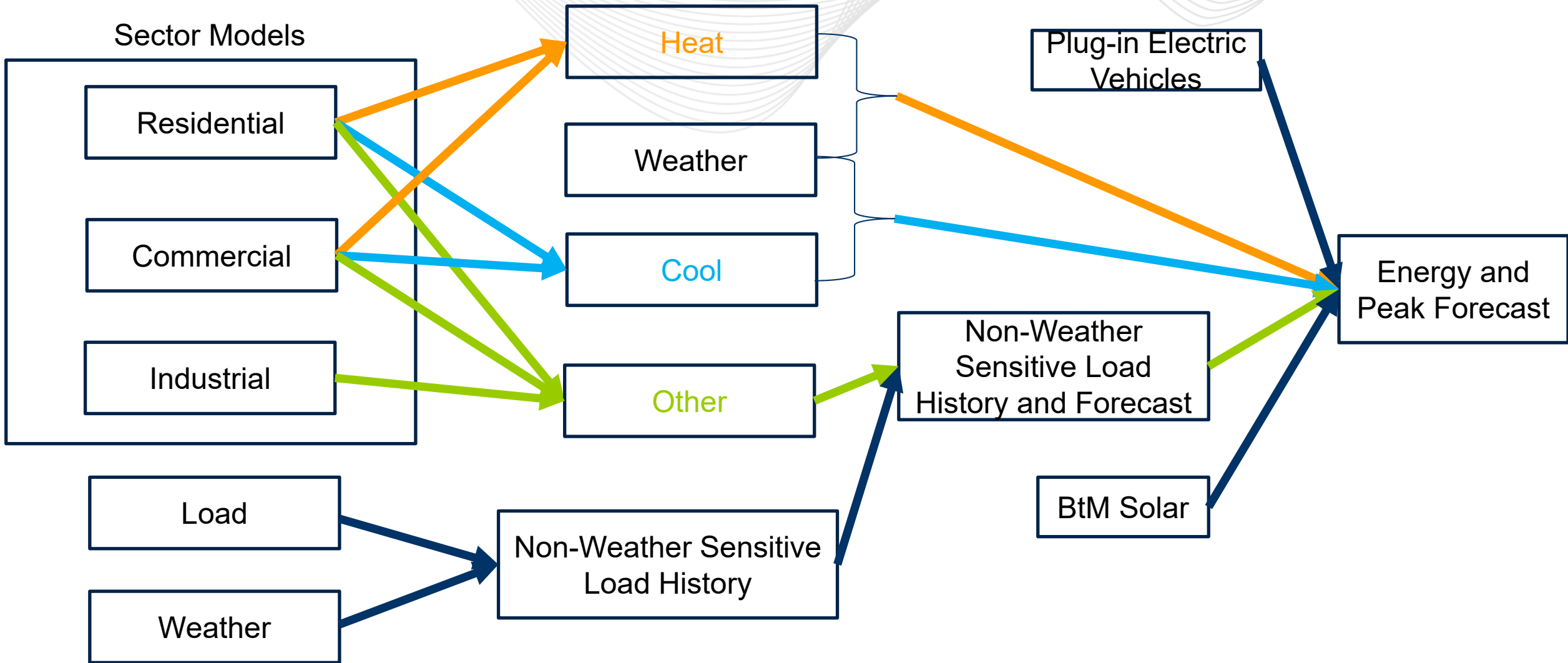


Forecast Model Estimation Period Analysis

Load Analysis Subcommittee
September 3, 2021

Andrew Gledhill
Sr. Analyst
Resource Adequacy Planning



- Sector Models and Non-Weather Sensitive Model
 - Current: Use all data available back to 1998
 - Test: Use only last 15 years
- Energy and Peak Model
 - Continue to use last 10 years

- Starting point is annual data from EIA-861 for Residential, Commercial, and Industrial
- Modeled against economics and end-use (intensity) trends
- Informs expectations for Heat, Cool, and Other

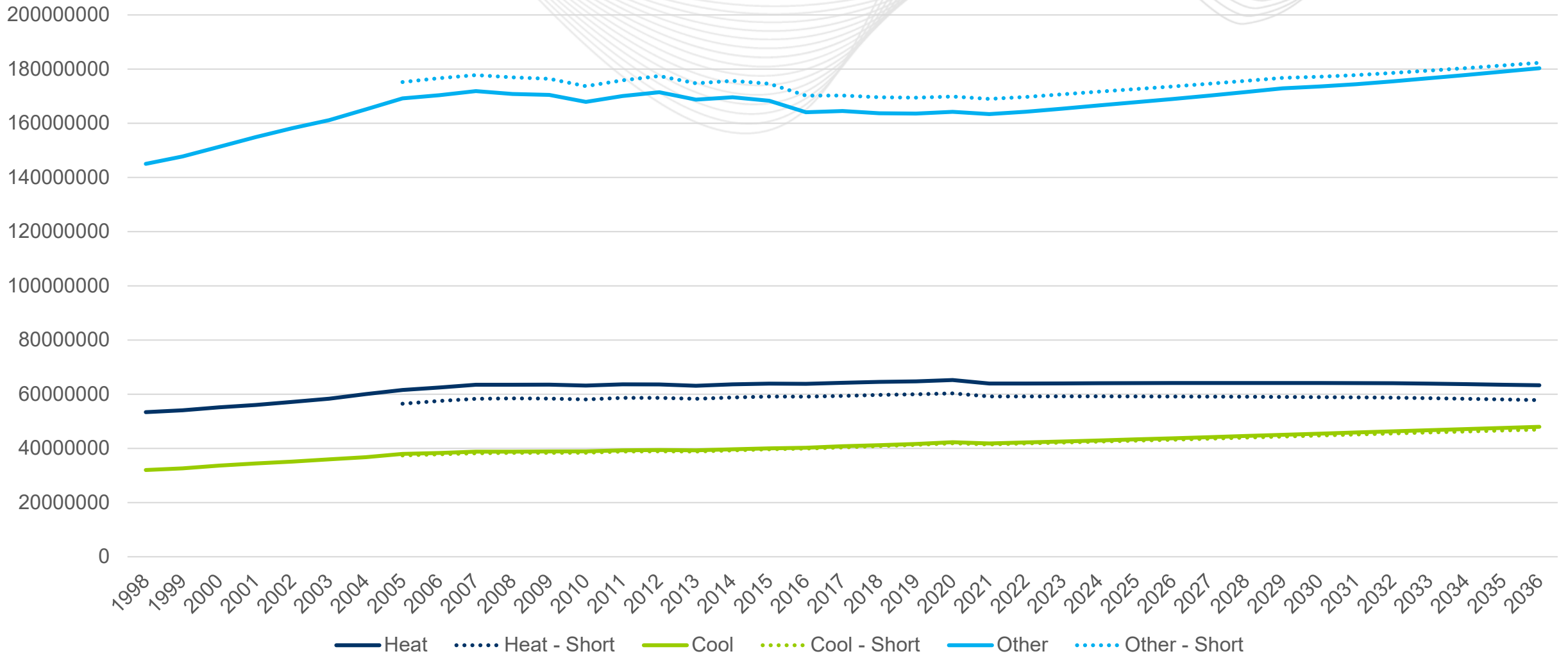
Vintage	Current				Test			
	Sector Est Pd		Non-Wthr Sens Est Pd		Sector Est Pd		Non-Wthr Sens Est Pd	
	Start	End	Start	End	Start	End	Start	End
2015	1998	2013	1998	2014	1999	2013	1999	2014
2016	1998	2014	1998	2015	2000	2014	2000	2015
2017	1998	2015	1998	2016	2001	2015	2001	2016
2018	1998	2016	1998	2017	2002	2016	2002	2017
2019	1998	2017	1998	2018	2003	2017	2003	2018
2020	1998	2018	1998	2019	2004	2018	2004	2019
2021*	1998	2019	1998	2020	2005	2019	2005	2020

**Vintage used for creating forecasts. Other vintages used only for accuracy testing.*

- Items we're watching
 - Sector results
 - Sector model coefficients
 - Overall model accuracy
 - Final forecasts



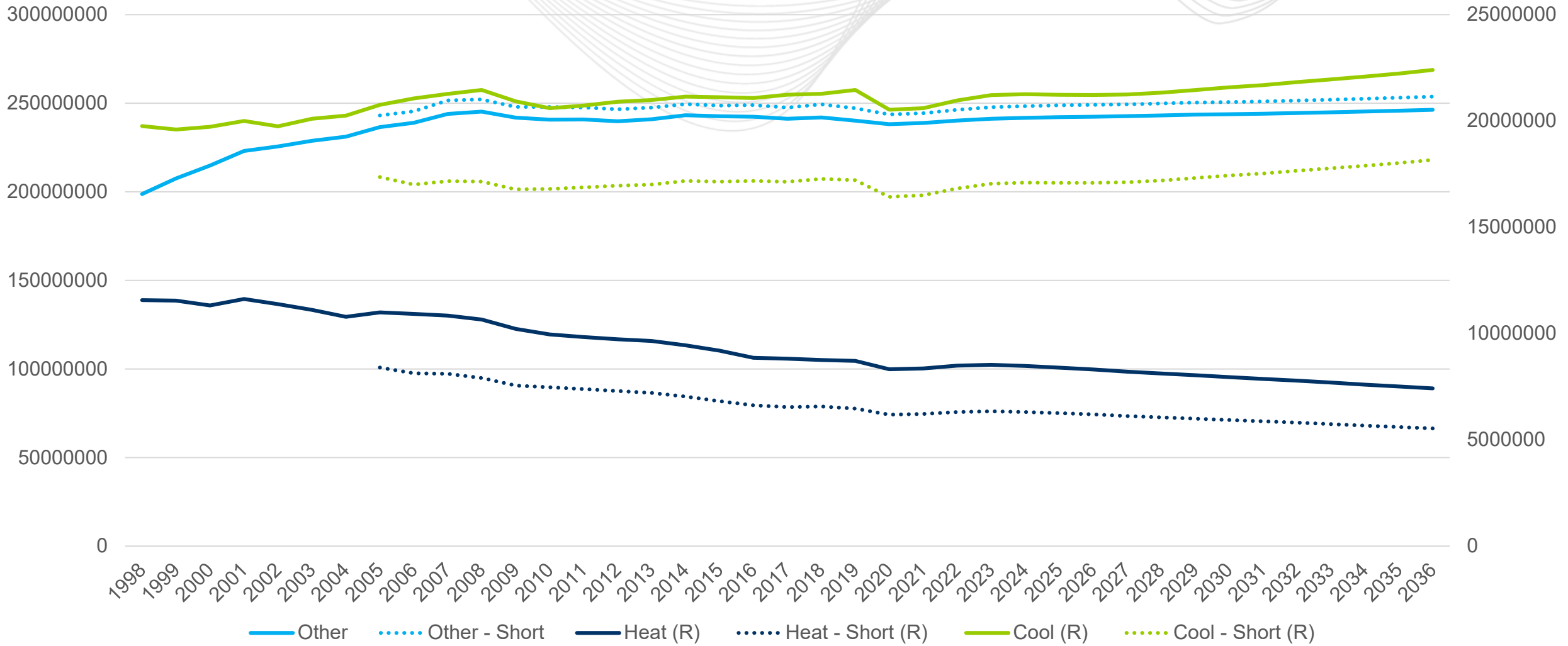
Sector Results - Residential



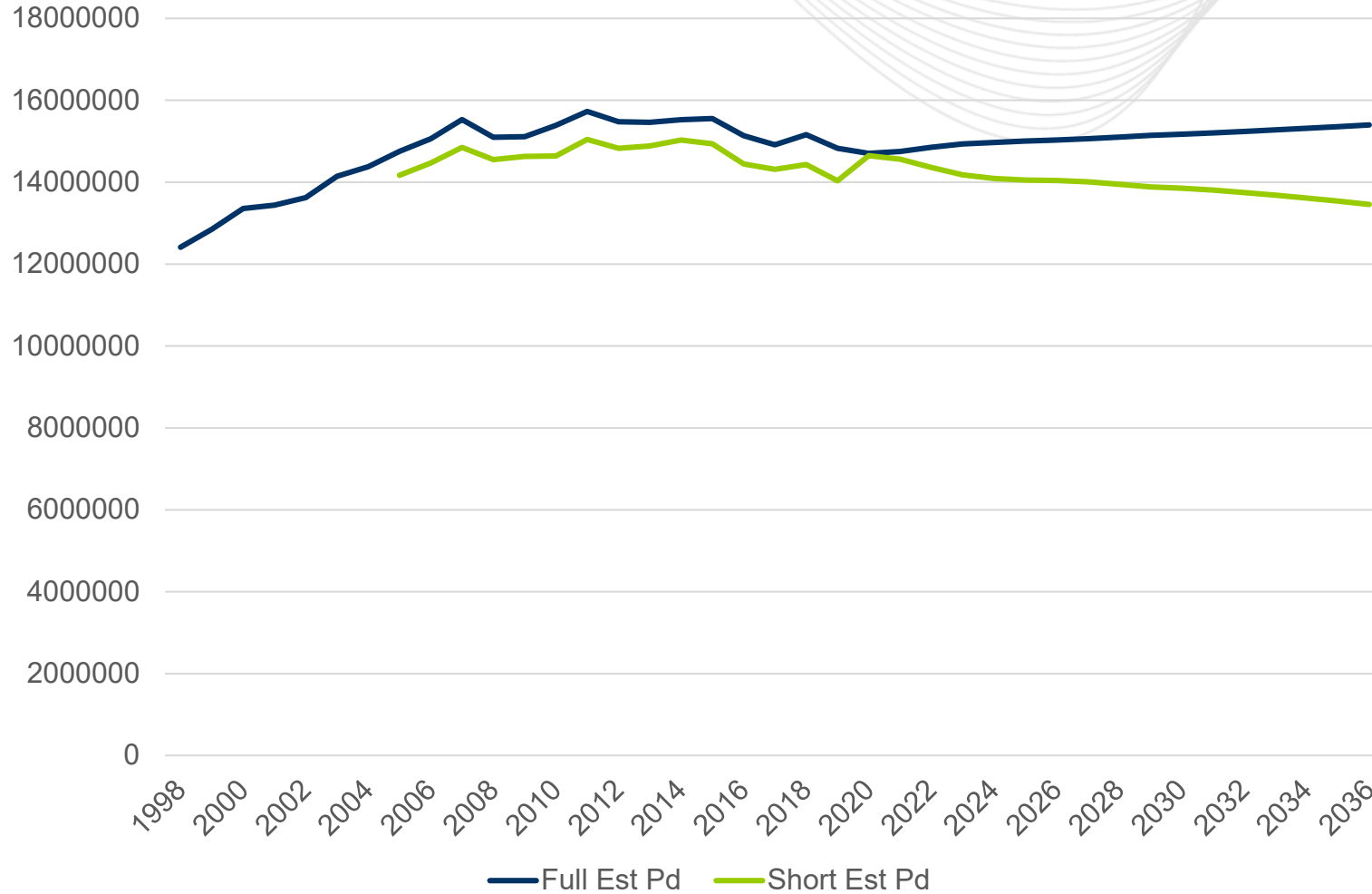
- Observations
 - In shortened estimation period, slight shifting from Heat to Other
 - RTO level growth trajectories are approximately the same
 - No coefficient issues in either full estimation period or short estimation period



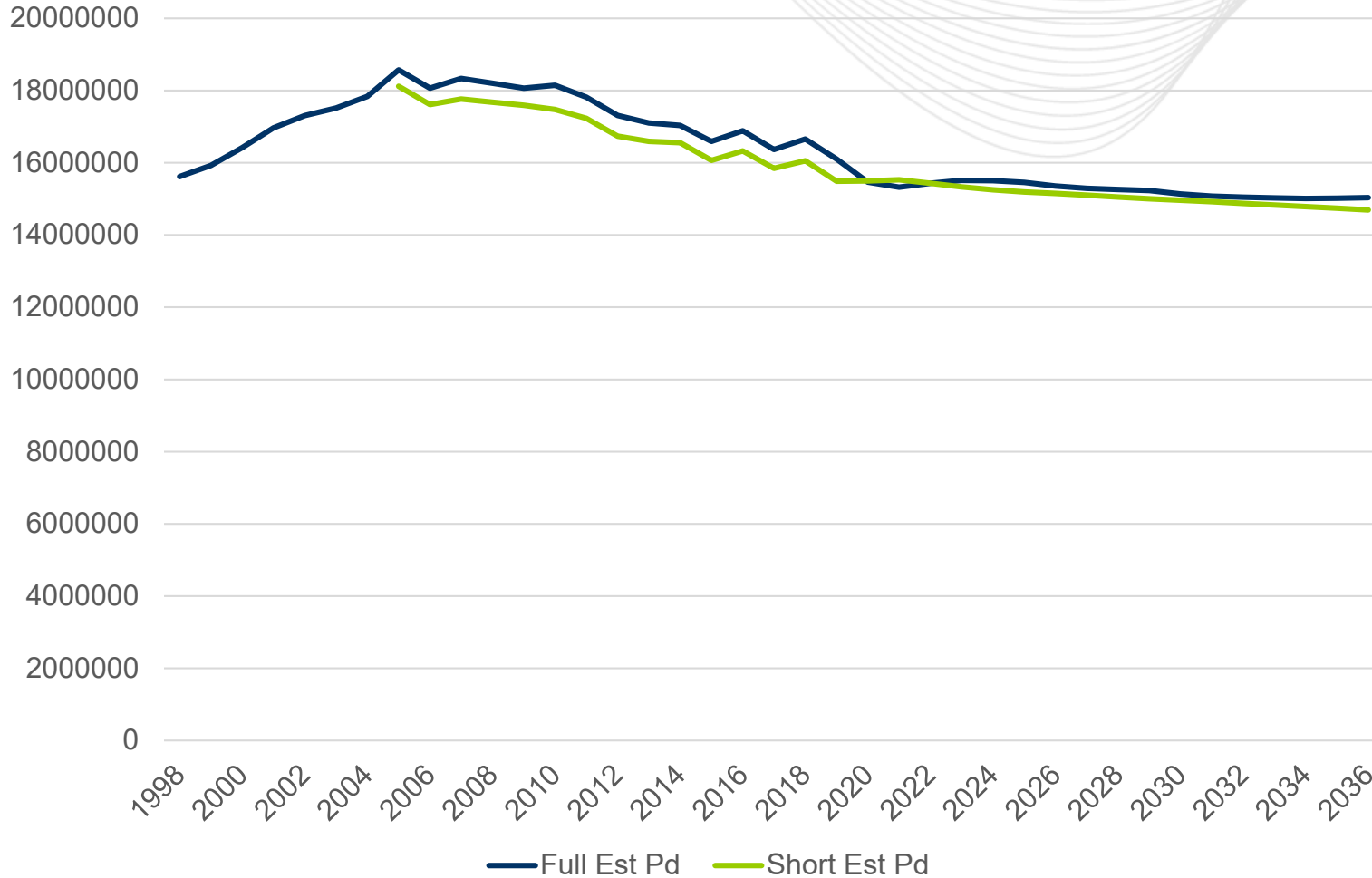
Sector Results - Commercial



- Observations
 - In shortened estimation period, more significant shifting from Heat/Cool to Other
 - RTO level growth trajectories are approximately the same
 - Some potentially problematic coefficients for non-weather sensitive portion in shorter estimation period
 - APS, ATSI, BGE, EKPC, PENLC, PEPCO, RECO

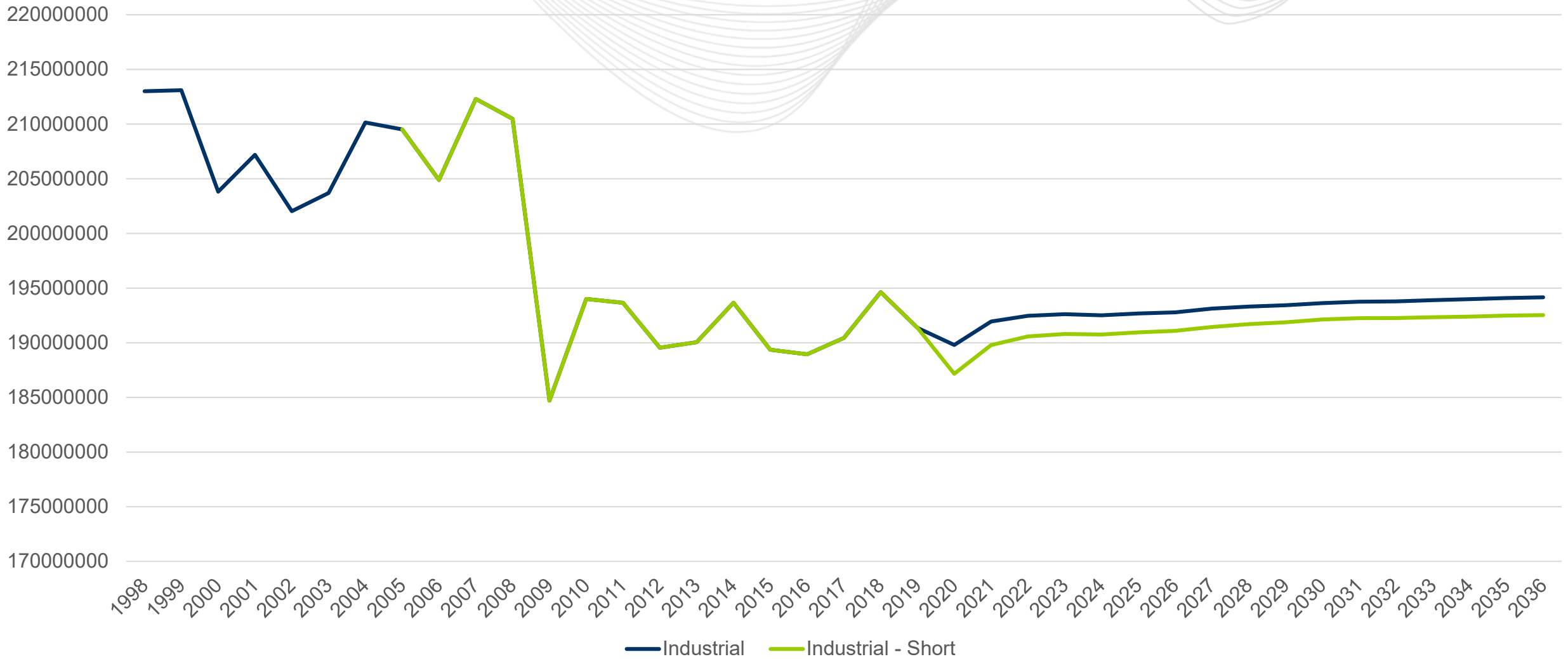


- Concerns with short estimation period results
 - Negative long-run growth driven not by independent variables but by assumed relationship through the negative coefficient
 - Shorter estimation period points to 4.4% growth in 2020. While we do not have annual 2020 Commercial data, this doesn't seem consistent with other info.

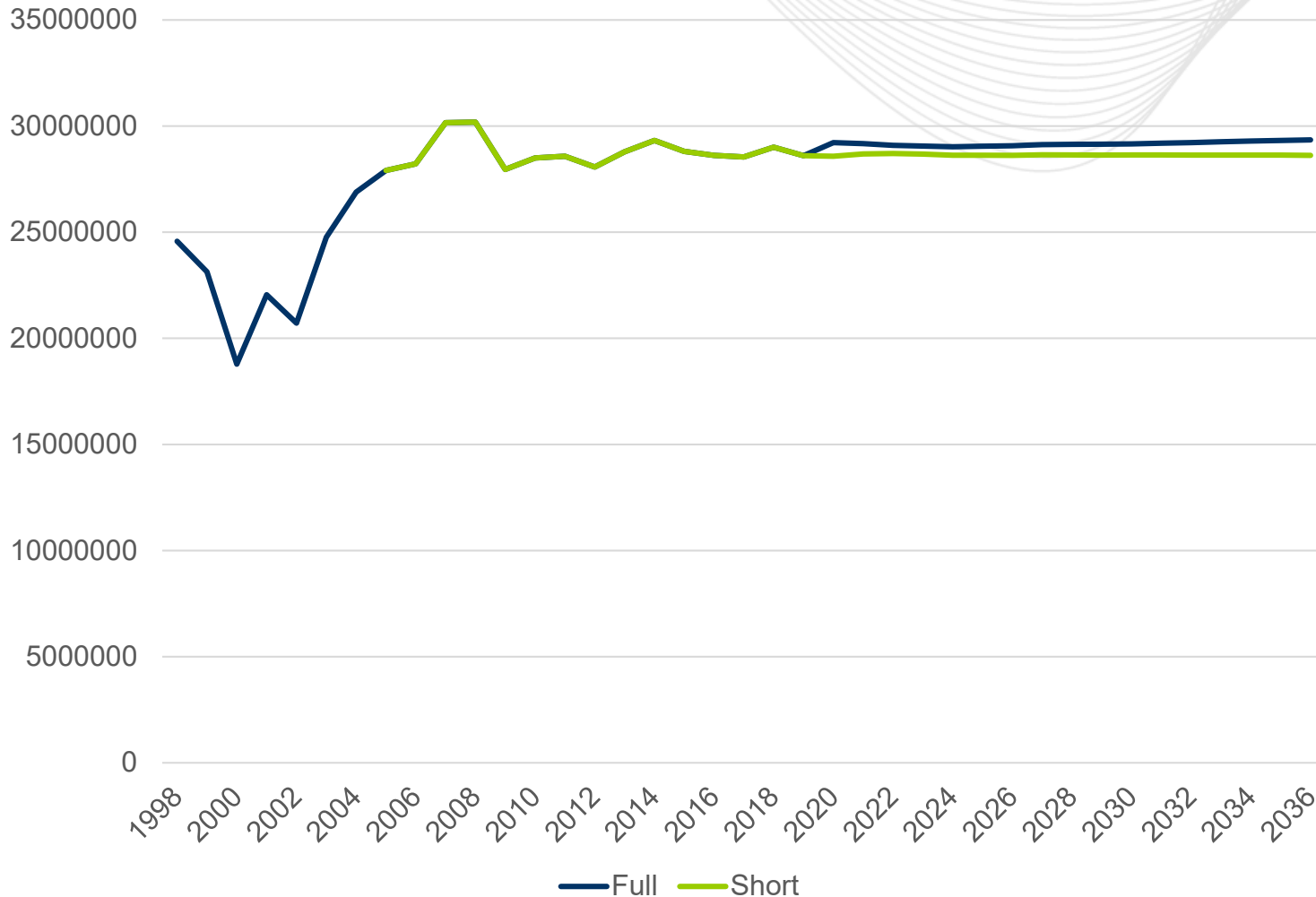


- Short estimation period not necessarily as concerning as with BGE
 - Negative long-run growth, but this is similar to what is seen in full estimation period model
 - Shorter estimation period points to 0.1% growth in 2020. While we do not have annual 2020 Commercial data, this doesn't seem consistent with other info.

- Residential and Commercial models
 - Goal of the sector models is to look at historic data and reasonably discern how much of load is weather sensitive (Heat/Cool) versus non-weather sensitive (Other), and use that information to help set future expectations.
 - Residential is very weather sensitive, in that weather can explain a lot of the variance from year-to-year. As a result, models can reasonably tease out weather sensitive vs non-weather sensitive even with fewer data points.
 - Commercial is less weather sensitive, and year-to-year variance is less driven by weather than in Residential. As a result, models may have difficulty discerning weather vs non-weather when data points are restricted.



- Observations
 - Industrial does not need to discern between weather and non-weather. Shorter estimation period leads to slightly lower expectations, though similar growth.
 - Some potentially problematic coefficients
 - Full estimation period: COMED, EKPC, PECO
 - Short estimation period: DQE, EKPC, DomVP

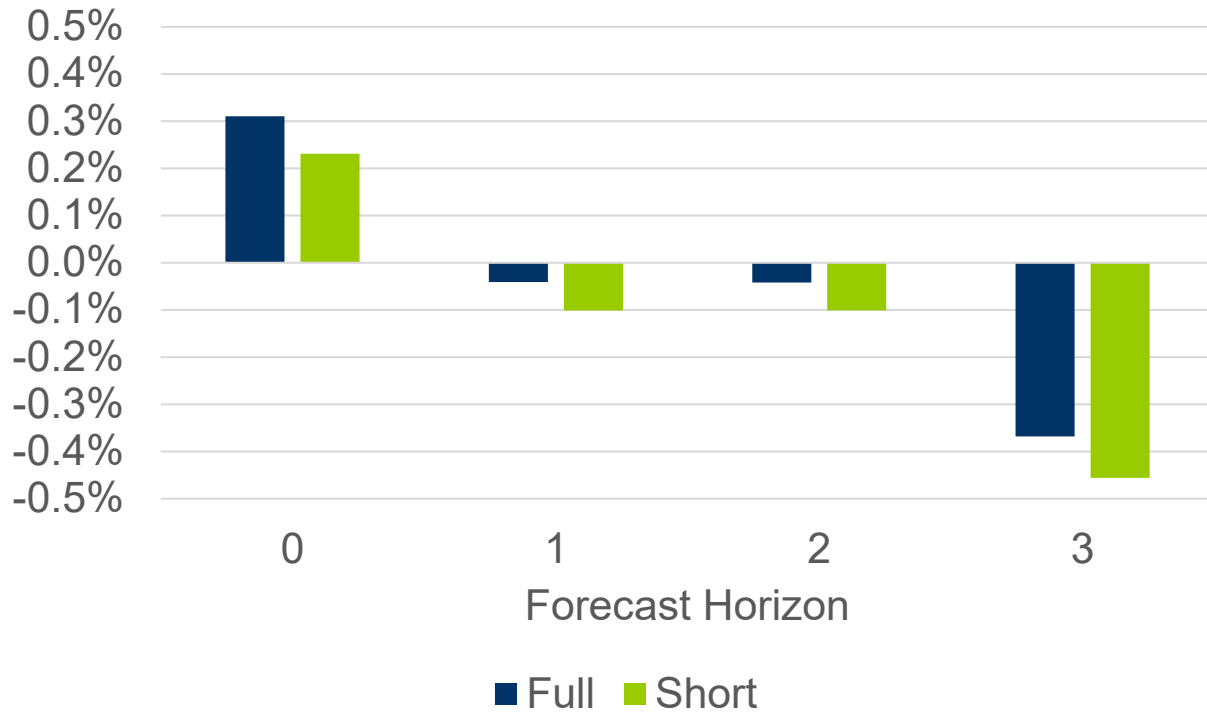


- Not large difference between using short or long estimation period.
- Long estimation period points to 2.1% growth in 2020. While we do not have annual 2020 Industrial data, this doesn't seem consistent with other info.
- Argument to go with short estimation period results in this case.

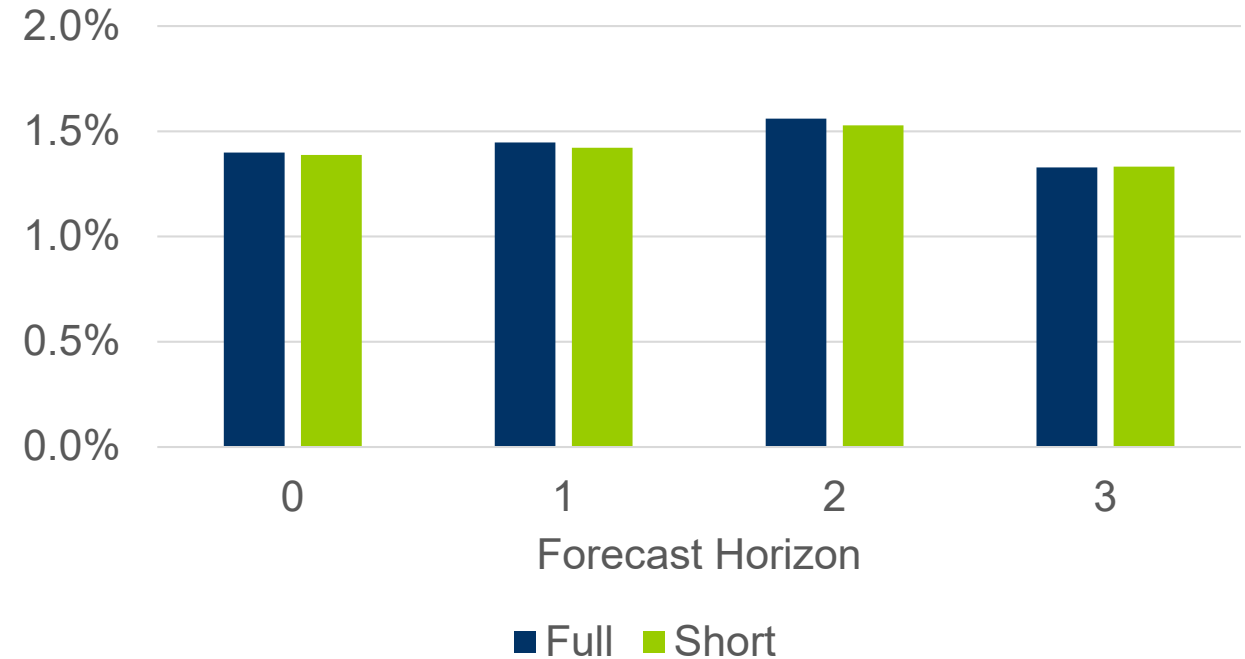
- Choice of estimation period is not very influential in outcome of Industrial results
- May need to make choice of estimation period on case-by-case basis
 - Example choose short estimation period for COMED given the coefficient issue
- Some zones may need additional attention

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

Mean Percent Error

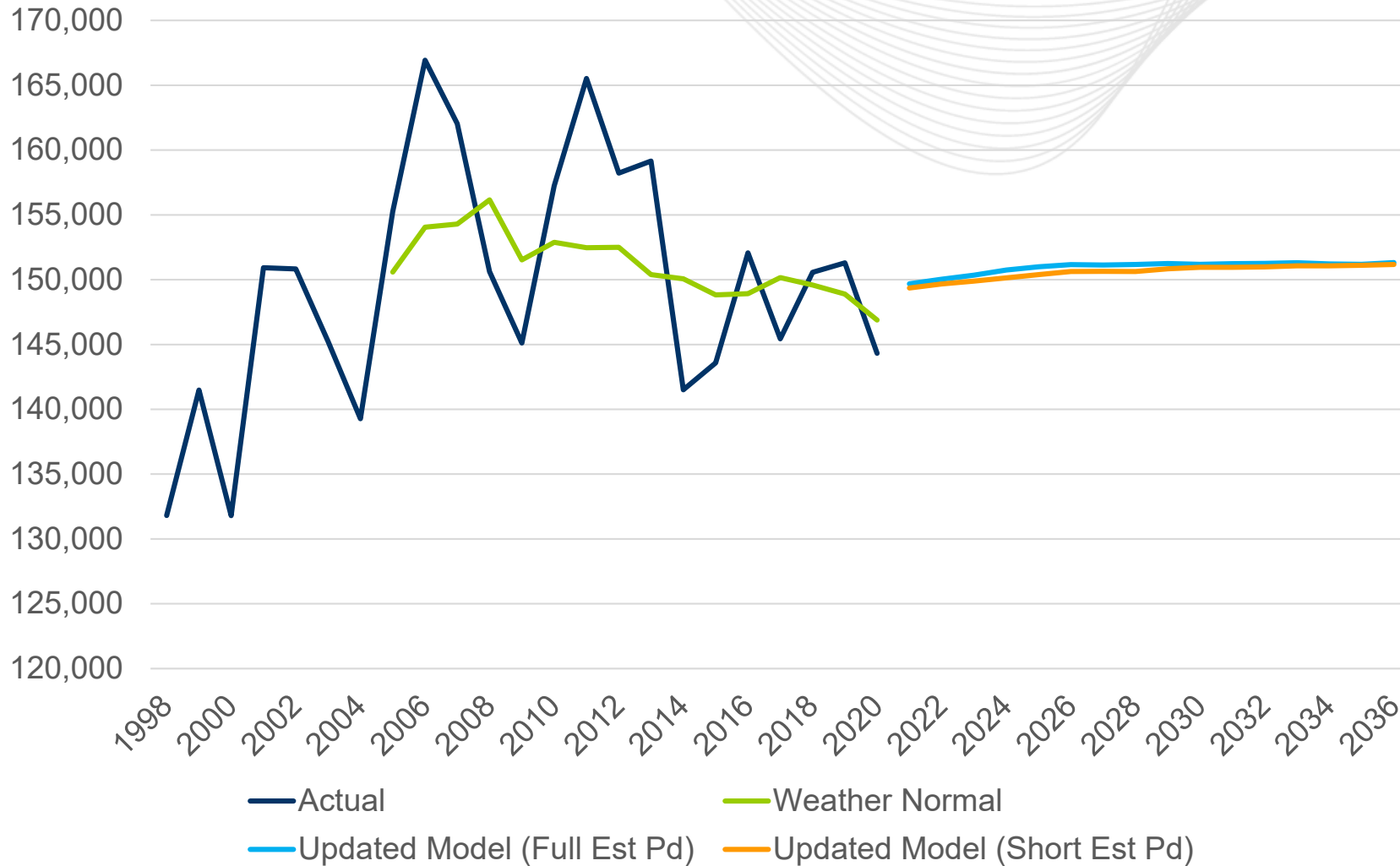


Mean Absolute Percent Error





Summer 50/50 Peak Forecast Results



- % change (Short vs Full)
 - 2021: -0.2%
 - 2024: -0.4%
 - 2036: -0.1%
- 15-yr Growth Rate
 - Short: +0.1%
 - Full: +0.1%
- All forecast data (including zones) is posted with the meeting materials.

- At the RTO level, choice of estimation period has minor impacts.
- Using shorter estimation period demonstrates no accuracy improvement.
- There might be some opportunity to use a shorter estimation period in some isolated cases (i.e. Industrial for some zones).

SME/Presenter:
Andrew Gledhill,
Andrew.Gledhill@pjm.com
Load_Analysis_Team@pjm.com

Forecast Model Estimation Period Analysis



Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com