

**COMMONWEALTH OF VIRGINIA**  
**STATE CORPORATION COMMISSION**

**PREFILED STAFF TESTIMONY**

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**APPALACHIAN POWER COMPANY**

**For approval of its 2025 RPS Plan under  
§ 56-585.5 of the Code of Virginia and  
related requests**

**Volume III of III**

*Public Version Only*

**PUR-2025-00049**

**July 16, 2025**

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### Direct Testimony Summary - Kenneth Curtis

Enverus, Inc., (“Enverus”) was engaged by the Staff of the Virginia State Corporation Commission to provide its forecasts, as well as its reviews of Appalachian Power Company’s (“APCo” or “Company”) forecasts within the Company’s Renewable Energy Portfolio Standard (“RPS”) Plan. My key findings include:

#### Forecast comparison:

##### • Commodity Price Forecasts

- The Company’s forecasts are generally reasonable. Where they differ from those produced by Enverus may primarily be driven by:
  - Timing – the Company’s commodity market forecast was finalized in December of 2024, including inputs dating back as early as June of 2024. The Enverus forecast was developed in June of 2025.

##### • Energy Sales Forecast

- In the sales forecasts for both the APCo Load Serving Entity and the PJM-AEP Zone, Enverus applies more conservative growth estimates than the Company. The contrast is particularly sharp when comparing the PJM forecast for AEP Zone to the Enverus forecast. The Enverus model is based on a more restrained outlook for load growth.

##### • Capacity Price Forecast

- Enverus is modeling a sharp decrease in capacity prices as compared to the Company, as Enverus expects that in the future there will no longer be a capacity price floor of \$175.

##### • Renewable Energy Certificate (“REC”) Price Forecast

- In general, there is consensus between Enverus and the Company’s REC price forecasts.

#### Historical forecast performance:

- When comparing actual prices to the Company’s forecasts after the fact, the short-term portion of the forecasts are generally accurate.
- Enverus disagrees with the Company’s outlook on energy sales and capacity prices.

#### Company forecasting methodologies:

- The Company appears to rely on historical econometric signals and attempts to blend separate short- and long-term methodologies to account for the dominant drivers for each time horizon.
- Enverus relies more heavily on machine learning in energy sales forecasting in order to better capture trends that may not be apparent in subjective observance of econometric data.
- In other instances, Enverus does employ similar frameworks to those laid out by the Company in Section 4 of the 2025 RPS, and Enverus does not object to their use.



**PRE-FILED TESTIMONY  
OF  
KENNETH CURTIS**

**PETITION OF APPALACHIAN POWER COMPANY  
FOR APPROVAL OF ITS 2025 RPS PLAN UNDER  
§ 56-585.5 OF THE CODE OF VIRGINIA AND RELATED REQUESTS**

**CASE NO. PUR-2025-00049**

**July 16, 2025**

1   **Q.   PLEASE STATE YOUR NAME AND OCCUPATION.**

2   **A.**   My name is Kenneth Curtis, and I am a Director of Power Markets for Enverus, Inc.  
3       (“Enverus”).

4   **Q.   PLEASE DESCRIBE YOUR BACKGROUND AND QUALIFICATIONS.**

5   **A.**   I am the Director of Power Markets at Enverus focusing on PJM Interconnection, LLC  
6       (“PJM”)<sup>1</sup> within our Power & Renewables business. I am responsible for all publications  
7       regarding the PJM market and provide customer solution sessions related to energy market  
8       activity and Enverus’ forecasting capabilities. I have accrued extensive experience  
9       working as a short-term physical and financial trader with several large utilities and trading  
10      firms. I joined Enverus in 2020. Prior to joining Enverus I worked for Twin Eagle  
11      Resource Management and EDF Trading. Working for these industry leaders I was  
12      responsible for the optimization of a fleet of generation in the northeast and northwest  
13      markets. My specific experience encompasses: physical and financial trading, managing  
14      thermal and renewable generation in CAISO, Mid-C, WECC, MISO, SERC, PJM, ISONE,

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<sup>1</sup> PJM Interconnection, LLC is the regional transmission organization of which APCo is a member.

and NYISO.<sup>2</sup> I hold a BBA Degree in Business Administration from the University of Texas at Austin McCombs School of Business.

**Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?**

**A.** Enverus was engaged by the Staff of the Virginia State Corporation Commission to:

- 1) Provide its proprietary benchmark and basis 25-year price forecasts for Natural Gas (Henry Hub, Dominion South); Coal (NAPP, CAPP); PJM AEP Zone<sup>3</sup> On-Peak Power Prices; and PJM AEP-Zone Off-Peak Power Prices.
- 2) Review APCo's 25-year commodity and power price forecasts contained in its 2025 Renewable Portfolio Standard ("RPS") plan ("2025 RPS Plan"), and compare and contrast Enverus commodity and power price forecasts with APCo's commodity and power price forecasts.
- 3) Review APCo's 25-year commodity and power price forecasts from prior Integrated Resource Plans ("IRPs") (2009-2022) and RPS Plans (2020-2024) and provide a detailed discussion of APCo's track record in making accurate commodity and power price forecasts.
- 4) Provide Energy Sales and Peak Load 25-year forecasts for the AEP Zone and the APCo Load Serving Entity ("LSE"); provide Peak Load forecasts for the PJM Summer Coincident Peak, the Summer Non-Coincident Peak, and the Winter Non-Coincident Peak; and compare and contrast Enverus Energy Sales and Peak Load forecasts with APCo's forecasts contained in its 2025 RPS Plan and with PJM's 2025 forecasts.
- 5) Review APCo's 25-year Energy Sales and Peak Load forecasts from prior IRPs (2009-2022) and RPS Plans (2021-2024) and provide a detailed discussion of APCo's track record in making accurate Energy Sales and Peak Load forecasts.
- 6) Review APCo's Regional Greenhouse Gas Initiative ("RGGI") and national carbon dioxide ("CO<sub>2</sub>") pricing included within its model and compare it to other RGGI and CO<sub>2</sub> forecasts available; and provide a detailed discussion of the reasonableness of including a national CO<sub>2</sub> price within the planning model.
- 7) Provide a 20-year renewable energy certificate ("REC") forecast for the PJM region.

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<sup>2</sup> Abbreviations used in this sentence stand for California Independent System Operator ("CAISO"), Mid-Columbia ("Mid-C"), Western Electricity Coordinating Council ("WECC"), Midcontinent Independent System Operator ("MISO"), Southeastern Electric Reliability Corporation ("SERC"), Independent System Operator New England ("ISONE"), and New York Independent System Operator ("NYISO").

<sup>3</sup> A "zone" within PJM refers to a transmission owner's area within the PJM region.

- 1           8) Review APCo's load, commodity price, market price and energy sales forecasts
- 2           and forecasting methodologies and provide a detailed discussion of the
- 3           reasonableness of the forecasting methodologies, assumptions, and inputs.
- 4           9) Provide a 20-year capacity price forecast for the AEP Zone within PJM.

5   **Q.     PLEASE PROVIDE A SUMMARY OF YOUR FINDINGS.**

6   **A.**     Enverus' conclusions include the following:

7       **Forecast Comparison:**

8       •   Commodity Price Forecasts

- 9           •   The Company's forecasts are generally reasonable. Where they differ from those
- 10          produced by Enverus may primarily be driven by:

- 11                 ○ *Timing* – the Company's commodity market forecast was finalized in
- 12                 December of 2024, including inputs dating back as early as June of 2024.
- 13                 In contrast, the Enverus forecast was developed in June of 2025.

14       •   Energy Sales Forecast

- 15           •   In the sales forecasts for both the APCo LSE and the PJM-AEP Zone, Enverus
- 16           applies more conservative growth estimates than the Company. The contrast is
- 17           particularly sharp when comparing the PJM forecast for AEP Zone to the Enverus
- 18           forecast. The Enverus is model is based on a more restrained outlook for load
- 19           growth.

20       •   Capacity Price Forecast

- 21           •   Over the next two auctions (2026/2027 and 2027/2028 delivery year) the "Capacity

Price Collar:”<sup>4</sup> will set a floor of \$175/megawatt-hour (“MWh”) and a ceiling of \$325/MWh. Enverus is modeling capacity prices clearing near or at the “Price Ceiling” through 2030. If and when the “Capacity Price Collar” is ended, Enverus is modeling a sharp decrease in capacity prices as compared to the Company, given that there will no longer be a capacity price floor of \$175.

- REC Price Forecast

- Compared to last year, the Enverus REC forecast has strengthened, as fewer wind and solar projects are being completed due to limited supply chains and lagging interconnection queues limiting REC supply. In general, there is consensus between Enverus and the Company’s REC price forecasts.

**Historical Forecast Performance:**

- When comparing actual prices to the Company’s forecasts after the fact, the short-term portion of the forecasts are generally accurate.
- For IRPs and RPS filings filed more than 3 years ago, the trend across the long-term portion of both price and sales forecasts exhibited overly optimistic positive trajectories that were not supported by actual results. However, that pattern appears to have been corrected with the last year’s RPS filing in 2024<sup>5</sup> and the instant proceeding.

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<sup>4</sup> See *Commonwealth of Pennsylvania v. PJM Interconnection, LLC*, Order Accepting Tariff Revisions and Dismissing Complaint, 191 FERC 61,066 (Apr. 21, 2025), available at [https://elibrary.ferc.gov/eLibrary/filelist?accession\\_number=20250421-3069&optimized=false](https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20250421-3069&optimized=false).

<sup>5</sup> *Petition of Appalachian Power Company, For approval of its 2024 RPS Plan under § 56-585.5 of the Code of Virginia and related requests*, Case No. PUR-2024-00020, Doc. Con. Cen. No. 240640019, Direct Testimony of Kenneth Curtis (Jun. 27, 2024), at 3.

- Enverus disagrees with the Company's outlook on energy sales and capacity prices.
  - Enverus projects lower capacity prices beyond 2030 compared to the Company.
- Strong price signals in previous delivery years are expected to encourage more thermal generation to enter the PJM market. However, Enverus acknowledges uncertainty in its forecast and offers a more optimistic alternative scenario. This bullish scenario reflects a tighter supply-demand balance if new dispatchable or intermittent generation fails to offset expected thermal retirements.

#### **Company Forecasting Methodologies:**

- The Company provides a description of its methodology in Section 4 of the 2025 RPS.
- The APCo load forecast was developed by the American Electric Power Service Corporation Economic Forecasting organization and completed in December of 2024, but includes inputs dating back as early as June of 2024.
- The Company appears to rely on historical econometric signals and attempts to blend separate short- and long-term methodologies to account for the dominant drivers for each time horizon.
- Enverus relies more heavily on machine learning in energy sales forecasting in order to better capture trends that may not be apparent in subjective observance of econometric data.
- In other instances, Enverus does employ similar frameworks to those laid out by the Company in Section 4 of the 2025 RPS, and does not object to their use.
- However, with any forecast methodology, the output can be greatly affected by



1           varying inputs to accommodate desired results.

2           • As suggested in the previous RPS filing,<sup>6</sup> Enverus continues to recommend:

3                   ○ Utilize timelier price and economic inputs within 6 months of the filing date.

4                   Although the Company used inputs developed within 1 year of filing, more  
5                   up-to-date market data is now more accessible than it ever has been, and  
6                   reliance on inputs from early 2024 appears dated.

7                   ○ Benchmark more transparently against similar forecasts being published by  
8                   PJM and specifically address any deviations.

9   **Q.   PLEASE IDENTIFY THE SCHEDULES ATTACHED TO YOUR TESTIMONY.**

10   **A.**   The following schedule is attached to my testimony as Attachment KC-1:

11                   • SUMMARY REPORT & FINDINGS - Case No. PUR-2025-00049 – 2025 APCo  
12                   Renewable Portfolio Standard Plan.

13           My testimony will sponsor and support the report in its entirety.

14   **Q.   DOES THIS CONCLUDE YOUR TESTIMONY?**

15   **A.**   Yes.

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<sup>6</sup> See *Petition of Appalachian Power Company, For approval of its 2024 RPS Plan under § 56-585.5 of the Code of Virginia and related requests*, Case No. PUR-2024-00020, Doc. Con. Cen. No. 240810042, Pre-Filed Testimony of Kenneth Curtis (June 27, 2025).



# 2025 APCo Renewable Portfolio Standard Plan

Summary Report and Findings – Case No. PUR-2025-00049

**Written for:** VA SCC | June 2025

**Prepared by:** Kenneth Curtis, Director of Power Markets



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## Table of Acronyms

Acronym	Definition
<b>CAPP</b>	Central Appalachian Coal (price assessment)
<b>APCo</b>	Appalachian Power Company or “The Company”
<b>AEP</b>	American Electric Power
<b>HH</b>	Henry Hub
<b>TCO</b>	Columbia Appalachia Hub
<b>IRP</b>	Integrated Resource Plan
<b>LSE</b>	APCo Load Serving Entity service territory
<b>NAPP</b>	North Appalachian Coal (price assessment)
<b>NYMEX</b>	New York Mercantile Exchange: Designated Contract Market
<b>PJM</b>	<p>PJM is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia.</p> <p>States served by PJM include Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia.</p>
<b>PJM-AEP</b>	AEP pricing zone of PJM
<b>REC</b>	Renewable Energy Certificate
<b>RGGI</b>	Regional Greenhouse Gas Initiative
<b>RPS</b>	Renewable Portfolio Standard
<b>SCC</b>	State Corporation Commission
<b>SOW</b>	Statement of Work
<b>YoY</b>	Year over Year

## Introduction

The findings contained in this report are presented in accordance with the Statement of Work (“SOW”) #SCC-21-002-PUR.10 between the Staff of the State Corporation Commission (“SCC”) and Enverus, Inc. for Case No. PUR-2025-00049.

Enverus developed 25-year forecasts for power prices and fuel commodity prices as well as energy sales and peak load. 20-year forecasts were provided for Renewable Energy Certificates (“REC”) and capacity prices for the locations identified in the SOW.

Enverus’ forecasts are compared to those included in Appalachian Power Company’s (“APCo” or “Company”) 2025 Renewable Energy Portfolio Standard (“RPS”) Development Plan. Enverus also compared forecasts included in APCo’s historical Integrated Resource Plans (“IRP”) and RPS plans (dating back to 2009 where available) to actual market results.

Per the Company’s response to Staff Interrogatory No. 1-24, all forecasted figures in the RPS Plan at Appendix A were finalized in December 2024. Energy and capacity forecasts were developed in September-November 2024. Henry Hub gas prices were developed in June-July 2024. NAPP Coal Prices are sourced from Wood Mackenzie’s June 2024 forecast.

Unless otherwise noted, Enverus’ forecasts were prepared in June 2025.

Enverus’ analysis is influenced by historical price and load data (from both publicly available and subscribed sources), observable forward market pricing, and proprietary forecasting and optimization methodologies.

A description of Enverus’ methodologies for both power price and energy sales forecasts are included in the Appendix of this report.

## Summary Of Findings

### Forecast Comparison:

#### 1. Commodity Price Forecasts

- The Company's forecasts are generally reasonable. Where they differ from those produced by Enverus may primarily be driven by:
  - Timing – the Company's commodity market forecast was finalized in December of 2024 including inputs dating back as early as June of 2024. The Enverus forecast was developed in June of 2025.

#### 2. Energy Sales Forecast

- In the sales forecasts for both the APCo-LSE and the PJM-AEP Zone, Enverus applies more conservative growth estimates than the Company. The contrast is particularly sharp when comparing the PJM forecast for AEP Zone to the Enverus forecast. The Enverus model is based on a more restrained outlook for load growth.

#### 3. Capacity Price Forecast

- Over the next two auctions (2026/2027 and 2027/2028 delivery year) the "Capacity Price Collar," will set a floor of \$175/megawatt-hour ("MWh") and a ceiling of \$325/MWh. Enverus is modeling capacity prices clearing near or at the "Price Ceiling," through 2030. If and when the "Capacity Price Collar" is ended, Enverus is modeling a sharp decrease in capacity prices as compared to the Company as there will no longer be a capacity price floor of \$175.

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- Compared to last year, the Enverus REC forecast has strengthened as fewer wind and solar projects are being completed due to limited supply chains and lagging interconnection queues limiting REC supply. In general, there is consensus between Enverus and Company REC Price forecasts.

### Historical Forecast Performance:

- When comparing actual prices to the Company's forecasts after the fact, the short-term portion of the forecasts are generally accurate.
- For IRPs and RPS filings filed more than 3 years ago, the trend across the long-term portion of both price and sales forecasts exhibited overly optimistic positive trajectories that were not supported by actual results. However, that pattern appears to have been corrected with the past two RPS filings in 2024 and 2025.
- Enverus disagrees with the Company's outlook on energy sales and capacity prices.
- Enverus projects lower capacity prices beyond 2030 compared to the Company. Strong price signals in previous delivery years are expected to encourage more thermal generation to enter the PJM market. However, Enverus acknowledges uncertainty in its forecast and offers a more optimistic alternative scenario. This bullish scenario reflects



a tighter supply-demand balance if new dispatchable or intermittent generation fails to offset expected thermal retirements.

**Company Forecasting Methodologies:**

- The Company provides a description of its methodology in Section 4 of the 2025 RPS.
- The APCo load forecast was developed by the American Electric Power Service Corporation Economic Forecasting organization and completed in December of 2024, but includes inputs dating back as early as June of 2024.
- The Company appears to rely on historical econometric signals and attempts to blend separate short- and long-term methodologies to account for the dominant drivers for each time horizon.
- Enverus relies more heavily on machine learning in energy sales forecasting in order to better capture trends that may not be apparent in subjective observance of econometric data.
- In other instances, Enverus does employ similar frameworks to those laid out by the Company in Section 4 of the 2025 RPS, and Enverus does not object to their use.
- However, with any forecast methodology, the output can be greatly affected by varying inputs to accommodate desired results.
- As suggested in the previous RPS filing, Enverus continues to recommend:
  - Utilize timelier price and economic inputs within 6 months of the filing date. Although the Company used inputs developed within one year of the filing, more up-to-date market data is now more accessible than it ever has been, and reliance on inputs from early 2024 appears dated.
  - Benchmark more transparently against similar forecasts being published by PJM and specifically address any deviations.

## Natural Gas Price Forecasts – Henry Hub

- Enverus forecasts Henry Hub prices by balancing proprietary production and demand models, determining a price level that is necessary to economically incent supply to meet forecasted demand.
- Throughout the term of the forecast, the Company's forecast is very similar to Enverus'. The only notable difference is in the near term 2025-2027, however this is likely an artifact of the timing of the forecasts. The Company's forecast was developed in June and July of 2024 when prices were meaningfully lower than they are today.
- Enverus expects lower supply and higher demand, with early signs already emerging. A critical finding is that the Haynesville basin, which Enverus considers to be the marginal U.S. gas molecule, appears unresponsive to prices below \$4.00/million British Thermal Units ("MMBtu"). This suggests that this price is necessary to motivate supply growth. Recent pipeline nomination data shows production is beginning to soften.
- Enverus believes that liquefied natural gas ("LNG") buildout is fundamentally changing North American gas markets, with international price risks now becoming domestic price risks. The Plaquemines LNG facility's aggressive ramp-up and corresponding tightening of Lower 48 gas balances serve as reminders of this structural change.

Figure 1: Henry Hub – Nominal

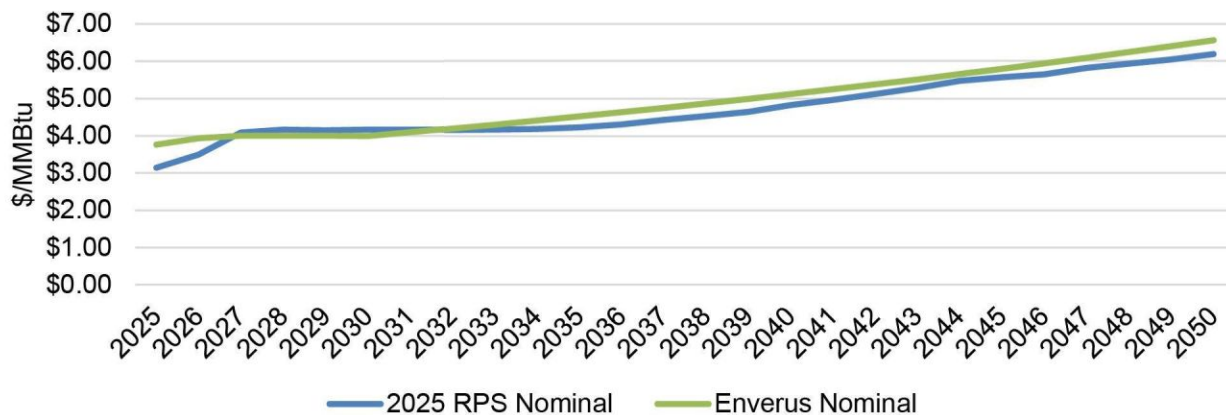
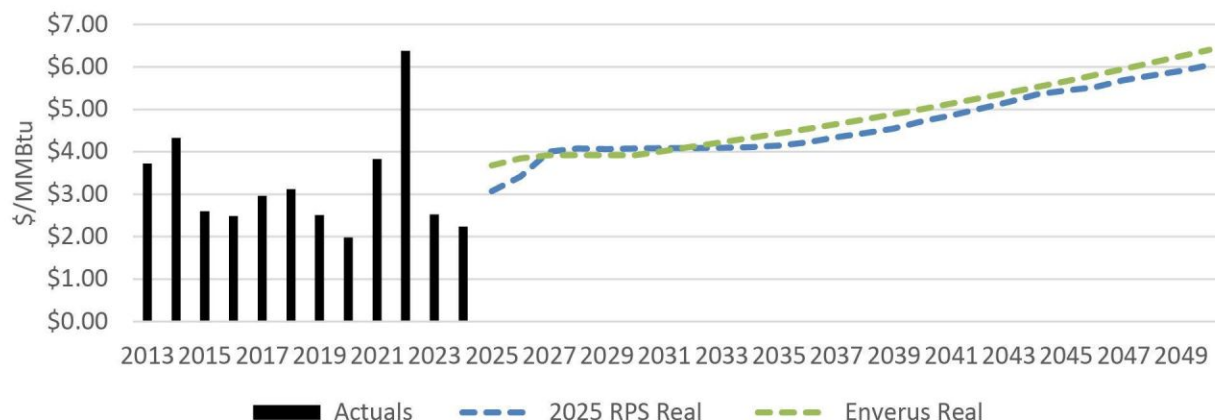


Figure 2: Henry Hub – Real



## Natural Gas Price Forecasts – Eastern Gas-South

- The Mountain Valley Pipeline came online in mid-2024 and has helped ease some congestion, but total egress capacity remains limited.
- While local transmission expansions support growth, the absence of greenfield pipelines from the U.S. Northeast to the Gulf Coast limits the Appalachian region's ("Appalachia") ability to provide additional supply to LNG markets.
- Enverus forecasts dry gas production in Appalachia will rise 2.2 billion cubic feet per day over the next five years, representing a 6% increase from current levels.
- The Company's forecasts and Enverus' are generally in agreement, but the timing difference of the forecast is likely the primary contributor to the differences.
- The volatile nature of the Company's forecast is questionable. Predicting such discrete price increases and decreases year to year beyond 2030 is unlikely to be accurate.

Figure 3: Eastern Gas South Nominal

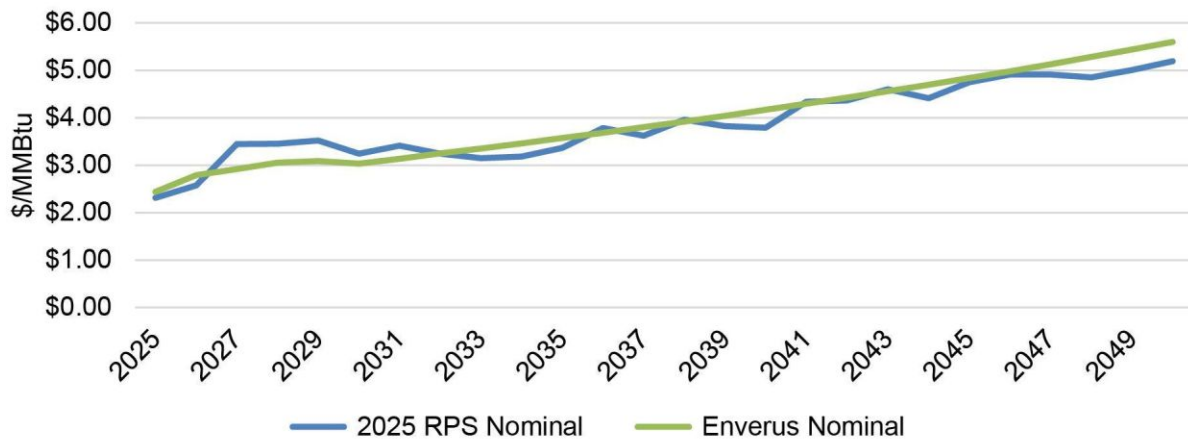
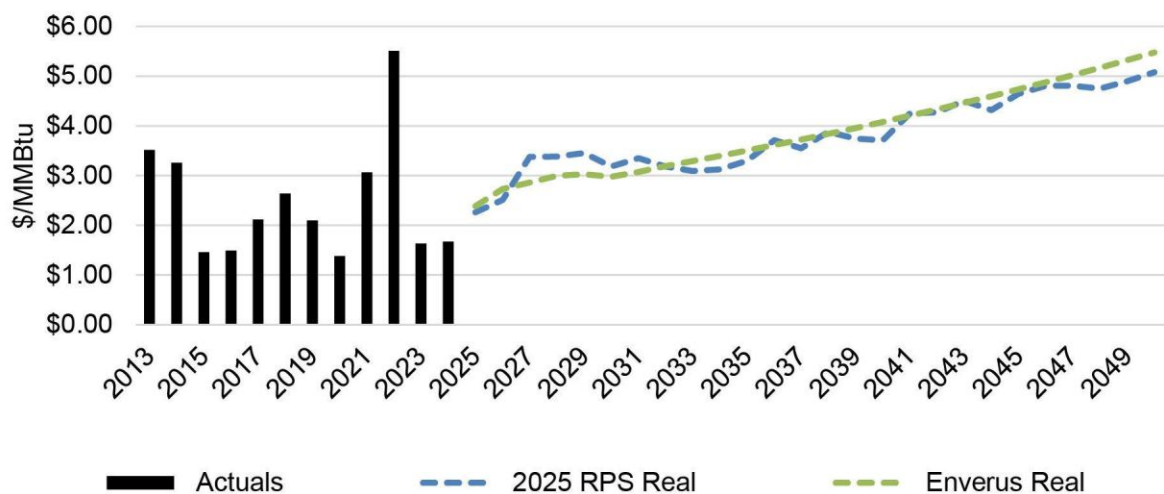


Figure 4: Eastern Gas South Real

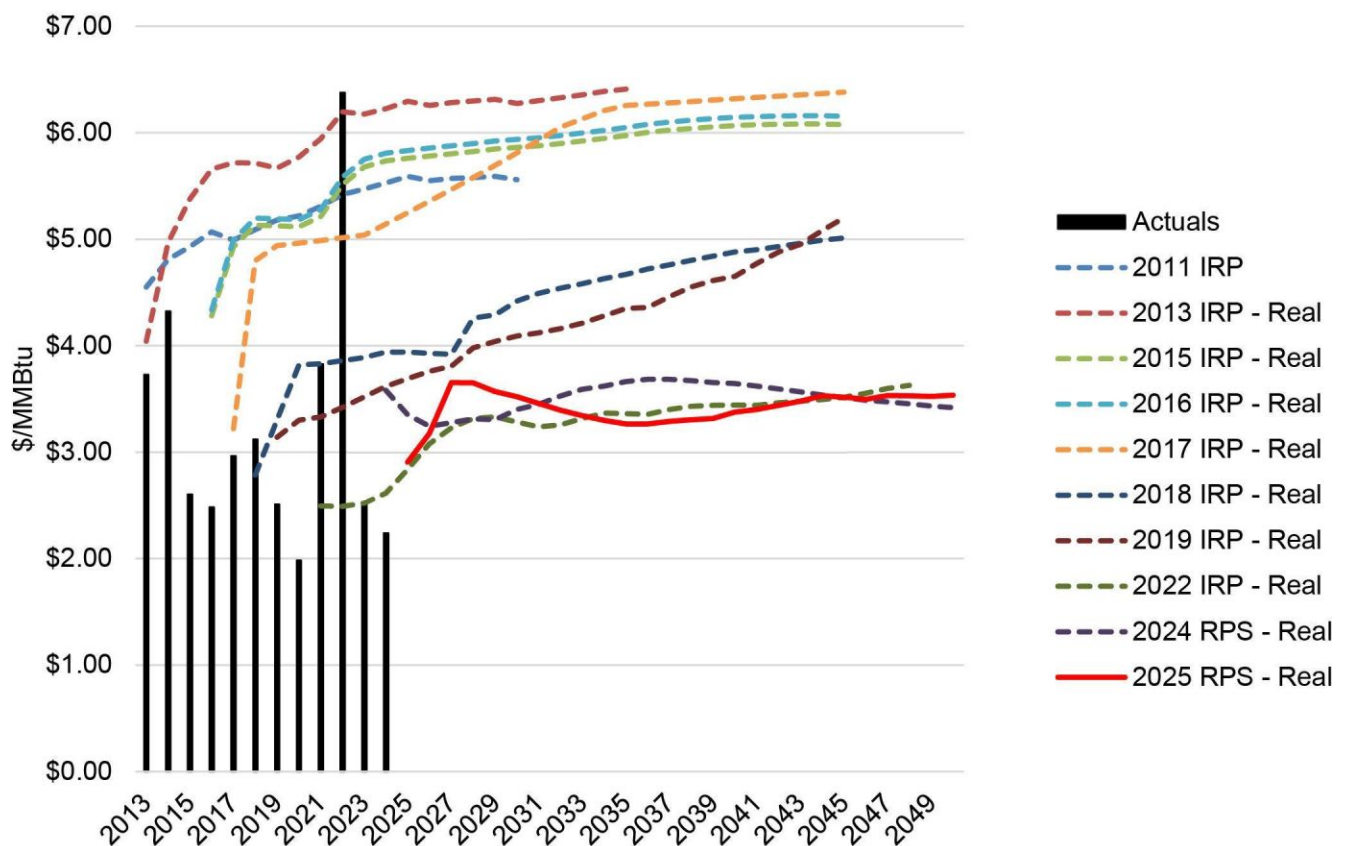




## Natural Gas Price Forecasts vs Actuals

- The chart below shows the Company's historical IRP and RPS filing of Forecasts vs. Actuals.
- Since 2013, Henry Hub natural gas forecasts were revised down every year in accordance with actual market results.
- In 2022, the Russian invasion of Ukraine resulted in massive supply disruption to Europe, with subsequent disruption to the entire global supply/demand balance. This introduced volatility to the market that had not been experienced in years.
- Since then, the market has returned to relative stability. However, the era of ever-declining natural gas prices brought on by the shale revolution (which enabled the multi year period of relative calm) is beginning to wind down. Exhaustion of low cost drillable locations is on the horizon.
- Going forward, the market for exported LNG is likely the most meaningful driver of natural gas prices, and more significant volatility can be expected.

Figure 5: Historical IRP Forecasts vs Actuals – Henry Hub



## Coal Price Forecasts – CAPP

- Enverus utilizes Evolution Markets for near term market observations (4 years) and blends that with the U.S. Energy Information Administration (“EIA”) Annual Energy Outlook and historical correlations to forecast coal prices for CAPP and NAPP.
- APCo’s forecast follows a similar trajectory to the Enverus forecast and Enverus has no objection to the Company’s forecast.
- Any differences are likely attributable to the difference in timing of when the forecasts were generated.
- The 2024 RPS Plan exhibited an inexplicably volatile forecast, which has been corrected in the 2025 RPS Plan.

Figure 6: Coal Price Forecast - CAPP (12,500btu/lb; 1.6% sulfur)

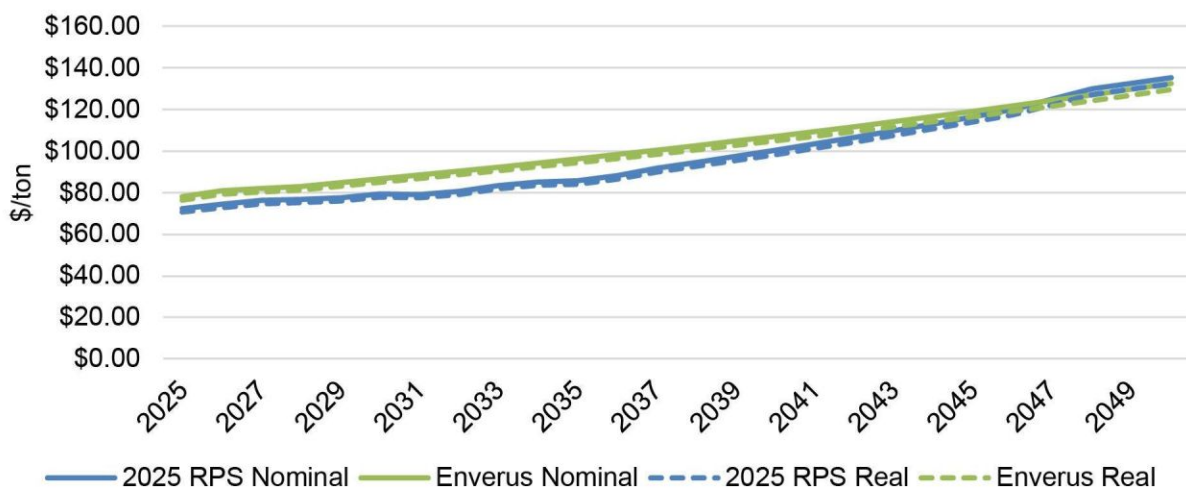
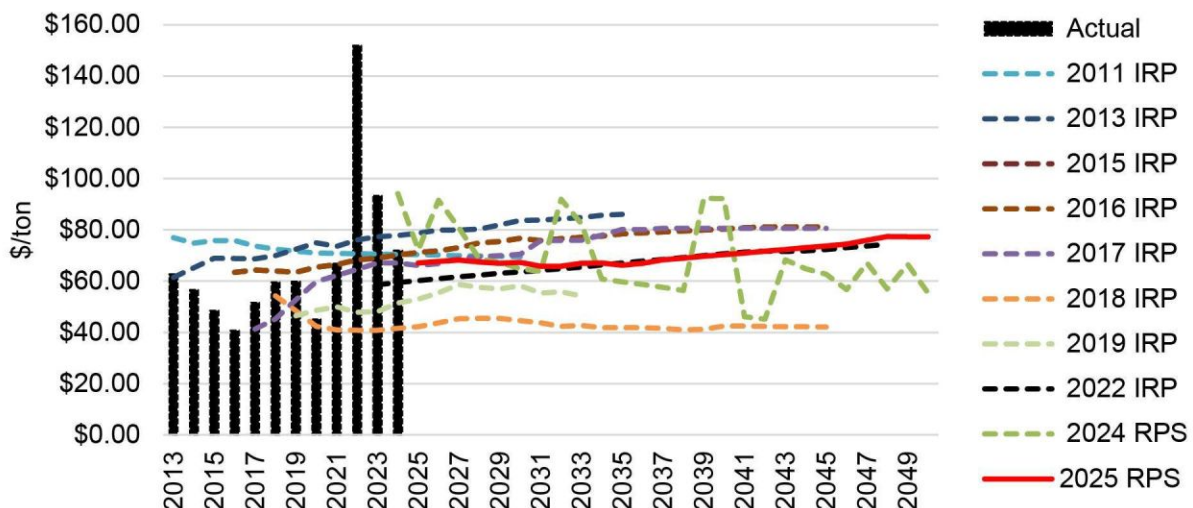


Figure 7: Historical IRP Real Forecasts vs Actuals – CAPP





## Coal Price Forecasts – NAPP

- Enverus utilizes Evolution Markets for near term market observations (4 years) and blends that with the EIA Annual Energy Outlook and historical correlations to forecast coal prices for CAPP and NAPP.
- APCo's forecast follows a similar trajectory to the Enverus forecast and Enverus has no objection to the Company's forecast.
- Any differences are likely attributable to the difference in timing of when the forecasts were generated.
- The 2024 RPS Plan exhibited an inexplicably volatile forecast, which has been corrected in the 2025 RPS Plan.

Figure 8: Coal Price Forecast - NAPP (12,500btu/lb; 6% sulfur)

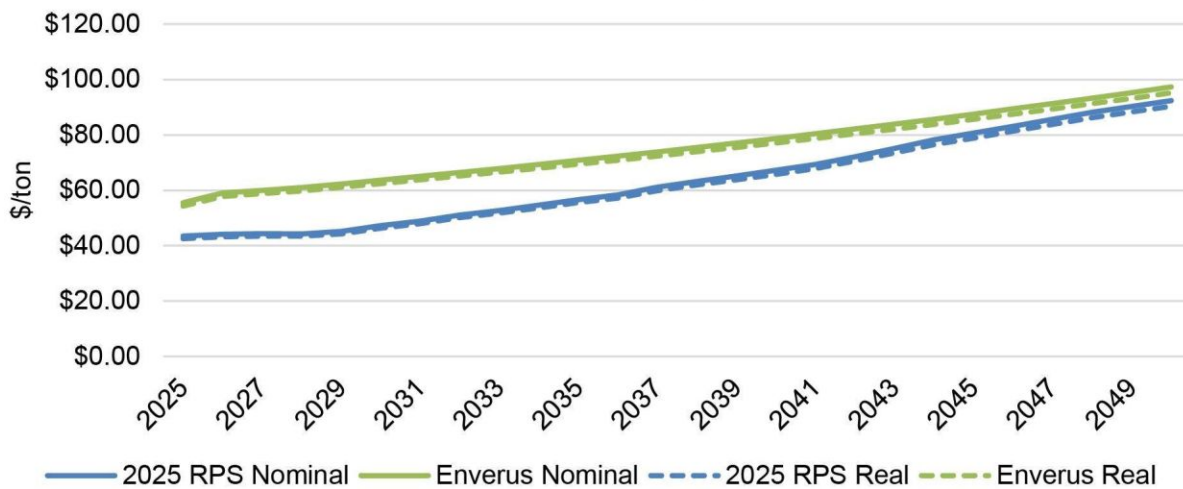
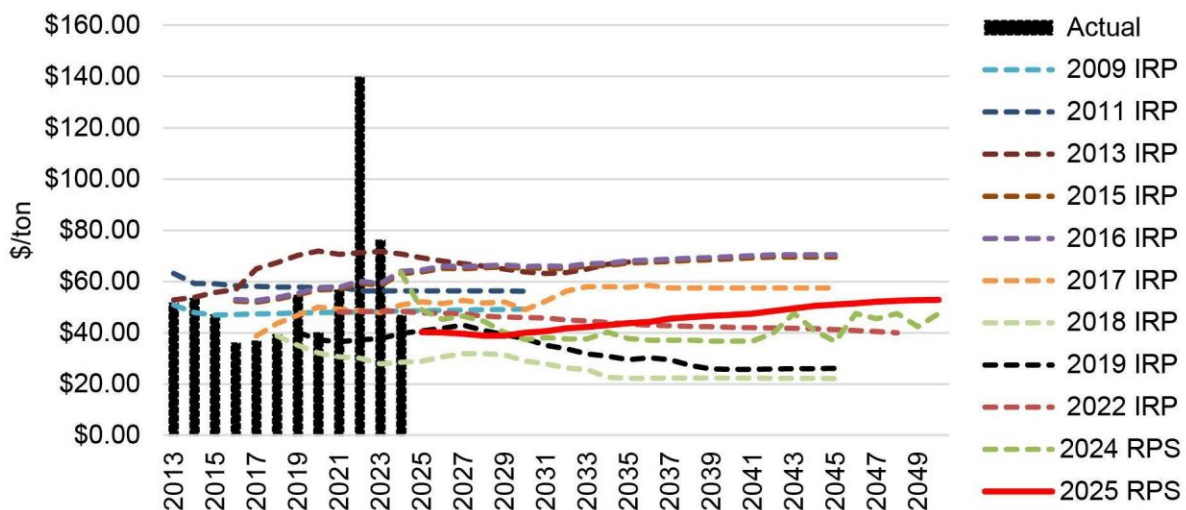


Figure 9: Historical IRP Real Forecasts vs Actuals – NAPP



## Energy Sales Forecast: APCo-LSE

- Enverus' weather normalized historical data supports 1-3% load growth for APCo. We are modeling a more conservative view and targeting 1.0% from 2026-2030 and then near 0.5% per annum for the remainder of the forecast in the APCo region. In contrast, the Company is forecasting a relatively flat outlook.
- We are anchoring our more conservative view of the weather normalized data (the 1-3% growth) on recent legislation that was just passed in West Virginia, i.e., House Bill 2014 [Passed April 12, 2025; in effect 90 days from passage (July 11, 2025)].<sup>1</sup>
- The bill is important, as it aims to incentivize data centers to self-supply through micro grids. The bigger takeaway in Enverus' view is that the potential data center loads would not increase APCo's load. HB 2014 states that "[a]n eligible plant or facility choosing to locate and operate within a microgrid district is not required to connect with and use any public electric utility . . . ."<sup>2</sup>
- Digging into the Company forecast for 2028-2029 reveals a decline of ~ -1.2%. This does not align with the "nearly 8,000 MW" of large load customers<sup>3</sup> that the Company has mentioned<sup>4</sup> and is utilizing to support proposed tariff changes.<sup>5</sup>
- Pressing the point further, in response to an interrogatory, the Company stated that it is in various stages of discussions with data centers all the way up to "late-stage contract negotiations."<sup>6</sup>

<sup>1</sup> 2025 W.Va. HB 2014 (signed by Governor Apr. 12, 2025), available at [https://www.wvlegislature.gov/Bill\\_Text\\_HTML/2025\\_SESSIONS/RS/bills/hb2014%20sub1%20enr.pdf](https://www.wvlegislature.gov/Bill_Text_HTML/2025_SESSIONS/RS/bills/hb2014%20sub1%20enr.pdf).

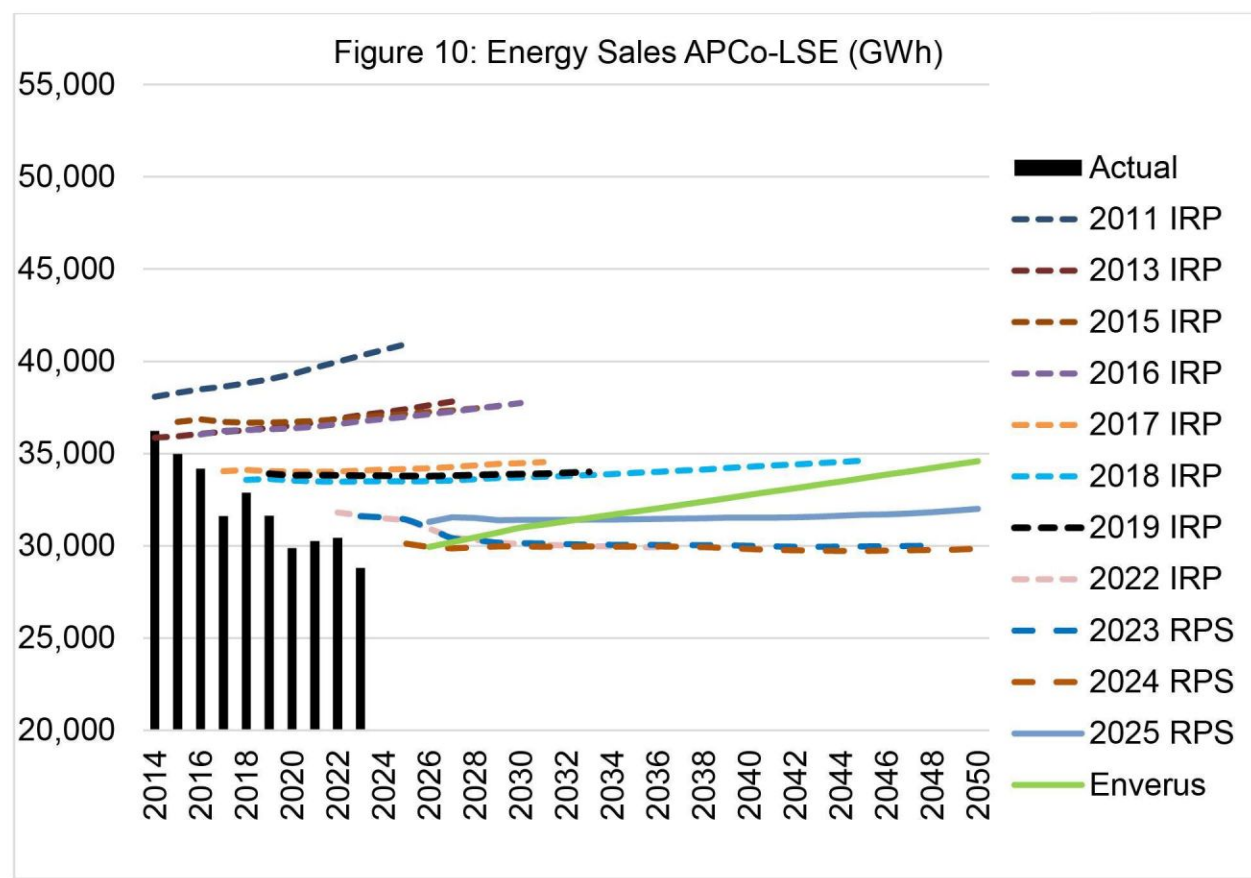
<sup>2</sup> *Id.* at 4.

<sup>3</sup> Company's Response to Staff Interrogatory No. 3-108.

<sup>4</sup> See *Application of Appalachian Power Company, For a 2024 biennial review of its base rates, terms and conditions pursuant to § 56-585.8 of the Code of Virginia*, Case No. PUR-2024-00024, Doc. Con. Cen. No. 241080082, Ex. 74 (Pre-filed direct testimony of Staff witness Brian S. Pratt) at 19 (Sept. 12, 2024) ("[T]he Company claimed that 17 prospective large non-residential customers, each with anticipated loads in excess of 200 MW, have recently expressed interest in locating their business operations in APCo's service territory.").

<sup>5</sup> *Petition of Appalachian Power Company, For approval of revisions to the Terms and Conditions of Rate Schedule L.P.S.*, Case No. PUR-2025-00057, Doc. Con. Cen. No. 250330263, Direct testimony of William K. Castle at 4 (Mar. 24, 2025).

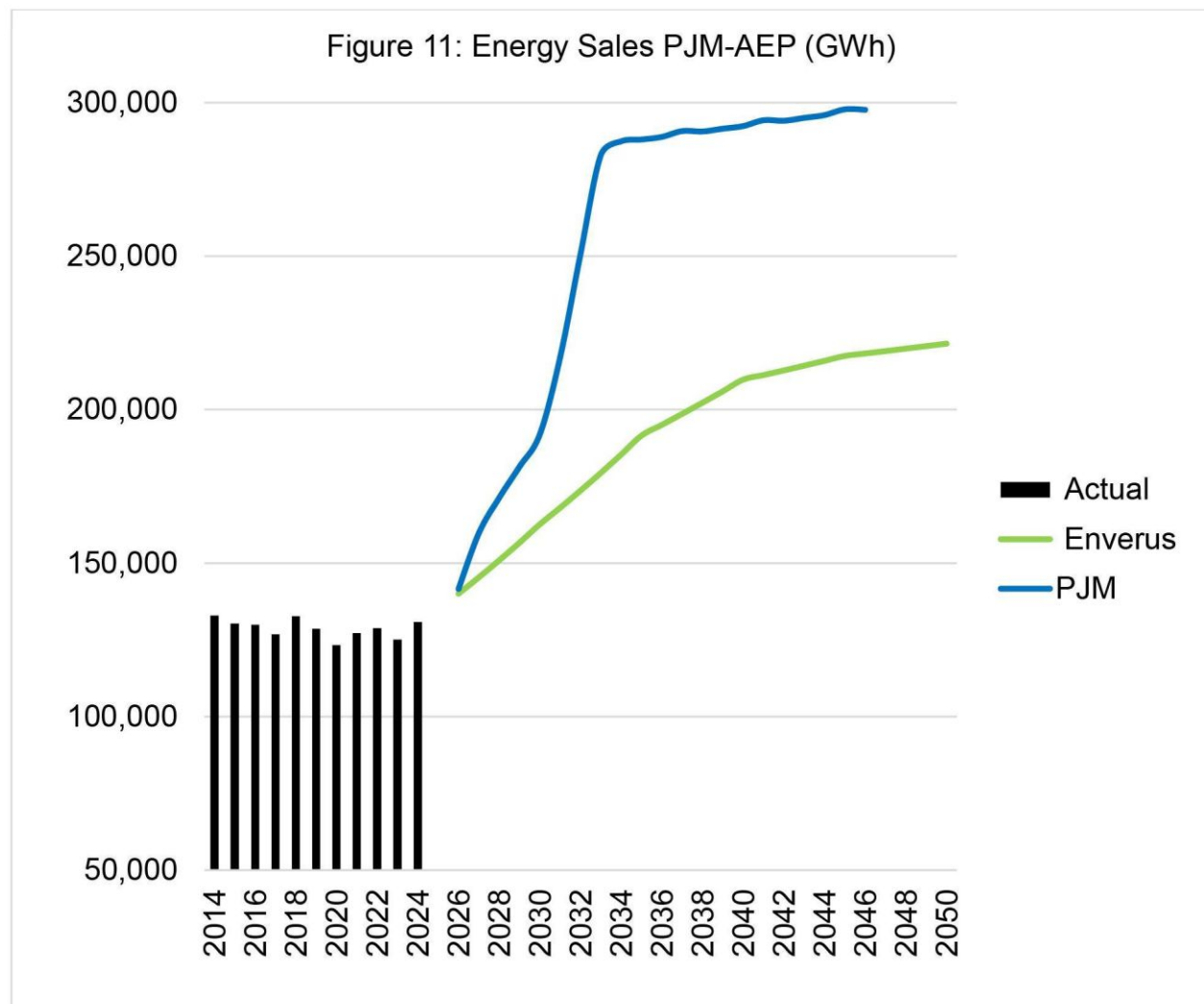
<sup>6</sup> Company's Response to Staff Interrogatory No. 1-58.





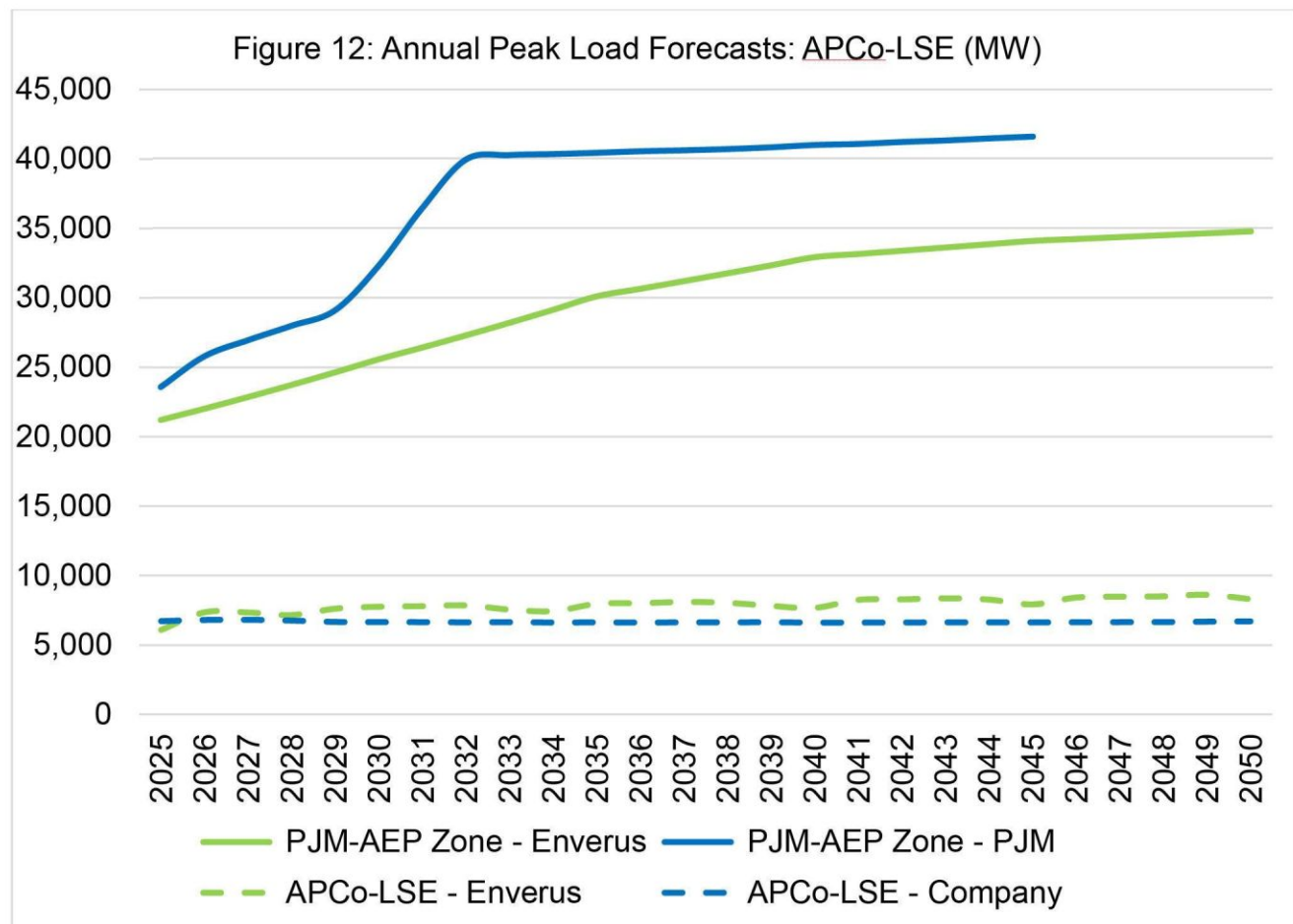
## Energy Sales Forecasts: PJM-AEP Zone

- Enverus' weather normalized historical data supports 4-5% load growth for the AEP footprint.
- Enverus is taking a more cautious view and modeling growth in the AEP Zone of ~4.0% per year for 2026-2030, which then begins to slide to near 2.5% over the next decade with the 2040s reflecting moderate growth of near 0.5%.
- In the chart below, the PJM-AEP forecast grows by greater than 10% over the next decade and then levels out to near 0% in the preceding decades. This results in an average near 3% for the entire forecast period. Enverus maintains two key reasons for a more reserved outlook after the 2030s:
  1. Recently, AEP and stakeholders have agreed that data centers must commit to at least 85% of reported power needs along with exit fees that put more of the financial burden on data centers going forward; and
  2. Thermal retirements in our modeling in the late 2030s outpace new thermal additions and renewable generation, causing wholesale power prices to surge beyond what may be acceptable for ratepayers.



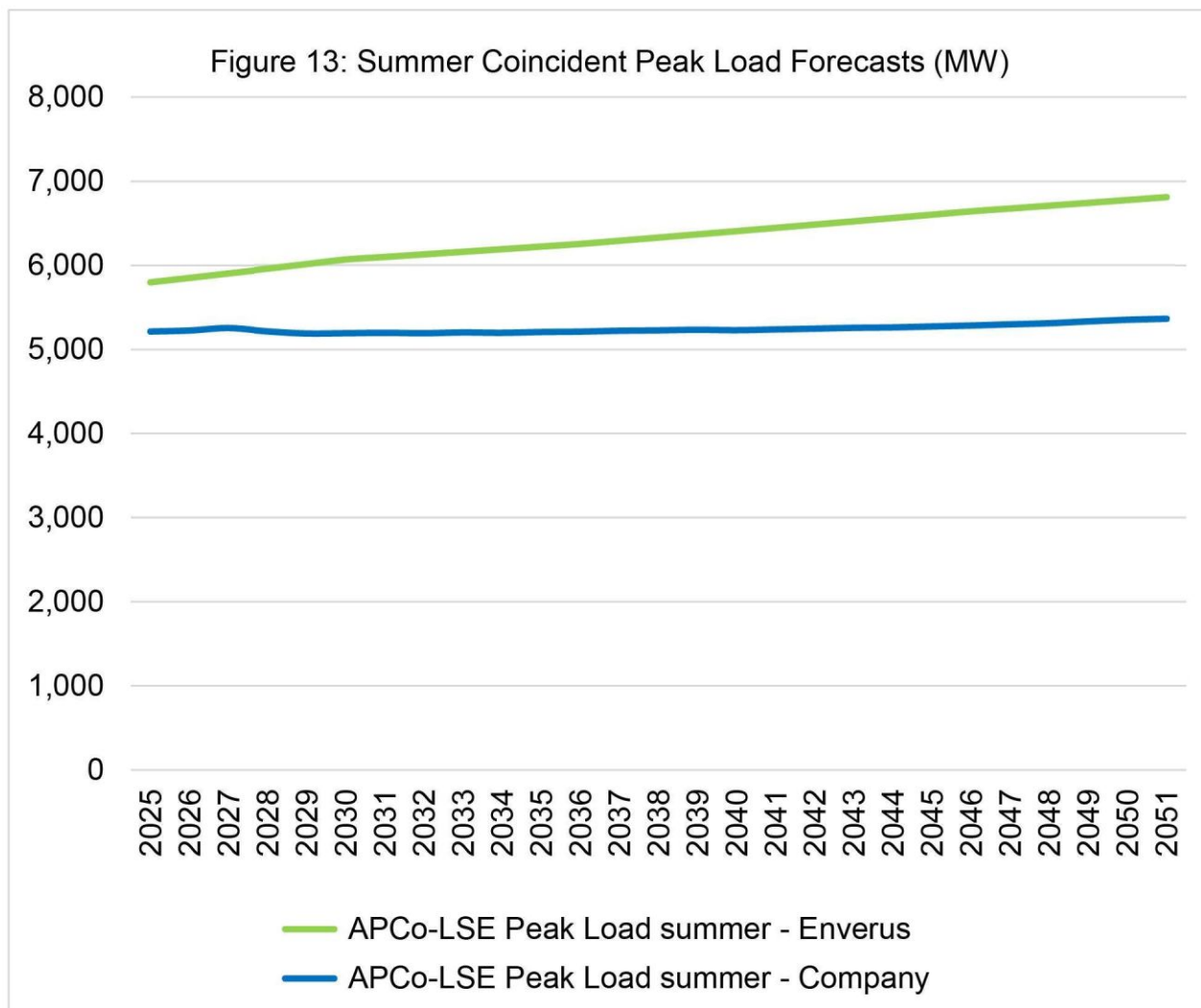
## Annual Peak Load Forecast – PJM-AEP Zone and APCo-LSE (MW)

- The chart below displays the peak demand by year for the PJM-AEP Zone as forecasted by Enverus and by PJM.
- It also shows peak demand by year for APCo-LSE as forecasted by the Company and by Enverus.
- PJM-AEP Zone and Enverus AEP Zone forecasts both show a shift to a winter peak for AEP starting in the early 2030s. This is primarily due to the electrification of heating, *i.e.*, larger adoption of electric heating pumps in newer homes versus older homes, which may use natural gas, oil, or propane fueled heating pumps.<sup>7</sup>
- Data centers do have an impact on loads, but it is more nuanced as they run year-round and raise the average load across all seasons.
- The Enverus AEP Zone forecast is not as optimistic as the PJM-AEP Zone Forecast in the short-term (2025-2030), predicting a growth rate near 3% as opposed to PJM's 6%.
- APCo-LSE is winter peaking as supported by historical data as well as the forecasts of both Enverus and the Company.



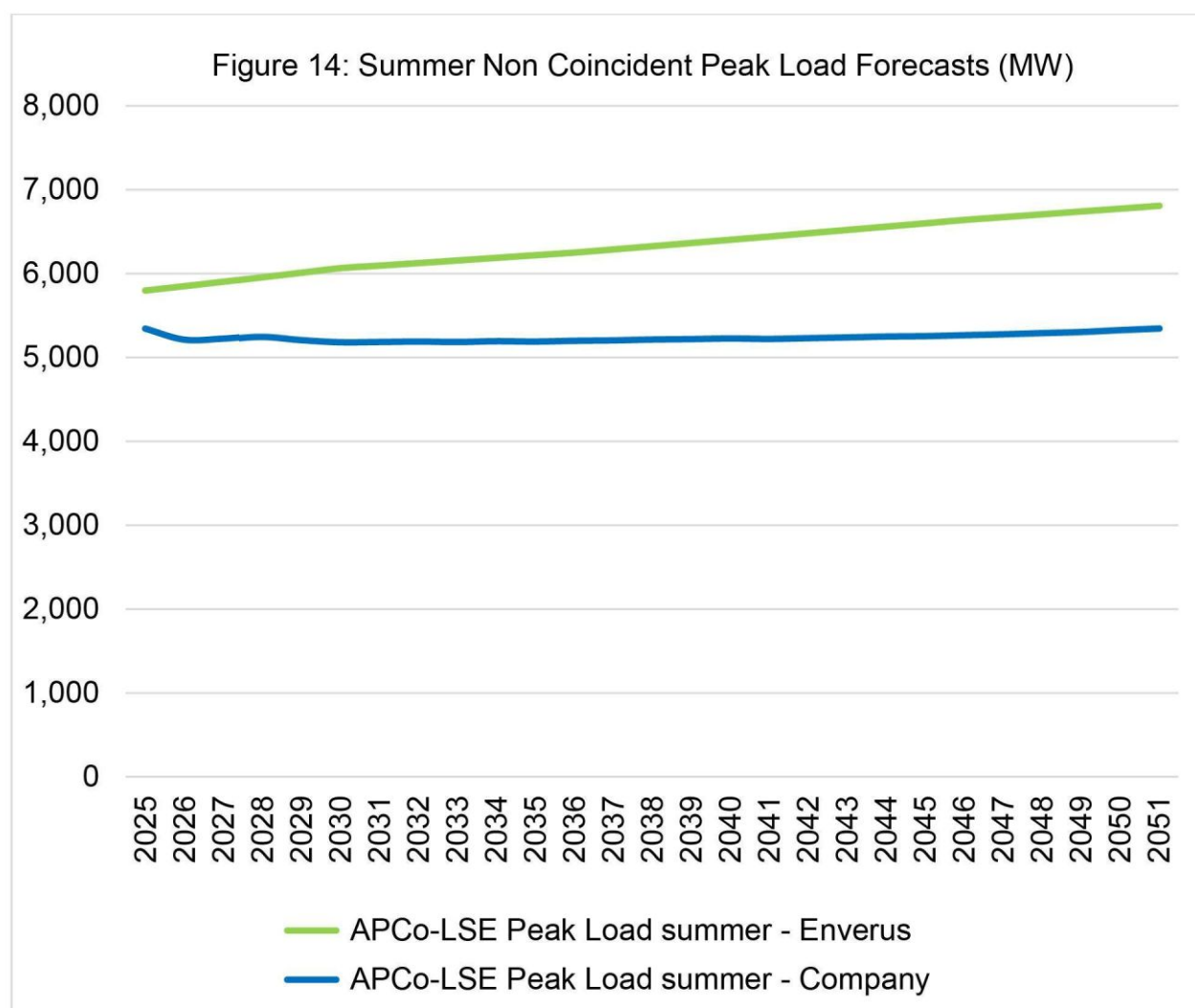
## Summer Coincident Peak Load Forecast (MW)

- The chart below illustrates the summer peak load for the APCo footprint.
- APCo historically is a winter peaking zone but it's important to highlight the summer peak below for planning purposes.
- Because PJM-AEP Zone is summer peaking while APCo-LSE is winter peaking, this load will not be the yearly peak for APCo-LSE.
- The primary difference between the forecasts is attributable to the differences in outlook for growing load (Enverus) and flat load (Company).



## Summer Non-Coincident Peak Load Forecast (MW)

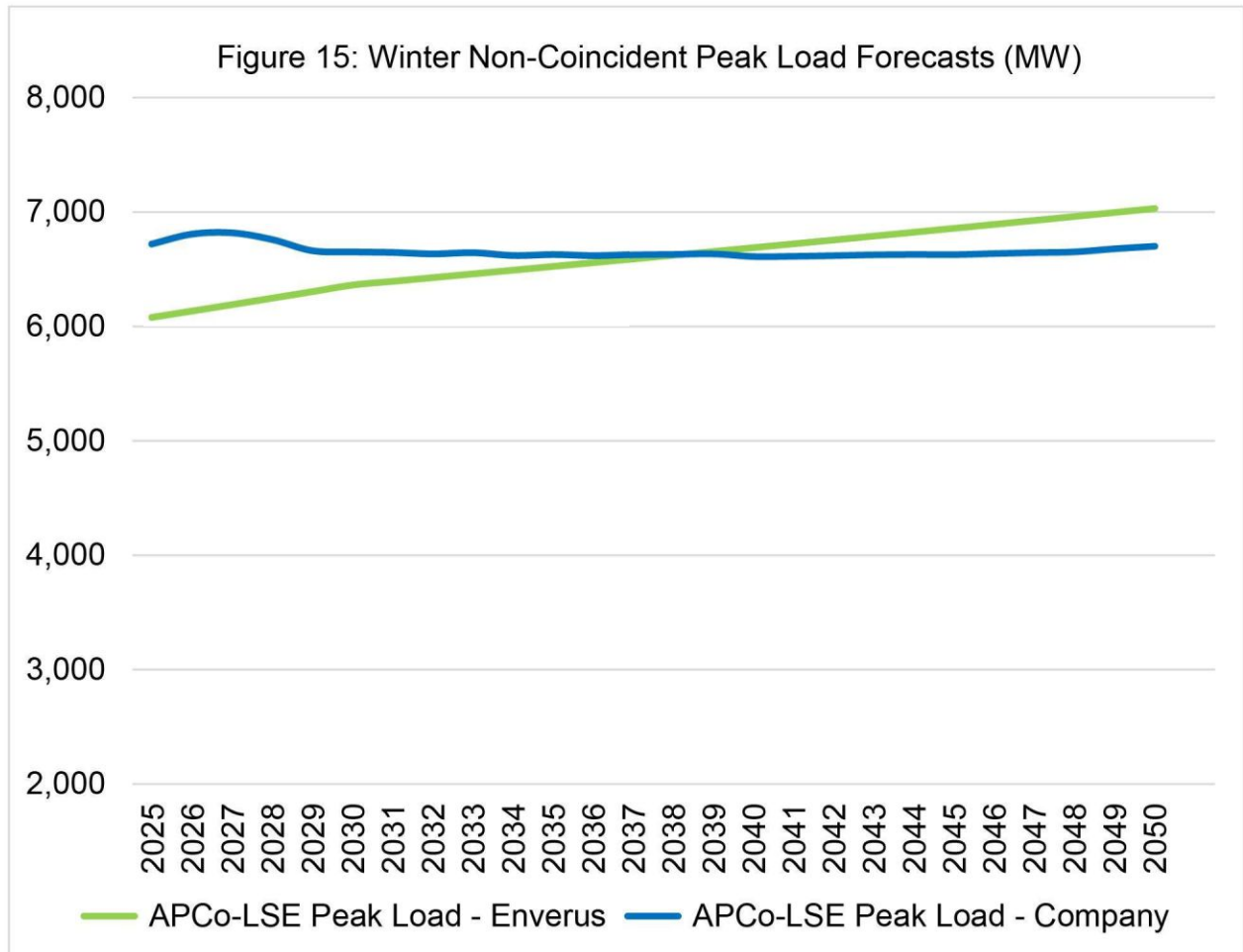
- The Summer Non-Coincident Peak Load Forecast represents the forecasted load peak in Summer in the APCo-LSE, regardless of what is forecasted for PJM-AEP Zone.
- Because PJM-AEP Zone is summer peaking while APCo-LSE is winter peaking, this load will not be the yearly peak for the APCo-LSE.
- The primary difference between the forecasts is attributable to the differences in outlook for growing load (Enverus) and flat load (Company).





## Winter Non-Coincident Peak Load Forecast MW

- The winter Non-Coincident Peak Load Forecast represents the forecasted load peak in winter in the APCo-LSE, regardless of what is forecasted PJM-AEP Zone.
- Because APCo-LSE is winter peaking, this load will be the yearly peak for the APCo-LSE.
- The primary difference between the forecasts is attributable to the differences in outlook for growing load (Enverus) and flat to declining load (Company).

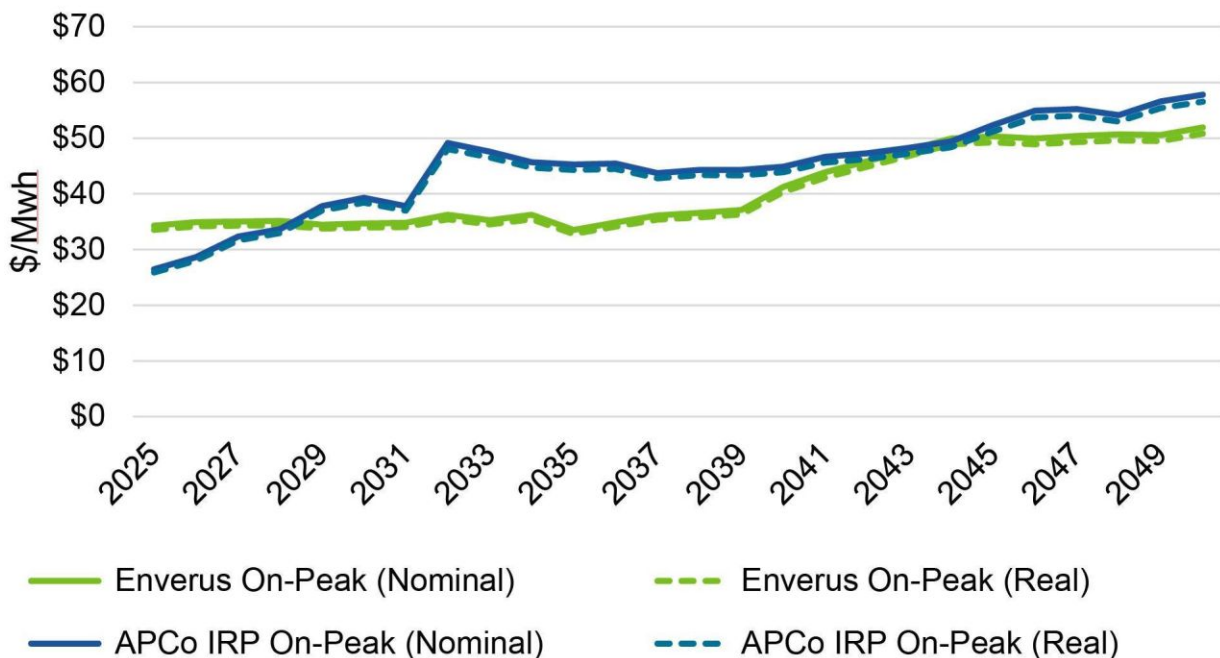




## Power Price Forecast: PJM AEP Zone

- APCo's On-Peak and Off-Peak power price forecasts are generally higher during the 2030's as compared to the Enverus forecasts. The cause appears to be APCo's reduction of "energy market import and export limits, constraining the model to select resources to support the energy need instead of purchasing exclusively from the PJM energy market."<sup>8</sup>
- The reason for the slight increase in the Enverus forecast for 2026 and 2027 is that demand outpaces renewable energy and reaches an inflexion point on the supply stack.
- We are modeling roughly 2 gigawatts ("GW") of thermal supply coming online in 2029 in Doddridge County with the Competitive Ventures Shay Energy Center. This helps to soften AEP On-Peak power prices during the 2030s.
- After 2040, Enverus is modeling the retirement of Amos and Mountaineer, which is consistent with APCo's modeling in the 2025 RPS Plan<sup>9</sup> and keeps our price forecast elevated.

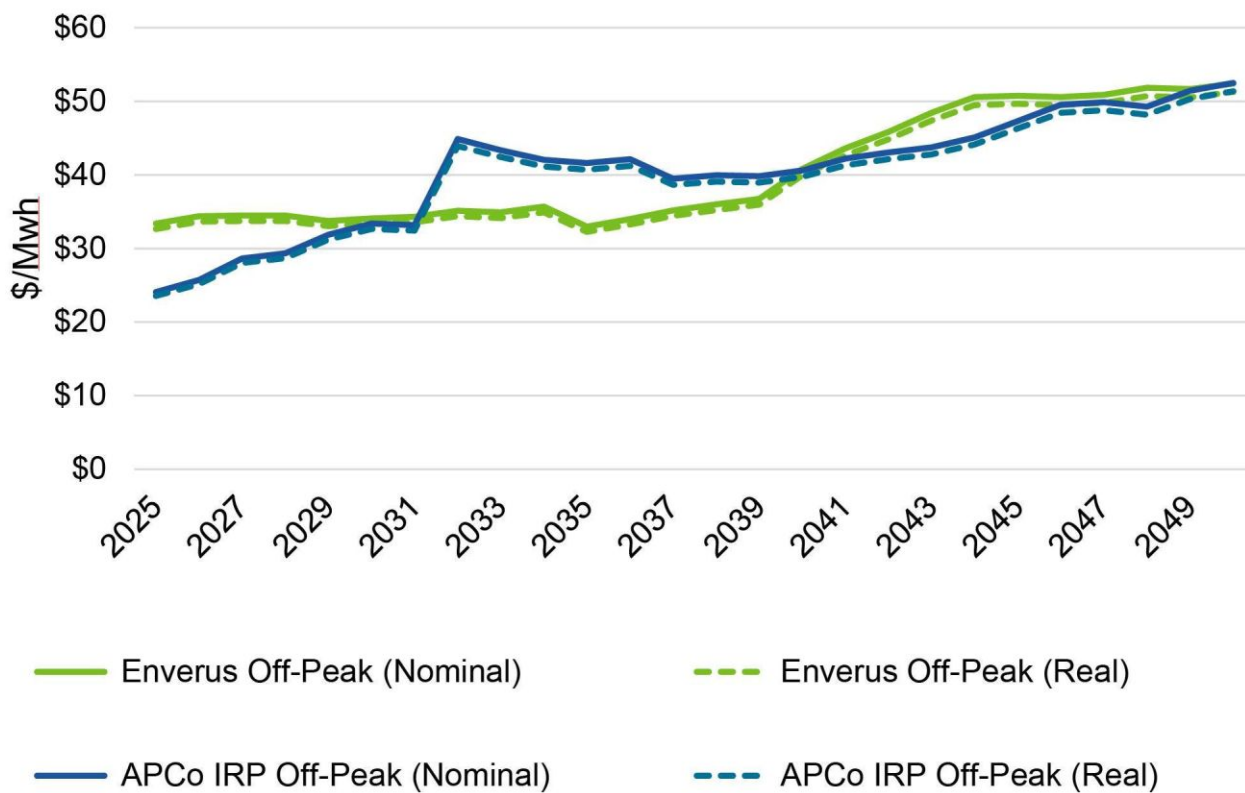
Figure 16: PJM AEP On-Peak Power Price Forecast



<sup>8</sup> 2025 RPS Plan at 18.

<sup>9</sup> *Id.* at 16.

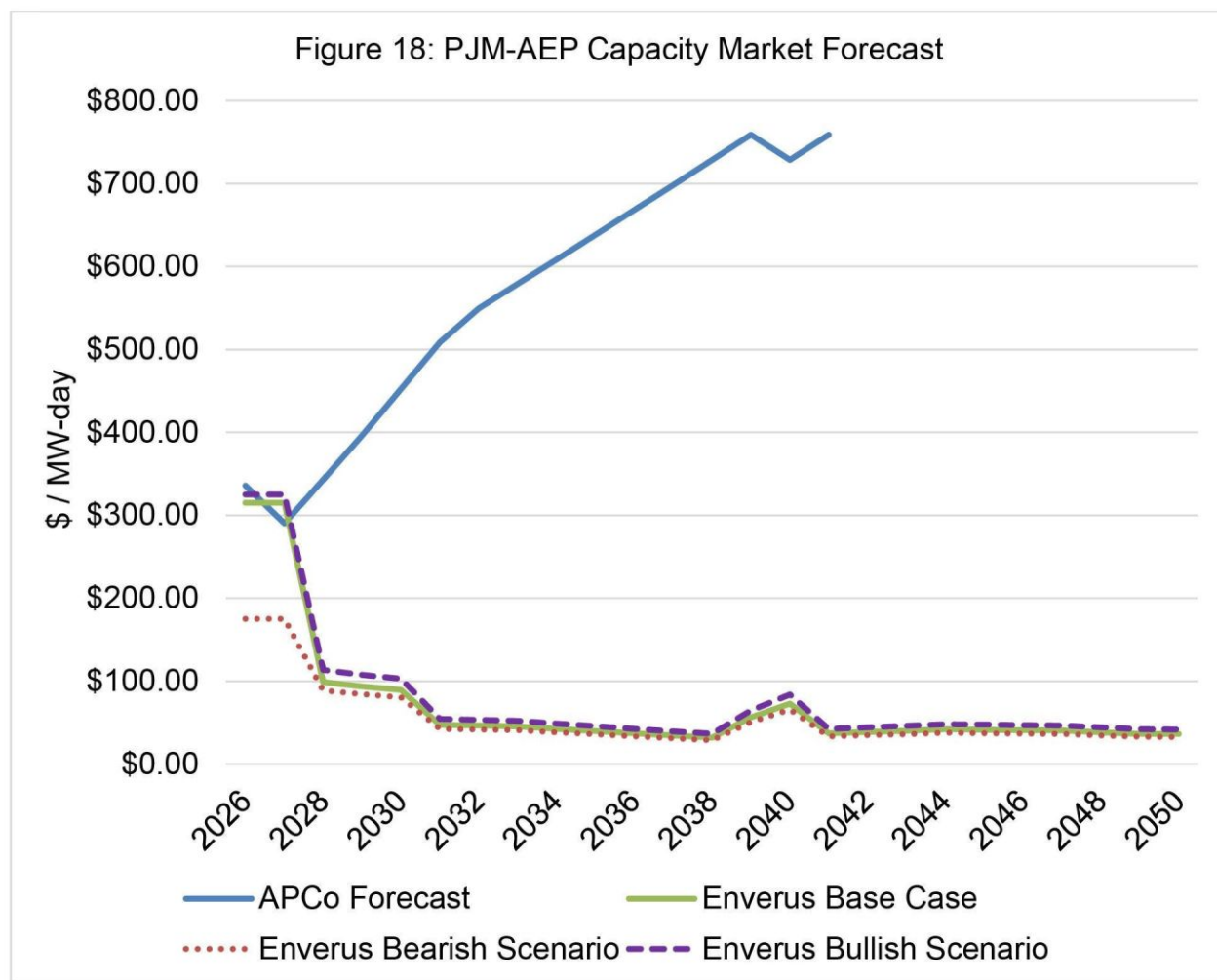
Figure 17: PJM AEP Off-Peak Power Price Forecast



## Enverus 25-Year PJM Capacity Price Forecast

- The Enverus forecast is created by calculating the actual heat rates from the prior delivery years. The actual heat rates are multiplied by gas forward market prices referencing Columbia-Appalachia TCO.
- Over the next two auctions (2026/2027 and 2027/2028 delivery year) the “Capacity Price Collar” will set a floor of \$175/MWh and a ceiling of \$325/MWh. Enverus is modeling capacity prices clearing near or at the “Price Ceiling” through 2030.<sup>10</sup>
- If and when the “Capacity Price Collar” is ended, Enverus is modeling a sharp decrease in capacity prices as the floor of \$175/MWh is lifted.
- Once the “Capacity Floor” of \$175/MWh is lifted the VRR Curve (Variable Resource Requirement) or the supply curve will be allowed to behave as it was designed. The VRR curve is essentially a downward-sloping demand curve, meaning that as the price of capacity decreases, the quantity demanded (i.e., the amount of capacity PJM will procure) increases. This is why the Enverus view has capacity prices declining, as opposed to the Company, which is forecasting an extended period of scarcity prices.
- APCo’s capacity price forecast implies no change in market behavior, or the PJM Capacity Market Construct, which is not supported in recent history. For example, the PJM Capacity Price Collar, which was enacted as a direct response to the record-breaking capacity prices from the 2025/2026 auction.
- In addition, the recent postponement of the retirements of the Eddystone gas unit in Philadelphia and Elwood combustion turbines in ComEd will keep nearly 2 GW of supply in the generation stack.
- Near 2040, portions of the U.S. nuclear fleet begin to approach end of 1<sup>st</sup> license extensions (average age of U.S. nuclear fleet is 42 years), which drives the short-term increase in our capacity price forecast.
- Enverus provides several scenarios to capture the inherent volatility stemming from the timing of the PJM capacity auctions. At this time, it appears likely that four capacity auctions will be held over 2 years, which increases the risk for high price volatility because it limits the time that supply will have to adjust to market changes.

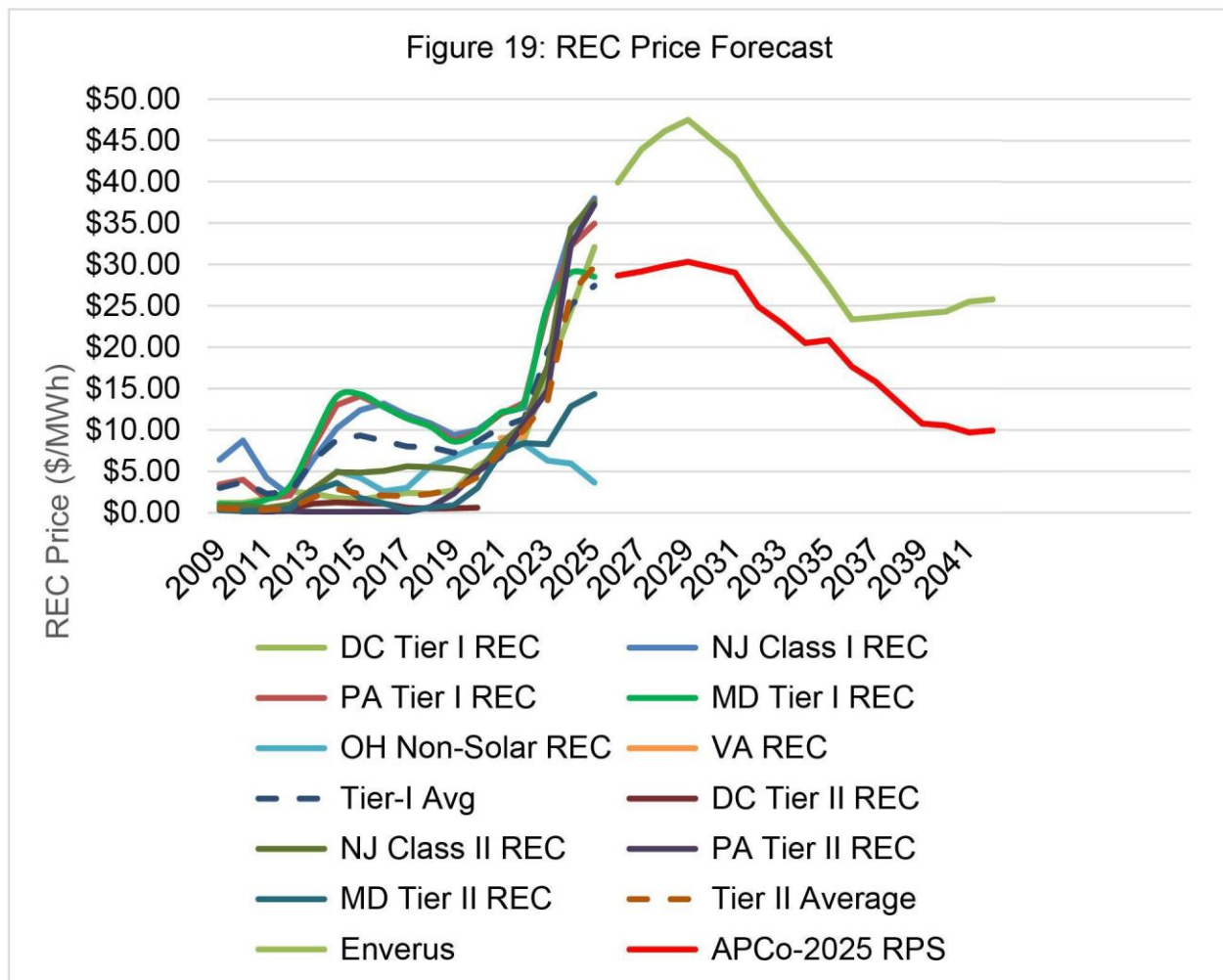
<sup>10</sup> See *Commonwealth of Pennsylvania v. PJM Interconnection, LLC*, Order Accepting Tariff Revisions and Dismissing Complaint, 191 FERC 61,066 (Apr. 21, 2025), available at [https://elibrary.ferc.gov/eLibrary/filelist?accession\\_number=20250421-3069&optimized=false](https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20250421-3069&optimized=false).





## Enverus 15-Year REC Forecast

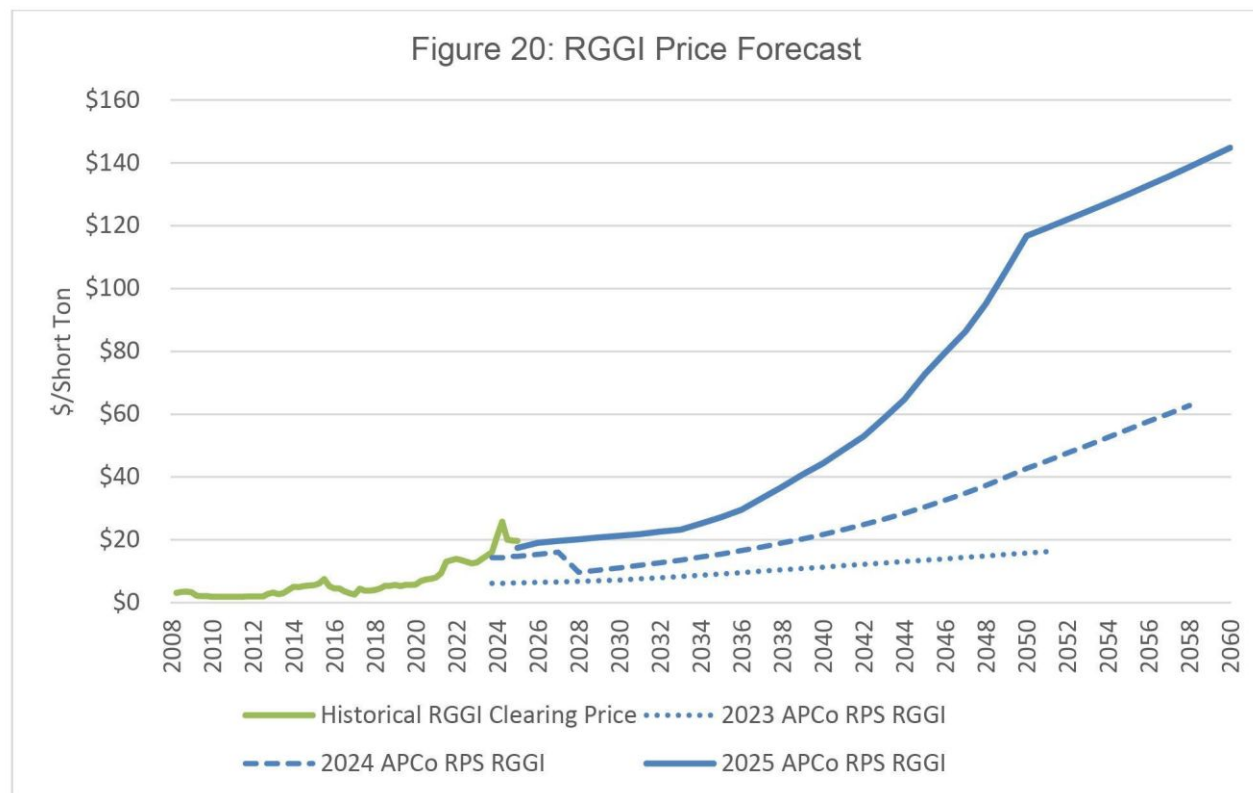
- The Enverus REC forecast has strengthened compared to last year as fewer wind and solar projects are being completed due to limited supply chains and lagging interconnection queues that are limiting REC supply.<sup>11</sup>
- The dip in the Enverus forecast starting in 2030 is due to coal retirements, which causes REC purchases to decrease. For that reason, Enverus cuts our price outlook for RECs by 10%.
- The additional round of thermal/coal retirements anticipated by PJM will be near 2035, which explains why our price signals continue to decrease. However, the 2035 retirements are more heavily weighted toward gas, which will result in less of a cut to REC price signals as compared to 2030.



<sup>11</sup> The "APCo-2025 RPS" shown on the red line in the chart is an average of the REC price forecasts provided by APCo specific to the PJM region. Company's Response to Staff Interrogatory No. 1-24.

## Regional Greenhouse Gas Initiative (RGGI)

- The 2025 RPS Plan does not provide a detailed analysis of the Company's outlook on RGGI.
- At page 22 of the 2025 RPS Plan, the Company states that "the forecast reflects the State Air Pollution Control Board's 2023 vote to repeal the Regional Greenhouse Gas Initiative (RGGI) regulation."
- However, despite the repeal vote, legal challenges seem to prevent immediate withdrawal, keeping Virginia in a state of regulatory limbo.
- Based on this, Enverus believes that incorporating detailed plans to address RGGI is unlikely to be productive until regulatory clarity improves.
- The Company did include a price forecast for RGGI, shown below, which compares the historical prices as well as forecasts from previous RPS Plans.
- Enverus does not have an objection to the Company forecast but does note that the strongly increasing price outlook relative to history implies great uncertainty, furthering the need for regulatory clarity.



## National CO<sub>2</sub> Pricing

- The Company does not include a forecast for national CO<sub>2</sub> pricing as part of its Fundamentals Forecast.
- There will always be considerable uncertainty about the U.S. adopting a national carbon price due to the political nature of such a policy and the range of potential outcomes. Therefore, predicting a national CO<sub>2</sub> price is difficult.
- Enverus does not believe the U.S. will adopt a national carbon price in the near-term, and if/when it does the price would be towards the low end of existing national carbon prices, and below the low end of the \$50-\$100/ton carbon price corridor recommended by the World Bank for 2030.

## Conclusions

Enverus has the following recommendations for the Company to improve on the forecasts it provides within the RPS and IRP proposals.

- Enverus recommends the Company provide a base case forecast for load/energy sales and then a sensitivity analysis including several portfolios to account for new large load customers and whether and to what extent these customers will locate within the Company's service territory.
- Utilize timelier price and economic inputs within 6 months of the filing date. Although the Company used inputs developed within one year of the filing, more up-to-date market data is now more accessible than it ever has been, and reliance on inputs from early 2024 appears dated.
- Benchmark more transparently against similar forecasts being published by PJM and specifically address any deviations.



## Appendix

### Energy Sales and Peak Load Forecast Methodology

- Enverus' proven expert load forecasts are generated by Pattern Recognition Technologies Inc. (PRT), acquired by Enverus in December of 2017
- PRT employs artificial neural network technology (ANN) to the core of all forecasting products.
- ANNs are computer models that are inspired from the way biological brains are organized and function. Forecasting has been one of the most successful ANN application areas where traditional techniques such as regression analysis have limited success, especially in the case of complex and nonlinear processes.
- Forecasting is viewed as a pattern mapping task whereby an input pattern consisting of factors affecting the variable to be predicted is to be mapped into the desired output.
- In short-term electric load forecasting, future load is highly dependent on several factors such as weather condition, calendar effects, recent load trends, etc. The correlation between these factors cannot be explicitly derived. However, ANNs can model this mapping/correlation through training with examples from historical data.
- An iterative adjustment scheme is repeated until the ANN outputs are sufficiently close to the desired outputs and the trained ANN is subsequently used for production-level forecasting.
- The use of ANNs for long-term forecasting requires assumption about the weather condition for the forecast period.
- Typically, a "normal weather scenario" is used for this purpose. This weather scenario is generated by averaging actual weather of several past years. This average is then used as the required weather input for the ANN models.

## **Energy Sales and Peak Load Forecast Methodology**

- Power prices are forecasted using a fundamental model of supply and demand. The key assumption is that power prices are directly related to the marginal variable costs incurred by power generation for a specific load.
- The supply curve is created by estimating fuel, and variable operations and maintenance costs for each power unit in PJM-AEP using infrastructure data from the IRP, PJM, Enverus project data, and analyst research.
- For natural gas and coal fired plants, the Enverus price forecasts are applied to the most recent reported annual heat rates to calculate fuel costs. For other fuels and for all operations and maintenance costs, the most recent reported annual figures are used.
- All announced builds and units that have announced future retirement are incorporated into the forecast according to their reported in-service or retirement dates.
- Seasonal capacity factors and hourly generation shapes are applied to wind, solar, and nuclear power units. Assuming that lower-cost units are dispatched first, the units are sorted by variable operating cost to create the supply curve.
- A fixed operations cost that increases by 1% per year is added to the supply curve to account for the non-variable part of operations, maintenance, and compliance.