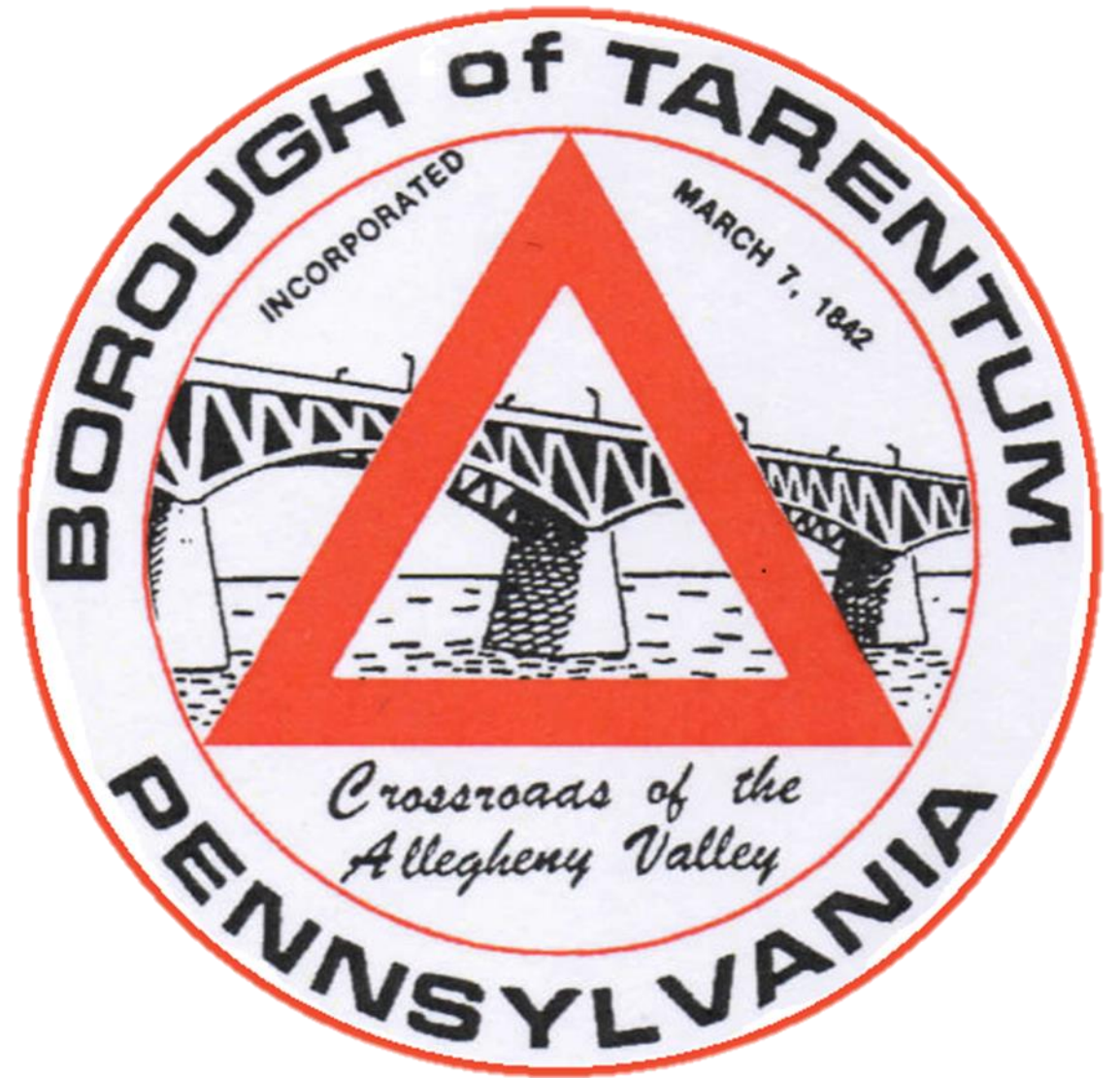


Tarentum, PA Council Meeting

August 13, 2024



Topics of Discussion

- Power Supply and Generation Terms
- Power Supply Planning
- Energy Market Functions and Cost Components
- Energy Infrastructure and Delivery
- Power Supply and Generation Resources
- Summary

Topics to Cover

- Who is AMP and How We Serve Members
- Power Supply – Terminology/Resources
- Power Supply - Cost Components
- Review Tarentum's Historical Power Requirements
- PJM Capacity Auction Cost Impact
- Fixed Energy Requirements Supply Options
- Block Energy Supply Option
- Peak Demand Shaving
- Questions?

Who is American Municipal Power, Inc. (AMP)?

- Ohio public power systems formed AMP-Ohio in 1971 to strengthen wholesale market buying power, gain access to transmission and enhance advocacy efforts; became AMP in 2009
- Today, AMP provides wholesale power and services to 133 municipal electric systems in nine states (DE, IN, KY, MD, MI, OH, PA, VA and WV)
- Members serve approximately 650,000 meters; nearly 3,500-megawatt peak
- Diverse generation portfolio, including hydro, coal, natural gas, solar, wind and diesel
- Approximately 200 Employees; \$5.7 billion in assets; \$1.2 billion in annual revenue
- Operate in PJM and MISO and non-RTO areas
- 22-member Board of Trustees made up of Member officials meets monthly
- AMP Transmission (AMPT) a wholly owned subsidiary



AMP Pennsylvania Members

Berlin

Blakely

Catawissa

Duncannon

East Conemaugh

Ellwood City

Ephrata

Girard

Goldsboro

Grove City

Hatfield

Hooversville

Kutztown

Lansdale

Lehighton

Lewisberry

Mifflinburg

New Wilmington

Perkasie

Quakertown

Royalton

Saint Clair

Schuylkill Haven

Smethport

Summerhill

Tarentum

Wampum

Watsonstown

Weatherly

Zelienople

AMP Serves Members Through Joint Action

- Manages and supplies competitively priced, reliable wholesale power to Members
- Negotiates and coordinates power-supply options and interconnection agreements and operates an energy control center 24/7/365
- Owns and manages a diverse array of power resources, allowing Members to select the sources that best meet their needs
- Advocates for Members on legislative and regulatory issues at the state, regional and federal levels
- Provides variety of value-added services and programs to help Members meet their customer needs



AMP conducted a regional Power Supply Meeting in Salem in June 2023.

AMP Power Supply and Generation

- **Power supply planning**
 - AMP assists member electric systems in assessing and filling their power supply needs
- **Peak shaving/demand response**
 - AMP manages a demand response and peak shaving program on behalf of its Members
- **Energy Control Center**
 - Operates 365 days a year, 24 hours a day
 - Minimizes costs for participating communities through economic dispatch of a blend of long- and short-term power sources and peak-shaving

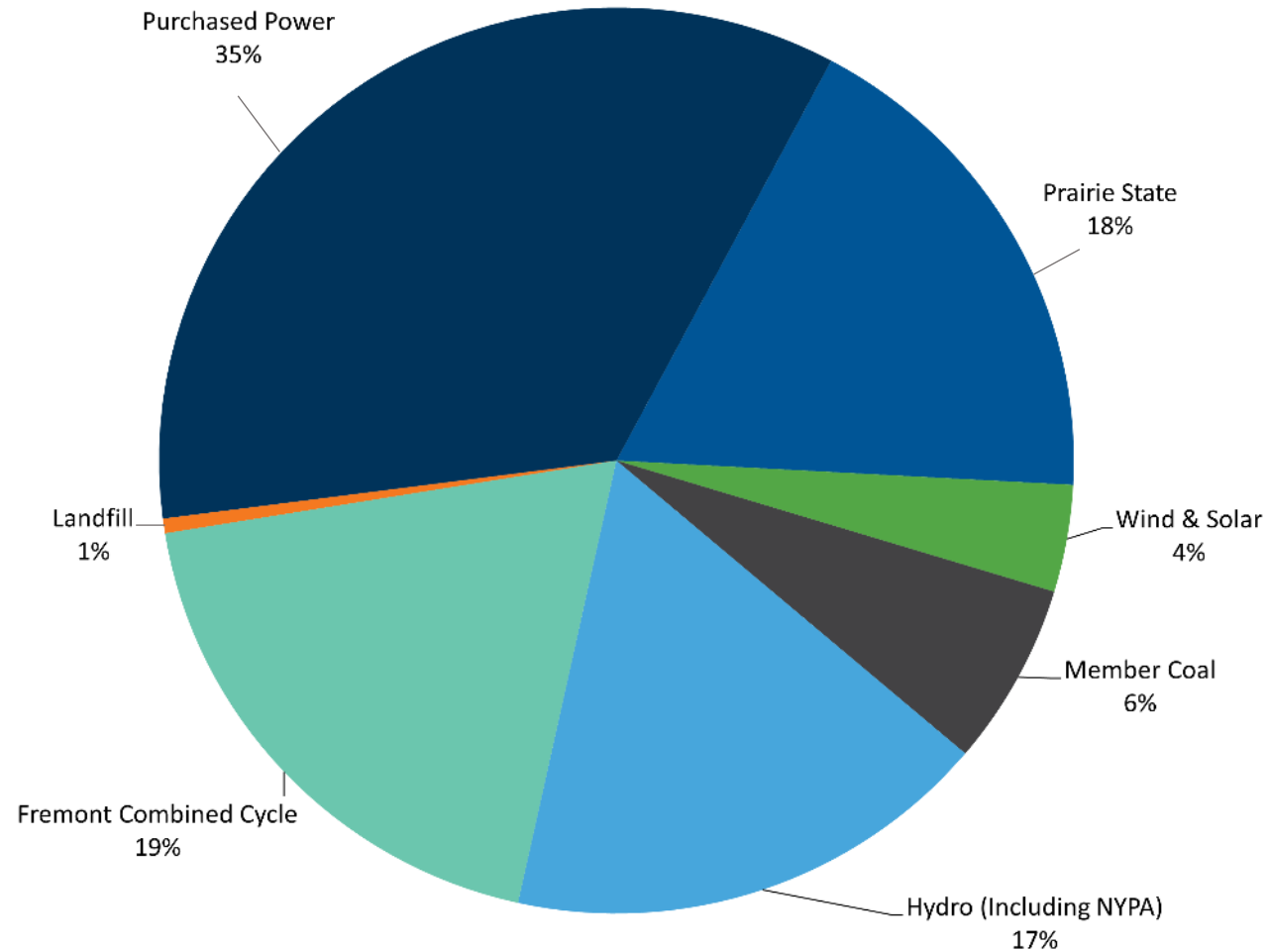


AFEC



Willow Island Hydroelectric Plant

2023 AMP Member Resource Mix (16,065,128 MWh)



Notes:

- The Wind & Solar percentage includes member-owned solar.
- The Hydro percentage includes member-owned hydro and NYPA.
- The Member Coal figure includes the participation of AMP members Paducah and Princeton in PSEC through the Kentucky Municipal Power Agency.
- AMP, on behalf of its Members, sells all or a portion of the RECs created by its renewable energy projects, power purchase agreements, and joint ventures to help reduce its wholesale power costs.

Programs and Services for Members

- Coverage of membership dues for the American Public Power Association (APPA) and APPA-affiliated programs (DEED, eReliability Tracker and Safety Tracker), as well as the Smart Electric Power Alliance (SEPA)
- Quarterly safety training, certified lineworker training and regional technical training
- Mutual aid program administration
- Weekly grant newsletter, grant program identification, database and high-level application assistance provided by nationally recognized partner (The Ferguson Group)
- Select sponsorship for Member crews to attend and compete in the APPA Lineworker Rodeo and to participate in Light Up Navajo
- Economic development support
- Focus Forward Advisory Council educational webinars and Member case studies related to grid evolution and innovation (including tools related to rate-setting, interconnection policies and electric vehicle integration)
- Sustainability reporting assistance

Programs and Services for Members

- WattPlan website for Member customers to access tailored electric vehicle information and savings
- Legal and regulatory assistance
- Member financing program assists Member communities to finance electric utility projects
- Best-practices resource repository on Member extranet
- Annual awards program recognizing Members for system improvements, innovation, environmental stewardship and public power promotion
- Public relations assistance and social media toolkits
- Scholarship programs for graduating seniors who live in Member communities or whose parents/guardians work for Member systems
- General assistance with APPA Reliable Public Power Provider (RP3) program applications, engineering and environmental matters

At-Cost Subscription Programs for Members

- Nationally recognized *Efficiency Smart*® comprehensive retail energy efficiency program
- *EcoSmart Choice*® green-pricing program
- Advanced Metering Infrastructure (AMI) program
- Community Energy Savings: Smart Thermostat program
- Cybersecurity assessments
- Key accounts program
- Detailed technical/engineering services, including environmental permitting and compliance services
- Operations and maintenance services
- OSHA compliance training
- NERC compliance assistance
- Lineworker, and regional, quarterly and virtual technical training courses
- AMP Lineworker Rodeo
- AMP Annual Conference and AMP Technical Services Conference
- Detailed grant-writing assistance
- Detailed RP3 application assistance
- Inventory Asset Management Program

Electric Industry Overview

Generation - Production of electricity using various fuel types, including coal, diesel, hydropower, landfill gas, natural gas, nuclear, solar and wind

- Generally unregulated
- Baseload, intermediate and peaking

Transmission - Movement of high-voltage electricity from generation facilities to local electric utilities

- Regulated by the Federal Energy Regulatory Commission (FERC)
- AMP Members and generation assets are in either the PJM Interconnection (PJM) or Midcontinent Independent System Operator (MISO) regional transmission organizations (RTO); also have Members in Kentucky on the LGEE system
 - An RTO coordinates, controls and monitors an electricity transmission grid; ultimately responsible for moving electricity over large interstate areas

Distribution - Delivery of electricity to homes and businesses over local poles and wires, transformers, substations and other equipment

- Generally, private utilities regulated by state utility commissions; consumer-owned utilities regulated by local governing bodies

Generation Resource Types

Baseload

- Low operating cost
- Usually higher capital costs
- Operate 24 hours a day
- Examples: coal, nuclear, landfill gas

Intermediate

- Mid-range of operating and capital costs
- Operate mainly during on-peak hours
- Ability to take offline during low load and low-price hours
- Example: combined cycle natural gas generation

Peaking

- Lower capital cost but higher operating cost (typically)
- Operate during hours of high load and prices
- Ability to bring online quickly
- Low run hours typically less than 500 hrs/yr
- Examples: simple cycle gas turbine, reciprocating internal combustion engines (diesel or gas), demand response (load curtailment or diesel generation)

Intermittent

- Renewable resource (typically)
- Operate only when generation source is available (i.e., wind is blowing or sun is shining)
- Non-dispatchable
- Not a resource that supports reliability and resiliency without being paired with a storage technology (i.e., battery)
- Examples: wind, solar, run-of-the-river hydro

Delivery of Power Charges

- Energy
 1. Kilowatt-hours (kWh) or Megawatt-hours (MWh) consumed by customers and produced by generators
- Demand
 2. Capacity
 - Measured in Kilowatt (kW) or Megawatt (MW)
 - Ensuring that there is enough generation available to supply customers during period of maximum usage
 3. Transmission
 - Measured in Kilowatt (kW) or Megawatt (MW)
 - High Voltage electric lines connecting generators to municipal system

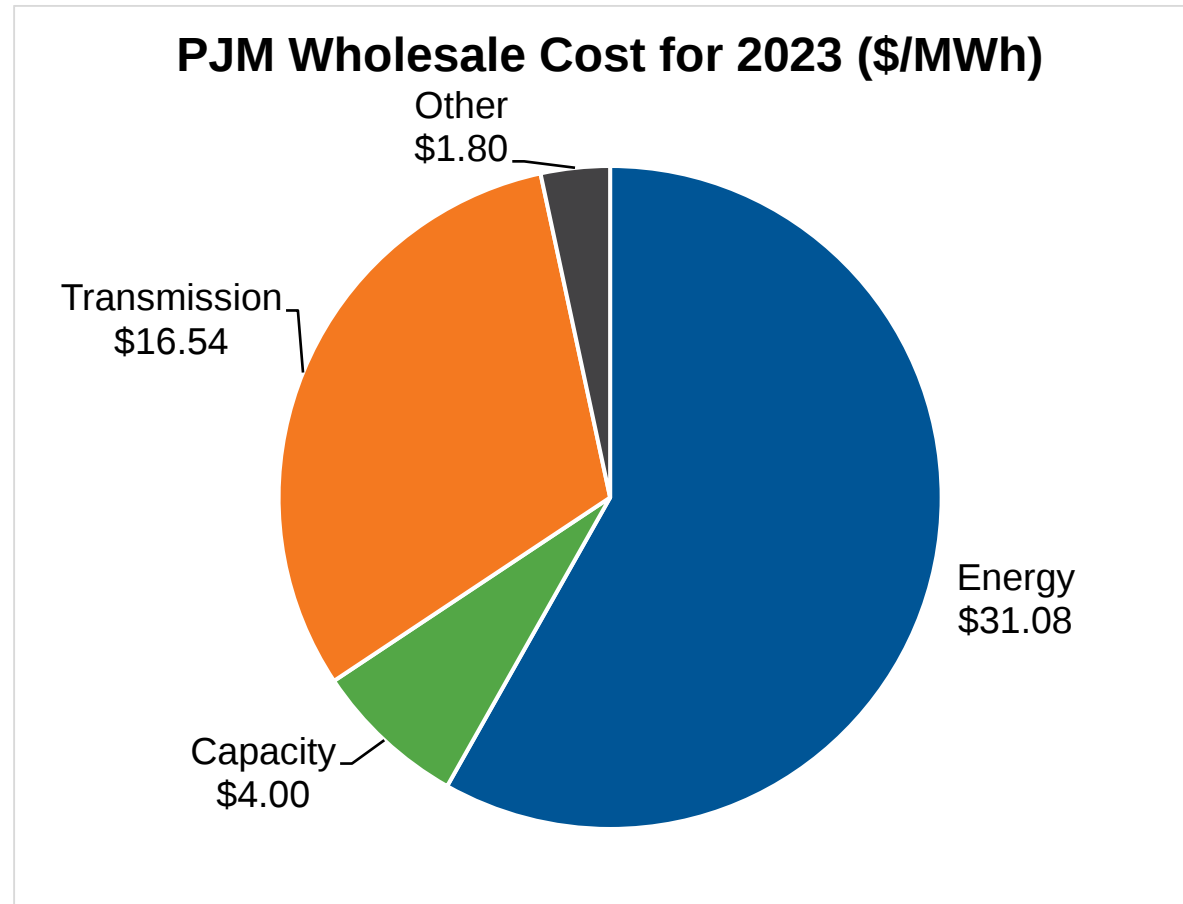
Pricing of Power

Cost	Usage	Price	Total Cost
Demand (Fixed)	2,000 kW	\$10 / kW-month	\$20,000
Energy (Variable)	1,000 MWh	\$30 / MWh	\$30,000
Total			\$50,000

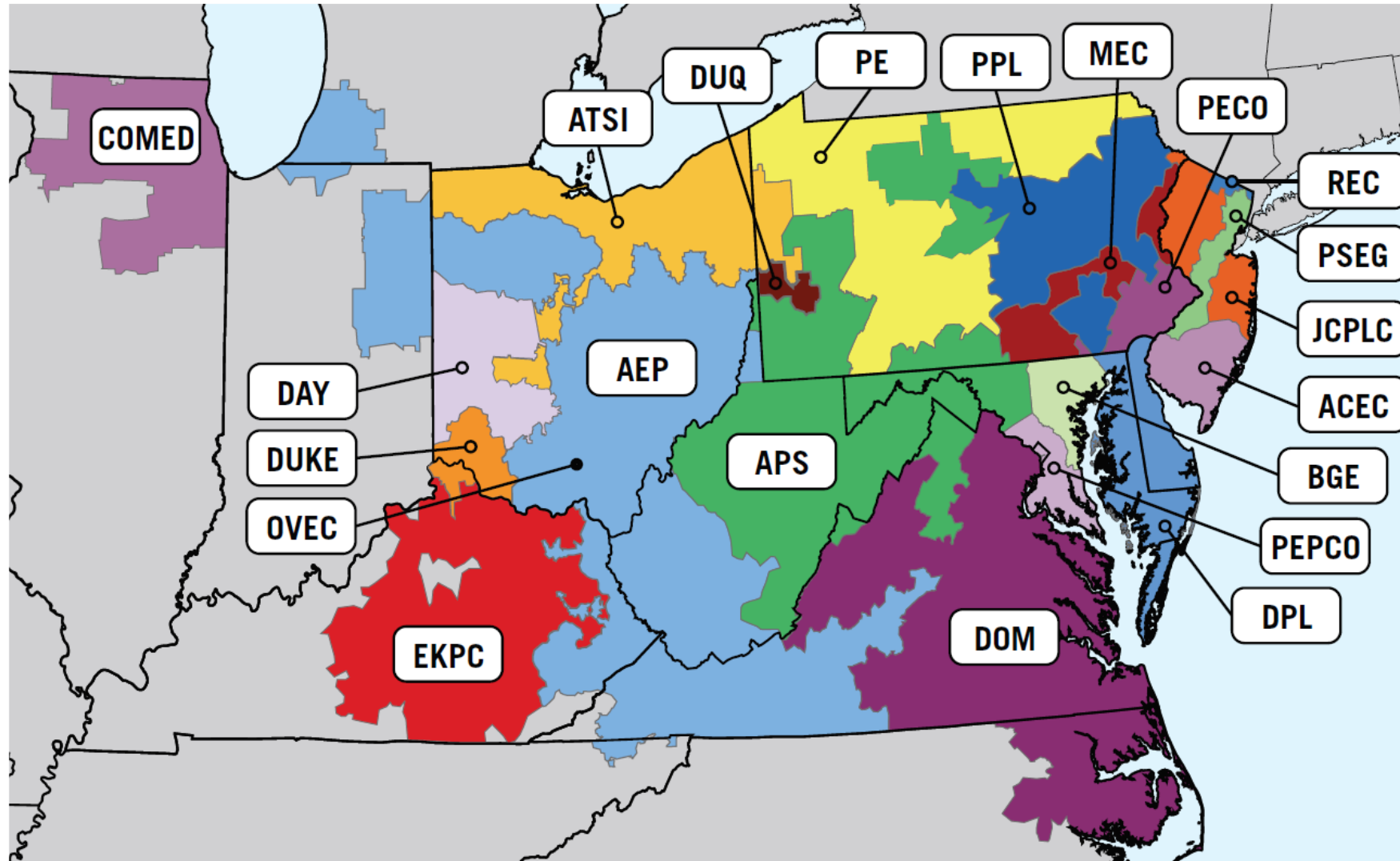
Effective Rate

Total Cost	Usage	Effective Rate	
\$50,000	1,000 MWh	\$50 / MWh	\$0.05 / kWh

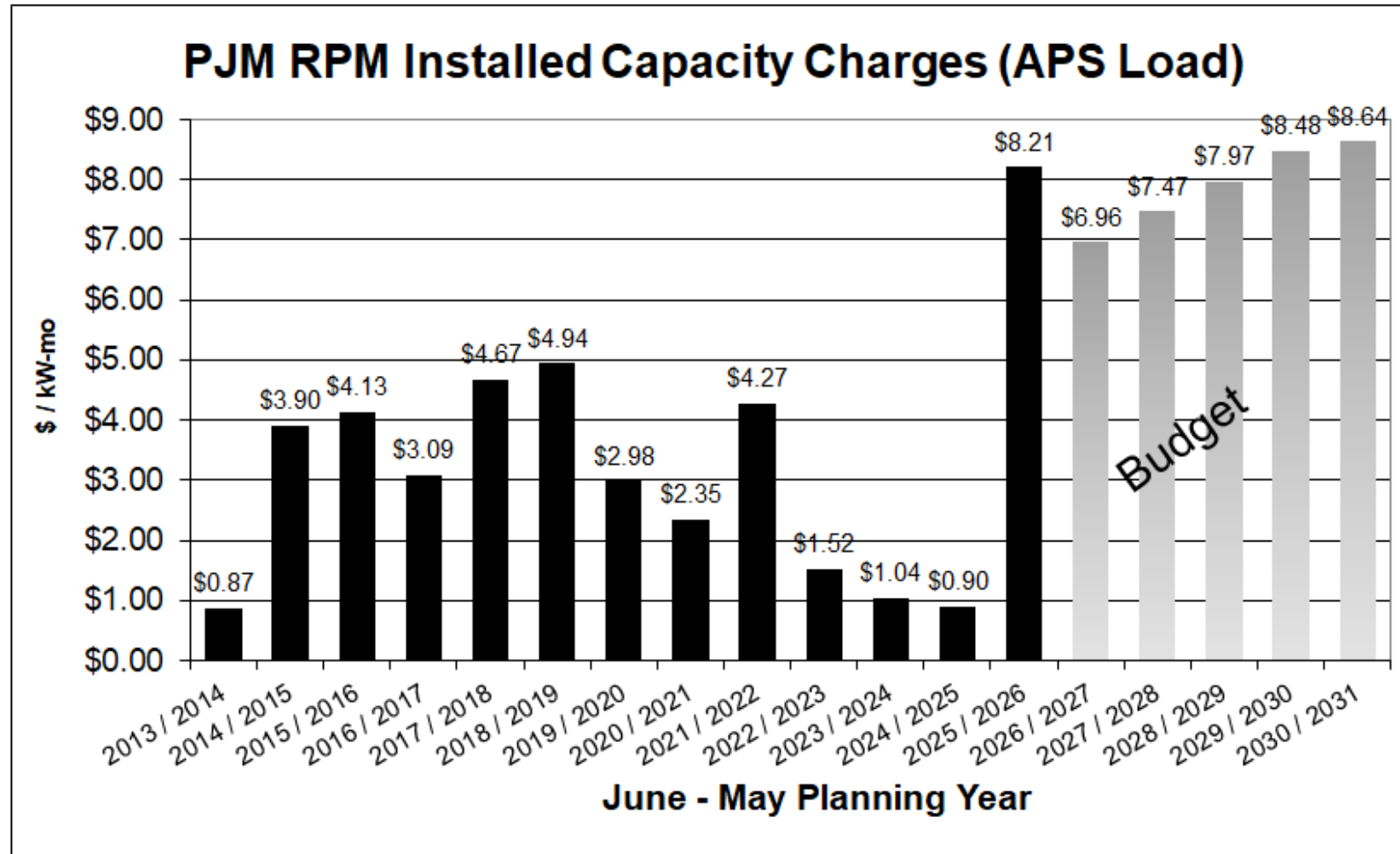
Wholesale Power Cost Example



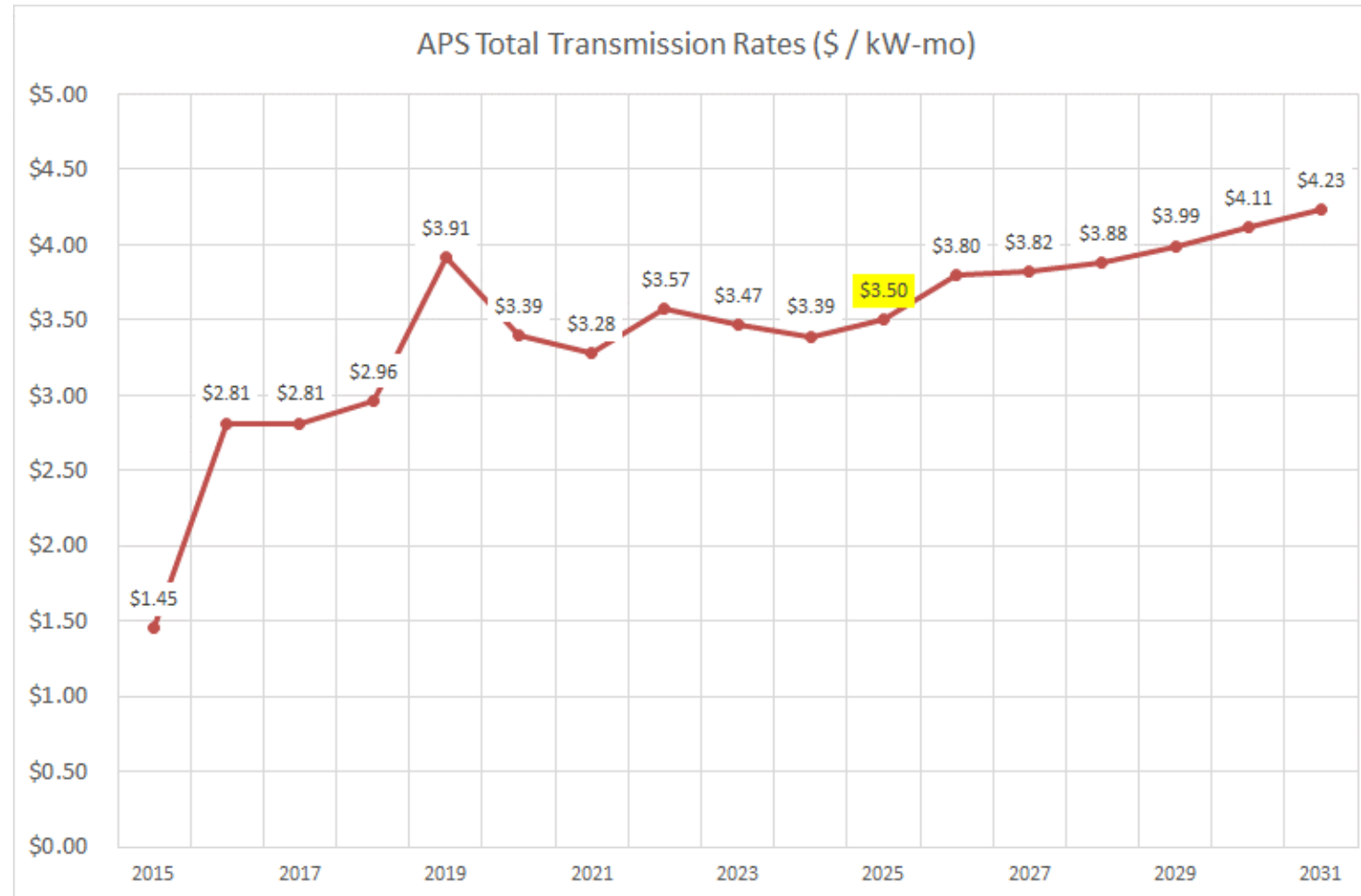
PJM Transmission Zones



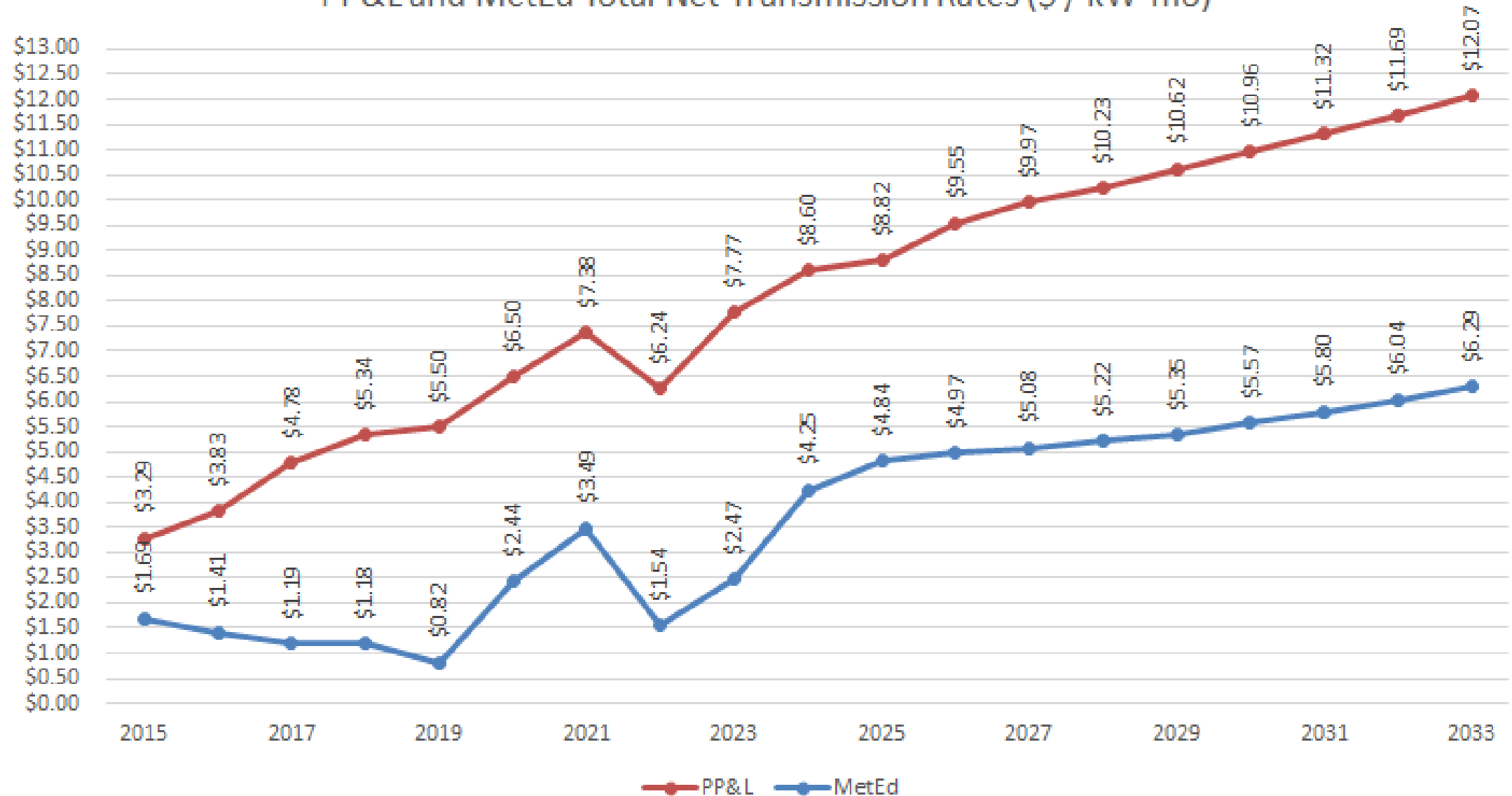
PJM Capacity Auction

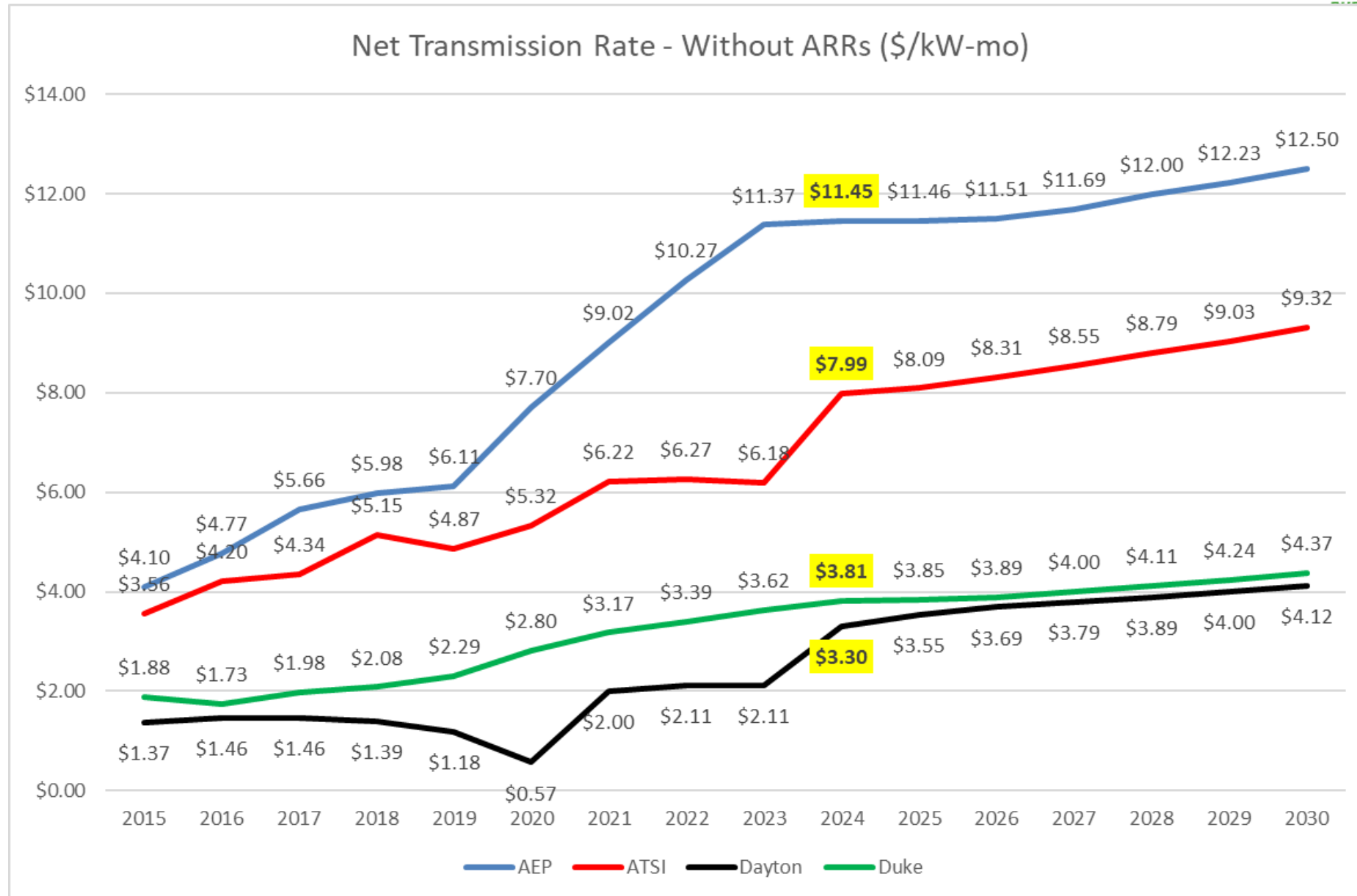


Transmission Rates

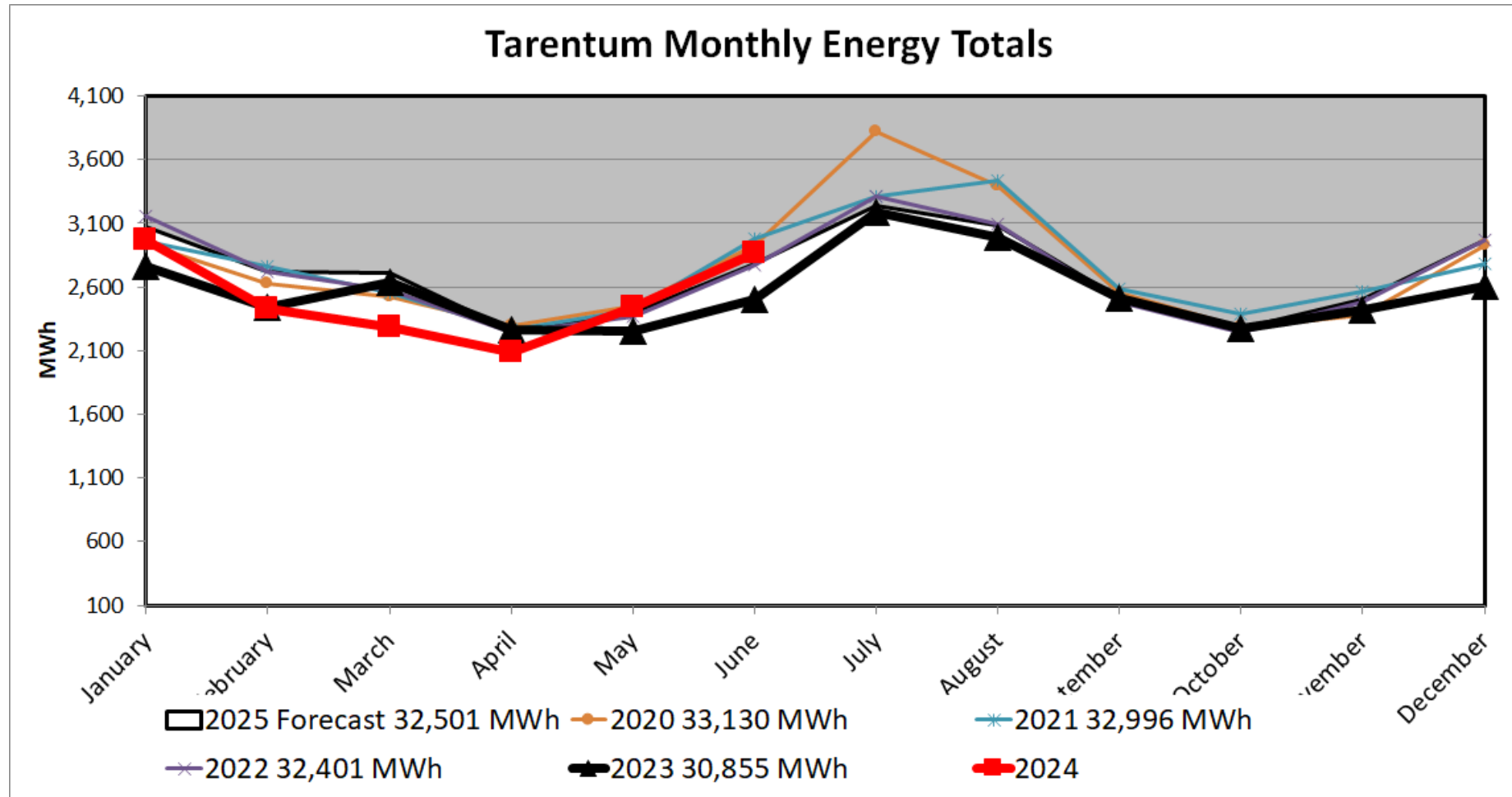


PP&L and MetEd Total Net Transmission Rates (\$ / kW-mo)





Monthly Energy



Historical Peak Demand (1 CP)

Tarentum	2024	2023	2022	2021
Peak Demand (MW)	6.84	6.68	7.22	7.56
Month & Day	Jun 21	Sep 06	Jun 16	Jun 29
Hour Ending (EST)	16	16	15	16

2024/2025 Capacity Cost Example

PJM Peak	1	2	3	4	5
Date	7/27/2023	9/5/2023	7/28/2023	9/6/2023	7/5/2023
Hour	5-6 PM	4-5 PM	5-6 PM	4-5 PM	5-6 PM

Borough's Average 5CP	6,318 kW
APS Zone Capacity Rate	\$0.90/kW-month
System Loss Factor	6%
Planning Reserve Margin	20%

Monthly Cost	$6,318 \times \$0.90 \times 1.26 = \underline{\$7,165}$
Annual Cost	$\$7,165 \times 12 = \underline{\$85,980}$
Effective Rate	$\$85,980 / 32,500 \text{ MWh} = \underline{\$2.65/\text{MWh}}$

2025/2026 Capacity Cost Example

PJM Peak	1	2	3	4	5
Date	7/16/2024	7/15/2024	8/1/2024	6/21/2024	7/8/2024
Hour	5-6 PM	5-6 PM	5-6 PM	5-6 PM	5-6 PM

Borough's Average 5CP	6,380 kW
APS Zone Capacity Rate	\$8.21/kW-month
System Loss Factor	6%
Planning Reserve Margin	20%

Monthly Cost	$6,380 \times \$8.21 \times 1.26 = \underline{\$65,999}$
Annual Cost	$\$65,999 \times 12 = \underline{\$791,988}$
Effective Rate	$\$791,988 / 32,500 \text{ MWh} = \underline{\$24.37/\text{MWh}}$

Indicative Fixed Price Requirements Energy

Period	Energy (\$/MWh)
1 Year (JAN 2025 – DEC 2025)	\$51.51
3 Year (JAN 2025-DEC 2027)	\$53.90
5 Year (JAN 2025 – DEC 2029)	\$55.24

Estimated Cost with Fixed Price Option – 1 Year

Period	Fixed Price Requirements Energy (\$/MWh)	APS & PJM Transmission (\$/MWh)*	PJM Capacity (\$/MWh)*	West Penn Distribution (\$/MWh)*	AMP Dispatch & Service Fee B (\$/MWh)	Total Power Cost (\$/MWh)
JAN 2025 – MAY 2025	\$51.51	\$8.16	\$2.75	\$5.11	\$1.38	\$68.91
JUN 2025- DEC 2025	\$51.51	\$7.84	\$23.85	\$4.85	\$1.38	\$89.43

* - Pass-through of actual costs

Estimated Cost with Fixed Price Option – 3 Year

Period	Fixed Price Requirements Energy (\$/MWh)	APS & PJM Transmission (\$/MWh)*	PJM Capacity (\$/MWh)*	West Penn Distribution (\$/MWh)*	AMP Dispatch & Service Fee B (\$/MWh)	Total Power Cost (\$/MWh)
JAN 2025 – MAY 2025	\$53.90	\$8.16	\$2.75	\$5.11	\$1.38	\$71.30
JUN 2025- DEC 2025	\$53.90	\$7.84	\$23.85	\$4.85	\$1.38	\$91.82
JAN 2026 – DEC 2027	\$53.90	\$11.41	\$22.20	\$4.95	\$1.38	\$93.84

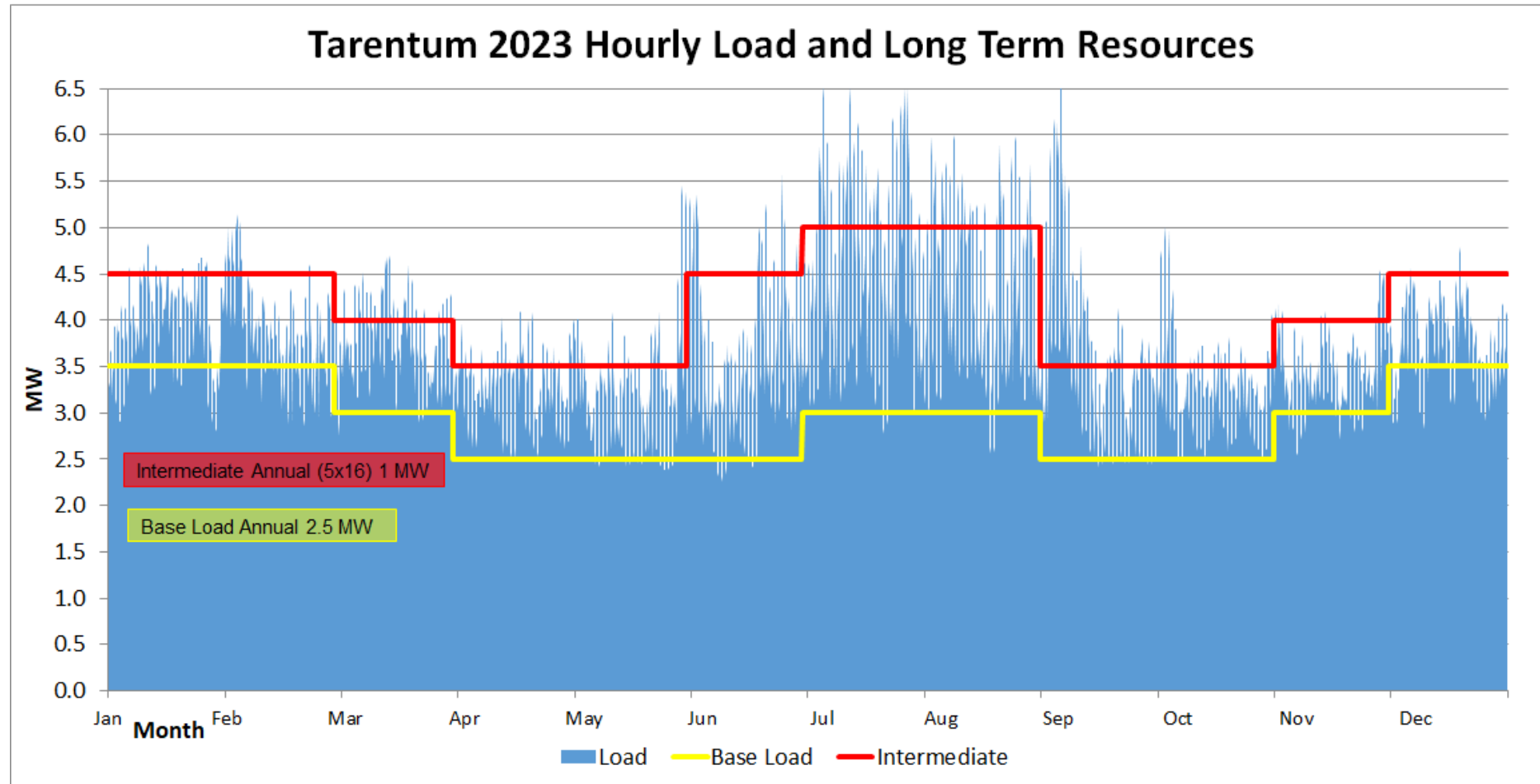
* - Pass-through of actual costs

Estimated Cost with Fixed Price Option – 5 Year

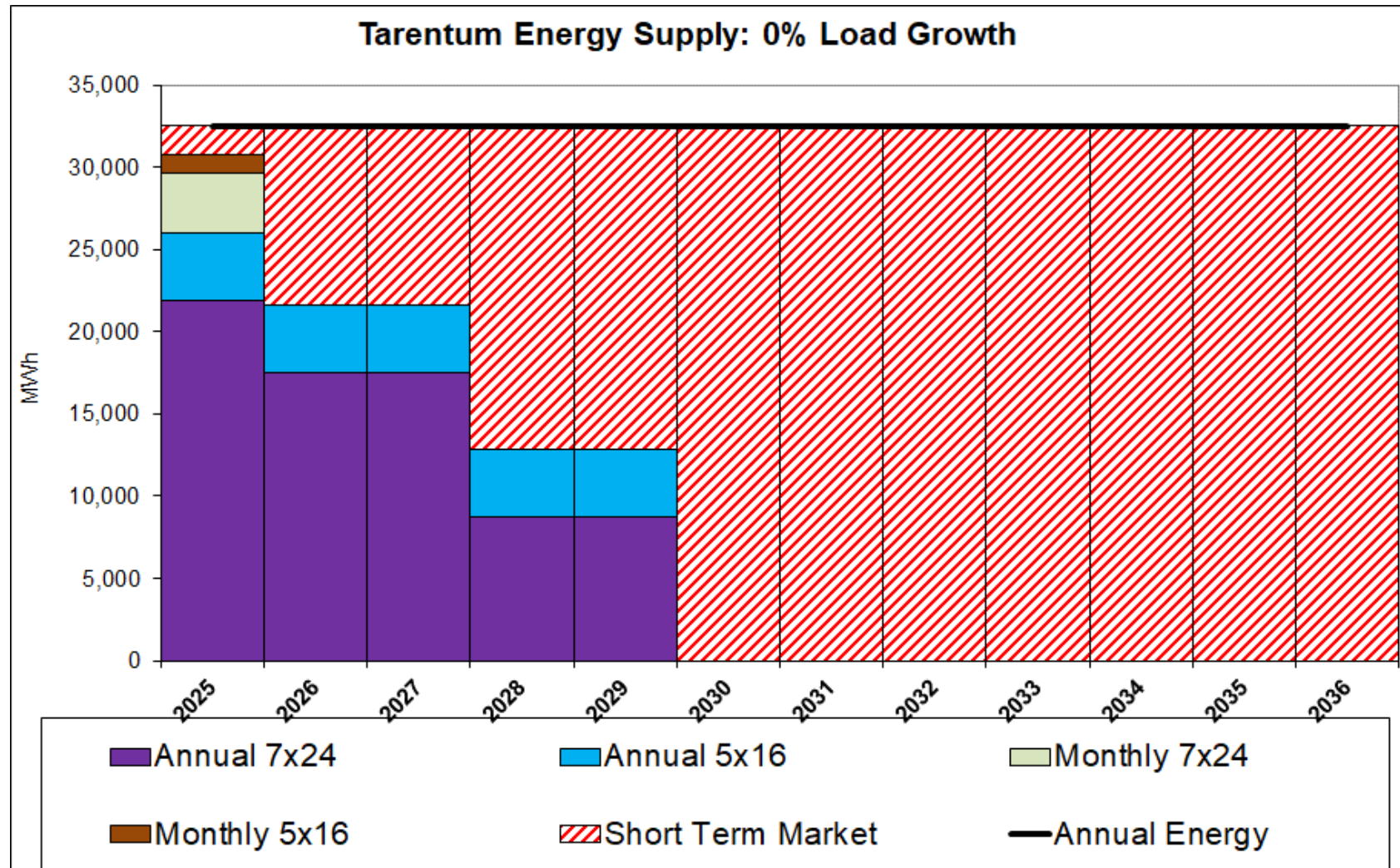
Period	Fixed Price Requirements Energy (\$/MWh)	APS & PJM Transmission (\$/MWh)*	PJM Capacity (\$/MWh)*	West Penn Distribution (\$/MWh)*	AMP Dispatch & Service Fee B (\$/MWh)	Total Power Cost (\$/MWh)
JAN 2025 – MAY 2025	\$55.24	\$8.16	\$2.75	\$5.11	\$1.38	\$72.64
JUN 2025- DEC 2025	\$55.24	\$7.84	\$23.85	\$4.85	\$1.38	\$93.16
JAN 2026 – DEC 2029	\$55.24	\$11.41	\$22.20	\$4.95	\$1.38	\$95.18

* - Pass-through of actual costs

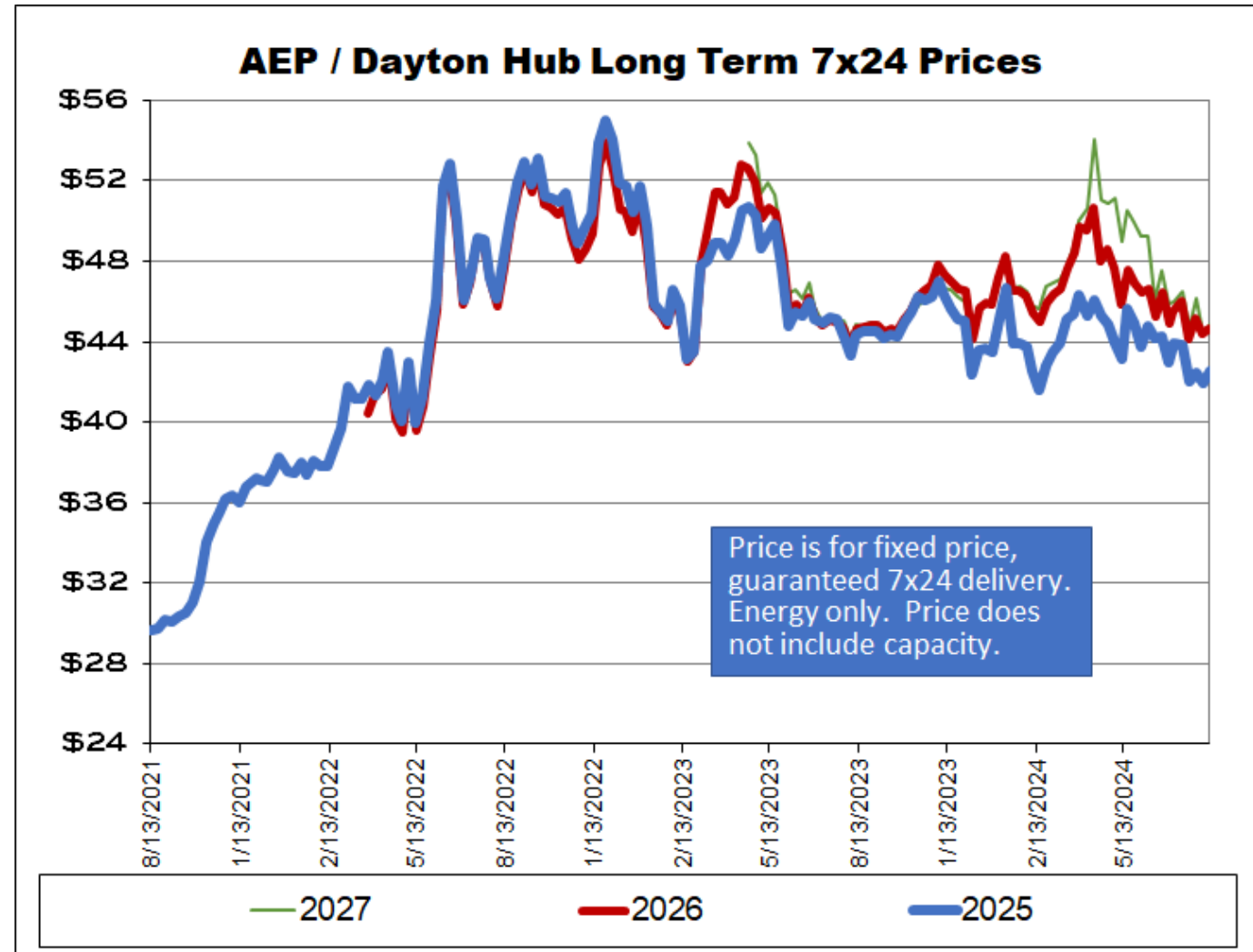
Tarentum Hourly Load 2023



Block Energy Strategy



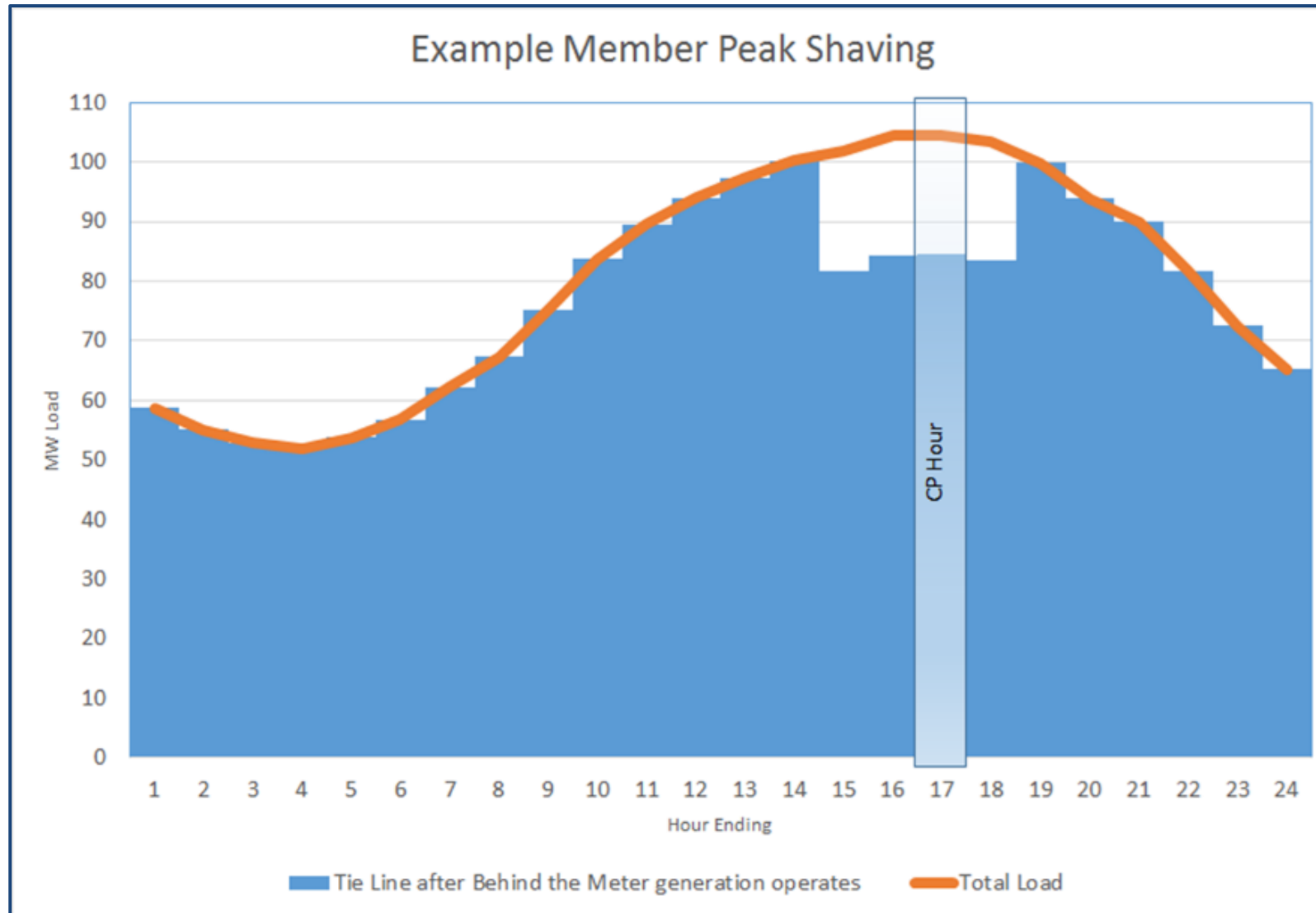
Current Forward Energy Markets



Peak Shaving

- Voluntary reduction in load during times of high load throughout PJM and respective member zones
- Three reasons to peak shave:
 - Reduce transmission charges
 - Reduce capacity charges
 - During times of high energy prices
- Lowers future rates

Peak Shaving



Peak Shaving / Load Reduction

- Behind the Meter Generation (BTMG)
 - Generation connected to Municipal Electric System
- Load Curtailment: residential, commercial, and industrial
 - Shut down municipal water pumping during peak times
 - Turn off or reduce commercial and industrial equipment
 - Increase temperature of AC system
- Public Outreach
 - Notice to public for load reduction during times of peak usage

Behind the Meter Phase II

- Member interest has been solicited for hosting a second phase PJM Behind the Meter (BTM) peaking projects
- BTM technologies being evaluated
 - Diesel reciprocating internal combustion engine (RICE) unit
 - Natural gas RICE unit
 - Battery storage
- AMP is finalizing Member recommendations
- Subscription process to begin Q1 2025

BTM PHASE II

Resource Evaluation

- Diesel RICE
 - PowerSecure
 - Technology used in BTM Phase I and recent Michigan project
 - Standard Power Block – 5 Engines
 - 2,700 kW (2.7 MW) nameplate



BTM PHASE II

Resource Evaluation

- Natural Gas RICE
 - Caterpillar (CAT)
 - Technology used in recent Michigan project
 - Model 3520 – 1 Engine – 2,500 kW (2.5 MW) nameplate



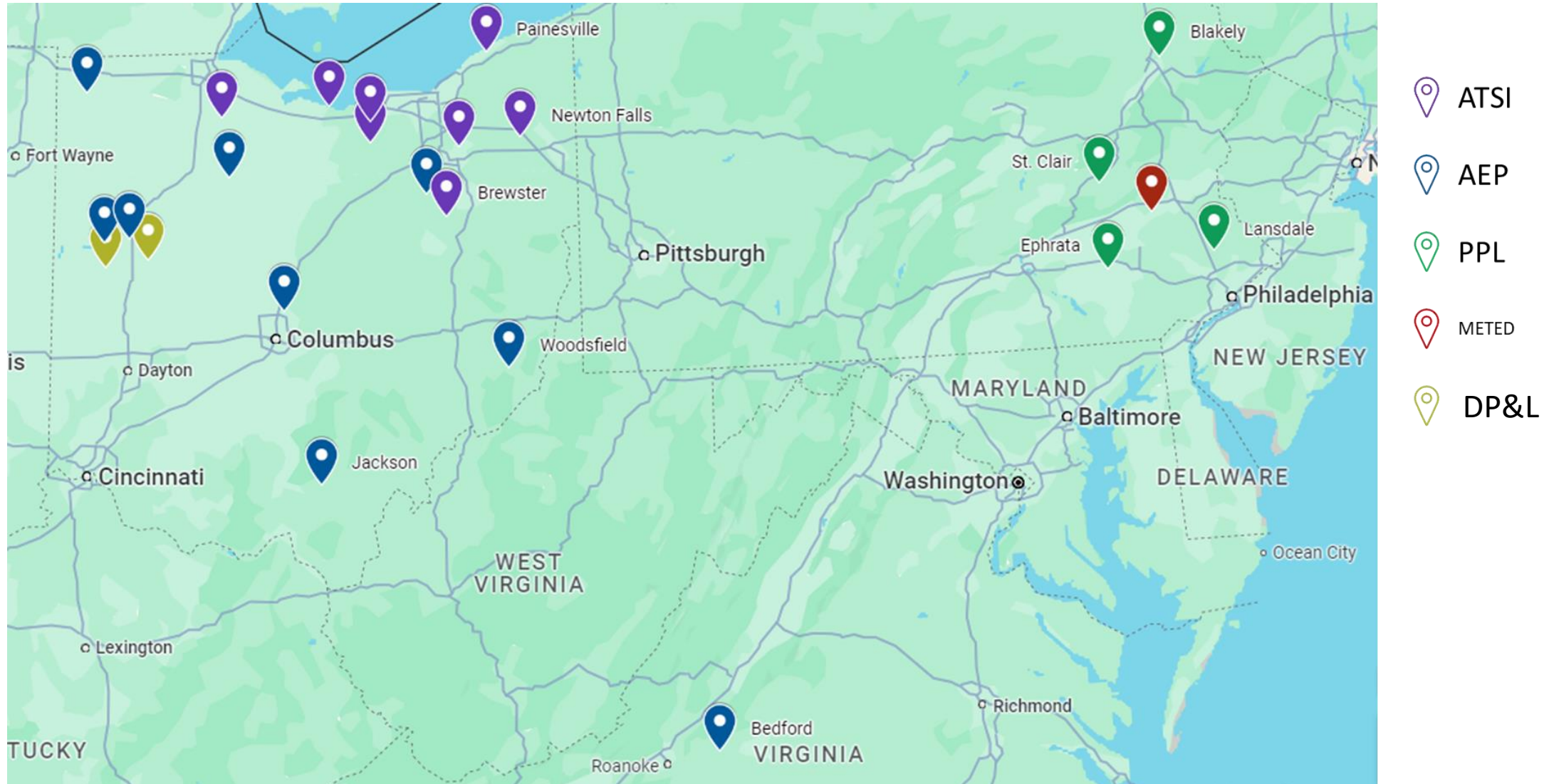
BTM PHASE II

Resource Evaluation

- Battery
 - STEM
 - Standard Power Bank – 2,790 kW (2.79 MW)
 - 4-hour duration



Member Site Evaluation for BTM Projects





For more information visit

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