Forecast Methodology Updates

Load Analysis Subcommittee
September 3, 2021

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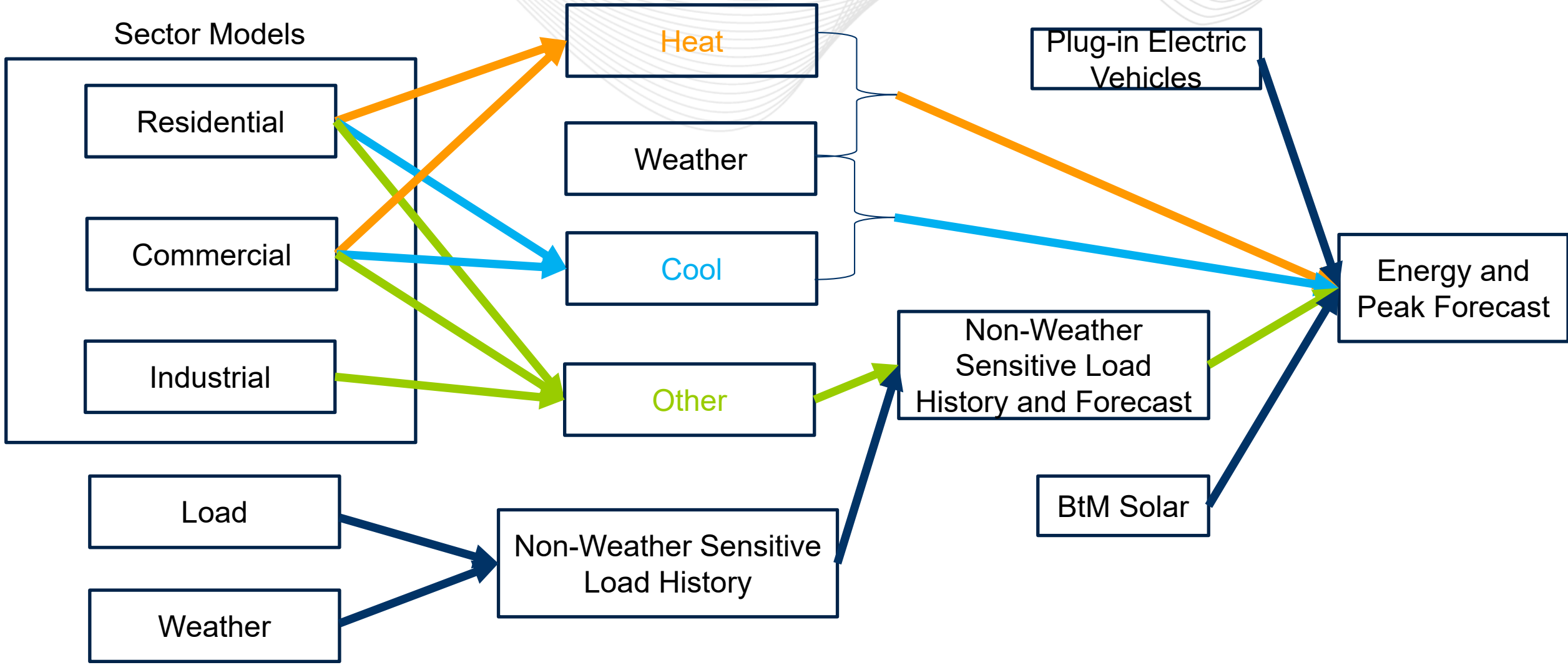
Resource Adequacy Planning

Load Forecast Model Flow



Methodology Updates

- Sector Models
- Refinements to final model specification

Sector Model – Commercial

- Pulled in Real Output as an additional driver
  - Economics for each zone is a weighted combination of real output, employment, and working-age population (previously just the latter two)
- Changes in Commercial model that allow for different Heat+Cool and Other for each zone based on model fit.
  - Previously was just a share down of energy based on Census division based end-use values

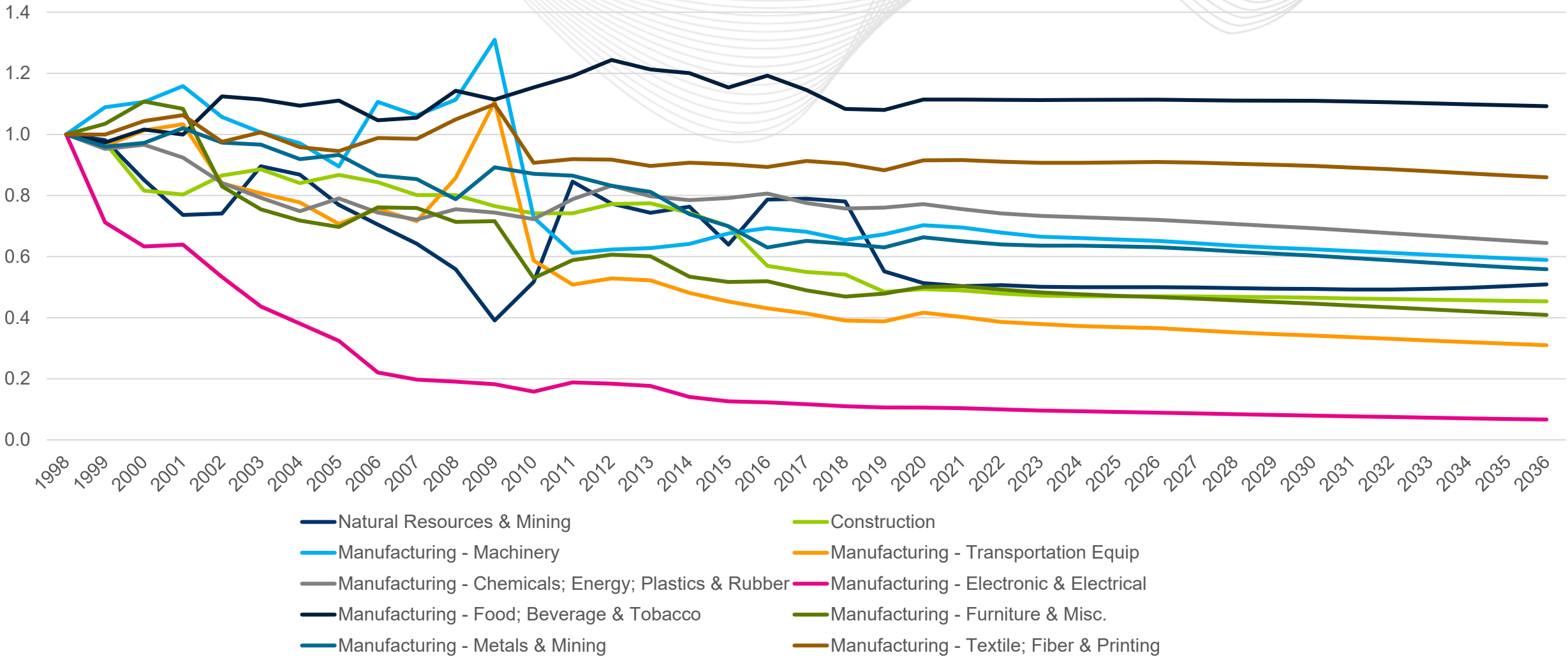
Sector Model - Industrial

- Brought in new sector-specific industrial intensity values that are then weighted together based on each zone's composition
  - Previously was a national intensity measure

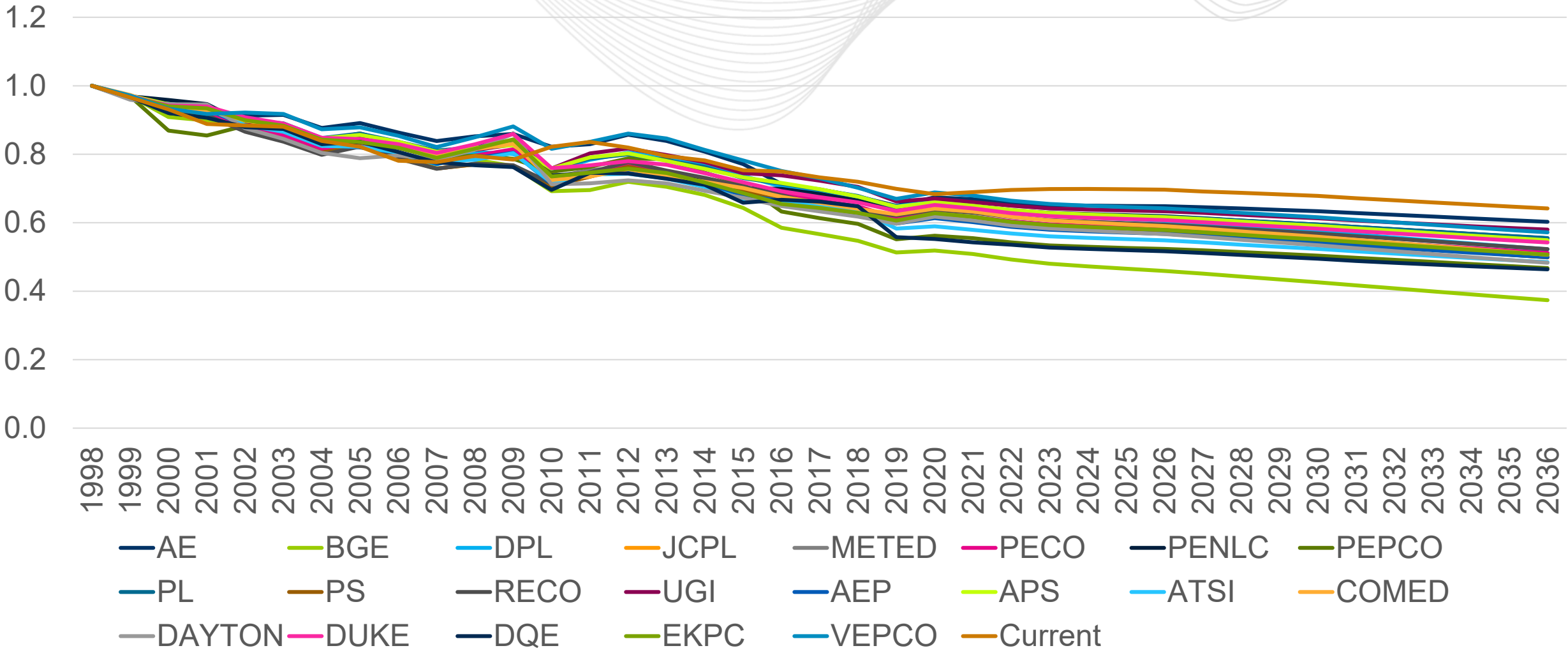
Industrial Details

- Economic real output measured at the zonal level but across more industries
- Intensity at the national level, but weighted for each zone based on its own industrial mix per the industries laid out above
- Industries
  - Natural Resources, Mining
  - Construction
  - Manufacturing - Machinery
  - Manufacturing - Transportation equipment
  - Manufacturing - Chemicals; Energy; Plastics & Rubber
  - Manufacturing - Electronic & Electrical
  - Manufacturing - Food; Beverage & Tobacco
  - Manufacturing - Furniture & Misc.
  - Manufacturing - Metals & Mining
  - Manufacturing - Textile; Fiber & Printing

Intensity by Industry



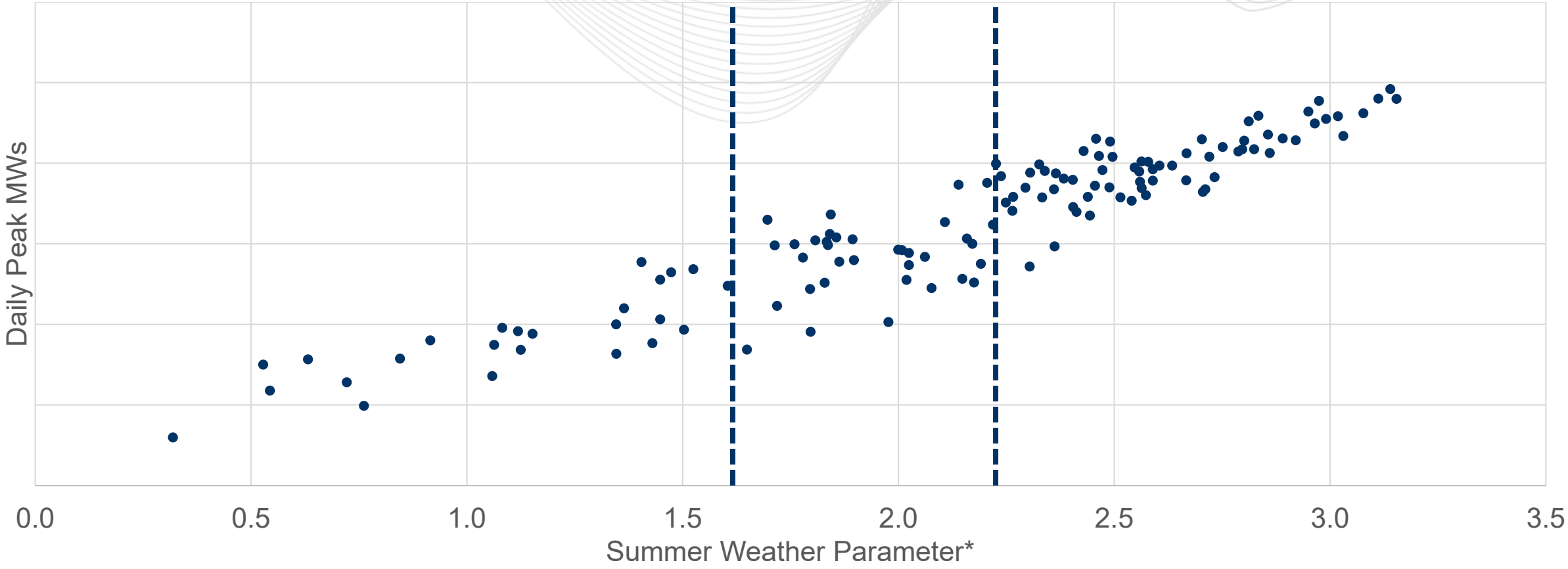
Zonal Industrial Intensity



Heat, Cool, Other

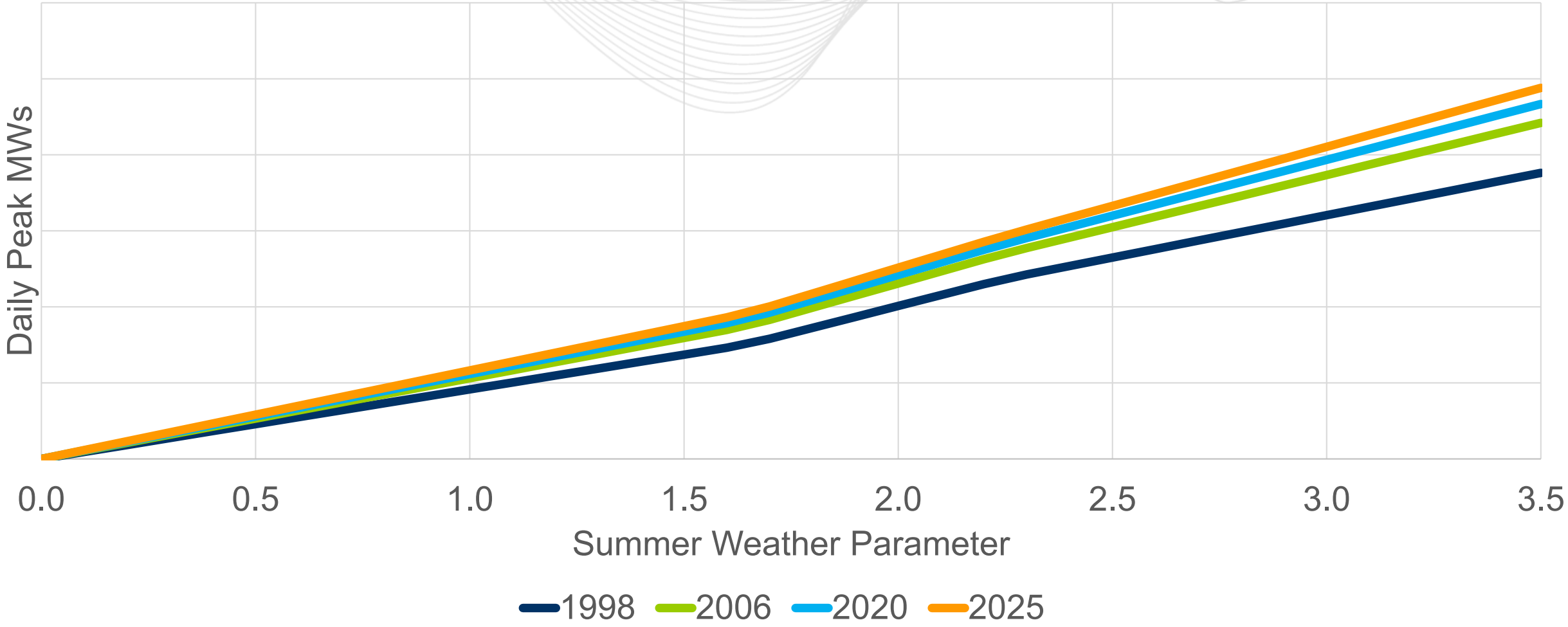
- Heat, Cool, and Other are retained from sector models as before
- Other still used as input to calibrate non-weather sensitive load
- Heat and Cool now used to calibrate observed changes in weather slopes.

Cooling - Load vs Weather



** Summer weather parameter is a weighted combination of daily Max THI, average afternoon THI, average morning THI, and average THI lagged 1 day*

Cooling Spline – Load vs Weather

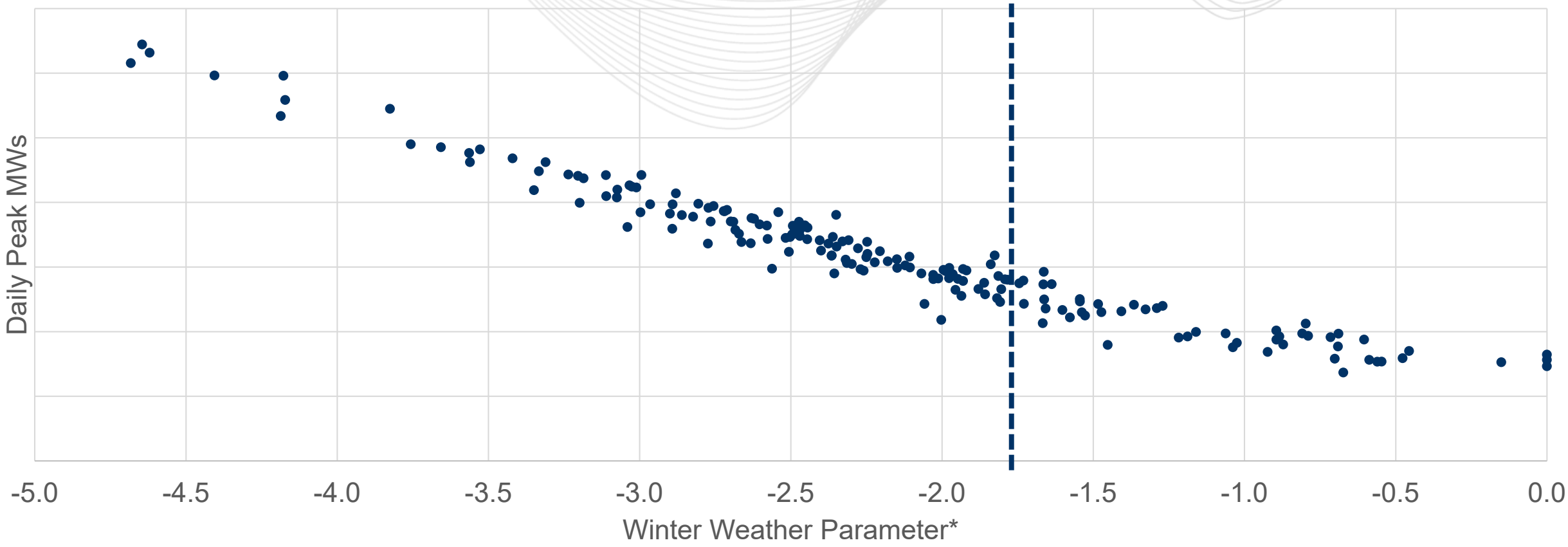


Cooling Overview

- Segments of spline are modeled against Cool index produced by Sector model process.

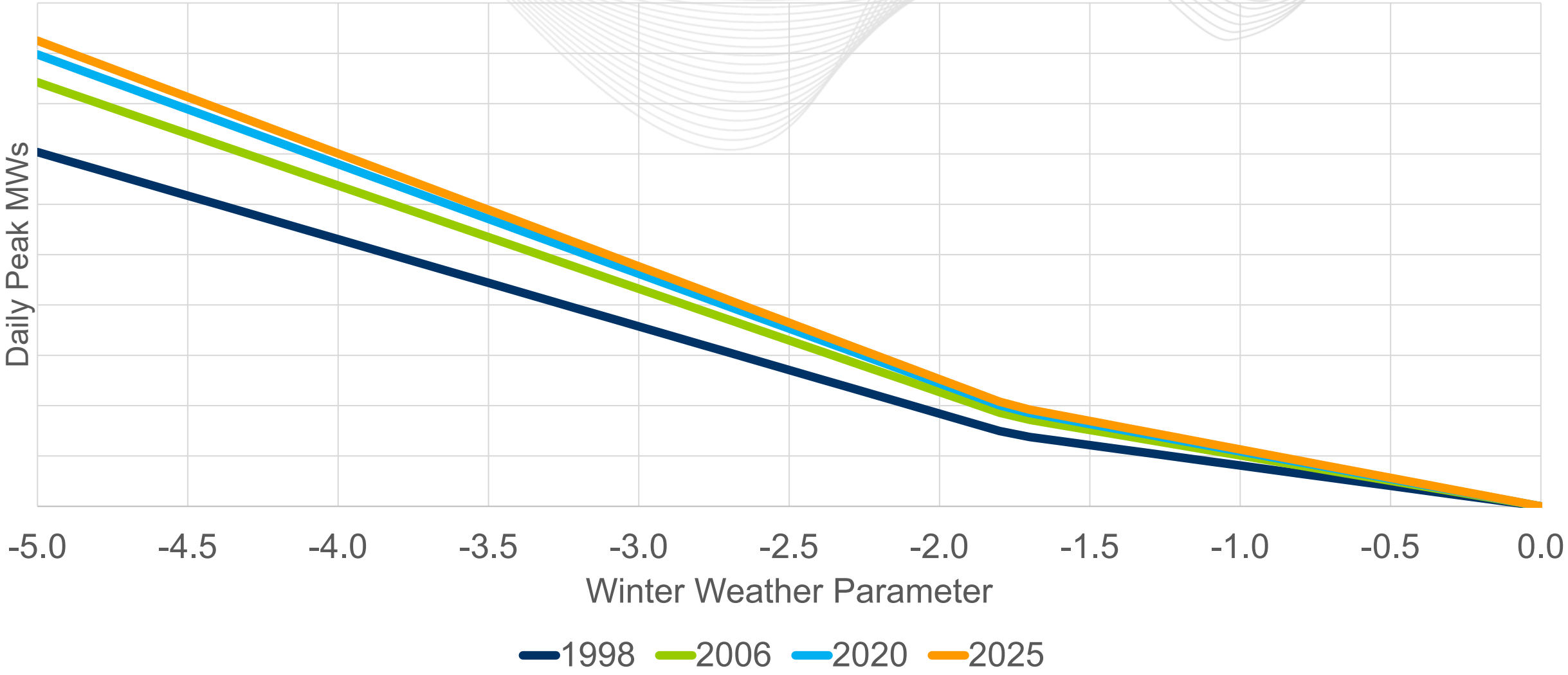
- Cooling response in the model changes over time to reflect the evolving state of economic and end-use factors (saturation/efficiency of cooling).

Heating - Load vs Weather



** Winter weather parameter is a weighted combination of wind-adjusted temperature at the time of the peak, daily Min wind-adjusted temperature, average daily wind-adjusted temperature, and average daily wind-adjusted temperature lagged 1-day*

Heating Spline – Load vs Weather



Heating Overview

- Segments of spline are modeled against Heat index produced by Sector model process.

- Heating response in the model changes over time to reflect the evolving state of economic and end-use factors (saturation/efficiency of heating).

Final Model

- Handling of Non-Weather Sensitive Load
  - Interacted with day of the week by month
    - Jan_Monday_NWS Jan_Tuesday_NWS Jan_Wednesday_NWS Jan_Thursday_NWS Jan_Friday_NWS Jan_Saturday_NWS Jan_Sunday_NWS

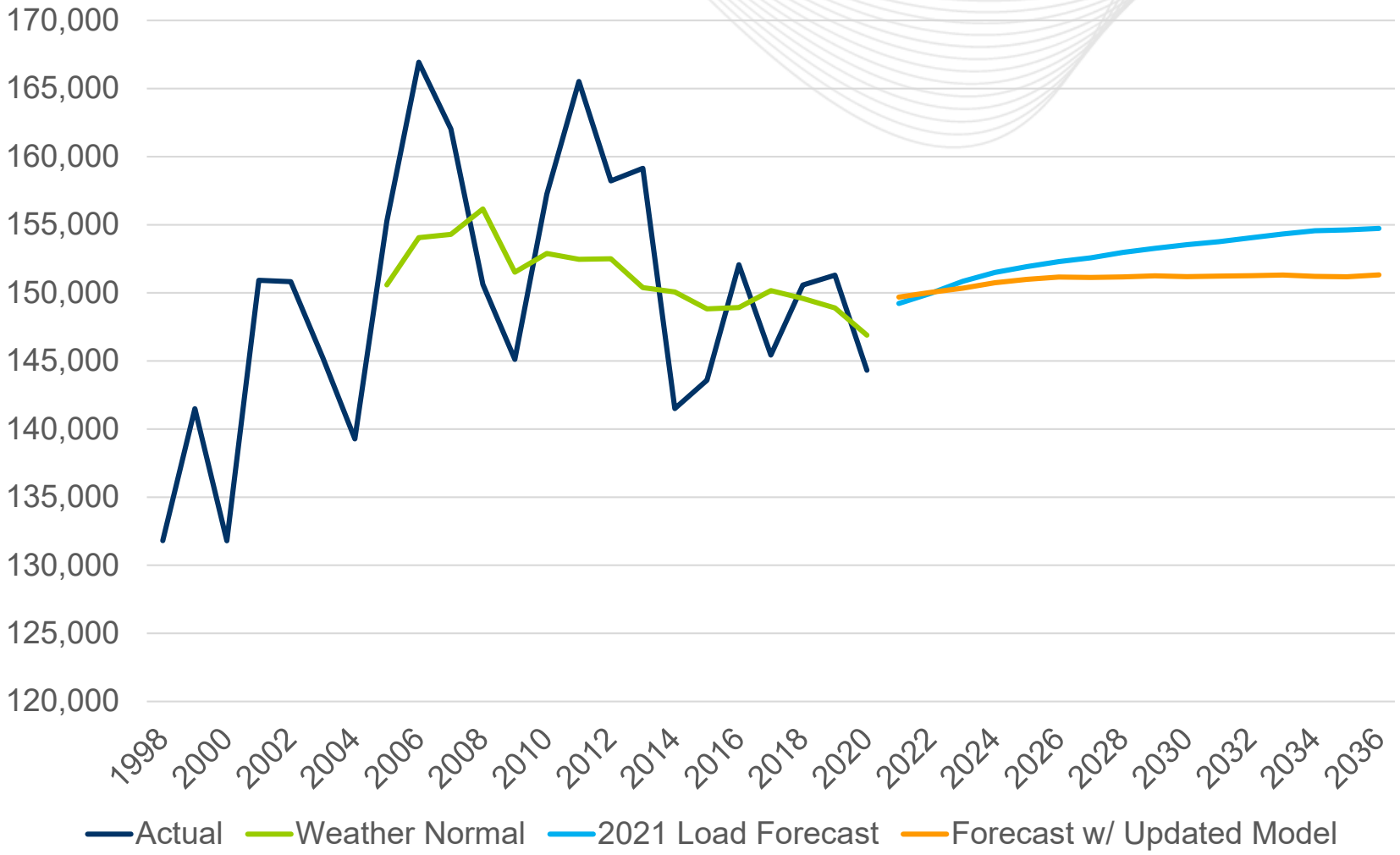
      …

      Dec_Monday_NWS Dec_Tuesday_NWS Dec_Wednesday_NWS Dec_Thursday_NWS Dec_Friday_NWS Dec_Saturday_NWS Dec_Sunday_NWS
  - Interacted with holidays

Final Model

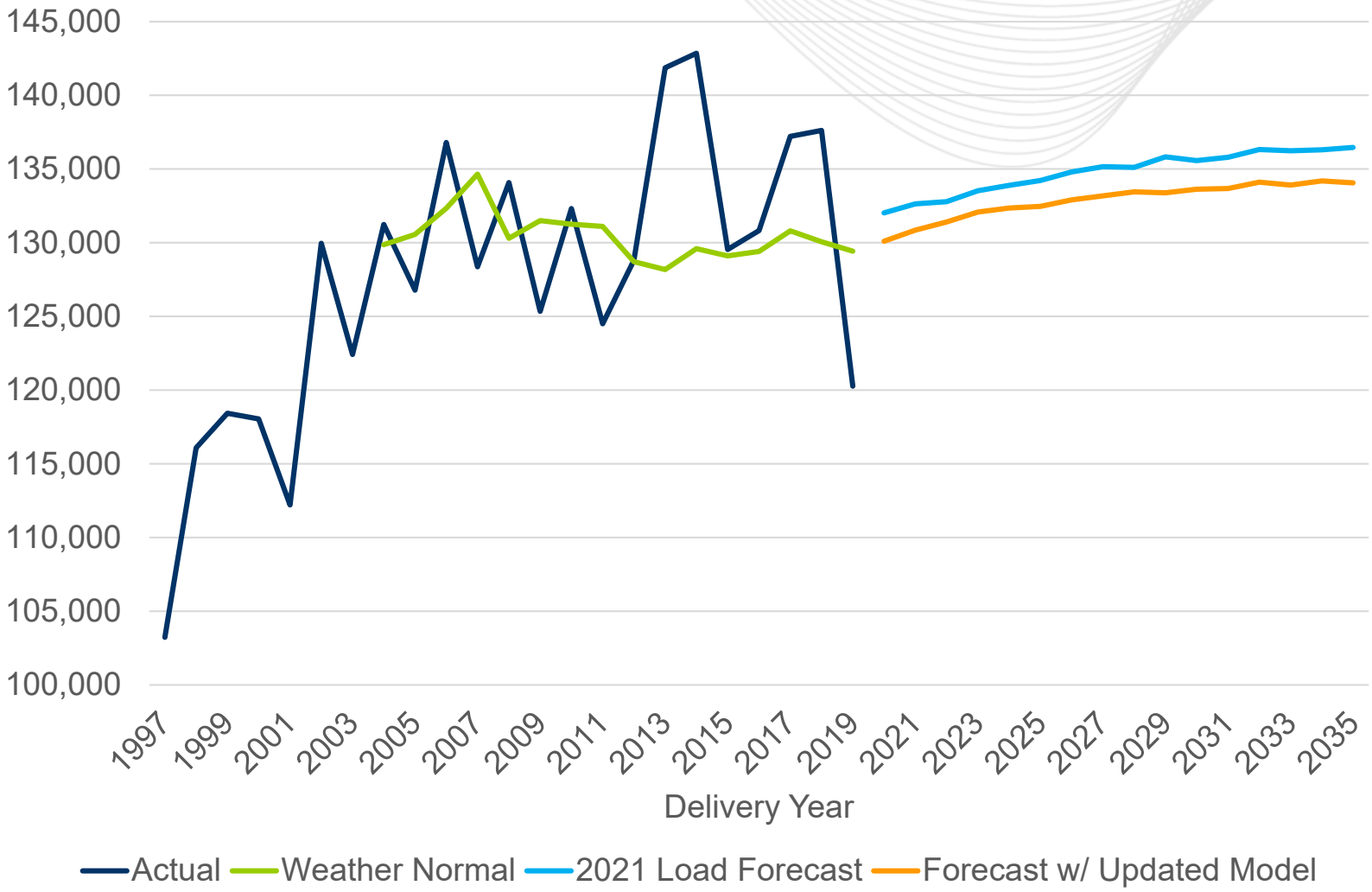
- Time trend variables
  - One for each month
    - Jan_Trend
      …
      Dec_Trend
  - Attempt to capture trends in load not accounted for in model variables
    - Can be thought of similar to including an intercept in a Diff/Diff model framework

Summer 50/50 Peak Forecast Results



- % change
  - 2021: +0.3%
  - 2024: -0.3%
  - 2036: -2.2%
- 15-yr Growth Rate
  - 2021 LF: +0.2%
  - Updated Model: +0.1%
- Both models use same estimation and input assumptions.

Winter 50/50 Peak Forecast Results

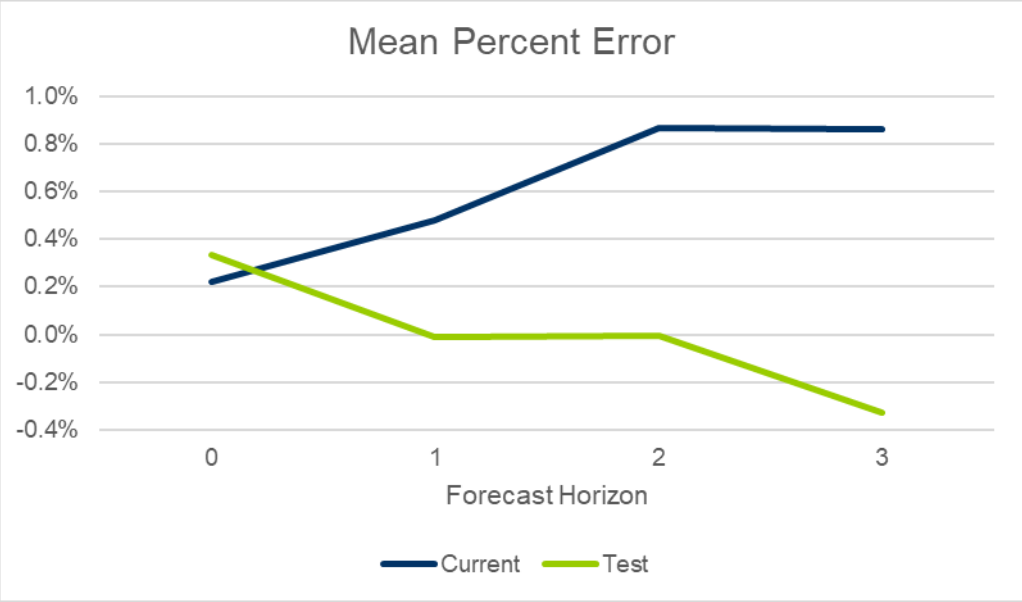


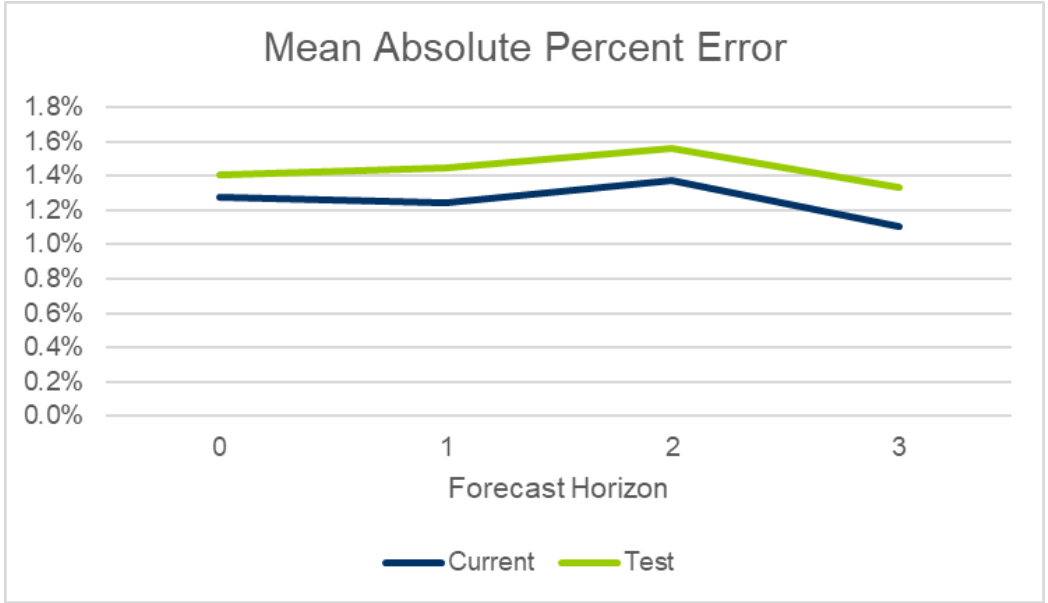
- % change
  - 2021: -1.3%
  - 2024: -1.1%
  - 2035: -1.8%

- 15-yr Growth Rate
  - 2021 LF: +0.2%
  - Updated Model: +0.2%

Summer Model Accuracy – 10CPs

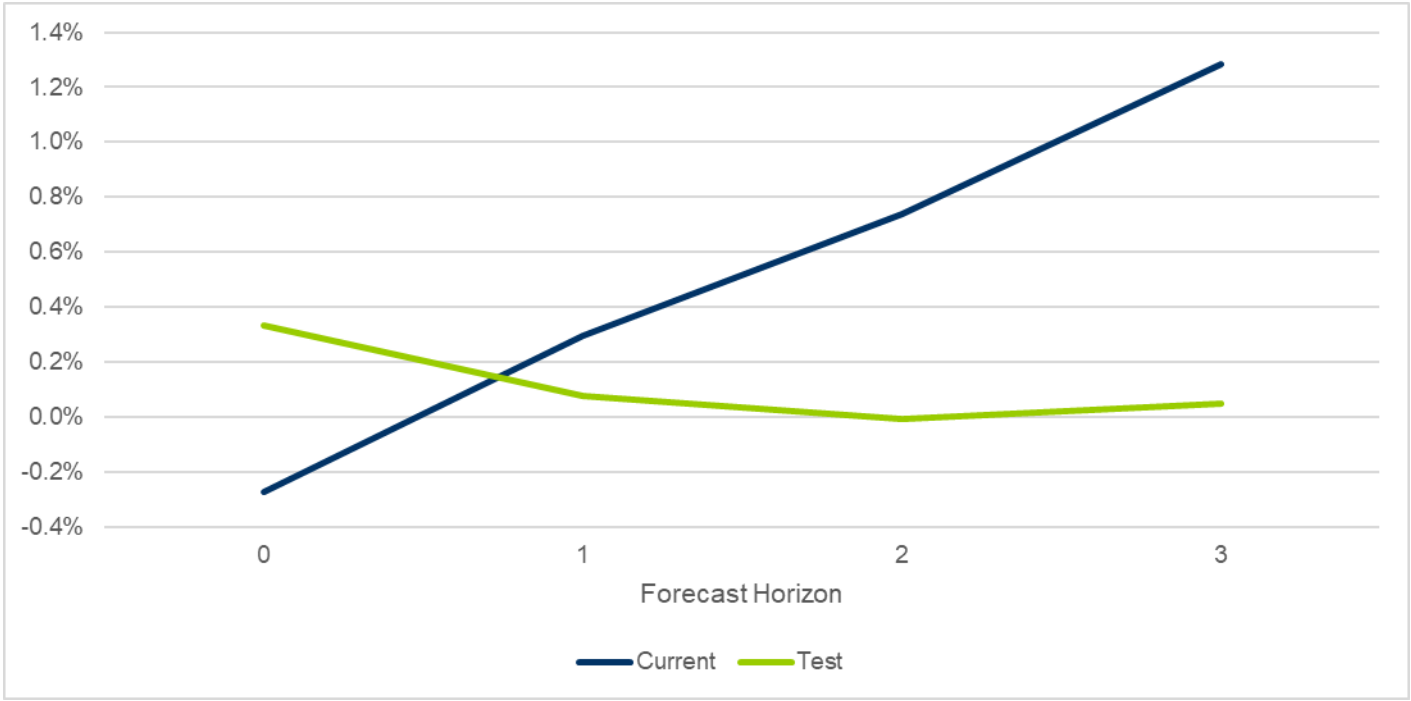
- Solve model with current economics/end-use given actual weather





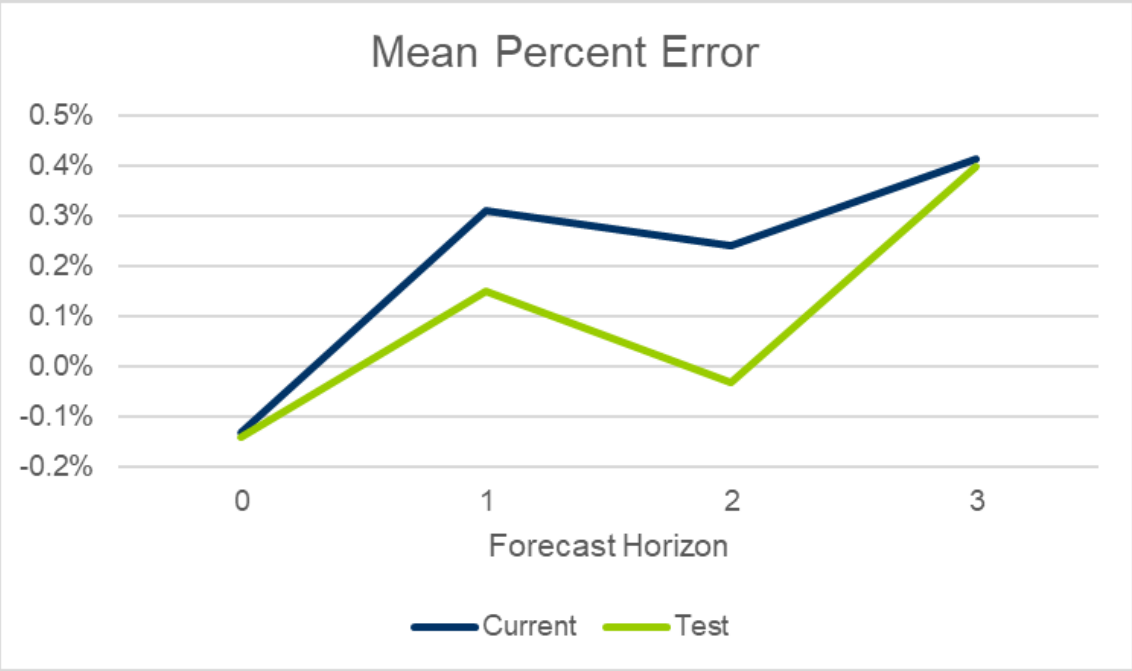
Summer Model Accuracy – Seasonal Peak

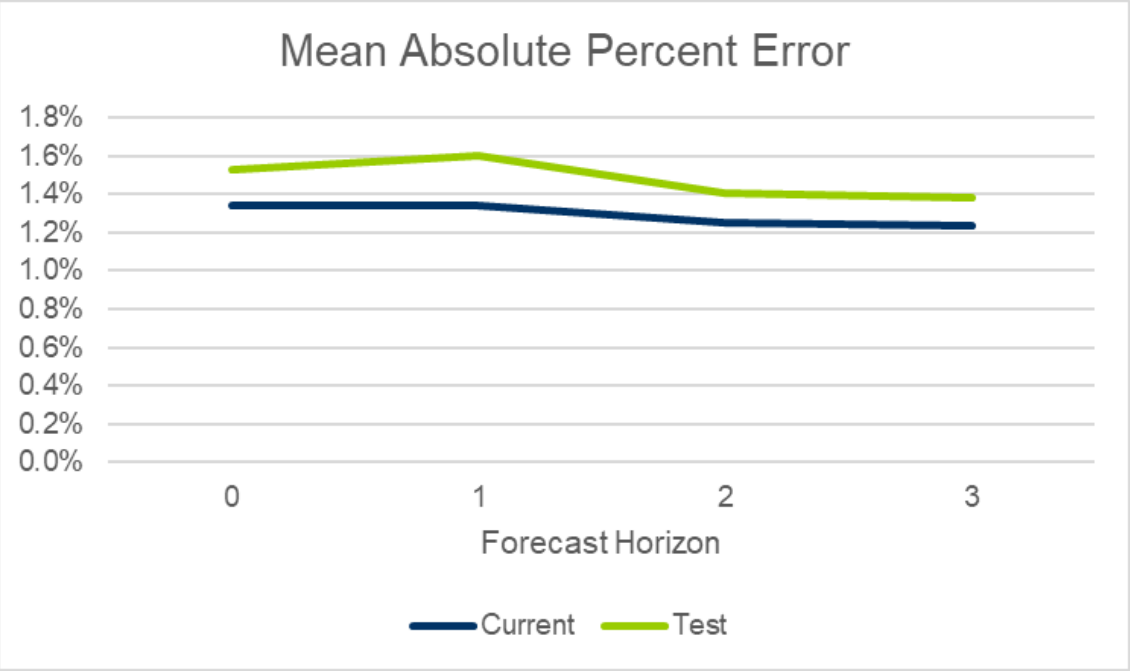
- Goal of model is to determine the seasonal peak, so alternatively can solve for how actual peaks compare to what model would solve for given knowledge of the seasonal weather



Winter Model Accuracy – 10CPs

- Solve model with current economics/end-use given actual weather





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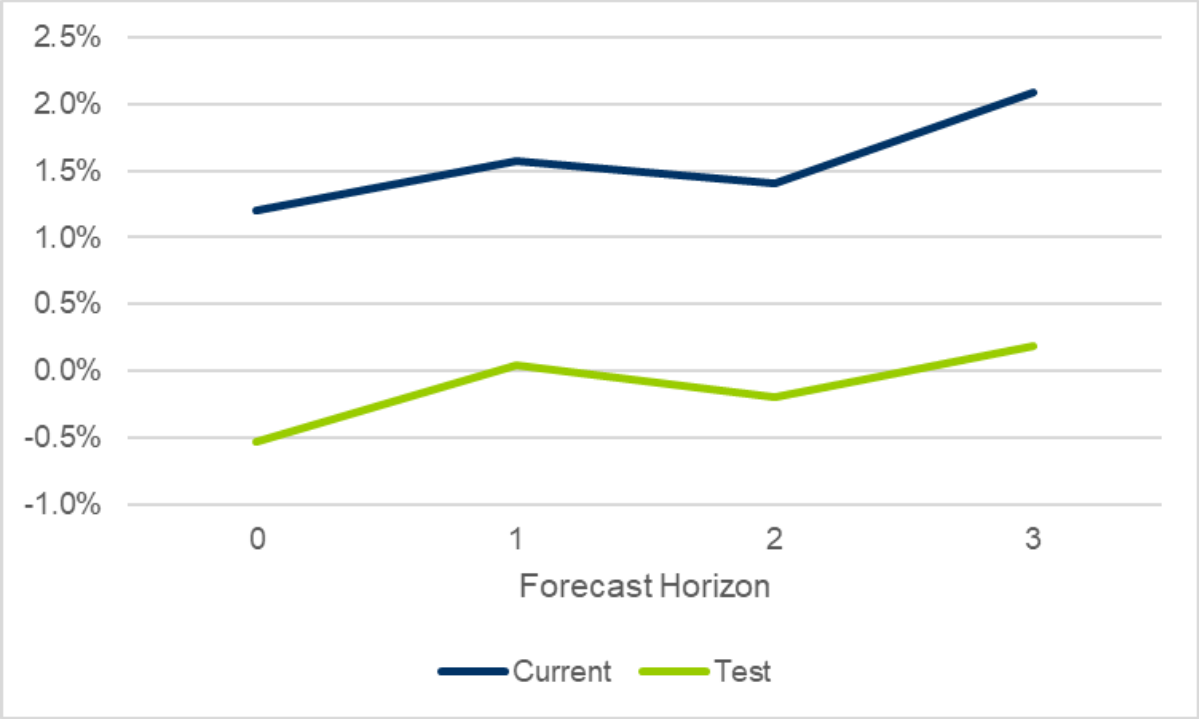

Still to consider

- Estimation period
  - Discussed in separate presentation
- Forecast adjustments
- Any additional stakeholder input

Contact

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Forecast Methodology Updates

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