

Prepared Testimony of

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Introduction

Good afternoon and thank you for the opportunity to provide this testimony to your committee.

I'm Vice Chair Kim Barrow of the Pennsylvania Public Utility Commission.

Key Takeaways

I'd provide two key takeaways for your committee.

First, the costs of electric power are largely split into two types of costs: supply of electricity, and delivery of electricity.

The second takeaway is that the trends for these costs vary in the long term and the short term. The long-term trend of supply of power is that it's getting less expensive. The long-term trend of delivery costs has been increasing over time. The short-term trend for both delivery and generation has been getting more expensive. The resultant combination is the price spike we are seeing now.

Because I believe it is not often discussed, I prepared today to talk about the details of the components of electric costs, and how the different dynamics play into the overall price trends that we have been seeing.

Components of Retail Power Costs

- **Energy:** Wholesale energy procured by the utility and third-party competitive supplier—known statutorily in Pennsylvania as an Electric Generation Supplier (EGS).
- **Capacity:** Most of the year, not all generators need to be kept online. Peak electric demand in most months is not that high relative to the capability of the system. PJM, our regional grid operator, reports that it has around 187 GW of installed generator capacity.¹ In September and October of last year, the peak demand overall was just under 120 GW. In Summer 2024 by contrast the peak load was 152 GW. Capacity revenues compensate resources that are needed for reliability after accounting for the possibility of generator failures and anomalous weather, even if a generator only operates in a few months out of the year.
- **Transmission:** Larger poles and wires, generally at higher voltages, with costs regulated by the Federal Energy Regulatory Commission (FERC).
- **Distribution:** Local poles and wires, meters, smaller substations, underground facilities, trucks to build and maintain systems, and other costs.

¹ Another 8.1 GW of demand response type services are available as well.

- **Ancillary Services:** As consumers, we interact with the grid by using power at the end of the line. The delivery of that power through an alternating current system requires stability services to maintain frequency, voltage, maintain short-term reserves, and other stability services.
- **Other Charges & Taxes:** Statutory programs such as Federal and State Universal Service, Act 129, AEPS, taxes.

Here’s a simplified example of how all that is converted to a rate for residential customers. In Pennsylvania, because it is not vertically integrated, the supply parts of the service (Energy, Capacity, Ancillary Services, some of the other riders) are separated out. For the delivery component of the service, the utility will study the share of the total costs that it takes to serve the residential rate class. That cost-of-service revenue requirement is divided by the expected amount of energy delivered, denominated in kilowatt hours; that becomes the \$/kWh rate.

For other rate classes, the same type of cost-of-service study is performed, but individual customers in that class may be allocated costs using more complex methods, such as through demand charges that measure a customer’s share of total demand during peak times.

Components of Power Costs

Figures 1 and 2 present a simplified breakdown of the cost of power over the prior 8 years, along with an aggregation of wholesale vs. retail cost components. The following figures are constructed from multiple sources. They do not account for differences between rate classes and do not include certain costs such as retail supplier markups above wholesale energy costs, but are illustrative of the trend in power costs. For 2025, the capacity component will increase due to the latest auction, but full-year data is not in yet.

Figure 1

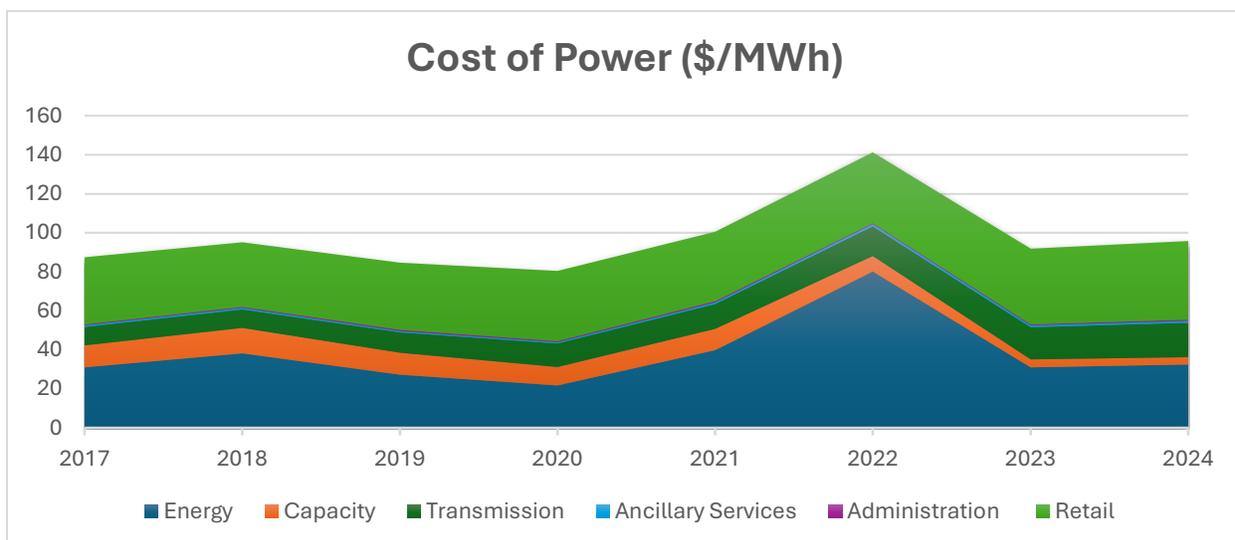
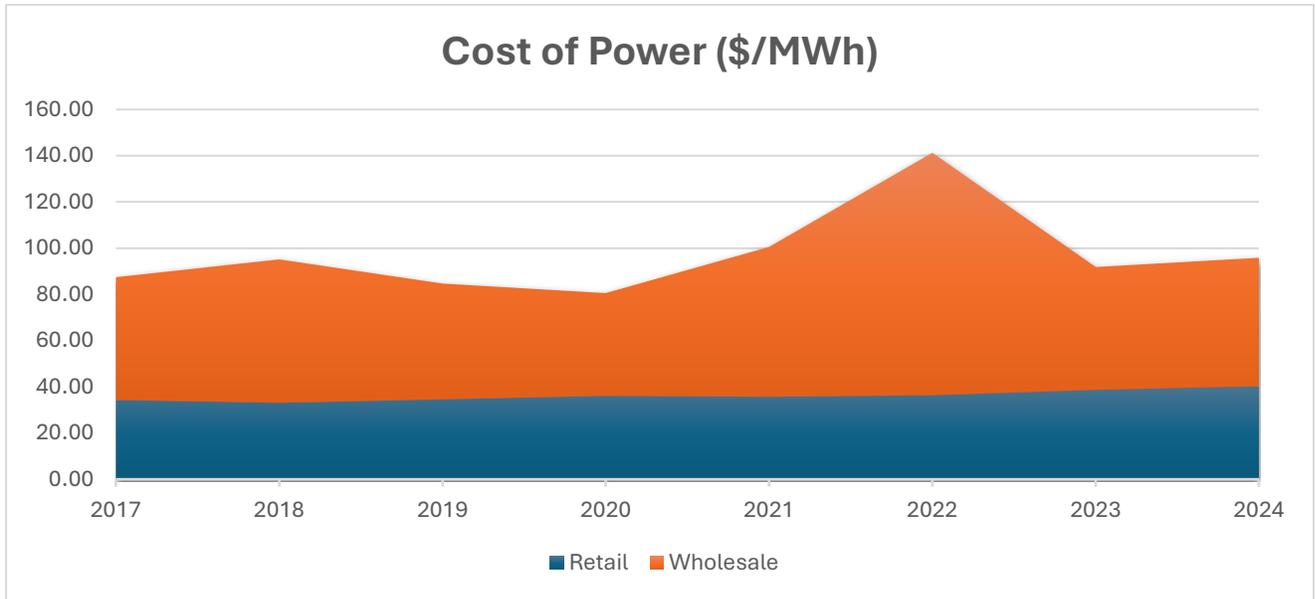


Figure 2

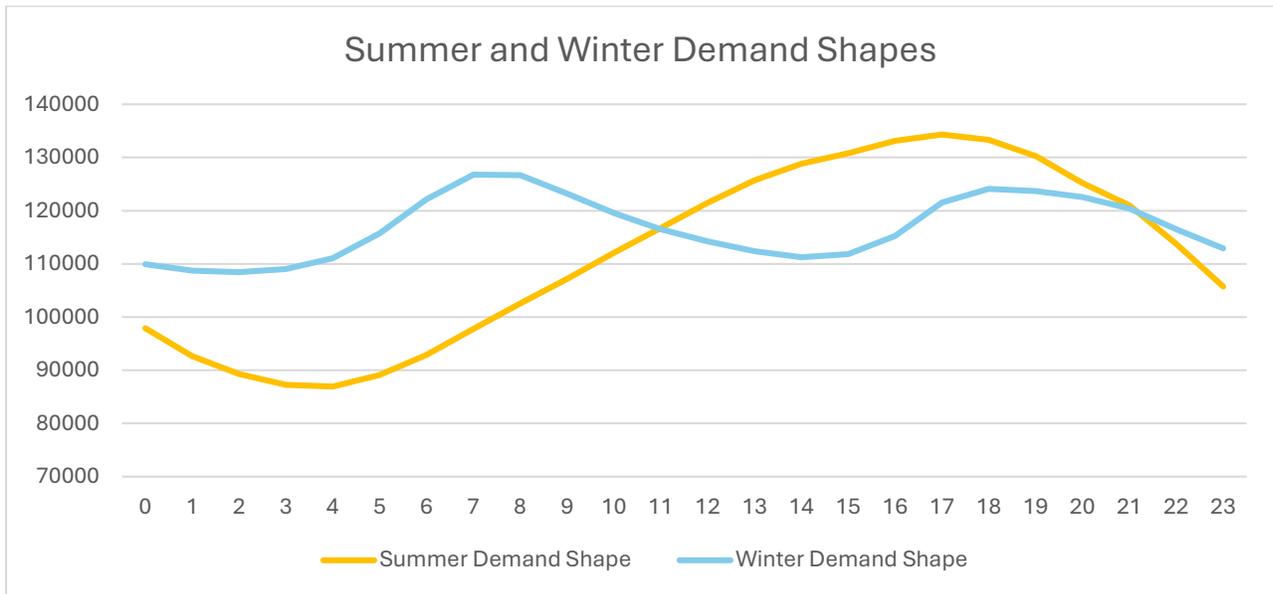


Energy Costs & Intraday Variation

Because of our participation in a regional grid, energy prices are determined at the wholesale level as a balance between supply and demand. Generators are told to run (called being dispatched) in order from least expensive to most expensive. If we have 100 GW of demand in a particular five-minute interval, we “dispatch” generators in order of price until we hit that level of generation. Transmission system constraints are also accounted for, using a tool known as “Security Constrained Economic Dispatch” or SCED.

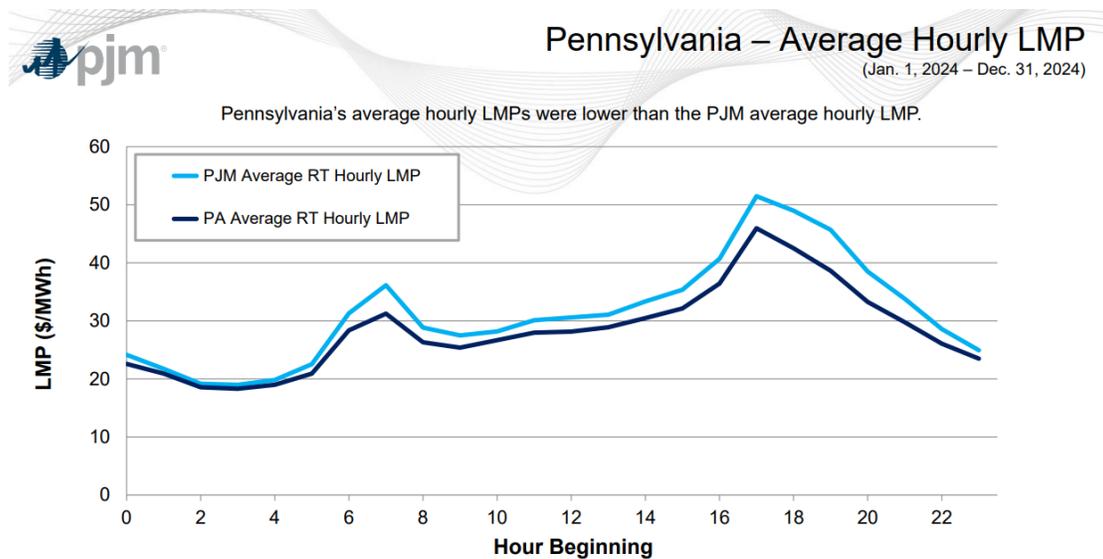
The Daily Load Shape. The level of demand varies significantly within a day. There are generally two peaks within a daily period. The morning peak and the evening peak. In the summer, the evening peak tends to be higher than the morning peak, if the morning peak exists at all. In the winter they are closer to equal. This is demonstrated in Figure 3 below using representative non-emergency days.

Figure 3 – Megawatt Demand by Hour of Day – July 10, 2025 vs. January 9, 2025



During periods of high demand and periods of rapid ramping, prices tend to be higher. As shown in Figure 4, the average price in Pennsylvania and PJM by hour of day. Locational Marginal Price (LMP) refers to the price based on the locational differences on the transmission system.

Figure 4 – Average Prices In Pennsylvania Relative To System Prices Over the Course of a Day²



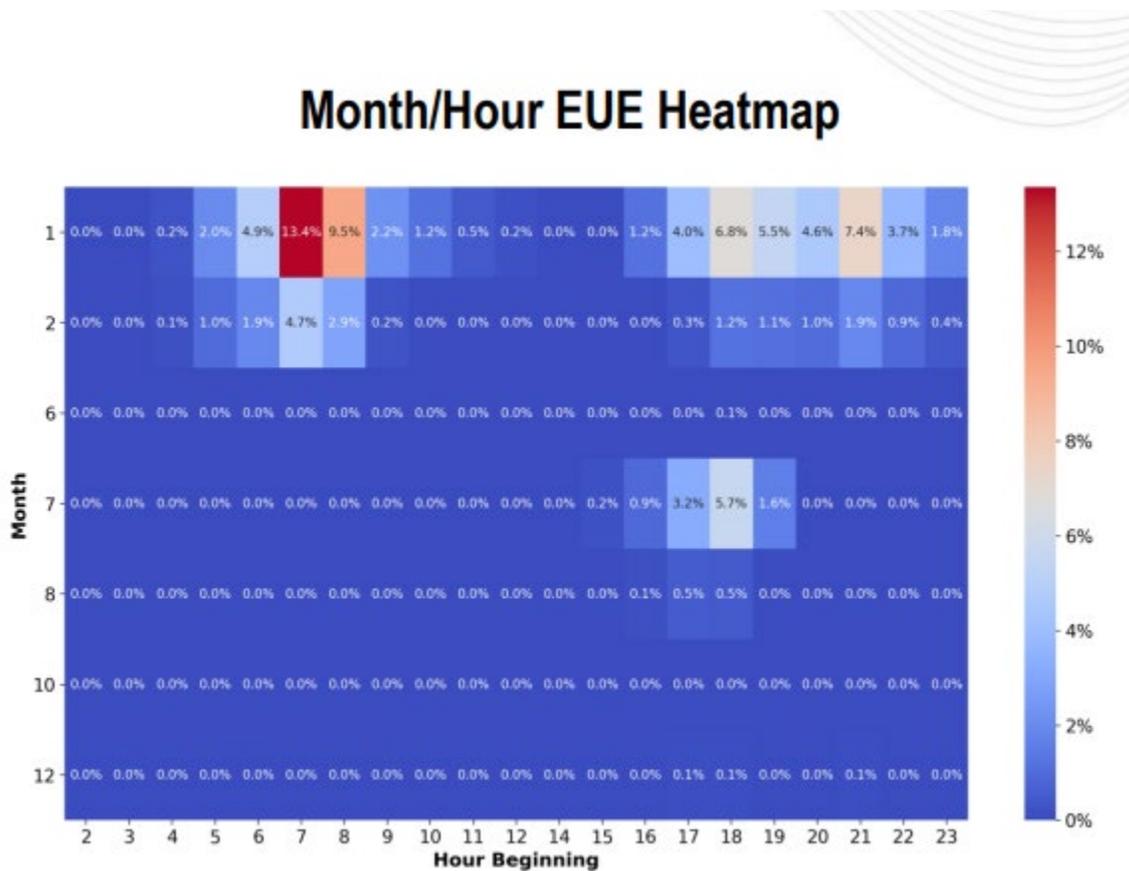
² Slide 23, <https://www.pjm.com/-/media/DotCom/library/reports-notice/state-specific-reports/2024/pennsylvania.pdf>.

In areas with substantial amounts of solar like California, Texas, and New England, midday demand (and consequently energy price) is reduced substantially. This effect is only just beginning in the PJM region.

Capacity Markets & Expected Unserved Energy

As described earlier in my testimony, in most hours during the year, the system is flush with supply. Figure 4 below produced by PJM shows the limited hours in which demand has the potential to outstrip supply. Note however, that because the risk metric used is very strict, even during these hours, lack of resource adequacy is still rare.

Figure 4 – Statistical Share of Expected Unserved Energy by Month and Hour³



³ Slide 23, <https://www.pjm.com/-/media/DotCom/committees-groups/committees/pc/2024/20240221-special/elcc-education.pdf>.

As part of determining how much capacity PJM needs to buy, it must determine the level of risk it faces, when it faces that risk, and how much a particular generator ameliorates that risk.

- **Risk Metrics.** Resource adequacy is measured with probabilistic metrics: LOLH (loss-of-load hours) and EUE (expected unserved energy), alongside traditional LOLE (loss-of-load expectation) standards (e.g., 1-day-in-10-years).
- **Accreditation:** Part of the assessment of capacity is determining the capability that a generator can provide to the system during the periods of highest risk. Historically, the periods of highest risk were periods of peak demand. Today, periods of highest risk are the combined periods of high demand and high resource non-performance. Although winter tends to have lower demand, resource performance is worse, and so it is weighted similarly to summer as a risk period.

Before Winter Storm Elliott in December 2022, PJM assessed the summer to be the major period of risk. Resource performance during the winter was worse than expected, as a result, generators were accredited as less valuable, and we need to buy more MWs of Installed Capacity to have the same level of reliability.

Figure 4 shows the Effective Load Carrying Capability (ELCC) by unit type—the amount of demand that 100 MW of a given resource can reliably serve. For example, 100 MW of Tracking Solar at 8% ELCC means PJM could support an additional 8 MW of flat-profile load. These figures reflect each resource’s reliability contribution, but not how that contribution compares to construction costs.

Figure 4 – ELCC by Unit Type for Delivery Year 2027/2028⁴

	2027/2028 BRA ELCC Class Ratings
Onshore Wind	41%
Offshore Wind	67%
Fixed-Tilt Solar	7%
Tracking Solar	8%
Landfill Intermittent	48%
Hydro Intermittent	39%
4-hr Storage	58%
6-hr Storage	67%
8-hr Storage	70%
10-hr Storage	78%
Demand Resource	92%
Nuclear	95%
Coal	83%
Gas Combined Cycle	74%
Gas Combustion Turbine	61%
Gas Combustion Turbine Dual Fuel	77%
Diesel Utility	92%
Steam	72%
Waste to Energy Steam	83%
Oil-Fired Combustion Turbine	80%

- Recent Market Outcomes:** In PJM’s most recent auction (delivery year 2026/27), all zones cleared at the FERC-approved UCAP price cap of \$329.17/MW-day. In the auction before that, the clearing price in Pennsylvania was \$269.92/MW-day. These were substantial increases from prior auctions and were due to a combination of reduced accreditation from poor performance during Winter Storm Elliott, other adjustments to reliability risk modelling which increased apparent winter risk, and increased peak demand forecasts. The Reliability Requirement, which sets the quantity of resources PJM needs to buy its capacity market increased from 132.1 GW to 133.6 GW. At the same time, offered accredited capacity declined from 138.8 GW to 129.6 GW. Together, this removed over 10 GW of surplus from the system.

⁴ <https://www.pjm.com/-/media/DotCom/planning/res-adeq/elcc/2027-28-bra-elcc-class-ratings.pdf>.

Transmission Costs

- **What We're Paying For:** Bulk grid projects to relieve congestion, interconnect new supply and load (e.g., data centers), upgrade aging lines, and harden for extreme weather.
- **Trends and Value.** The Department of Energy's National Transmission Needs Study found substantial regional and interregional needs this decade.⁵
- **Investments:** Like Capacity, due to declining peak demand, the region built very few miles of high-voltage lines recently. Most transmission planning has been local in nature, addressing an aging grid rather than preparing for sweeping generator interconnection needs.

Ancillary Services

- **Definition:** Services that keep the grid stable and operating within tight parameters: regulation (frequency), spinning/non-spinning reserves, voltage/reactive support, black start, etc.
- **Costs and Importance:** Ancillary services make up a very small component of retail bills. Although they are likely to remain a small part of costs, ancillary services are likely to be of increasing importance because inexpensive renewable energy does not innately provide ancillary services in the same way that traditional resources do. Batteries, as well as recent improvements in inverters, known as grid-forming inverters, can address this challenge.

Distribution Costs

Distribution costs include poles, wires, transformers, substations, metering, vegetation management, storm recovery, and other costs of maintaining local systems.

- **Trend.** Utilities nationally have materially increased distribution substation and related equipment spending (e.g., 2023 distribution substation equipment spend up 15% YoY and +184% vs 2003).⁶

⁵ National Transmission Needs Study, available at https://www.energy.gov/sites/default/files/2023-12/National%20Transmission%20Needs%20Study%20-%20Final_2023.12.1.pdf

⁶ Energy Information Administration, <https://www.eia.gov/todayinenergy/detail.php?id=63724>

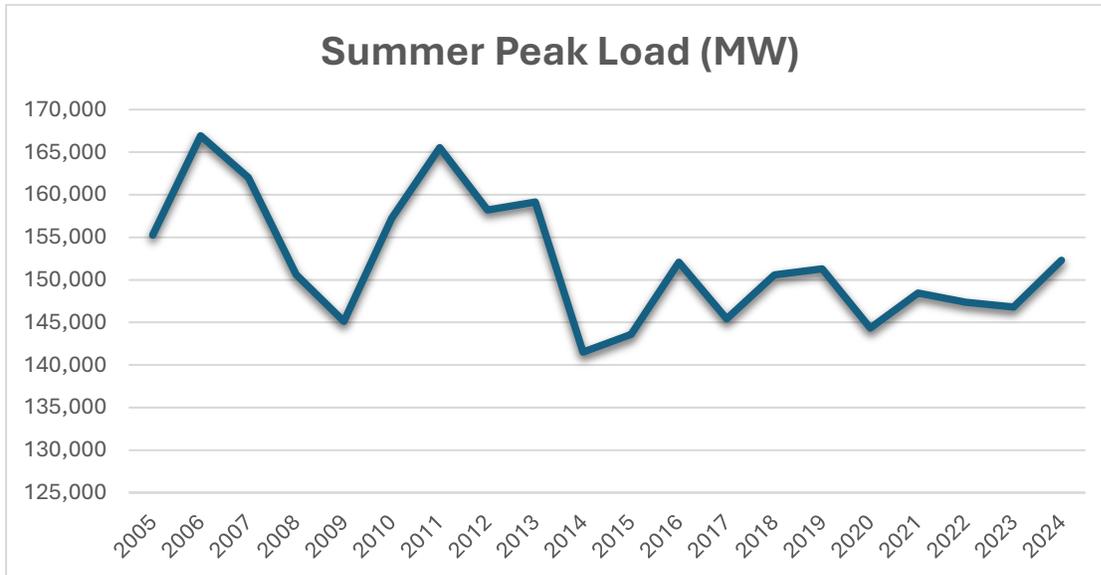
Long-Term vs Short-Term Trends

Long-Term:

- **Fixed-Cost Components are Trending Up.** Capacity, transmission, and distribution requirements have become a larger driver of bills as we replace aging infrastructure and prepare for higher electrification peaks.
- **Generation Trends and Natural Gas Costs:** In general, wholesale electricity cost trends have trended down over time. However, wholesale electricity costs are structurally tied to gas prices. Natural gas generation in PJM makes up half of all installed capacity and is often the marginal resource. Because of this, the cost for natural gas electric generation sets the market price for electricity. Aside from a spike in 2022, natural gas prices have been fairly flat for a decade and have trended downward since the beginning of the fracking revolution, when natural gas started to dominate the electricity market.

In the long term, competition and innovation in the generation sector have lowered prices, while delivery costs have increased at a consistent but slow rate. On the demand side, system peak demand has been decreasing for a generation. Figure 5 demonstrates the downward long-term trend of peak load.

Figure 5 - PJM RTO Historical Peaks



These effects combined have led to long-term nominal price increases, but overall prices have decreased since competition was introduced after accounting for

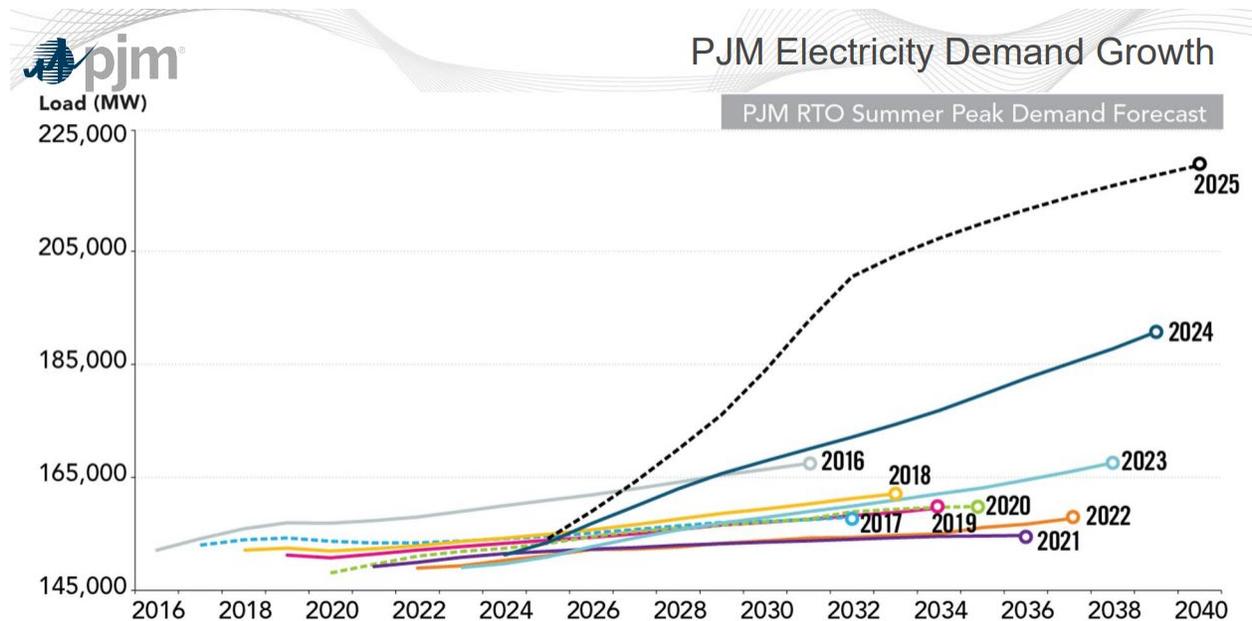
inflation. The overall price trend is shown in our recently published Electric Power Outlook Report.⁷

Short-Term (Previous 3–5 years and next few years)

Unlike the downward trend of peak demand and generation price reductions, the last few years and coming years indicate a reversal.

- **Demand Increases:** As stated above, prior to 2023, peak demand was decreasing in the PJM region. Contrast that with present forecasts due to data center construction and electrification as shown in Figure 6. In Pennsylvania the future spike of demand is particularly pronounced in PPL’s service territory, with over 14 GW of new demand from data centers being noticed for construction by 2032.⁸

Figure 6 – PJM Demand Forecasts⁹



- **Supply-side Interconnection Crunch:** Historically, PJM’s interconnection queue was designed for a relatively small number of very large power stations. In 2001, the average interconnection queue request was for 289 MWs. In 2021, just before PJM paused its queue to implement reforms, the average request was for 79 MWs. Illustrated in Figure 7, the PJM queue received far more requests for smaller generation projects to interconnect. It broke down.

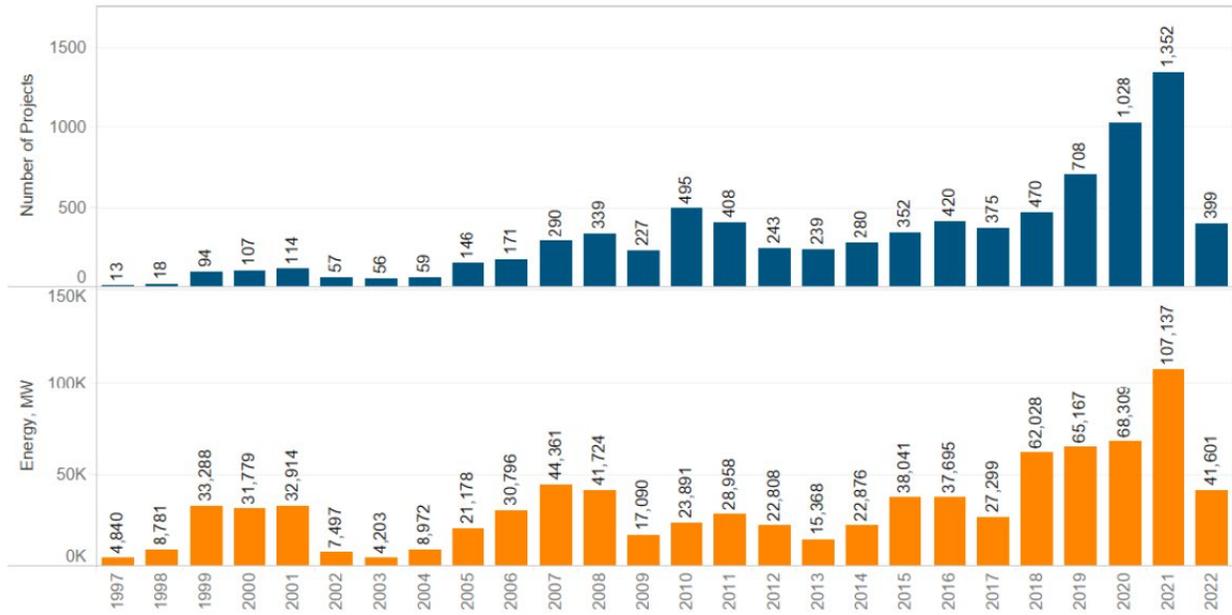
⁷ <https://www.puc.pa.gov/media/3586/final-draft-2025-epo-2024-2029-8-2025.pdf>.

⁸ Taken from PJM Transmission Enhancement Advisory Committee (TEAC) meeting notifications.

⁹ Slide 19, <https://www.pjm.com/-/media/DotCom/library/reports-notice/state-specific-reports/2024/pennsylvania.pdf>.

Since the interconnection queue reform, in June of this year, PJM stated it has signed interconnection agreements with 46 GW of generation. Yet much of that has not come online. Part of the reason for this is that the projects were stale after sitting in PJM’s queue for years. Other reasons include siting and permitting challenges. In a survey recently conducted by PJM generators reported that permitting added 14.5 months of project delays, constituting 29% of project delays.¹⁰

Figure 7 – Total New Services Requests by Year¹¹



- Delivery Side:** Like capacity, the transmission system is built out to serve peaks. The transmission system needs to be large enough to serve combined demand at the same moment. In practice, this means early evening hours in the summer and winter, and 6-10 AM in the morning on cold winter days. Because the peaks are increasing again, large transmission infrastructure projects are being built. In the last two years of transmission planning, PJM has approved more than \$10 Billion in new transmission construction.

What Can Customers do?

For customers there are options. Since today’s hearing is being held in the PECO territory, I will highlight some of PECO’s customer assistance programs for low-income customers and then address tools available for all customers. PECO offers 4 programs: the Customer Assistance Program, or CAP; the Low Income Usage

¹⁰ Slides 8 and 9, <https://www.pjm.com/-/media/DotCom/committees-groups/subcommittees/ips/2025/20250626/20250626-item-05---construction-metrics.pdf>.

¹¹ Page 5, PJM Interconnection Reform Filing, FERC Docket No. ER22-2110 (Filed June 14, 2022).

Reduction Program, or LIURP; the Matching Energy Assistance Fund, or MEAF; and the Customer Assistance and Referral Evaluation Services Programs, or CARES.

For all customers, Act 129 programs, Time-of-Use Rates, and Shopping are viable options to reduce bills.

General Customer Programs

Act 129 is an energy efficiency and demand response statutory program that uses EDC funds to invest in energy efficiency, the goal being to reduce consumption and benefit all customers. Reaching out to EDCs regarding these programs can save an individual customer money by helping to upgrade to more energy efficient appliances, replace insulation, or a variety of other tools. The programs help all customers by reducing peak demand on the system and avoiding energy costs.

Shopping is also a viable option to reduce your bills. On www.papowerswitch.com, a Commission run website, you can compare offers from competitive suppliers who may provide services at a less expensive rate. Customers can also shop for longer-term contracts if they want stability in their bills. It is important if you are going to shop to know what you are signing up for and pay careful attention to contract renewal dates. Commission regulations require that competitive suppliers provide notice well in advance of renewal dates, but if you miss a renewal, it is possible to be placed on a month-to-month contract at much higher rates than the customer's original contract.

Time of Use rates, or TOU rates as they are generally known, provide an alternative rate without switching suppliers. They price power more in line with demand. During peak times, it is more expensive, but if you can avoid large appliance use during that time, then TOU rates can unlock deep savings during off-peak times relative to the EDC's default rate. PECO's TOU rate, for example, provides for on-peak rates from 2-6 PM on weekdays, off-peak rates during most other weekday hours as well as weekends and holidays. Super-off-peak rates are available from midnight to 6 AM and provide for very low rates. PECO offers a tool to compare whether you would save by switching to TOU.

Both shopping and TOU rates will generally only affect the supply portion of the bill, not the delivery portion.

Low Income Programs

CAP is an assistance program for low-income residential customers whose total household income levels are at or below 150% of the Federal Poverty Level, or FPL. CAP provides a fixed bill equal to what the CAP customer can afford to pay for utility service based upon the customer's FPL and the household's allowable energy

burden. When the CAP customer pays their bill each month, credits will be applied to reduce the customer's monthly undiscounted bill.

LIURP is a usage reduction program for low-income residential customers with household gross income at or below 200% of the FPL and with high usage as defined by PECO's program. LIURP assistance includes direct weatherization and conservation measures as well as in-home education that promotes usage reduction for the customer.

MEAF is PECO's hardship fund which includes contributors and grant recipients. Contributors pledge donations either through their monthly bill or through PECO's website. Grant recipients are residential customers whose income is at or below 200% of the FPL, that have not received a MEAF grant in the past 12 months, that are in imminent danger of service termination or their services have been terminated, and that can bring their balance to zero between the combination of the MEAF grant, customer payments, and/or other grants.

CARES is a referral and informational service designed to assist low-income customers who are at or below 200% of FPL with special needs or extenuating circumstances that hinder their ability to pay their bills. Eligible customers may receive temporary protection from termination of service as well as specific education and referral information for energy and non-energy related assistance.

Additionally, there is a nationwide customer assistance program provided in all service territories, the Low-Income Home Energy Assistance Program, or LIHEAP. LIHEAP is a federally funded program which aids customers based upon household size and income, type of fuel used, and geographical region. LIHEAP has three components: Cash, Crisis, and weatherization assistance. The Cash program provides a direct payment to a vendor, such as the EDC or NGDC. The Crisis program allocates funding for emergencies including purchasing home heating fuel, preventing service termination, or reinstating service that was terminated for non-payment. The weatherization program provides funding for winter emergencies including repairing leaking pipes and broken furnaces.

Funding for the LIHEAP program is appropriated by Congress under the Labor/Health and Human Services Appropriations Bill and is subject to change each year. In Pennsylvania, this program is administered by the Department of Human Services. Unfortunately, the current future of LIHEAP funding is uncertain. To put it in perspective, during the 2024-2025 heating season, LIHEAP provided over \$152 million in aid to Pennsylvania's most vulnerable citizens – \$85,326,745 to 292,854 utility customers through Cash Grants and \$67,055,553 to 127,944 households through Crisis Grants. LIHEAP funds are, in many instances, the only source of funding available to help our senior citizens, children, and individuals with disabilities and severe illnesses maintain or restore their heating services.

About a week ago, led by my colleague Commissioner Zerfuss, the Commission intensified its efforts to rally support and help secure funding for LIHEAP.¹² The Commission sent a letter to the Pennsylvania Congressional Delegation, urging Congress to support the highest level of funding possible for LIHEAP in Fiscal Year 2026 and to protect the program from any reductions. Earlier, in April, the Commission had sent an initial letter to the delegation raising concerns that these funds might not be distributed to Pennsylvania.

What Can we Do as a State?

As a state, there are some critical policies I believe we should endeavor to take on to save customers money. First and foremost, it's time to move at the speed of business and reduce hurdles and unnecessary slowdowns on energy projects of all types, while still maintaining regulatory oversight for safety and health. Second, Distributed Energy Resources (DERs) offer major pathways to allow customers to take control, play a greater role in the energy system. Moreover, distributed resources can lower delivery costs by placing generation near load. Finally, we need to address the demand side like never before. Perhaps counterintuitively, large loads like data centers actually have the potential to lower delivery bills for customers in the long term. The key is to ensure they pay their fair share for the new infrastructure they cause, as well as improve the utilization factors on existing infrastructure.

¹² See our recent letter to the Pennsylvania Congressional Delegation, <https://www.puc.pa.gov/press-release/2025/puc-commissioners-urge-congressional-support-on-liheap-9-2-25>.