays.
  - Winter charging needs are greater than in Summer.
  - Key resource on charging:
    - ISO New England
      - https://www.iso-ne.com/static-assets/documents/2021/04/final_2021_transp_elec_forecast.pdf

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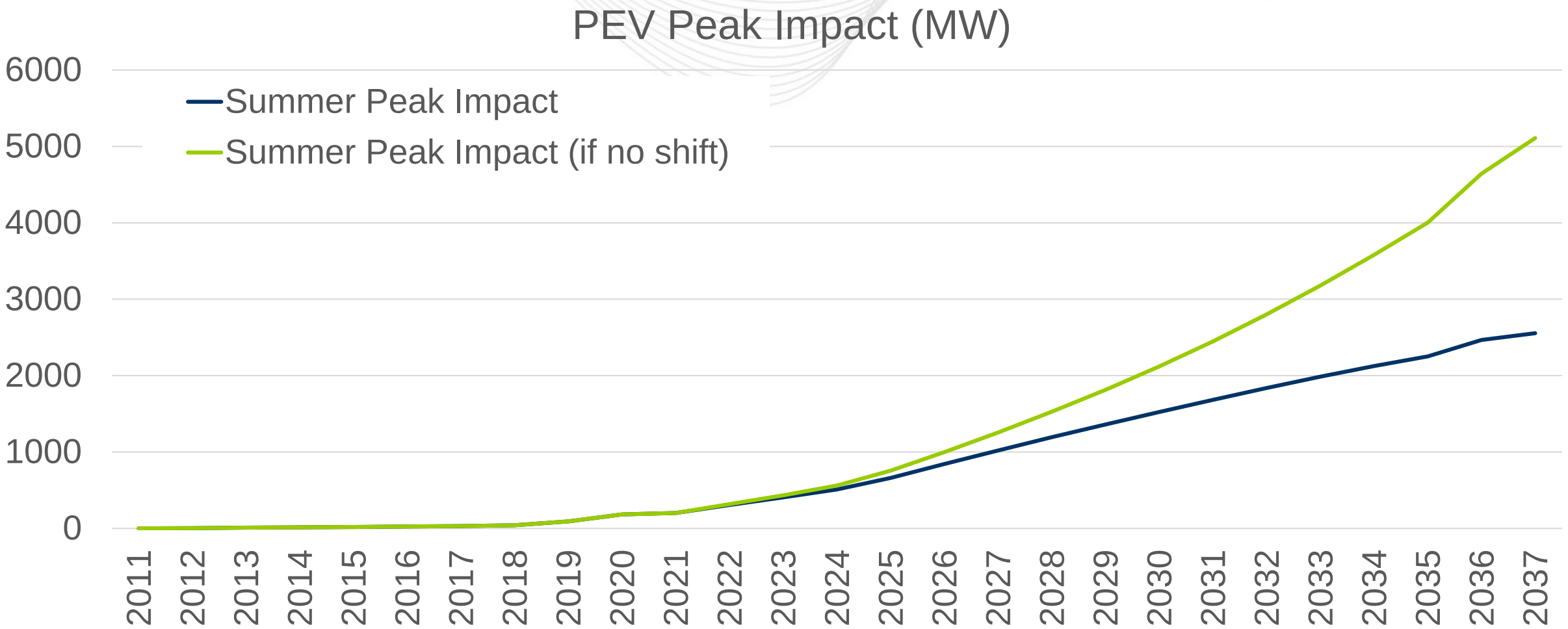
PEV Impact



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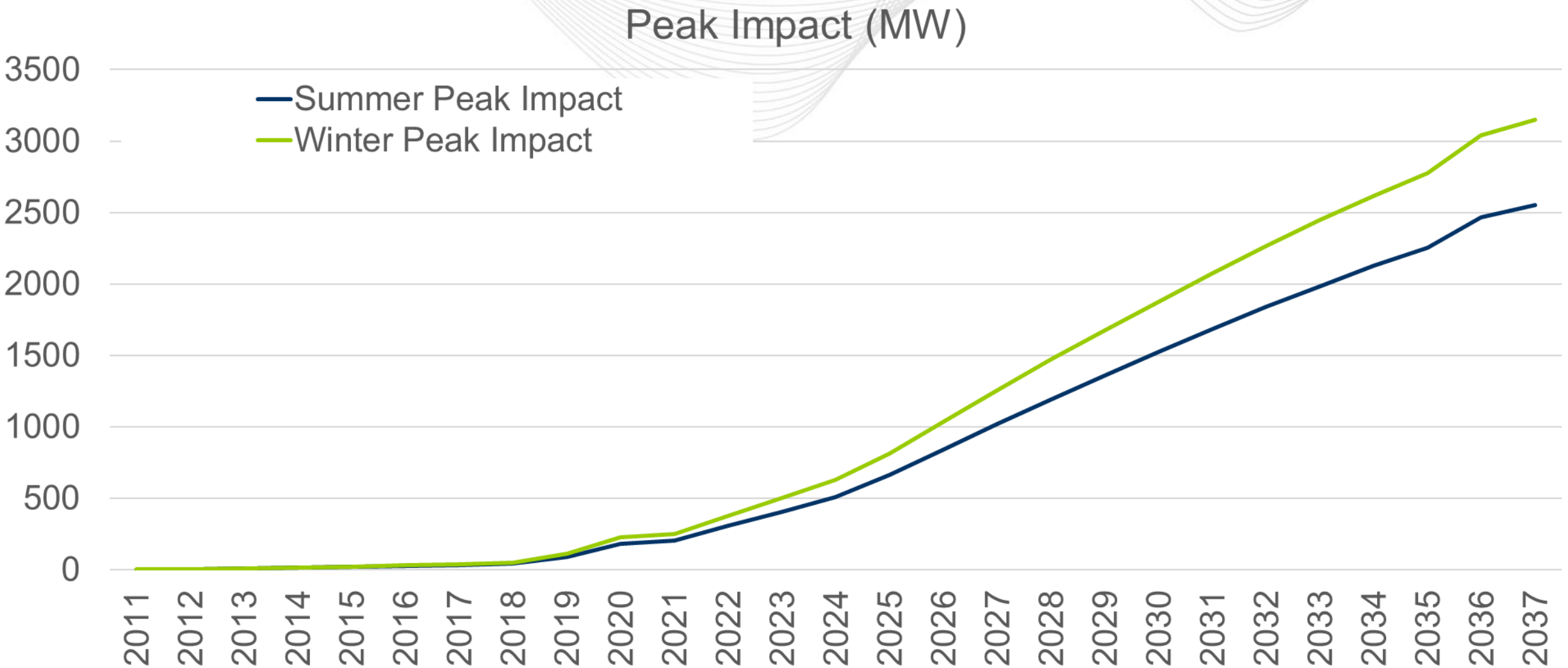
PEV Seasonal Impact



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Forecast Adjustments

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Forecast Adjustments

- EDCs are encouraged to provide PJM with information about large changes that may not be captured in the forecast process.

- PJM evaluates and incorporates using the sector models. 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?

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Forecast Adjustment Process

- Remove impact of adjustment on history
  - If decrementing load, increase load with historical effects
  - If increasing load, reduce load with historical effects

- Restore impact of adjustment to forecast
  - If decrementing load, reduce forecast with anticipated effects
  - If increasing load, add to forecast with anticipated effects

- “Adjustment Impact” is calculated by comparing with a forecast as if there were no explicit treatment.

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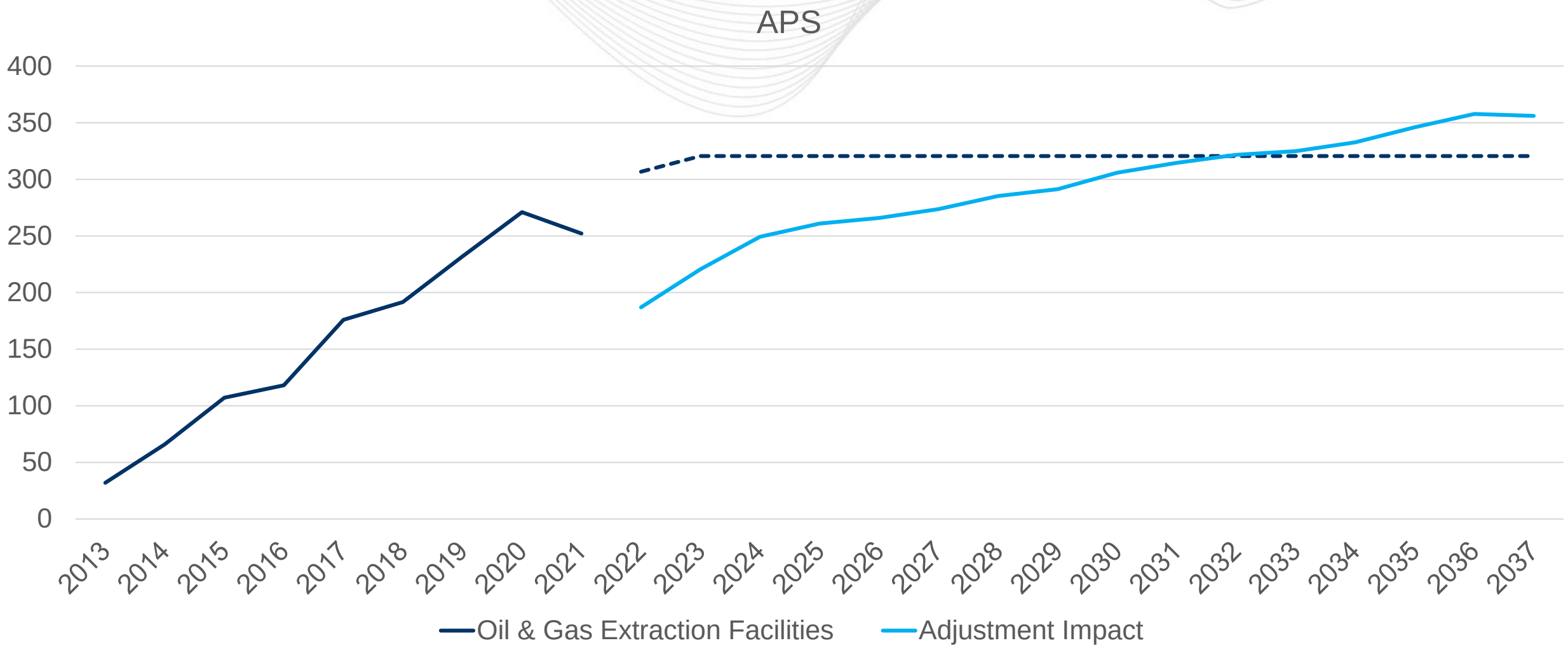
APS


APS
400
350
300
250
200
150
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2013
2014
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Oil & Gas Extraction Facilities
Adjustment Impact

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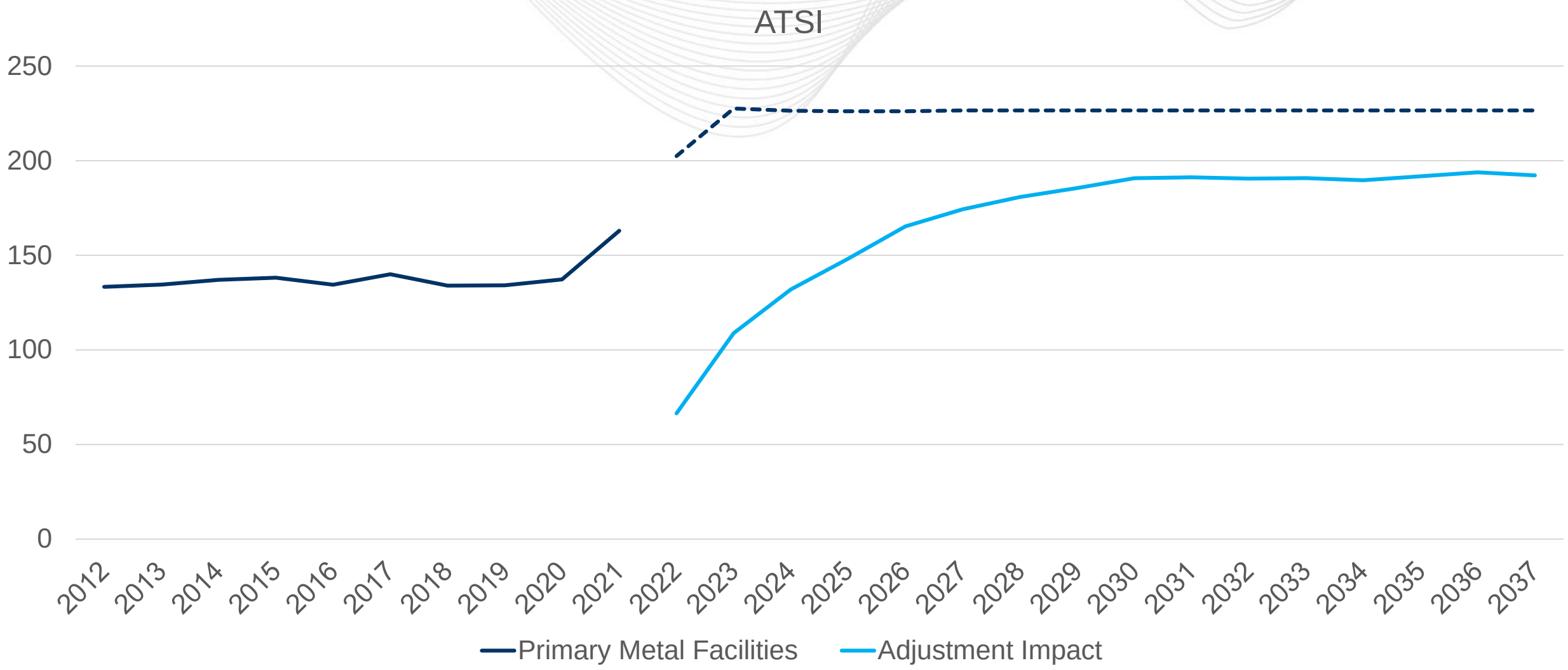
ATSI



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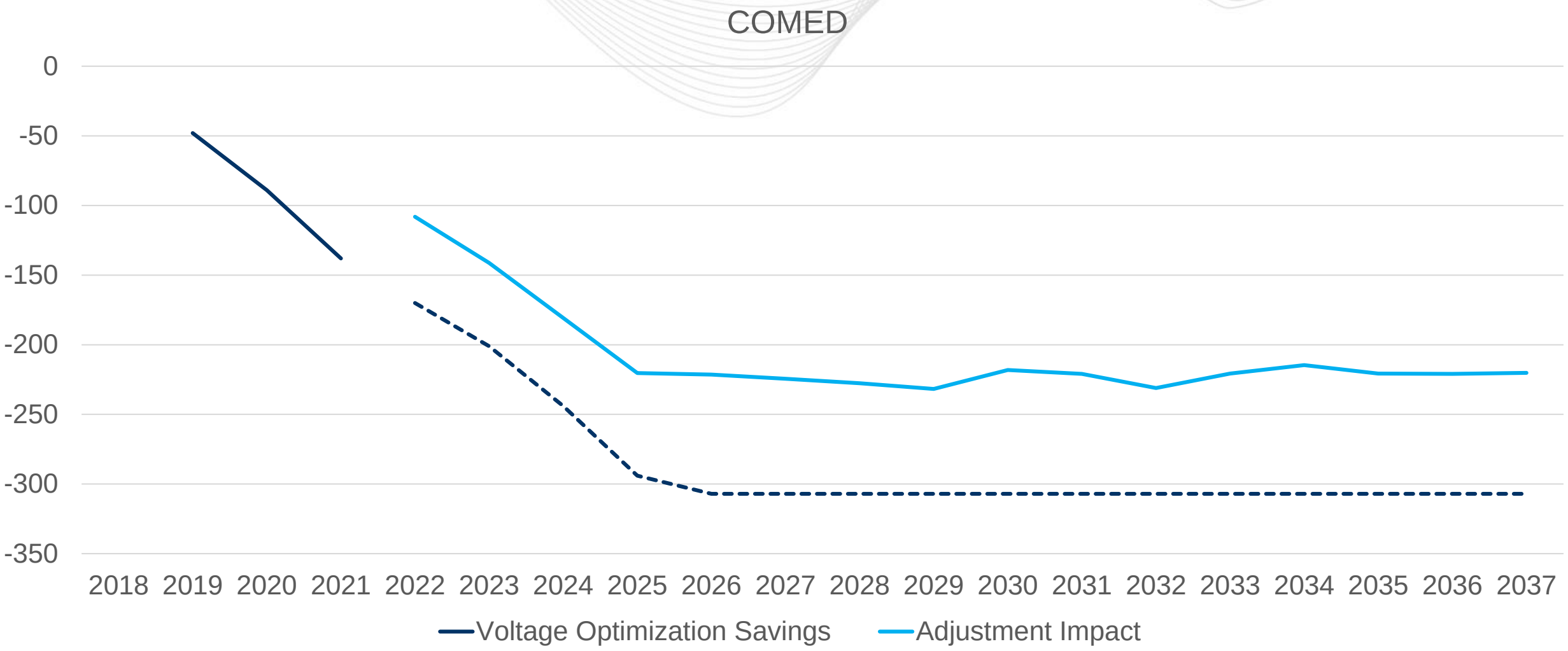
COMED



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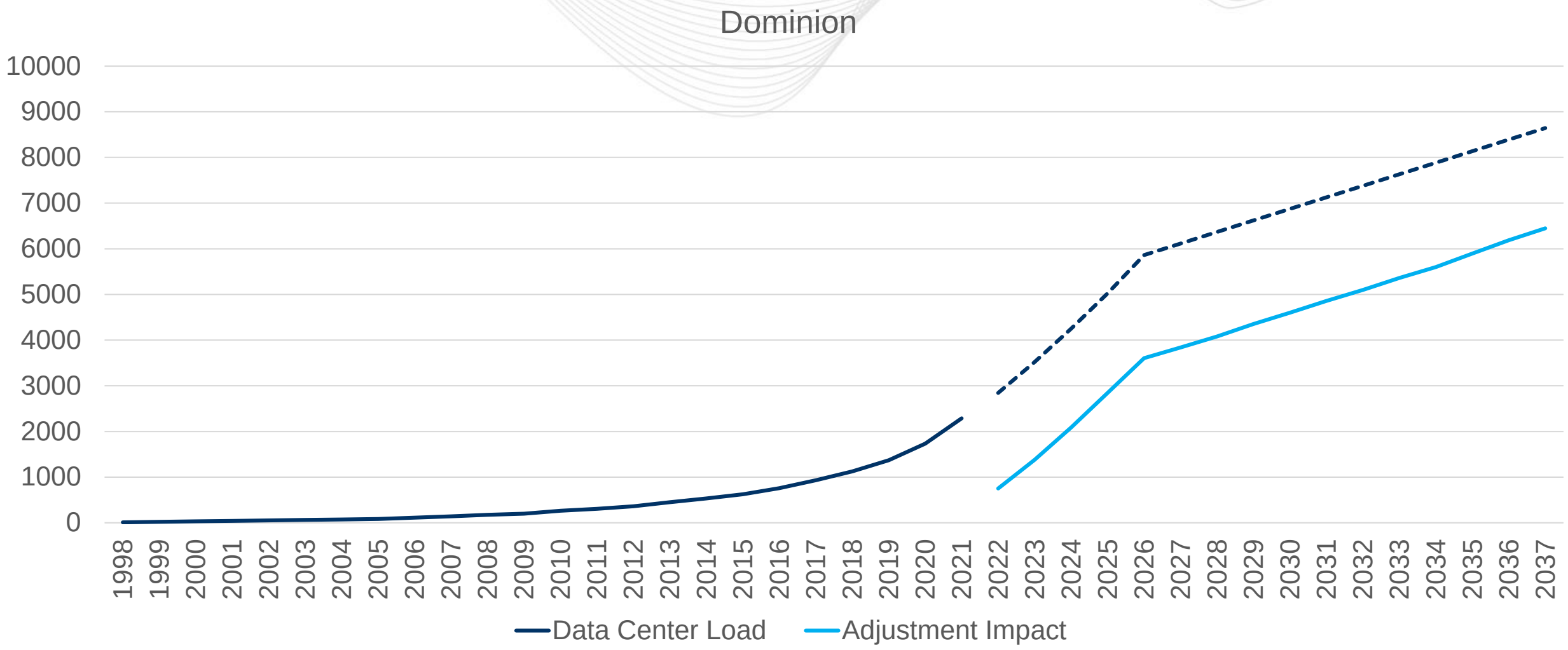
Dominion



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Preliminary Forecast

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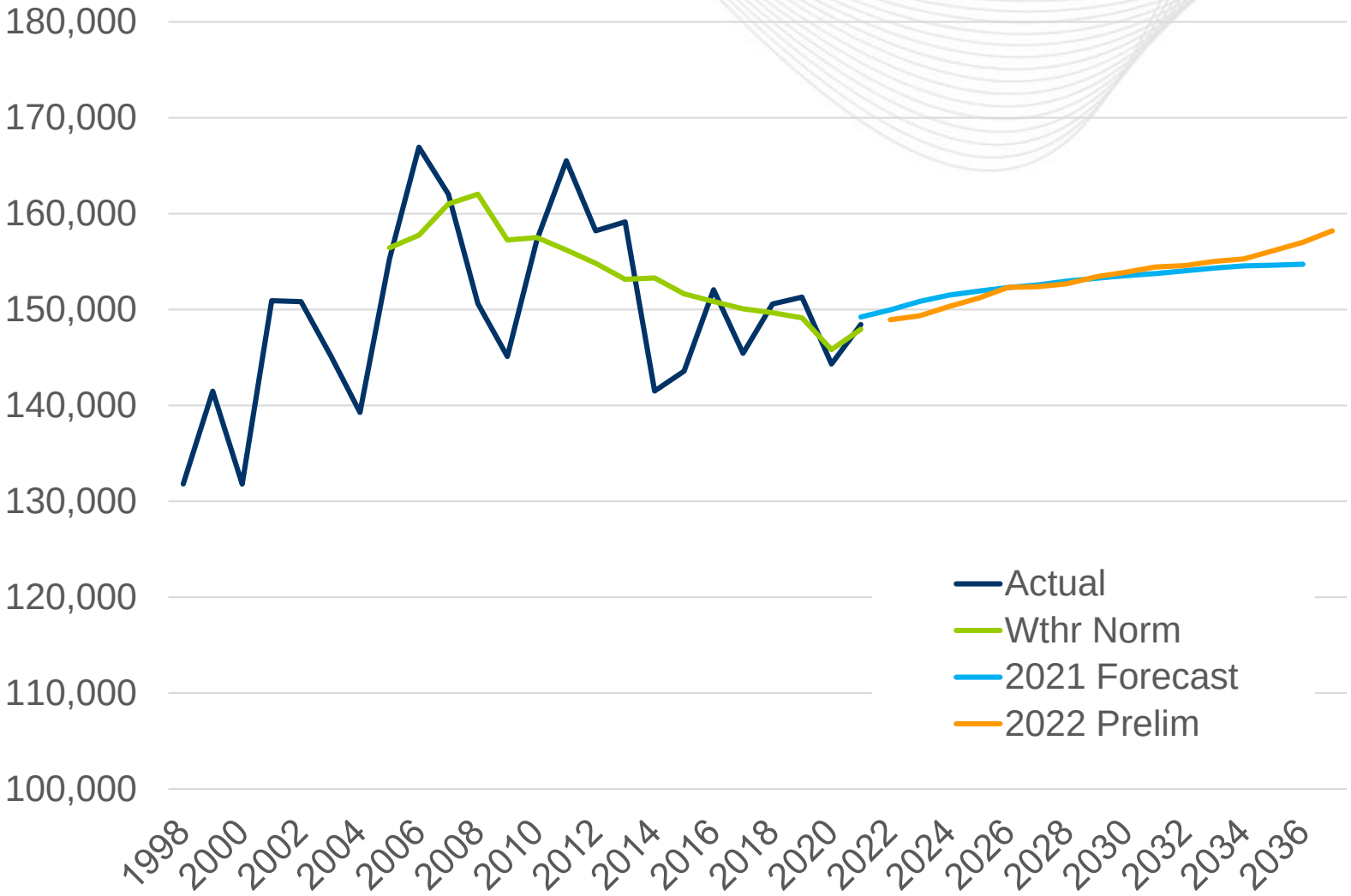
Summer Forecast Comparison 2021 vs 2022



- 15-year Annualized Growth Rate
  - 2021 LF: 0.2%
  - 2022 Prelim: 0.4%
- Select year comparisons (2022 Prelim vs 2021LF)
  - 2025: Down 0.5%
  - 2027: Down 0.1%
  - 2036: Up 1.5%

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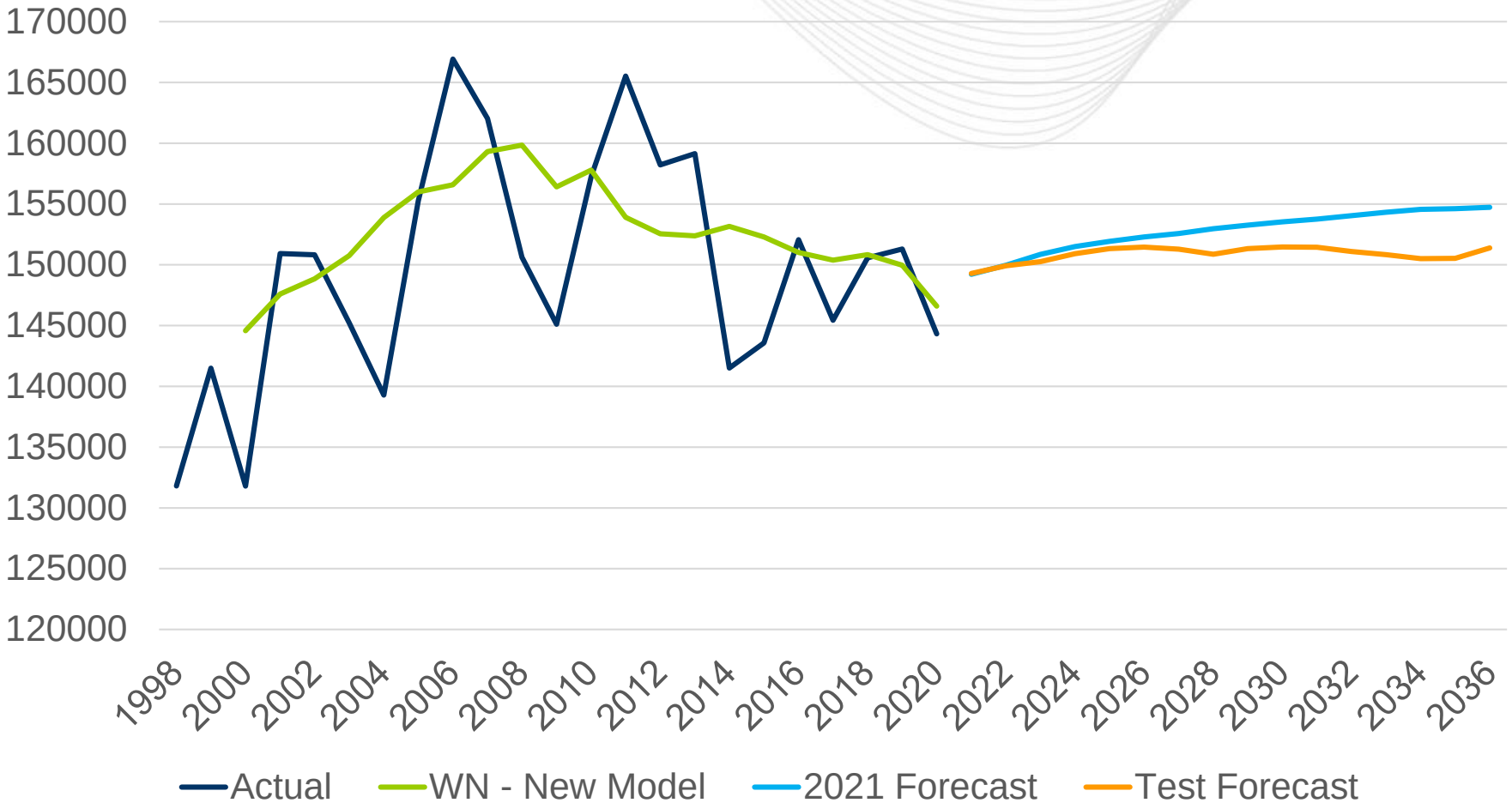
Recall chart from Nov 9 LAS - Summer Peak Forecast



- New model alone leads to lower growth.
- “Test Forecast” is a representation of what the forecast would have been had we been using the new model for the 2021 Forecast.
- The change is in some of the exogenous assumptions.

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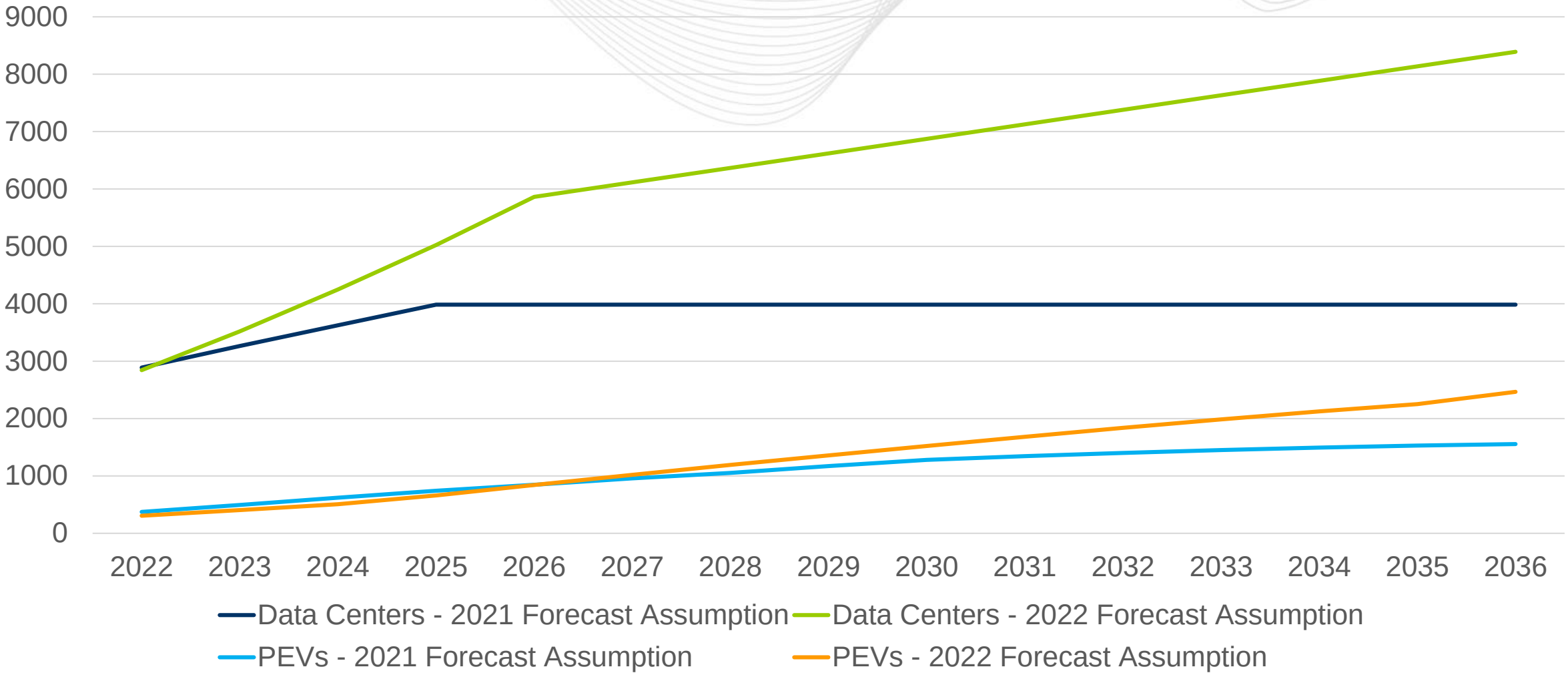
Exogenous Assumption Changes



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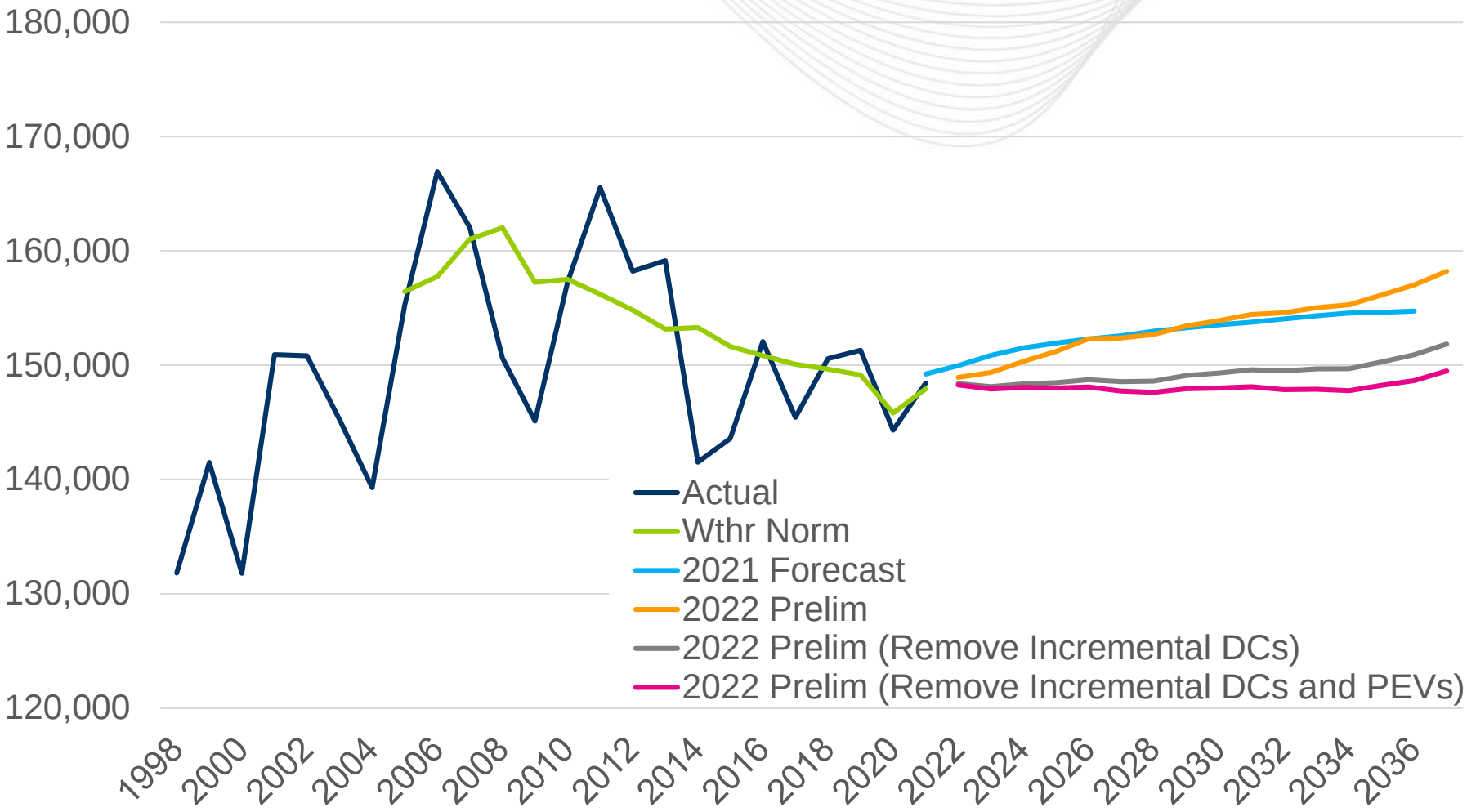
Impact of Incremental Data Centers and PEVs



- Without new data centers and new PEVs, 15-year average annual growth would be a scant 0.05%.
- Additional data centers add 0.25% per year to growth.
- Additional PEVs add 0.1% per year to growth.

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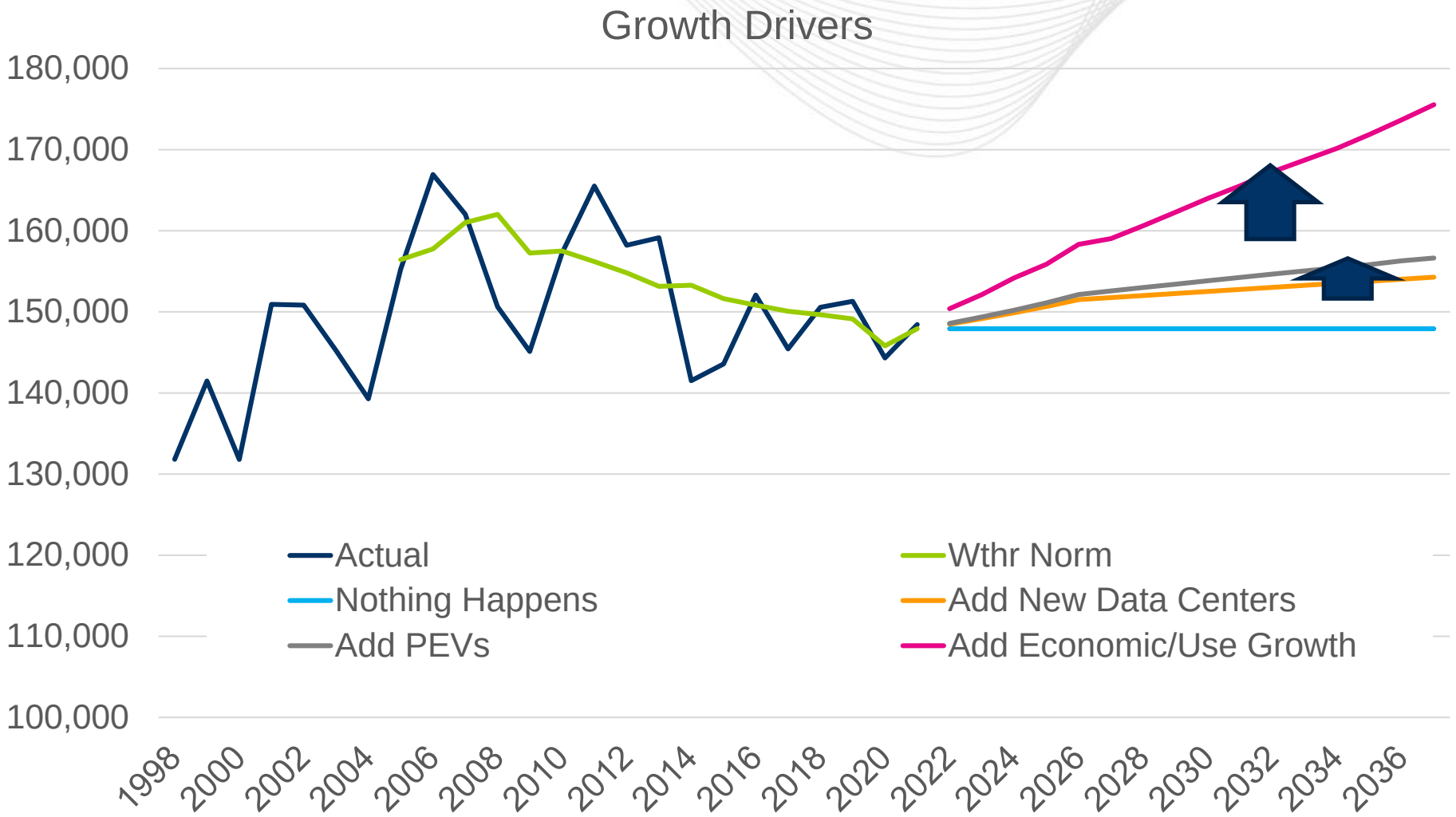
Building to a Summer Peak Forecast – Part I



- "Add Economic/Use Growth" includes no future efficiency gains or future solar
- PEV and Data Centers contribution shown here is only additions beyond 2021.

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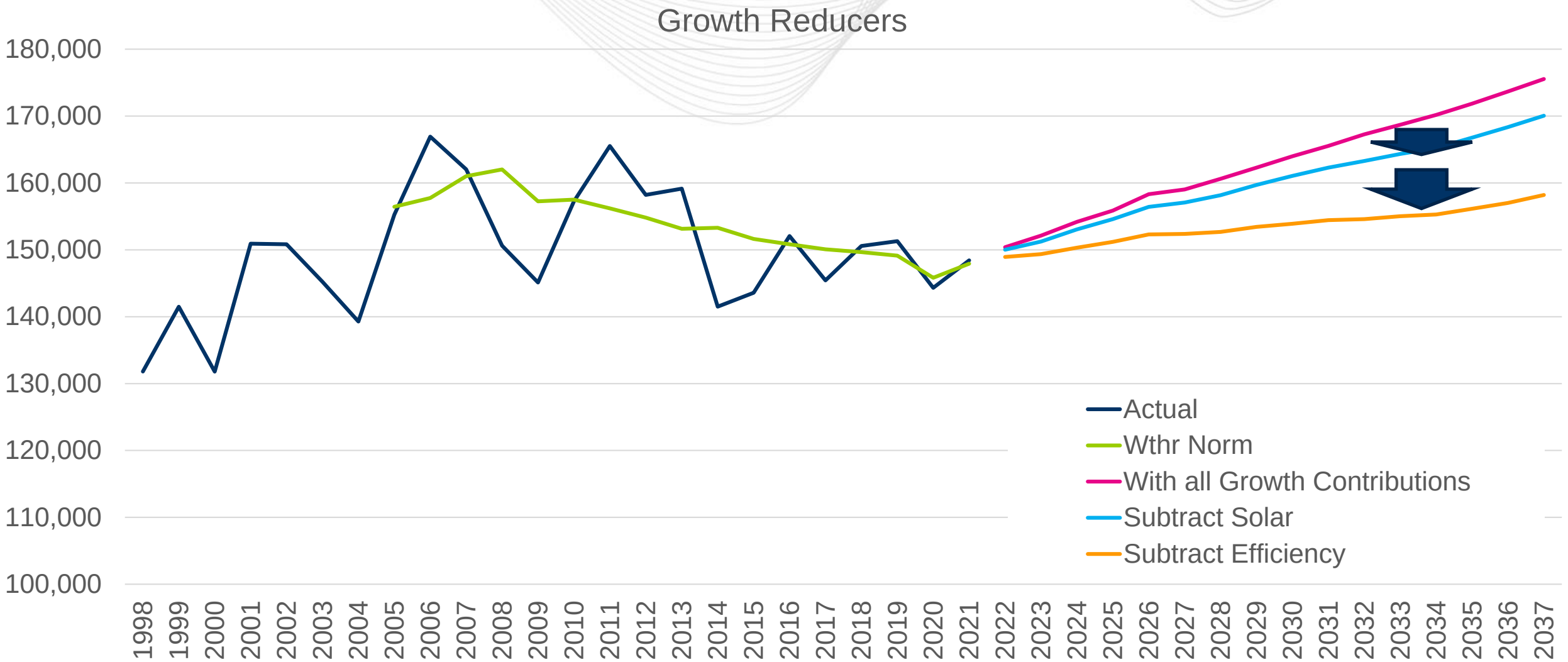
Building to a Summer Peak Forecast – Part II



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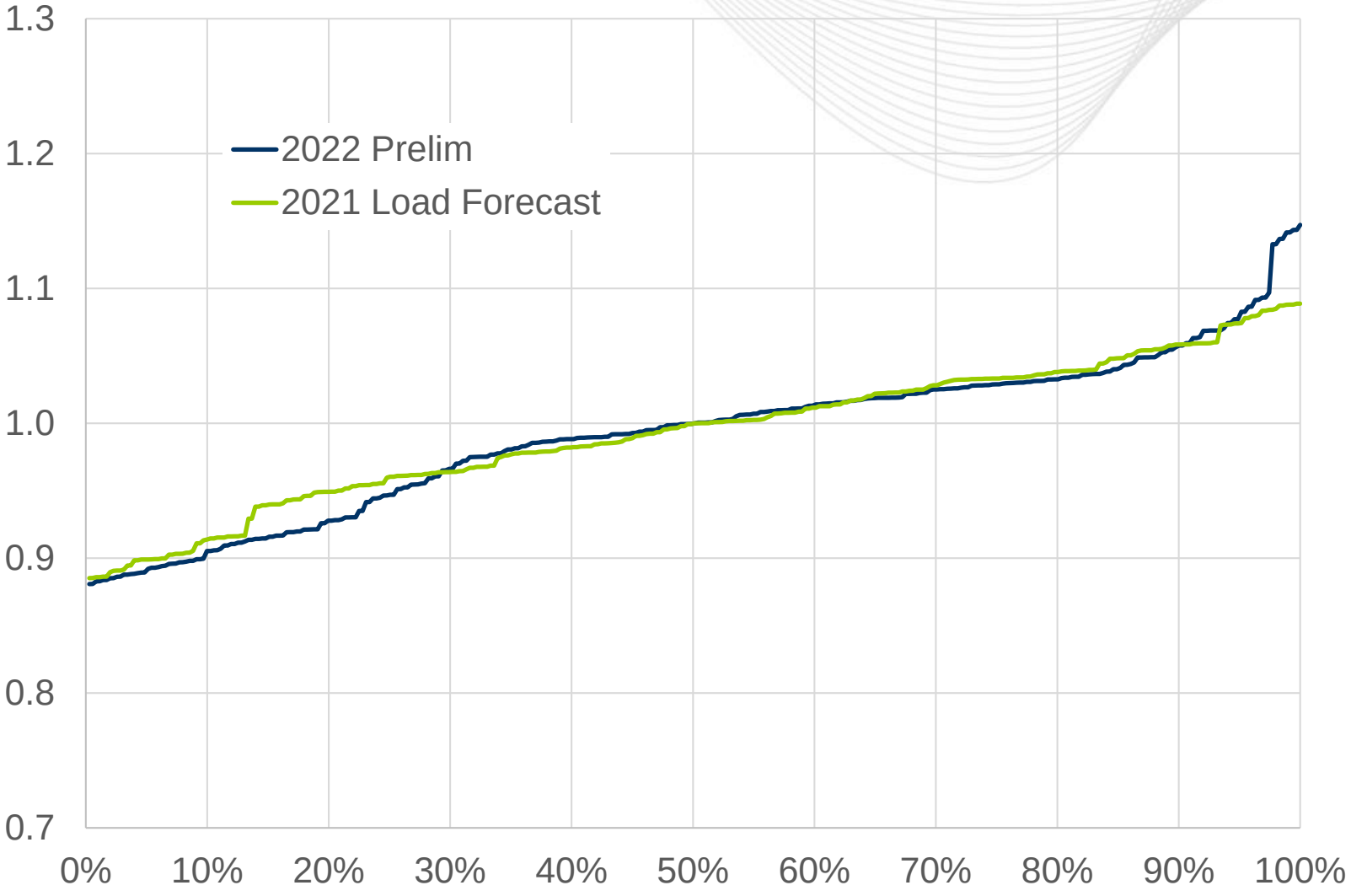
2024 Summer Peak Distribution Comparison
50/50 Forecast = 1.0



2022 Load Forecast used weather simulation of 1994-2020 to construct distribution compared with 1993-2019 in 2021 Load Forecast.

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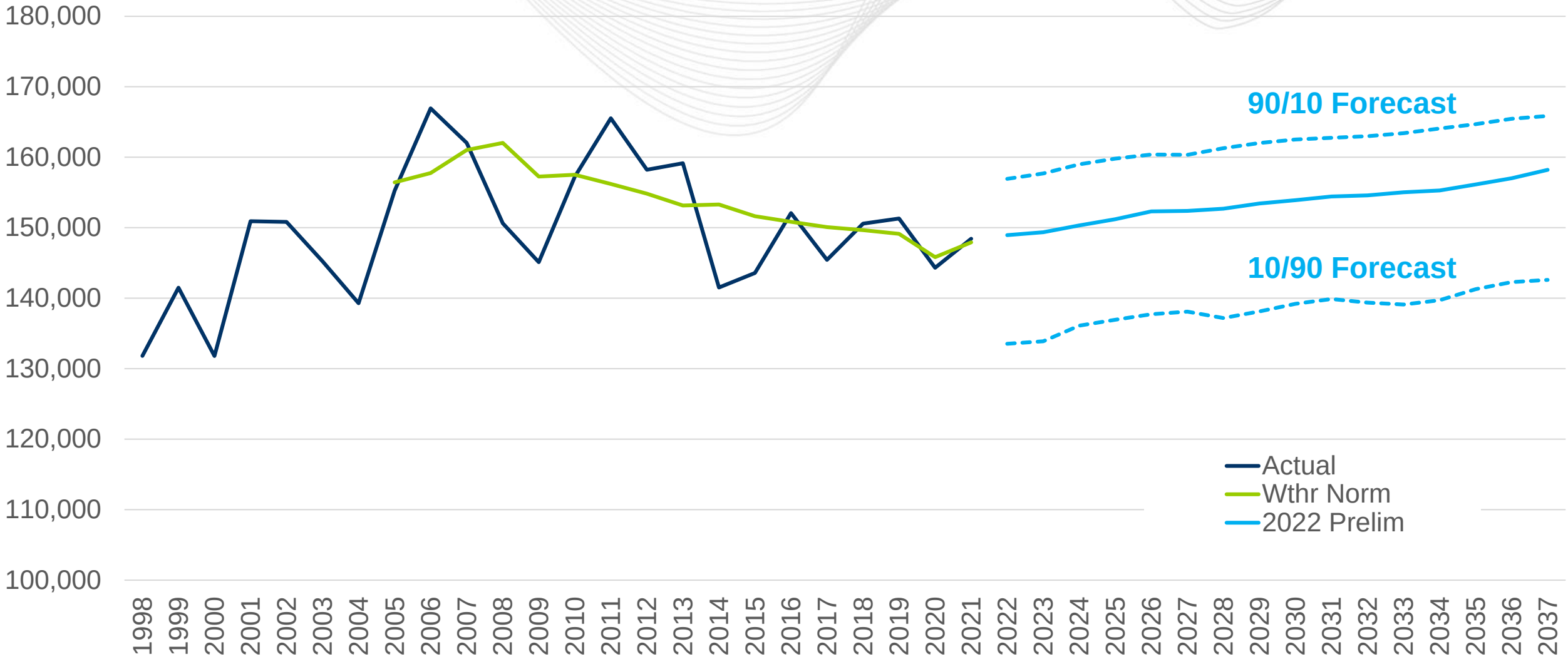
Summer Forecast with 90/10 and 10/90 Weather Bands



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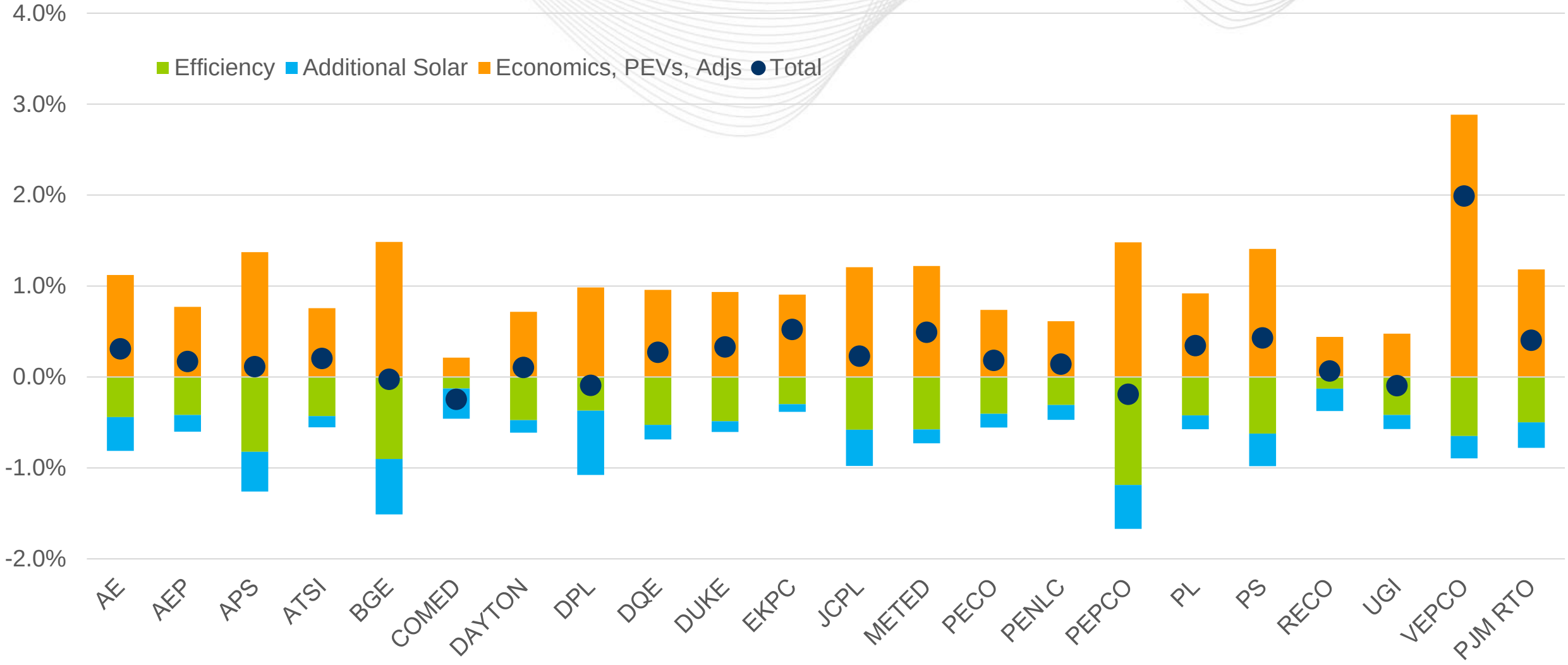
Summer Peak Average Annual Growth (2022-2037)



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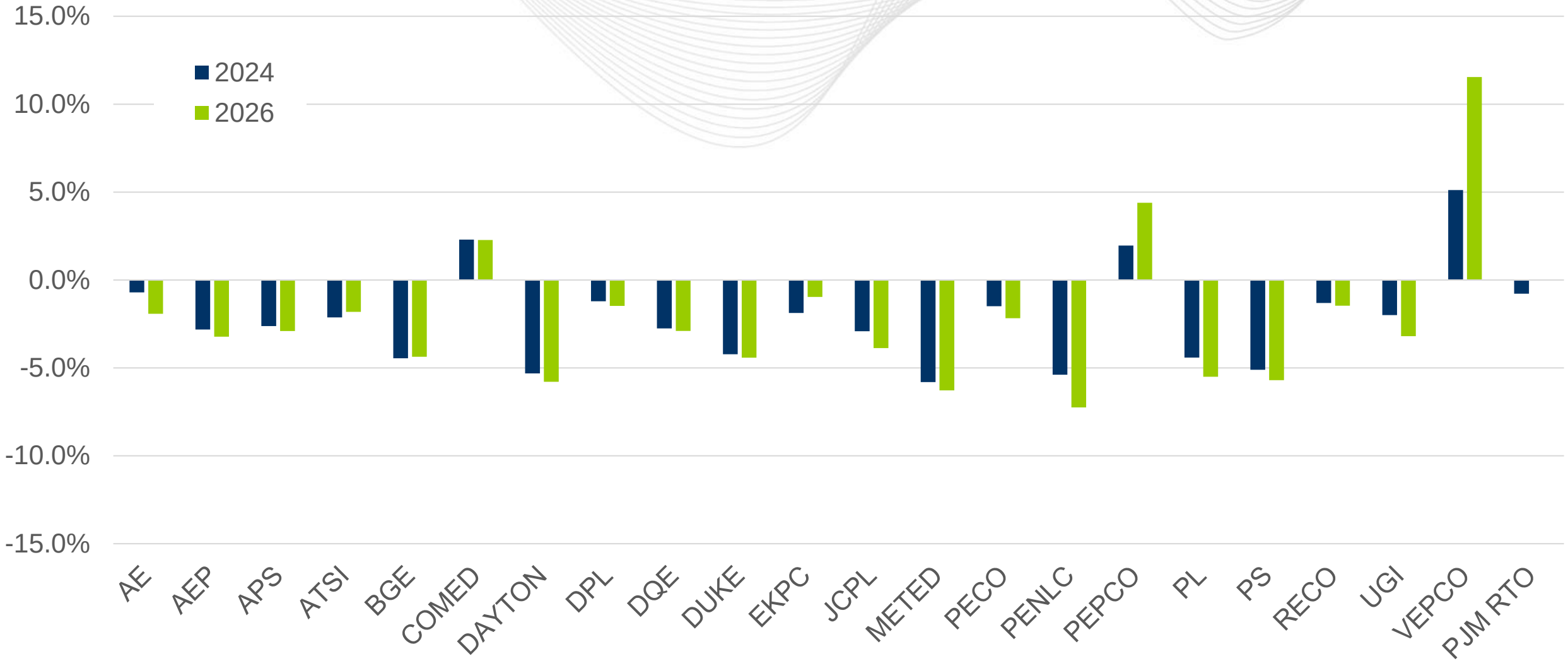
Percent Change in Summer 50/50 Forecast
2022 Preliminary vs 2021 Load Forecast



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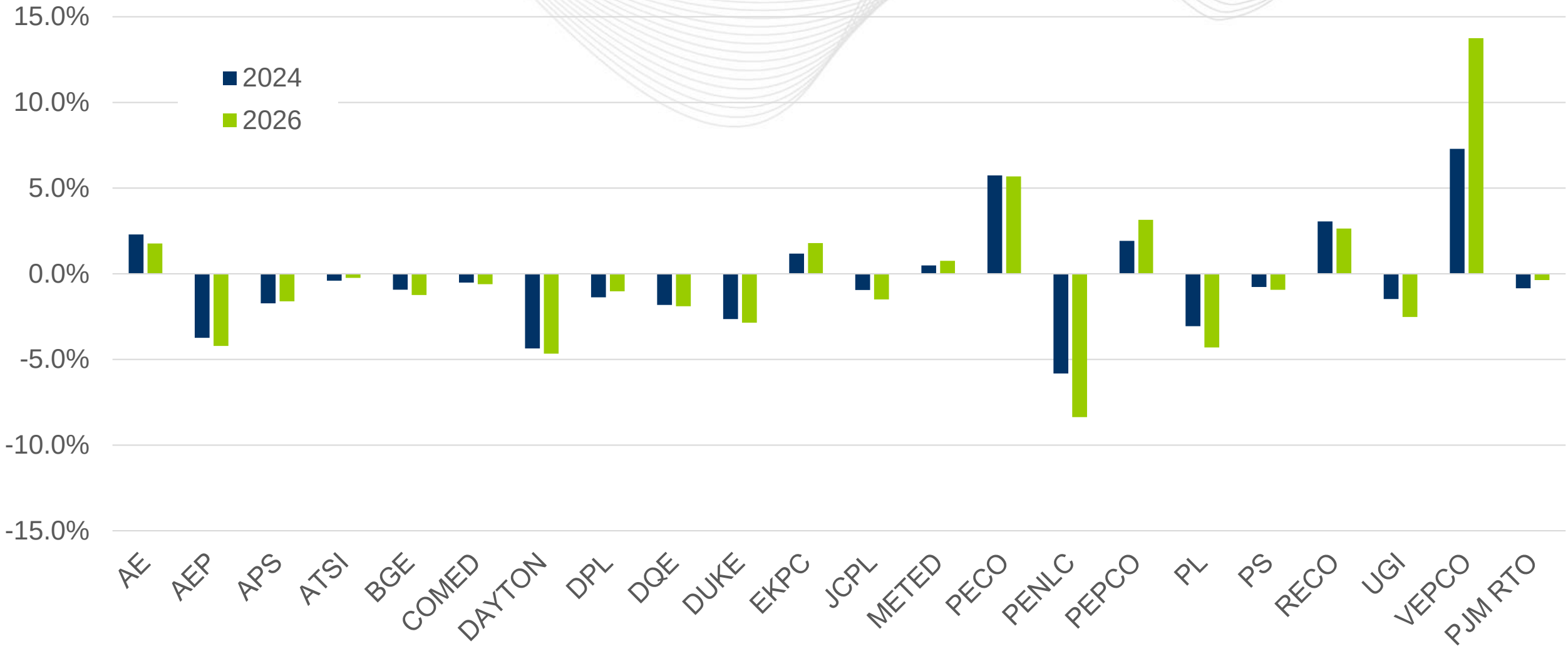

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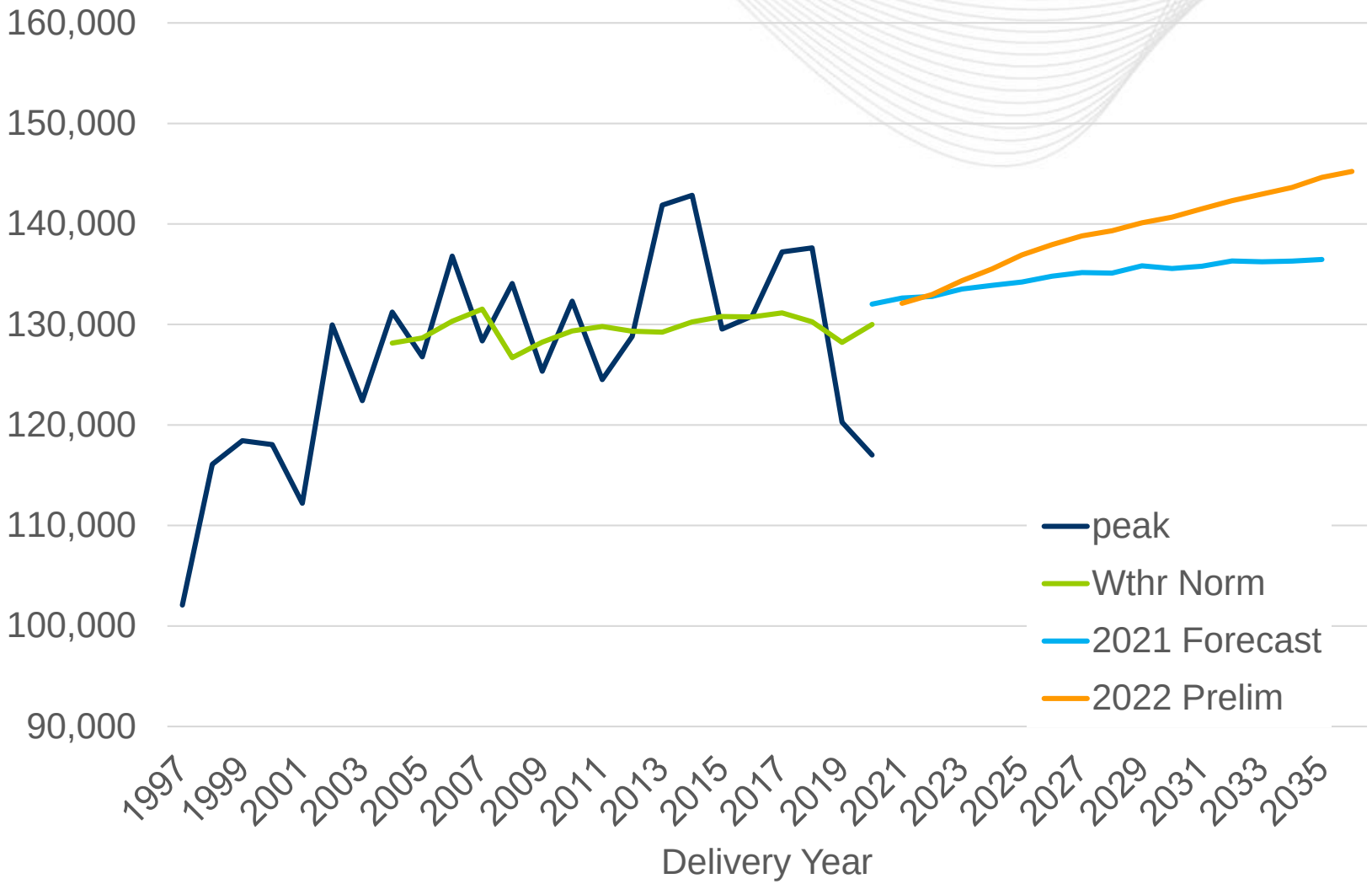
Winter Forecast Comparison 2021 vs 2022



- 15-year Annualized Growth Rate
  - 2021 LF: 0.2%
  - 2022 Prelim: 0.6%
- Select year comparisons (2022 Prelim vs 2021LF)
  - 2025: Up 2%
  - 2027: Up 2.7%
  - 2035: Up 6%

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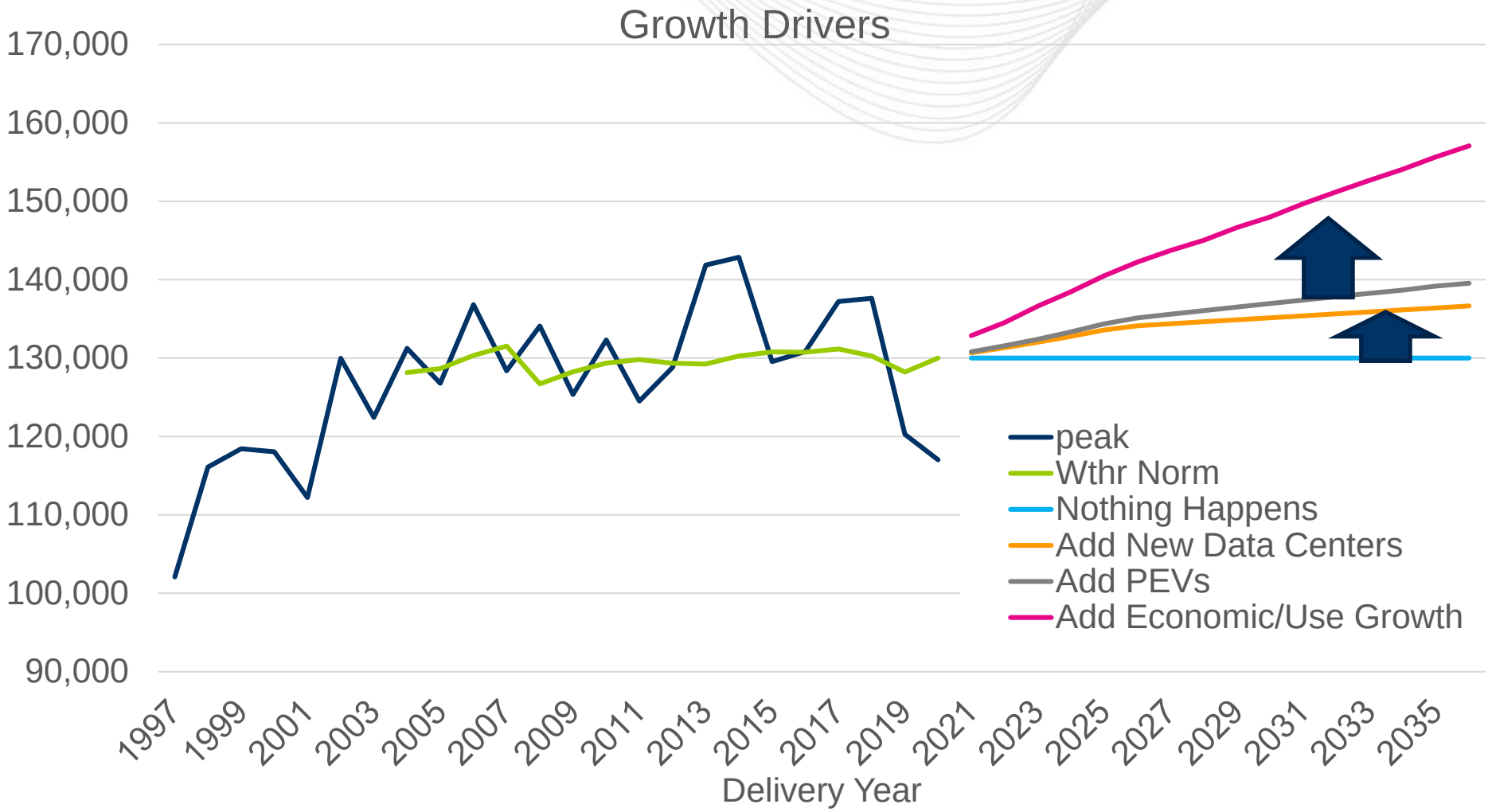
Building to a Winter Peak Forecast – Part I



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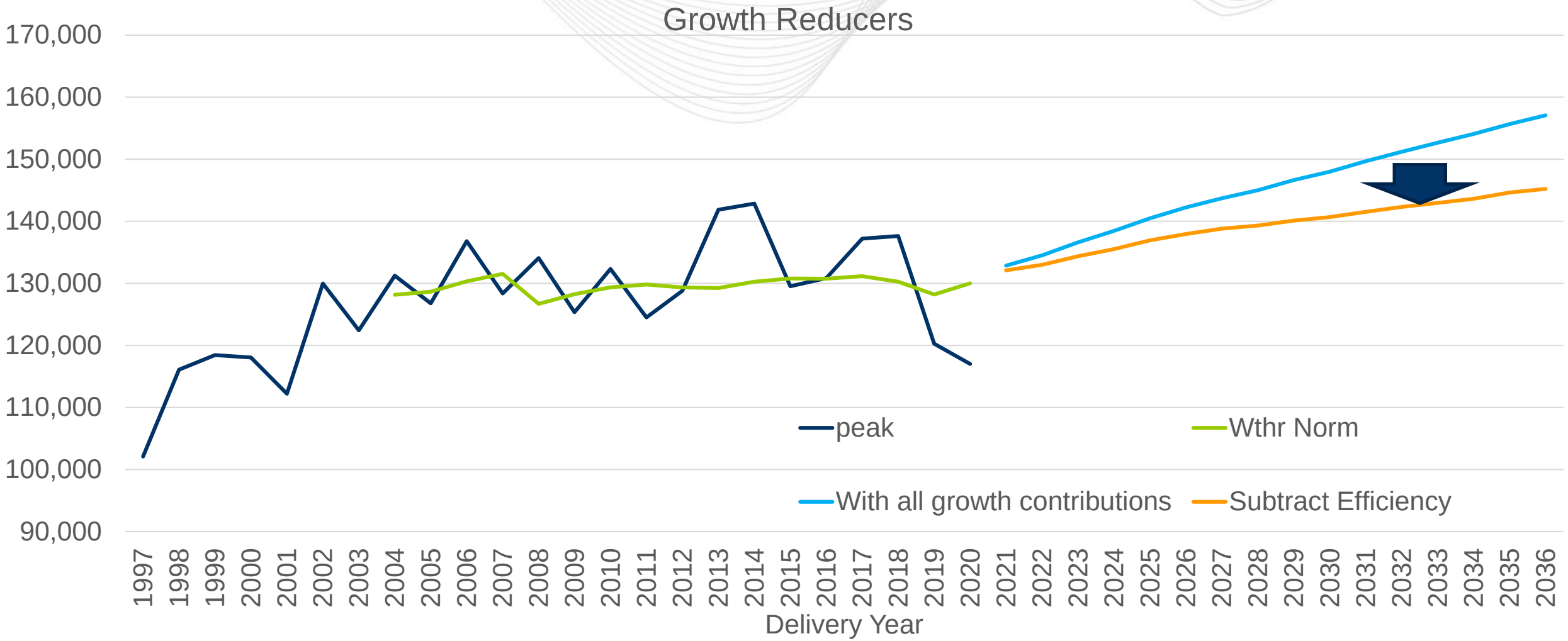
Building to a Winter Peak Forecast – Part II



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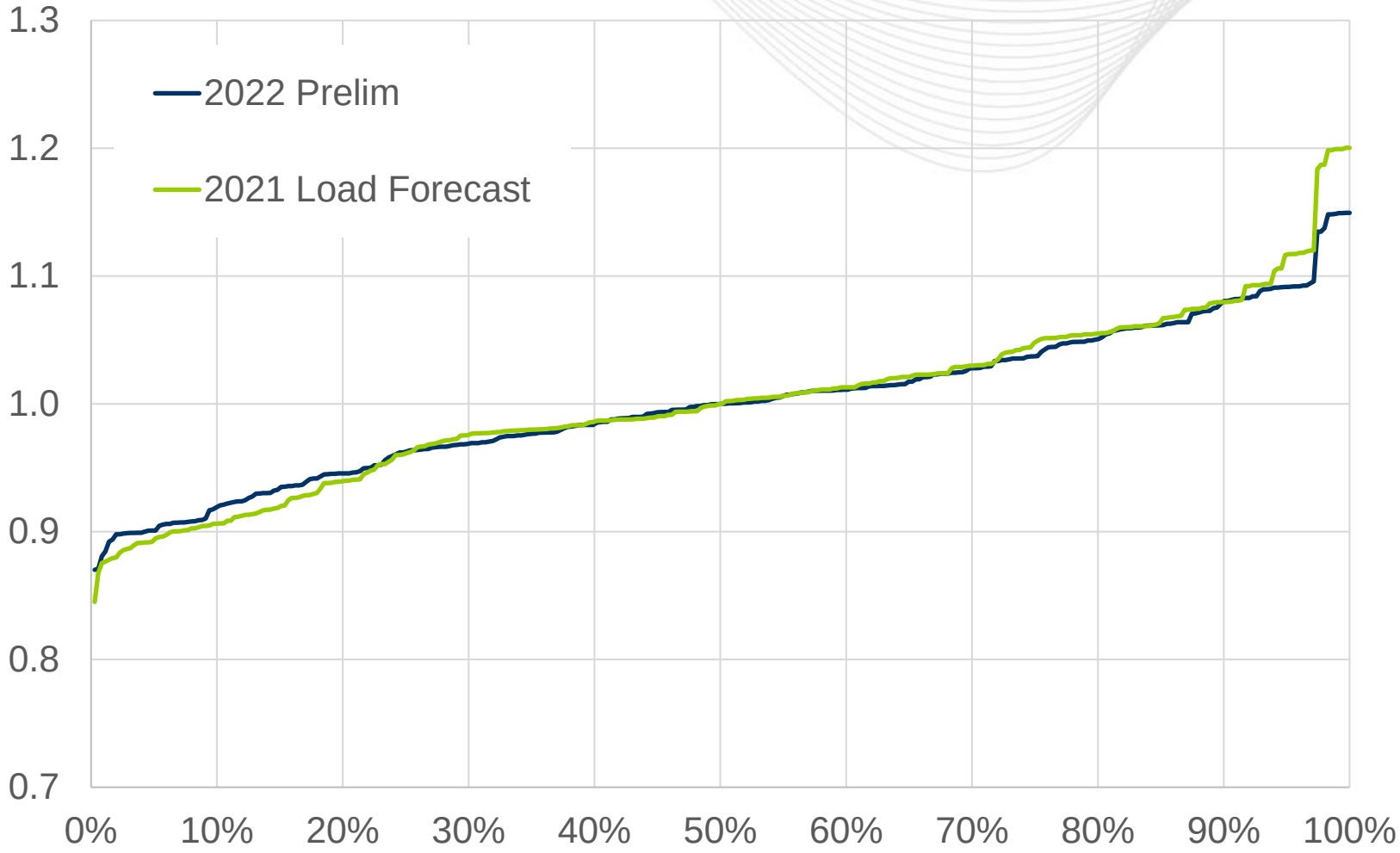
Winter Peak Distribution Comparison
50/50 Forecast = 1.0



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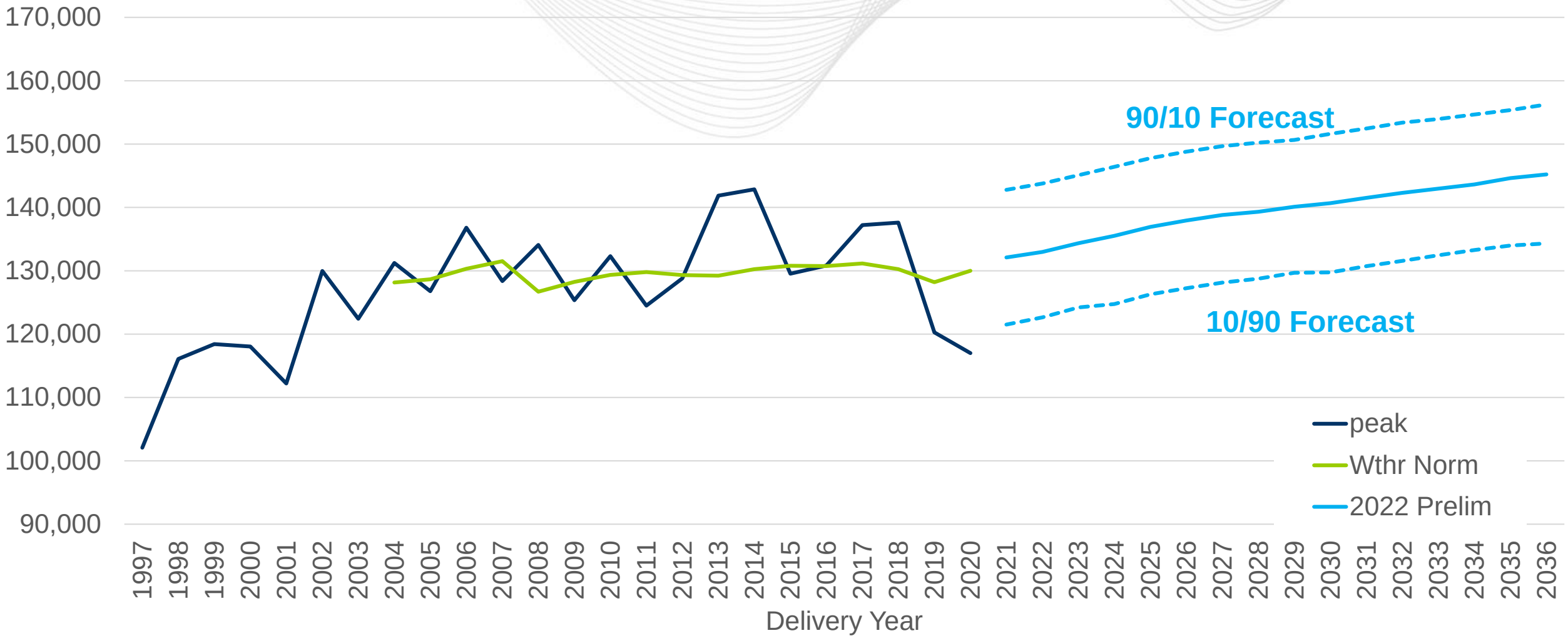

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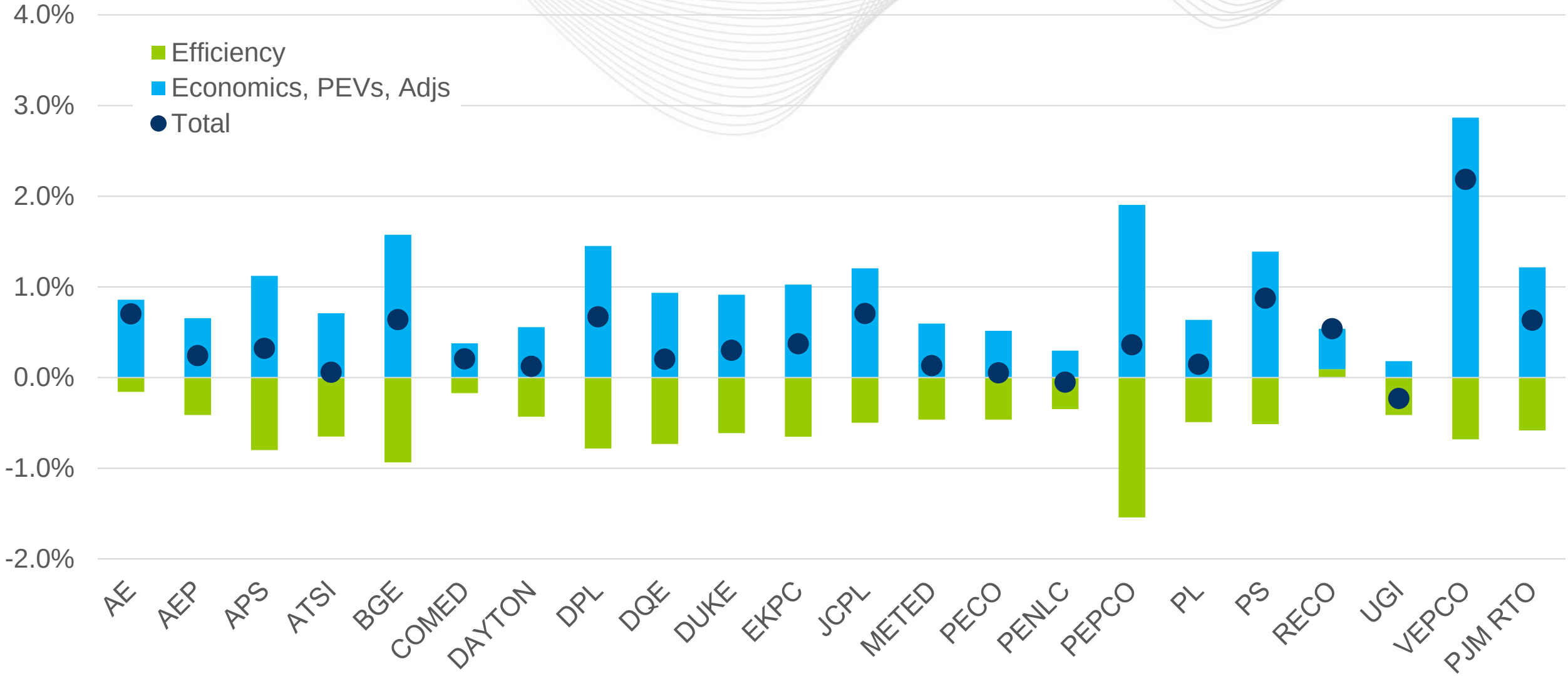
Winter Average Annual Growth (2021DY – 2036DY)



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Percent Change in Winter 50/50 Forecast
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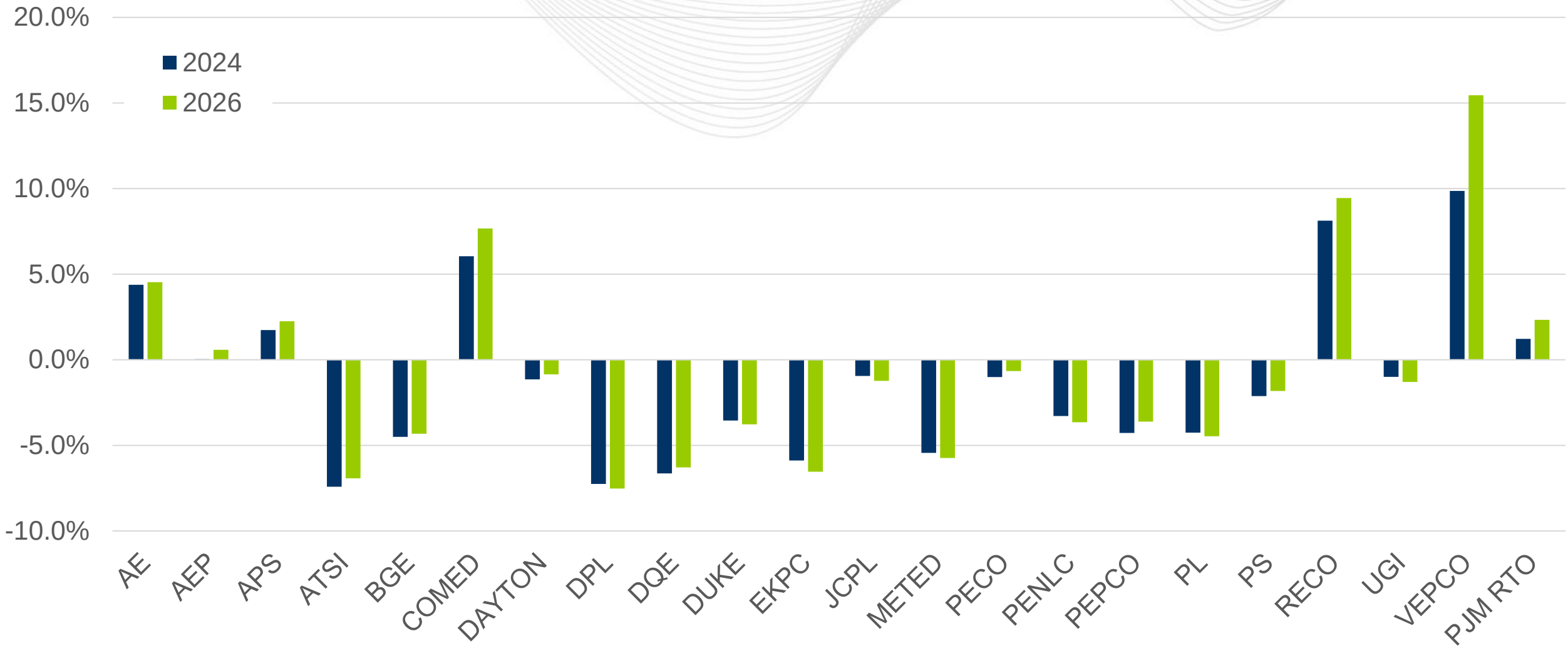

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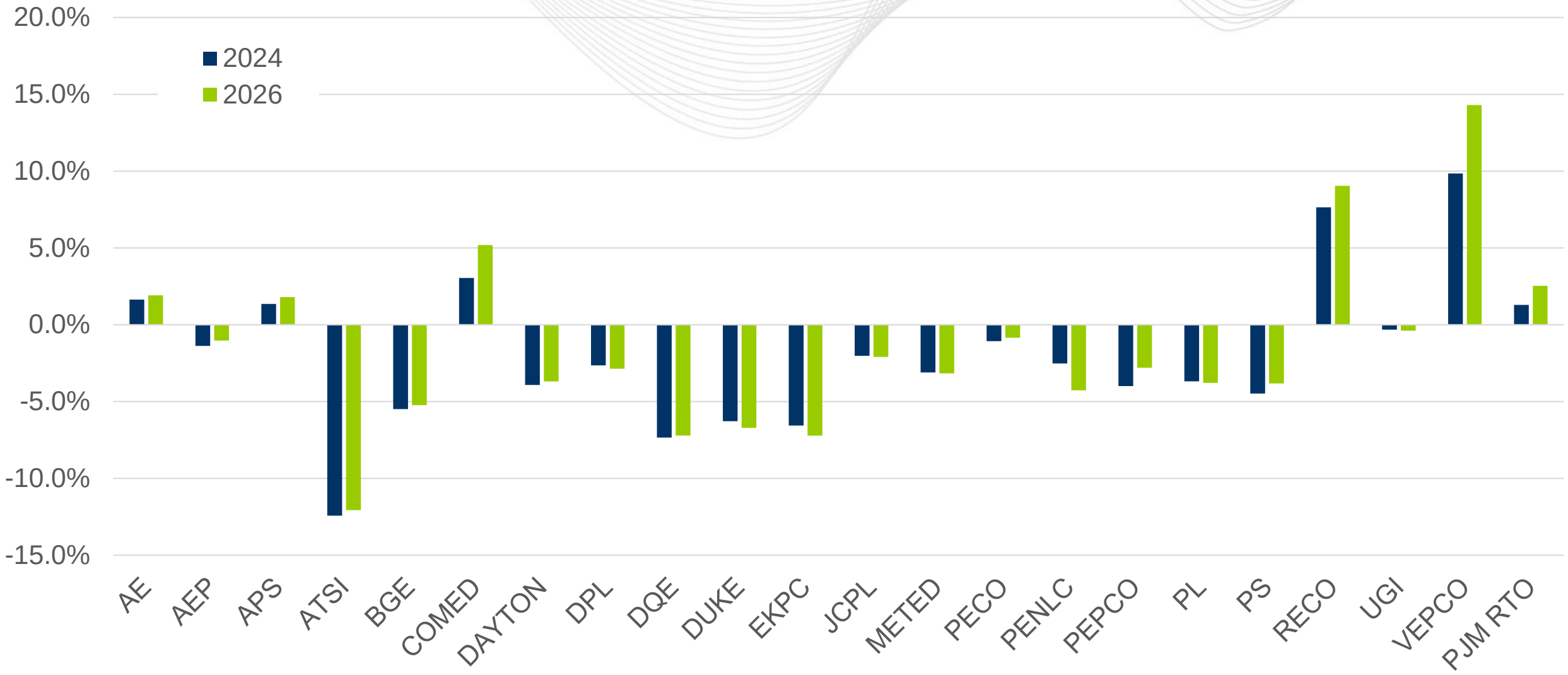

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Areas of Focus in 2022

- Transition to hourly framework

- Continue development on forecast assumptions
  - Electric Vehicles
  - Storage

- Review/implement consultant recommendations
  - Modeled forecast
  - EVs, Solar/Storage, Load Management

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Next Steps

- Review with Planning Committee (12/14/2021)
- Publish final report in late December
  - Accompanying spreadsheets
    - Unrestricted Loads
    - Model Details Spreadsheets
    - End-Use Indices
    - Weather Variables
    - Statistical Appendix
  - Load Report Supplement

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Contact

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Andrew.Gledhill@pjm.com

Load_Analysis_Team@pjm.com

2022 Preliminary Load Forecast

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(866) 400 – 8980

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