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Electric Power Outlook for Pennsylvania 2022-2027

August 2023

Pennsylvania Public Utility Commission

ELECTRIC POWER OUTLOOK FOR PENNSYLVANIA 2022–2027

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Executive Summary

Introduction

Section 524(a) of the Public Utility Code (Code) requires jurisdictional electric distribution companies (EDCs) to submit to the Pennsylvania Public Utility Commission (PUC or Commission) information concerning plans and projections for meeting future customer demand.[1] The PUC's regulations set forth the form and content of such information, which is to be filed on or before May 1 of each year.[2] Section 524(b) of the Code requires the Commission to prepare an annual report summarizing and discussing the data provided, on or before September 1. This report is to be submitted to the General Assembly, the Governor, the Office of Consumer Advocate and each affected public utility.[3]

Since the enactment of the *Electricity Generation Customer Choice and Competition Act*,[4] the Commission's regulations have been modified to reflect the competitive market. Thus, projections of generating capability and overall system reliability have been obtained from regional assessments.

Note: Any comments or conclusions contained in this report do not necessarily reflect the views or opinions of the Commission or individual Commissioners. Although issued by the Commission, this report is not to be considered or construed as approval or acceptance by the Commission of any of the plans, assumptions, or calculations made by the EDCs or regional reliability entities and reflected in the information submitted.

Overview

This report concludes that sufficient generation, transmission, and distribution capacity exists to reasonably meet the needs of Pennsylvania's electricity consumers for the foreseeable future.

Regional generation adequacy and reserve margins of the mid-Atlantic will be satisfied through 2032, provided planned generation and transmission projects will be forthcoming in a timely manner. The North American Electric Reliability Corporation (NERC) provided a reliability assessment of the Regional Transmission Organization (RTO), which is PJM Interconnection, LLC (PJM), and concluded that PJM will meet its reserve margin requirements.

In 2023, the PJM reserve margin requirement is 14.8% with an anticipated reserve of 35.7%, as compared to a reserve margin requirement of 14.7% and anticipated available reserve of 30.6% in 2022. NERC also projects PJM will have enough generation capacity to meet its reserve margin requirements through 2032.[5]

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[1] *See,* 66 Pa.C.S. § 524(a).
[2] *See,* 52 Pa. Code §§ 57.141—57.154.
[3] *See,* 66 Pa.C.S. § 524(b).
[4] *See,* 66 Pa.C.S. §§ 2801—2812.
[5] *See,* NERC, *2022 Long-Term Reliability Assessment*, December 2022, available at: https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf.

The Commission notes here that much of the stability of the electric grid that serves Pennsylvania, and the region, depends upon the ability of reserve generation to operate during extreme cold. That ability depends upon the natural gas supply system, the other fuel delivery systems, and the generator's ability to start, operate and continue operations during extreme weather situations such as severe cold events. As noted in Section 1 of this report under both the NERC and PJM subsections, extreme weather can have significant impacts on electric generation.[6] The cold weather impacts of Winter Storm Elliott on PJM being a prime example.

Pennsylvania's aggregate electrical net energy usage (residential, commercial, industrial, sales for resale, and other) in 2022 was 143,511 gigawatt hours (GWh) as compared to: 142,827 GWh in 2021; 139,185 GWh in 2020; 138,042 GWh in 2019; and 148,334 GWh in 2018. Year-over-year (YOY) electric usage increased by 0.48%. In general, residential, commercial, and industrial usage changed YOY by 0.17%, -0.46% and 1.36%, respectively. Pennsylvania's 2022 GDP saw a smaller YOY increase of 1.9%, as compared to 2021 when the GDP experienced a YOY increase of 8.75%.[7]

The total average annual aggregate five-year energy usage growth projection for the residential, commercial, and industrial classes is projected to increase by 0.31% per year. This includes an essentially flat growth rate for residential of 0.11%, a commercial growth rate of 0.40%, and an industrial growth rate increase of 0.49% for the entire five-year projected period.

[6] Specifically, see this report's page 11 (bottom), page 12 (top), and page 18 (*PJM Bulk Power System Status – Winter Performance*).
[7] US Bureau of Economic Analysis: www.bea.gov/.

Section 1 – Regional Electric Outlook

Section 2 – Pennsylvania Electric Outlook

Appendix A – Data Tables

Appendix B – Plant Additions and Upgrades

Appendix C – Existing Generating Facilities

Section 1 – Regional Electric Outlook

Purpose

The *Electric Power Outlook for Pennsylvania 2022-2027* discusses the current and future electric power supply and demand situation for the 11 investor-owned jurisdictional electric distribution companies (EDCs) operating in the state and the entities responsible for maintaining the reliability of the bulk electric supply system within the region that encompasses the state.

Pursuant to Title 66, Pennsylvania Consolidated Statutes, Section 524(b), the PUC annually submits this report to the General Assembly, the Governor, the Office of Consumer Advocate and affected public utilities. It also is posted on the Commission's website.[8]

The information contained in this report includes highlights of the past year, as well as the EDCs' projections of energy demand and peak load for 2023-2027. The state's seven largest EDCs[9] represent 99% of both jurisdictional electricity customers and electrical energy consumption in Pennsylvania. Accordingly, information regarding the other four smallest EDCs contained in this report is limited. The report also provides a regional perspective with statistical information on the projected resources and aggregate peak loads for the region that impacts Pennsylvania.

As permitted under Section 2809(e) of the Public Utility Code, the Commission has adopted revised regulations, reducing from 20 years to five years the reporting requirements and the reporting horizon for energy demand, connected peak load, and number of customers. Because Pennsylvania has a competitive retail electric market, certain information is no longer required to be reported. This includes information regarding generation facilities such as capital investments, energy costs, new facilities, and expansion of existing facilities.

Data for the report is submitted annually by EDCs, pursuant to the Commission's regulations.[10] Additionally, the Commission relies on reports and analyses of regional entities, including the ReliabilityFirst Corporation (RFC) and PJM, to obtain a more complete assessment of the current and future status of the electric power supply within the region. Sources also include data submitted by regional reliability councils to the North American Electric Reliability Corporation (NERC), which is subsequently forwarded to the U.S. Energy Information Administration (EIA).

[8] The reports are available at : http://www.puc.pa.gov/utility_industry/electricity/electric_reports.aspx.
[9] Those EDCs with at least 100,000 customers.
[10] *See*, 52 Pa. Code §§ 57.141—57.154.

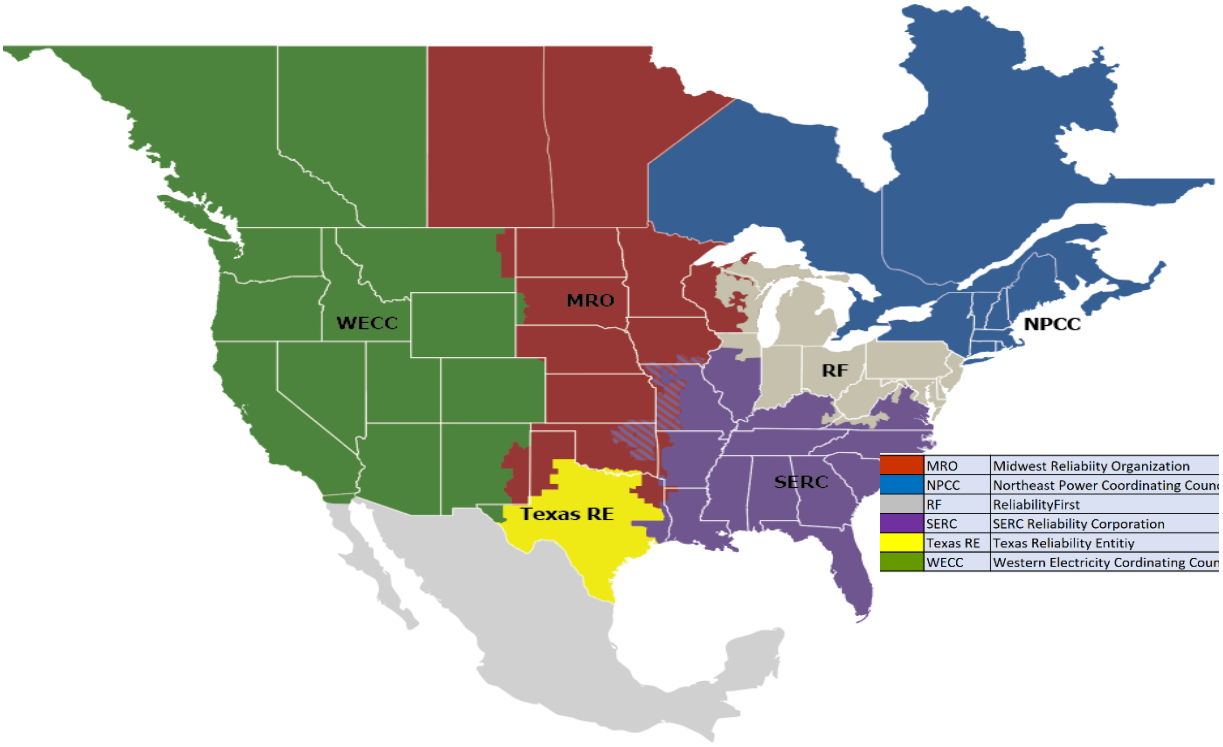
Regional Reliability Organizations

In Pennsylvania, all major EDCs are interconnected with neighboring systems extending beyond state boundaries. These systems are organized into regional reliability entities responsible for ensuring the reliability of the bulk electric system.

North American Electric Reliability Corporation

The North American Electric Reliability Corporation (NERC) has been granted legal authority by the Federal Energy Regulatory Commission (FERC) to enforce reliability standards and to mandate compliance with those standards. NERC oversees the reliability of the bulk power system that provides electricity to more than 334 million people, has a peak capacity of over 1,057 gigawatts (GW) and supplied over 4,674,290 gigawatt hours (GWh) of electricity in 2022. NERC has approximately 522,665 miles of high-voltage transmission lines (100,000 volts and greater) and represents more than $1 trillion worth of assets.[11]

North American Electric Reliability Corporation NERC Regional Reliability Entities



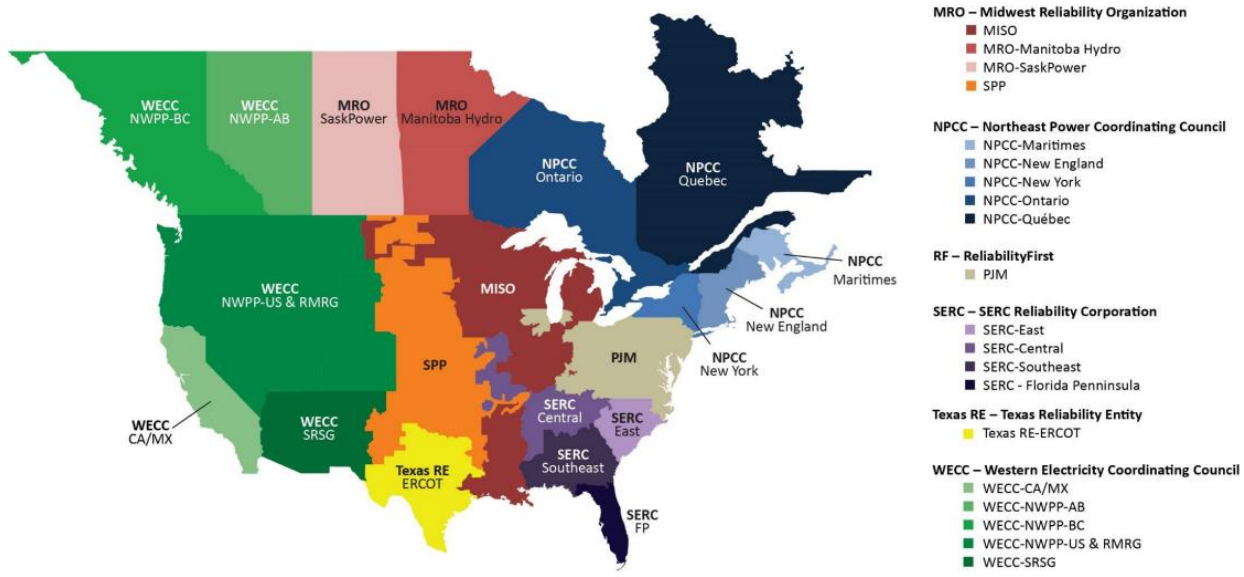
As shown above, NERC's members operate in six regional reliability entities. Members include investor-owned utilities, federal and provincial entities, rural electric cooperatives, state/municipal and provincial utilities, independent power producers, independent system operators, merchant electricity generators, power marketers and end-use electricity customers. The membership accounts

[11] https://www.nerc.com/pa/RAPA/PA/Performance%20Analysis%20DL/NERC_SOR_2023_Overview.pdf

for virtually all the electricity supplied in the United States, Canada, and a portion of Baja California Norte, Mexico. The regional entity operating in Pennsylvania is ReliabilityFirst Corporation (RFC).

To conduct NERC reliability assessments, NERC further divides the Regional Entities into 20 assessment areas, shown below. NERC notes that this level of granularity allows it to better evaluate resource adequacy and ensure deliverability constraints between and among assessment areas are accounted for.

North American Electric Reliability Corporation Assessment Areas



NERC establishes criteria, standards and requirements for its members and all assessment areas. All assessment areas must operate in a seamless and stable condition to prevent uncontrolled system separations and cascading outages caused by any single transient event.

NERC Executive Summary & Reliability Assessment

The *2022 Long–Term Reliability Assessment*[12] (LTRA) is NERC's independent assessment and comprehensive report on the adequacy of planned North American bulk power system (BPS) resources to reliably meet the electricity demand across North America over the next 10 years. The LTRA also identifies reliability trends, emerging issues, and potential risks that could impact the long-term reliability, resilience, and security of the BPS.

NERC reported the findings of the 2022 LTRA are vitally important to understand the reliability risks to the North American BPS as it is currently planned and as it is being shaped by government policies, regulations, consumer preferences, and economic factors. Energy systems and the electricity grid are undergoing unprecedented change on a scope, scale, and speed that challenges the ability to foresee, and design for, their future states. The LTRA report contains future energy

[12] *See*, NERC, *2022 Long-Term Reliability Assessment*, December 2022, available at: https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf.

sufficiency metrics that serve as guideposts for the reliability of the North American electric grid on its current trajectory. It also describes the relevant trends that are propelling the grid's transformation and have the potential to alter the ability of the BPS to service the energy needs of communities and industries in North America.

The LTRA notes that governmental policies, changes in comparative resource economics, and customer demand for clean energy are driving the rapidly changing resource mix within the BPS and that the BPS has already seen a great deal of change, and more is underway. The LTRA also noted that managing this pace of change presents the greatest challenge to reliability. As the system transitions, changing weather systems present new challenges and fuel becomes inherently less secure.

Electricity supplies can decline in extreme weather for many reasons. Generators that are not designed or prepared for severe cold or heat can be forced off-line in increasing amounts. Wide-area weather events can also impact multiple balancing and transmission operations simultaneously that limit the availability of transfers. Fuel production or transportation disruptions could limit the amount of natural gas or other fuels available for electric generation. Wind, solar, and other variable energy resource (VER) generators are dependent on the weather.

The LTRA identified numerous risks that stakeholders and policymakers need to focus on over the next 10 years. NERC's assessment assumed the latest demand forecasts, resource levels, and area transfer commitments as well as accounts for expected generator retirements, resource additions, and demand-side resources.

Projected Area Supply Shortfalls

High Risk Areas: The NERC LTRA states that most areas are projected to have adequate electricity supply resources to meet demand forecasts associated with normal weather. However, the MISO area, NPCC-Ontario area, and the California/Mexico part of the WECC area are considered high-risk areas that do not meet resource adequacy criteria, such as the 1-day-in-10-year load-loss metric during periods of the assessment horizon. This indicates that the supply of electricity for these areas is more likely to be insufficient in the forecast period and that more firm resources are needed.

- In the MISO area, the previously reported reserve margin shortfall has advanced by one year, resulting in a 1,300 MW capacity deficit for the summer of 2023. The projected shortfall continues an accelerating trend since both the NERC *2020 LTRA* and *2021 LTRA* as older coal, nuclear, and natural gas generation exit the system faster than replacement resources are connecting.

- NPCC-Ontario also continues to project a reserve margin shortfall in 2025 and beyond. The capacity deficit of 1,700 MW is driven by generation retirements and lengthy planned outages at nuclear units undergoing refurbishment.

- Resource additions in the California/Mexico (CA/MX) part of WECC are alleviating capacity risks, but energy risks persist. Planned reserve margins meet annual reserve

margin targets for the duration of the 10-year horizon. However, overall variability in both the resource mix and demand profile contributes to shortfall risk periods, mainly in summer months around sunset, when expected supplies are not sufficient to meet the demand.

Elevated Risk Areas: Elevated Risk Areas are those that meet resource adequacy criteria and have sufficient energy and capacity for normal forecasted conditions, but they are at risk of shortfall in extreme conditions. The following are those areas considered at elevated risk: all three U.S. West areas of WECC, the Texas RE (ERCOT), SPP and NPCC New England.

- All three WECC assessment areas in the U.S. West have increasing demand and resource mix variability. In normal conditions, the expected demand and resource variability is balanced across the area as excess supply from one part of the system is delivered through the transmission network to places where demand is higher than supply. However, more extreme summer temperatures that stress large portions of the Interconnection reduce the availability of excess supply for transfer while also reducing the transmission network's ability to transfer the excess.

- Reliability during extreme winter weather remains a concern in ERCOT as ERCOT's winter peak load varies substantially (as much as 12.5%) between the coldest temperatures of an average year and a more extreme year as might be experienced once per decade. A high number of forced outages of the thermal and wind generation fleet have been an issue in severe winter weather. Improved generator availability resulting from winter preparedness programs and reforms implemented by Texas regulators, ERCOT, and generator owners since February 2021 are expected to reduce the risk that electricity supplies will be insufficient during a severe winter storm.

- SPP is exposed to energy risks in ways that are similar to both ERCOT and the U.S. West. Severe weather in SPP is likely to cause high generator outages and poses a risk to natural gas fuel supplies. In addition, the high penetration of wind generation makes the resource mix variable and exposed to insufficient energy during low wind periods.

- In NPCC New England, limited natural gas infrastructure can impact winter reliability due to increased heating demand and the potential for supply disruptions to generators. Liquefied natural gas facilities and sufficient generators with stored backup fuels are critical to electric reliability.

Continuing Resource Mix Changes and Implications for Reliability

The generation resource mix continues to change and have potential impacts for reliability. Highlights of these trends and the implications for reliability include the following:

- Reliable Interconnection of Inverter-Based Resources: Reliably integrating inverter-based resources (IBR), which include most solar and wind generation, onto the grid is paramount. Over 70% of the new generation in development for connecting to the BPS over the next 10 years is solar, wind, and hybrid (a generating source combined with a

battery). Note that the regional transmission operator (RTO) that serves Pennsylvania, PJM Interconnection, LLC (PJM), has developed a white paper outlining some risks with high penetration of IBR if proper planning and study are not undertaken.[13]

- Accommodating Large Amounts of Distributed Energy Resources (DER): Preparing the grid to operate with increasing levels of distribution resources must also be a priority in many areas. Solar photovoltaic (PV) DERs are projected to reach over 80 GW by the end of the LTRA 10-year assessment, a 25% increase in projection since NERC's 2021 LTRA. A total of 12 assessment areas project to double the amount of DERs in their areas by 2032.

- Managing the Pace of Generation Retirements: Within the 10-year horizon, over 88 GW of generating capacity is confirmed for retirement through regional transmission planning and integrated processes. Effective regional transmission and integrated resource planning processes are the key to managing the retirement of older nuclear, coal-fired, and natural gas generators in a manner that prevents energy risks or the loss of necessary sources of system inertia and frequency stabilization that are essential for a reliable grid.

- Maintaining Essential Reliability Services: The changing composition of the North American resource mix calls for more robust planning approaches to ensure adequate essential reliability services as retiring conventional generation is being replaced with large amounts of wind and solar. Various technologies can contribute to essential reliability services, including variable energy resources. However, policies and market mechanisms need to reflect these requirements to ensure these services are provided and maintained.

Trends and Implications for Reliability

Demand trends and implications as well as transmission development trends and implications can affect long-term reliability and the sufficiency of electricity supplies. Several key insights emerging from the latest industry data include:

- Peak Demand and Energy Growth: Projected growth rates of electricity peak demand and energy in North America are increasing for the first time in recent years. Government policies for the adoption of electric vehicles (EVs) and other energy transition programs have the potential to significantly influence demand. Demand-side management programs, including conservation, energy efficiency, and demand response continue to offset demand and contribute to load management.

- Insufficient Transmission for Large Power Transfers: Transmission development projections remain near the averages of the past five NERC LTRAs. There has been

[13] *See*, PJM, *Energy Transition in PJM: Resource Retirements, Replacements & Risks*, available here: https://www.pjm.com/-/media/library/reports-notices/special-reports/2023/energy-transition-in-pjm-resource-retirements-replacements-and-risks.ashx.

some increase in the number of miles of transmission line projects for integrating renewable generation over the next 10 years as compared to the *2021 LTRA* projections. Transmission investment is important for reliability and resilience as well as the integration of new generation resources.

- Emerging Electrification Challenges: Several emerging issues and trends have the potential to impact future long-term projections of demand and resources. In addition to EV and electrification issues, cryptocurrency mining may have a notable impact on demand and resources in some areas.

NERC Conclusions and Recommendations

The energy and capacity risks identified in the LTRA underscore the need for reliability to be a top priority for the resource and system planning community of stakeholders. General actions for industry and policymakers to address the reliability risks described in the 2022 LTRA include the following:

- Manage the pace of generator retirements until solutions are in place that can continue to meet energy needs and provide essential reliability services.

- Include extreme weather scenarios in resource and system planning.

- Address IBR performance and grid integration issues.[14]

- Expand resource adequacy evaluations beyond reserve margins at peak times to include energy risks for all hours and seasons.

- Increase focus on DERs as they are deployed at increasingly impactful levels.

- Mitigate the risks that arise from growing reliance on just-in-time fuel for electric generation and the interdependent natural gas and electric infrastructure.

- Consider the impact that the electrification of transportation, space heating, and other sectors may have on future electricity demand and infrastructure.

NERC further noted the following three additional areas of concern and provided recommendations:

- Reducing the Risk of Insufficient Energy*:* Energy risks emerge when weather-dependent generation is impacted by abnormal atmospheric conditions or when extreme conditions

[14] *See*, the NERC report, *Odessa Disturbance*, available here: https://www.nerc.com/pa/rrm/ea/Documents/Odessa_Disturbance_Report.pdf.

disrupt fuel supplies. In areas with a high dependence on VERs and natural-gas-fired generation, prospective reserve margins (PRM) are not sufficient for measuring resource adequacy. Recommendations to reduce risk include:

- Industry and regulators should conduct all-hours energy availability analyses for evaluating and establishing resource adequacy and include extreme condition criteria in integrated resource planning and wholesale market designs.

- NERC and industry should prioritize the development of reliability standard requirements to address energy risks in operations and planning.

- State and provincial regulators and independent system operators (ISO)/regional transmission operators (RTO) should have mechanisms they can employ to prevent the retirement of generators that they determine are needed for reliability, including the management of energy shortfall risks.

- Regulatory and policy-setting organizations should use their full suite of tools to manage the pace of retirements and ensure that replacement infrastructure can be timely developed and placed in service. If needed, the Department of Energy should use its 202(c) authority as called upon by electric system operators.

- Planning and adapting for IBRs and DERs: IBRs, including most solar and wind as well as new battery or hybrid generation, respond to disturbances and dynamic conditions based on programmed logic and inverter controls. The tripping of BPS-connected solar PV generating units and other control system behavior during grid faults has caused a sudden loss of generation resources over wide areas in some cases. As areas become more reliant on IBRs for their electricity generation, it is critically important to reduce risks from IBR performance issues. Recommendations to reduce risk include:

  - NERC and Industry should take steps to ensure that IBRs operate reliably, and ensure that the system is planned with due consideration for their unique attributes. NERC has developed an IBR strategy document to address IBR performance issues that illustrates current and future work to mitigate emerging risks in this area.[15] Regulators, industry-standards-setting organizations, trade forums, and manufacturers each have a role to play to address IBR performance issues.

  - Industry should increase its focus on the technical needs for the BPS to reliably operate with increased amounts of DERs. Increased DER penetrations can improve local resilience at the cost of reduced operator visibility into loads and resource availability. Data sharing, models, and information protocols are needed

[15] See, NERC, *Inverter-Based Resource Strategy*, available at: https://www.nerc.com/comm/Documents/NERC_IBR_Strategy.pdf

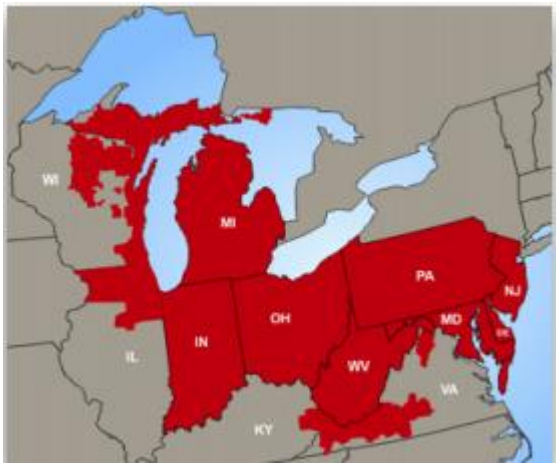
to support BPS planners and operators. DER aggregators will also play an increasingly important role for BPS reliability in the coming years.

- Addressing the Reliability Needs of Interdependent Electricity and Natural Gas Infrastructures: Natural gas is an essential fuel for electricity generation that bridges the reliability needs of the BPS during this period of energy transition. As natural-gas-fired generation continues to increase, vulnerabilities associated with natural gas delivery to generators can potentially result in generator outages. Energy stakeholders must urgently act to solve reliability challenges that arise from interdependent natural gas and electricity infrastructure. Recommendations to reduce risk include:

    - ERO and Industry planners should enhance guidelines for assessing and reducing risks through system and resource planning studies and develop appropriate Reliability Standards requirements to ensure corrective actions are put in place.

    - Regulators and other energy stakeholders must also take steps to promote coordination on interdependencies. The forum convened by the North American Energy Standards Board is one such important action that should be broadly supported.

ReliabilityFirst Corporation



ReliabilityFirst Corporation (RFC), headquartered in Cleveland, Ohio, is one of six NERC regional entities serving North America, and is the regional reliability entity for Pennsylvania. Its service territory consists of more than 72 million people in a 238,000 square-mile area covering New Jersey, Delaware, Pennsylvania, Maryland, District of Columbia, West Virginia, Ohio, Indiana; and parts of Michigan, Wisconsin, Illinois, Kentucky, Tennessee, and Virginia. Its membership includes load-serving entities (LSEs),[16] RTOs, suppliers, and transmission companies.

The RFC controls reliability standards and enforcement by entering into delegation agreements with regional entities to ensure adequate generating capacity and transmission. Program areas include compliance monitoring, enforcement, entity development, event analysis and situational awareness, regulation and certification, reliability assessment and performance analysis, risk analysis and mitigation, and standards.

[16] A Load Serving Entity (LSE) is any entity (or the duly designated agent of such an entity), including a load aggregator or power marketer that (a) serves end-users within the PJM Control Area, and (b) is granted the authority or has an obligation pursuant to state or local law, regulation or franchise to sell electric energy to end-users located within the PJM Control Area (definition from *PJM.com* glossary).

RFC is responsible for resolving and enforcing noncompliance using a risk-based approach. RFC notes that this involves the following: assessing the risk of the noncompliance and understanding the root cause (and contributing cause(s)); working with entities to ensure they take steps to remediate the noncompliance and prevent recurrence; and processing the noncompliance through an appropriate resolution based on risk and other factors.

In 2022, RF continued to process high volumes to keep up with intake on noncompliances and processed 439 noncompliances in 2022 as compared to 362 noncompliances in 2021. The majority of the noncompliances in 2022 were of minimal risk, but RFC processed more settlements than in previous years.[17] The majority of the noncompliances in 2022 were compliance exceptions that were NERC Critical Infrastructure Protection (CIP)-related and entities self-reported 93% of noncompliances.[18]

Regional Transmission Organization: PJM Interconnection

The two regional transmission organizations (RTOs) within the RFC footprint are PJM Interconnection, LLC (PJM) and Midcontinent Independent System Operator, Inc. (MISO). Because MISO does not operate in Pennsylvania, only PJM will be addressed in this report.

PJM is a regional transmission organization that ensures the reliability of the largest centrally dispatched control area in North America, covering 368,906 square miles. PJM coordinates the operations of more than 88,115 miles of transmission lines.[19] The PJM RTO coordinates the movement of electricity for over 65 million people through all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia. PJM coordinates the operation of 1,419 electric power generators with more than 183,254 megawatts (MW) of generating capacity. PJM's peak customer load of 165,563 MW was recorded during Summer of 2006. According to the 2023 Summer forecast, PJM is prepared to serve a forecasted summer peak demand for electricity of approximately 156,000 MW, but has performed reliability studies at even higher loads in excess of 163,000 MW.[20] PJM manages a sophisticated regional planning process for generation and transmission expansion to ensure the continued reliability of the electric system. PJM is responsible for maintaining the integrity of the regional power grid and for managing changes and additions to the grid to accommodate deactivating and new generating plants, substations, and transmission lines. In addition, PJM analyzes, and forecasts future electricity needs of the region. Its planning process ensures that the electric system growth is efficient and takes place in an orderly fashion. PJM supports market innovation through its active support for demand response markets for energy,

[17] *See*, reference materials for the ReliabilityFirst Q1 and Q2 Compliance Committee public materials, April 2022, available here: https://rfirst.org/eventdetail?EventId=268.
[18] *See*, RF, *2022 Annual Report*, available here: https://rfirst.org/about/publicreports/Public%20Reports/2022%20Annual%20Report.pdf.
[19] *See*, PJM, *2022 PJM Annual Report*, available at services.pjm.com/annualreport2022/.
[20] *See*, 20230511-pjm-summer-outlook-sufficient-supply-to-serve-electric-demand-under-anticipated-conditions.ashx.

capacity, and ancillary services, and helps ensure that appropriate infrastructure and operational capabilities are in place to support newly installed renewable energy and other generation facilities.

PJM's mission can be described as below:[21]

- Acts as a neutral, independent party. PJM operates a competitive wholesale electricity market and manages the high-voltage electricity grid to ensure reliability for more than 65 million people.

- PJM's long-term regional planning process provides a broad, interstate perspective that identifies the most effective and cost-efficient improvements to the grid to ensure reliability and economic benefits on a system wide basis.

- An independent Board oversees PJM's activities. Effective governance and a collaborative stakeholder process help PJM achieve its vision: "To be the electric industry leader – today and tomorrow – in reliable operations, efficient wholesale markets, and infrastructure development."

PJM coordinates the continuous buying, selling and delivery of wholesale electricity through open and competitive spot markets. PJM balances the needs of suppliers, wholesale customers and other market participants, and continuously monitors market behavior in tandem with the Monitoring Analytics LLC, the PJM RTO Market Monitoring Unit.

PJM Bulk Power System Status

PJM membership, which includes energy suppliers, generation and/or transmission owners and operators, was 1,111 at the end of 2022. In 2022, the PJM market amount billed increased to $86.3 billion, as compared to $54.1 billion in 2021; $36.2 billion in 2020; $39.2 billion in 2019; $49.8 billion in 2018; and $40.172 billion in 2017. PJM's 2021 transmission volumes were 821 terawatt hours (TWhs) as compared to: 757.3 TWhs in 2020; 787.3 TWhs in 2019; 806.5 TWhs in 2018; and 807 TWhs in 2017.[22]

In terms of generator deactivations, more than 36,000 MW of coal-fired generation has retired since 2011. The economic impacts of environmental public policy, coupled with the age of these plants − many more than 40 years old – make ongoing operation prohibitively expensive.

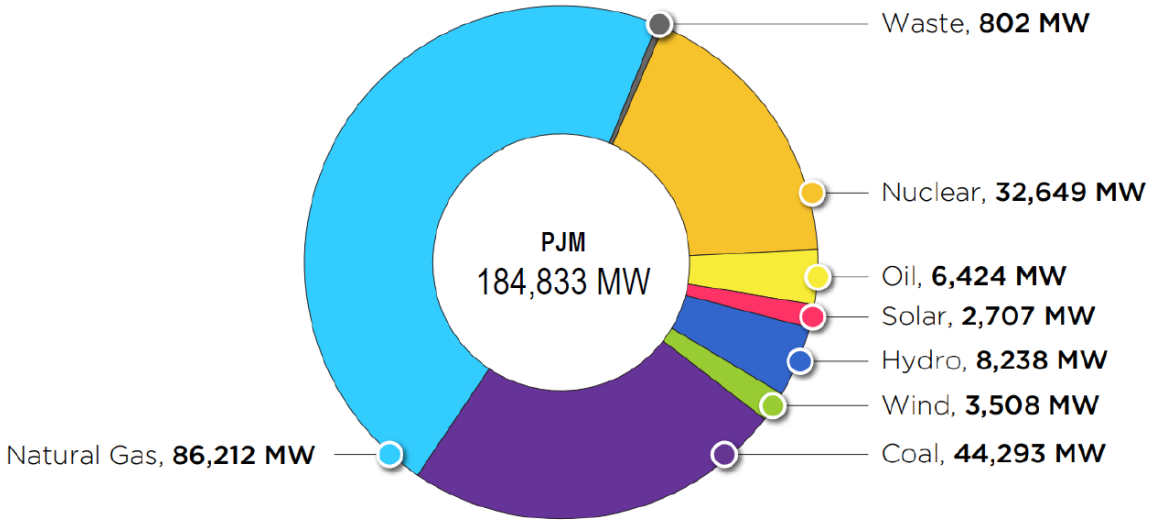
Throughout 2022, PJM received 20 generator deactivation notices totaling 5,119 MW, as compared to: 10,607 MW in 2021; 4,428 MW in 2020; 7,650 MW in 2019; 10,882 MW in 2018; 4,800 MW in 2017; 5,605 MW in 2016; and 1,626 MW in 2015.

As of Dec. 31, 2022, PJM's 184,833 MW of eligible existing installed capacity reflects a fuel mix comprising 46.6% natural gas, 23.9% coal and 17.6% nuclear, as shown in Figure 1 on the next page.

[21] http://www.pjm.com/about-pjm/who-we-are.aspx.
[22] *See*, PJM, *2022 PJM Annual Report*, available at https://services.pjm.com/annualreport2022/.

Hydro, wind, solar, oil and waste fuels constitute the remaining 12%. Nameplate capacity values represent the full power output of the generators.[23]

Figure 1: Existing Installed Capacity Mix within PJM as of Dec. 31, 2022

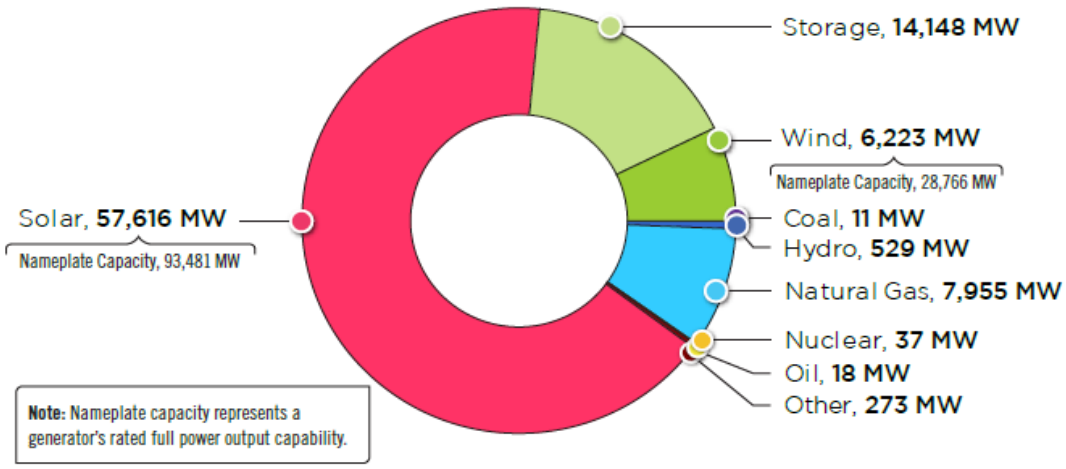


Totaling over 78,000 MW of Capacity Interconnection Rights (CIRs), renewable fuels are changing the landscape of PJM's interconnection queue. Solar energy makes up 66% of the generation in PJM's interconnection queue. An increase in solar generation interconnection requests is attributable to state policies encouraging renewable generation. Figure 2 below shows PJM's fuel mix based on requested CIRs for generation that was active, under construction or suspended as of Dec. 31, 2022.[24]

[23] *See*, PJM, *PJM 2022 Regional Transmission Expansion Plan Report*, Book 1, available at: https://pjm.com/-/media/library/reports-notices/2022-rtep/2022-rtep-report.ashx, and *2022 Pennsylvania State Infrastructure Report*, available at: https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2022/2022-pennsylvania-state-infrastructure-report.ashx.

[24] *See*, PJM, *PJM 2022 Regional Transmission Expansion Plan Report*, Book 1, available at: https://pjm.com/-/media/library/reports-notices/2022-rtep/2022-rtep-report.ashx.

Figure 2: Generation Projects requesting Capacity Interconnection Rights in PJM Queue as of Dec. 31, 2022



PJM Load Growth and Projections

Net energy for load growth for the PJM RTO is projected to average 1.4% per year over the next 10-year period, and 1.3% over the next 15 years. Total PJM RTO energy is forecasted to be 909,622 GWh in 2033, a 10-year increase of 121,572 GWh, and 960,428 GWh by 2038, a 15-year increase of 172,378 GWh. Annualized 10-year growth rates for individual transmission zones in PJM range from -0.7% to 7% with a median of 0%.[25]

Summer peak load growth for the PJM RTO is projected to average 0.8% per year over the next 10 and 15 years. The PJM RTO summer peak is forecasted to be 160,971 MW in 2033, which is a 10-year increase of 11,912 MW, and the summer peak reaches 167,567 MW in 2038, which is a 15-year increase of 18,507 MW. Annualized 10-year growth rates for individual zones range from -0.7% to 5% with a median of -0.1%.

Winter peak load growth for PJM RTO is projected to average 1% per year over the next 10-year period, and 0.9% over the next 15-years. The PJM RTO winter peak load for the 2032/33 winter is forecasted to be 144,992 MW, which is a 10-year increase of 14,180 MW, and the winter peak reaches 150,555 MW in 2037/38 winter, which is, a 15-year increase of 19,744 MW. Annualized 10-year growth rates for individual zones range from -0.3% to 4.8%, with a median of 0.1%.[26]

[25] *See*, PJM, *PJM Load Forecast Report January 2023*, available at: https://www.pjm.com/-/media/library/reports-notices/load-forecast/2023-load-report.ashx.
[26] *Id.*

PJM Bulk Power System Status – Winter Performance[27]

Winter Storm Elliott (Elliott) impacted the eastern United States over the holiday weekend of Dec. 23, 2022, through Dec. 25, 2022. PJM noted that the large drop in temperatures within a very short time-period tested the reliability of much of the Eastern Interconnection. Temperature drops and powerful winds caused widespread generator failures and froze up natural gas supplies while driving up electricity demand, leading to power outages for some of PJM's neighboring RTOs.

While PJM and its members were able to maintain the reliability of the system, serve customers and even support neighboring systems during some periods, PJM operators had to implement multiple emergency procedures and a public appeal to reduce energy use to maintain reliability in the PJM footprint.[28] The PUC communicated with the Pennsylvania Emergency Management Agency (PEMA) and the Department of Environmental Protection's Energy Programs Office (DEP EPO) throughout the event, pursuant to the responsibilities of the PUC, PEMA, and DEP EPO under the Commonwealth Emergency Operations Plan. During the course of the event, the PUC recognized some opportunities for improved communications and information sharing with PJM and has already engaged PJM in developing and enacting those improvements.

Overall, PJM was able to maintain grid reliability. However, the impacts of Elliott reinforce the concern of NERC (see the section on NERC, above) that energy risks present themselves during extreme weather events that can disrupt fuel supplies that can impact RTOs with a high dependence on natural-gas-fired generation. In other words, RTOs and independent system operators (ISOs) that are heavily reliant on natural gas for capacity resources must be cognizant of how extreme weather can impact fuel supplies and, in the case of Elliott in the PJM RTO, the mechanical operations of gas generation. While significant, the majority of gas generator outages in PJM during Elliott were not due to fuel supply. The report issued by PJM on Elliott provides great detail on these impacts.

On July 17, 2023, PJM released its *Winter Storm Elliott Event Analysis and Recommendation Report* (Elliott Report), which provided significant details on the impacts of Elliott on the PJM region and its members. Some critical findings in the report are:[29]

- PJM's load forecasts for December 23 and 24 were approximately 8% under the actual peak.

- Based on the Day-Ahead Market results, PJM did not anticipate the need to run a significant amount of additional combustion turbine (CT) assets on December 23 or 24. However, as more and more generating resources started to report their unavailability to PJM during the evening peak on December 23 and through the early morning hours of December 24, PJM Dispatch began scheduling additional CTs to come online.

- PJM did not declare a Unit Startup Notification Alert or commit any long lead generation or recall maintenance outages to meet capacity forecasts, based on PJM forecasting a significant

[27] The information in this section is based on PJM's *Winter Storm Elliott Event Analysis and Recommendation Report*, which is available here: https://www.pjm.com/-/media/library/reports-notices/special-reports/2023/20230717-winter-storm-elliott-event-analysis-and-recommendation-report.ashx.
[28] *Id.*, an overview of the emergency procedures PJM undertook and the timeline of events begins on page 27.
[29] *Id.*

surplus of generation leading into the December 23 operating day and its accounting for a historical average of generator forced outages through cold weather events

- PJM's forecast for December 23 was about 127,000 MW, and load came in at about 136,000 MW. This demand level is approximately 25,000 MW above a typical winter peak day. In preparation for this day, PJM had approximately 158,000 MW of operating capacity based on what was scheduled in the Day-Ahead Market plus available generation able to be called upon in real time. PJM was able to meet this load with the help of a Maximum Generation Action and Demand Response.

- Complications arose on December 24 resulting from the unanticipated failure of generation resources that were called into the operating capacity on that day. At one point, almost a quarter of the generation capacity, about 47,000 MW, was on forced outages. While generators are required to provide updates on their operating parameters, including operating status, ramp times and fuel availability, in 92% of generator outages, PJM operators had an hour's notice or less, and in most cases, PJM was informed of outages when dispatchers called generators to request them to turn on.

- During the morning hours of December 24, PJM was at risk of having to initiate load shed (i.e., voltage reduction possibly followed by rolling blackouts) for the entire RTO, including Pennsylvania. PJM would have had to initiate such actions if another large generation unit was lost or imports from NYISO into PJM were cut.

- Gas generators accounted for 70% of the generator outages on December 24. Most outages were caused by equipment failure likely resulting from the extreme cold, though broader issues of gas availability also contributed to the outages.

- Generator outages due to gas supply issues accounted for approximately 11,000 MW at the peak hours on December 24.

- Over 21,000 MW of the gas generator outages were due to units that failed due to freezing issues at temperatures above their cold weather operating limits, i.e., the units should have performed as the temperatures were above the limits that should have caused problems to the operating equipment. However, 99% of the generation resource owners in the PJM region verified that they completed the items on the Generation Resource Cold Weather Preparation Checklist (or performed an equivalent checklist or process).

- PJM initiated calls for demand response on December 23 and 24, which involves curtailment service providers (CSPs) that are expected to reduce electric load when called upon. On December 23, only 26% of the expected MW reductions occurred and on December 24, only 32% of the expected MW reductions occurred.

PJM's Elliot Report outlined 30 recommendations for improvement. Some of the key recommendations included:[30]

[30] *Id.*

- PJM will evaluate needed enhancements to the generator Cold Weather Checklist and the Cold Weather Operating Limit reporting practices used to prepare for cold weather to help improve generator cold weather performance in the future. PJM will incorporate lessons learned as necessary to improve these checklists to include validation procedures.

- PJM will evaluate reasons why the information provided by CSPs regarding their ability to curtail load was not accurate. PJM will incorporate lessons learned as necessary to include validation procedures.

- PJM noted the need to evaluate opportunities for improvements to the extreme weather load forecast processes and methodology with independent and peer analysis.

- PJM will evaluate the current multi-day commitment process for use during expected critical high demand periods so as to analyze the costs and benefits of providing greater certainty of fuel supply procurement through the critical period, with a focus on weekends when the gas commodity market can be less liquid.

- PJM will evaluate options for requiring generators to provide procurement information to PJM in real time and day ahead to provide greater situational awareness to PJM regarding the ability and timeliness of procuring fuel.

PJM Pennsylvania State Infrastructure Information

The Pennsylvania electric power outlook generally reflects the projections of RFC, which are based on forecasts of PJM and MISO. PJM evaluates regional data concerning the current and future condition of the bulk power system because it is planned on a regional rather than a state basis. While the aggregate load for the state's consumers can be determined, the availability and mix of electrical generation units cannot be predicted, since the complexities of weather, generation availability, and fuel prices will be the primary driving forces.

An RTO such as PJM has the primary responsibility to coordinate and plan future upgrades and expansion of the regional transmission system. PJM noted that a key part of the planning process is to evaluate existing generation deactivation, new generation interconnection, and merchant transmission interconnection requests. Although transmission planning is performed on a regional basis, most upgrades and expansion in Pennsylvania are planned to support the local delivery system and new generating facilities.

LSEs acquire capacity resources as follows: entering bilateral agreements; participating in the PJM-operated capacity market; owning generation; and/or pursuing load management options. The PJM generator interconnection process ensures new capacity resources satisfy LSE requirements to reliably meet their obligations.

All new generation that anticipates interconnecting and operating in parallel with the PJM transmission grid and participating in the PJM capacity and/or energy markets must submit an interconnection request to PJM for technical evaluation and approval. A summary of key

information related to generation capacity and usage for the PJM RTO area and information specific to electric generation in Pennsylvania are provided in Appendices B and C of this report.

PJM Pennsylvania State Infrastructure Summary**:** [31]

- Existing Capacity: generating capacity in 2022 Pennsylvania totaled 46,977 MW as compared to: 47,633 MW in 2021, 46,941 MW in 2020; 44,705 MW in 2019; 44,660 MW in 2018; and 42,257 MW in 2017.

- Natural gas represents approximately 49.2% of the total installed capacity in the Pennsylvania service territory while coal represents approximately 20.1% and nuclear 19.3%. In the PJM region, natural gas and coal are 47.9% and 23.4% of total installed capacity, respectively, while nuclear represents 17.4%. In terms of actual electrical generation in 2022 for the PJM region, natural gas generated 40% of the load, coal 20% and nuclear 32.3%. See Figures 3 and 4, below.

- Interconnection Requests: Solar represents 68.3% of new interconnection requests in Pennsylvania, and storage represents 24.2%, while natural gas represents approximately 1.0% of new requests. See Figure 5, below.

- Deactivations: 832 MW in Pennsylvania gave notification of deactivation in 2022, as compared to: 920.8 MW in 2021; 78.3 MW in 2020; and 976.2 MW in 2019. See Appendix B for further details on the generation that gave notification of deactivation.

- Regional Transmission Expansion Plan (RTEP) 2022**:** Pennsylvania's 2022 RTEP project total represents approximately $664.35 million in investment, as compared to Pennsylvania's 2021 RTEP projects that totaled $176.9 million. A portion of the projects associated with New Jersey's State Agreement Approach (SAA) are in Pennsylvania and have an estimated cost total of $114.11 million. A listing of all RTEP projects over $10 million, as well as those specific to Pennsylvania, may be found in PJM's RTEP.[32] The status of individual PJM Board-approved baseline and network RTEP projects, as well as that of Transmission Owner Supplemental Projects, is available on the PJM website.[33]

- Load Forecast: Pennsylvania's summer peak load growth is projected to range between -0.3% and 0.8% annually over the next ten years, depending on the service territory. The overall PJM RTO projected summer load growth rate is 0.8%.

- Calendar Year 2022 Market Performance: Pennsylvania's average hourly locational marginal prices (LMPs) were generally lower than the PJM average hourly LMP.

[31] *See*, PJM, *2022 Pennsylvania State Infrastructure Report*, available at: https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2022/2022-pennsylvania-state-infrastructure-report.ashx.
[32] *Id.*, Pennsylvania-specific information begins on page 200.
[33] https://www.pjm.com/planning/project-construction.

- 2023/24 Capacity Market: Pennsylvania's service territory cleared at the RTO price of $34.13/MW-day and the MAAC price of $49.49/MW-day for the 2023/2024 Base Residual Auction.

- 2024/25 Capacity Market: Pennsylvania's service territory cleared at the RTO price of $28.92/MW-day, the MAAC price of $49.49/MW-day, and the Eastern MAAC price of $54.95/MW-day for the 2024/2025 Base Residual Auction.

- Emissions: Pennsylvania's average CO2 emissions decreased in 2022 compared to the 2021 level.

Figure 3: Pennsylvania Electric Generation by Fuel Type as of Dec. 31, 2022

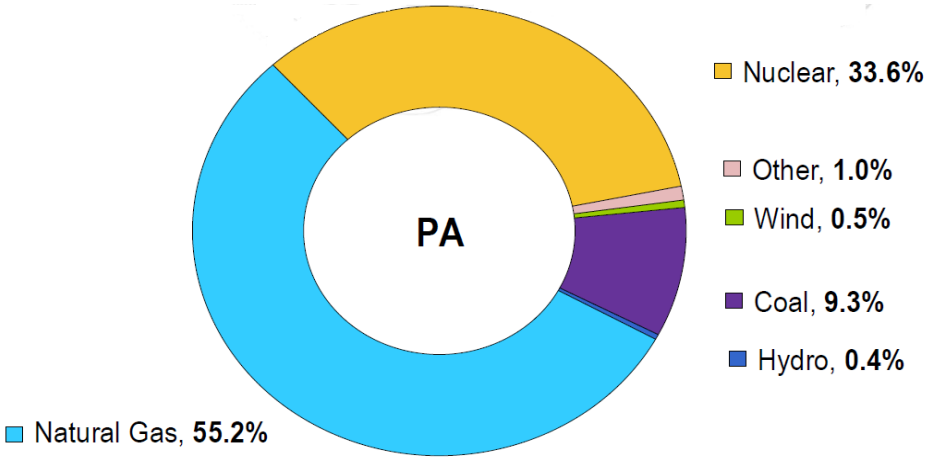


Figure 4: Pennsylvania Installed Electric Generation Capacity by Fuel Type as of Dec. 31, 2022

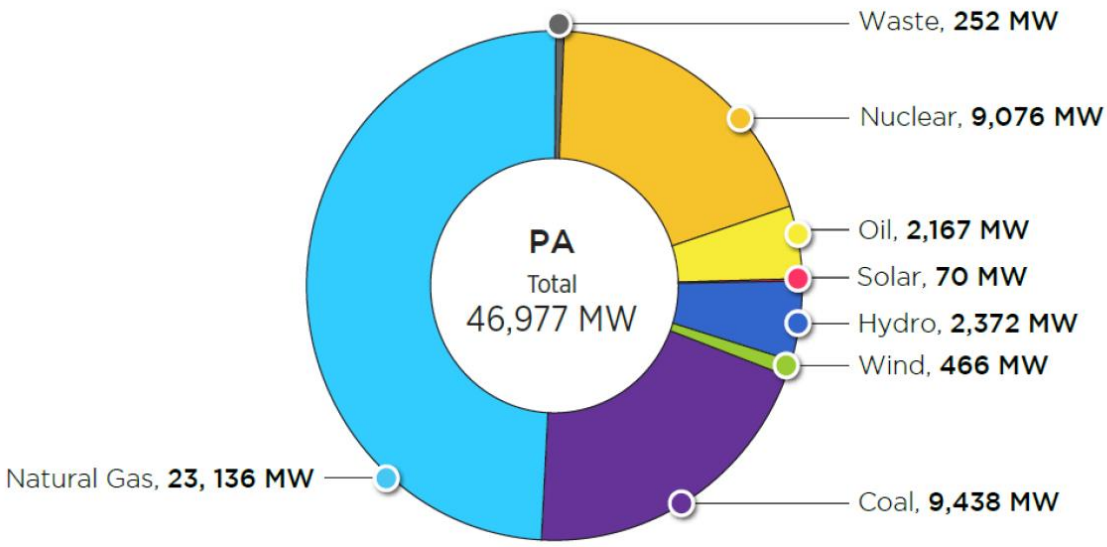
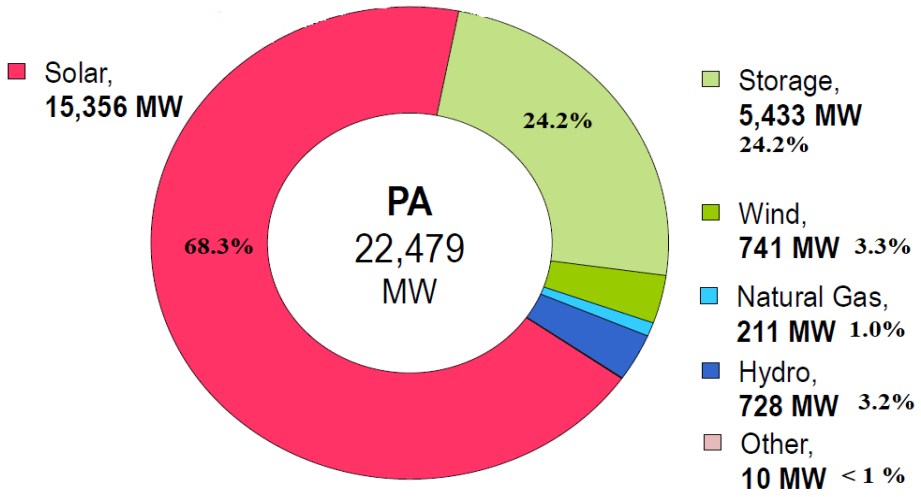


Figure 5: Pennsylvania – Queued Capacity by Fuel Type – as of April 1, 2023 [34]



[34] *See*, PJM, *2022 Pennsylvania State Infrastructure Report*, available at: https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2022/2022-pennsylvania-state-infrastructure-report.ashx.

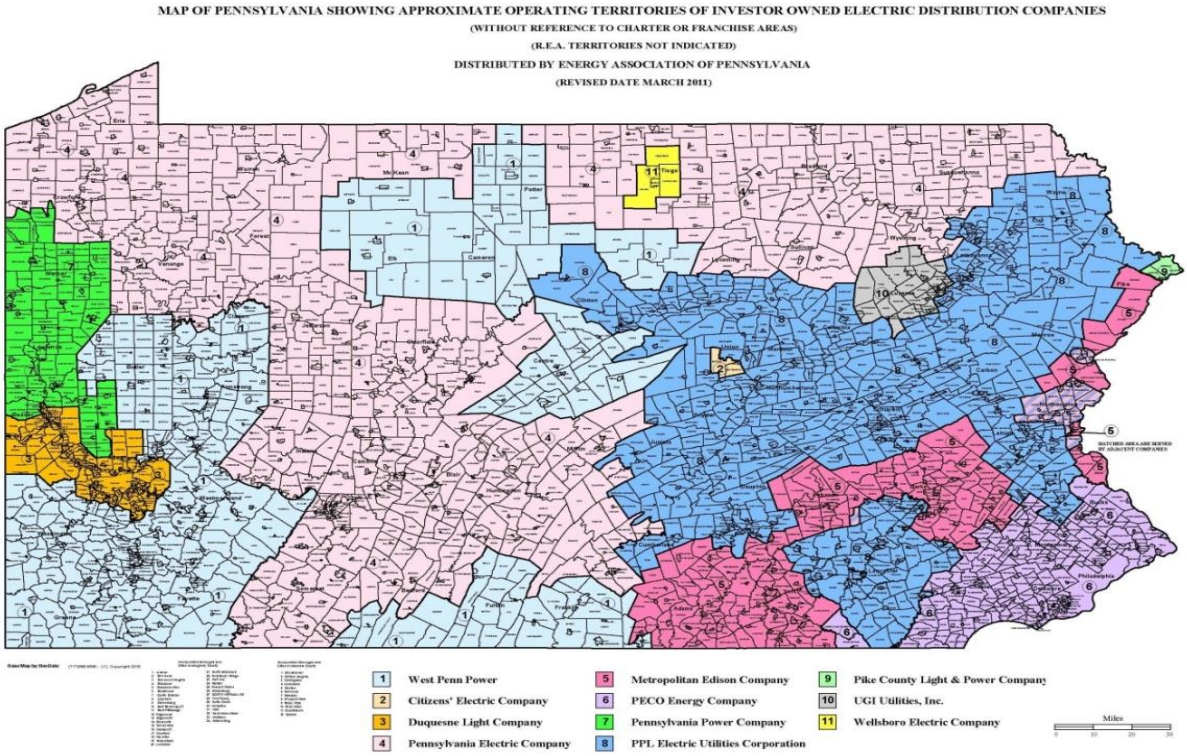
Section 2 – Pennsylvania Electric Outlook

Electric Distribution Companies

Eleven EDCs currently serve the electricity needs of most Pennsylvania's homes, businesses and industries. Cooperatives and municipal systems provide service to several rural and urban areas. The Commission does not regulate the cooperative and municipal electric systems. The 11 jurisdictional EDCs shown in Figure 7 below are:

- Citizens' Electric Company
- Duquesne Light Company
- Metropolitan Edison Company (FirstEnergy)
- Pennsylvania Electric Company (FirstEnergy)
- Pennsylvania Power Company (FirstEnergy)
- PPL Electric Utilities Corporation
- PECO Energy Company (Exelon)
- Pike County Light & Power Company
- UGI Utilities Inc. – Electric Division
- Wellsboro Electric Company
- West Penn Power Company (FirstEnergy)

Figure 7: Map of EDC Service Territories



Each LSE is responsible to make provisions for adequate generating resources to serve its customers. The local EDC or a Commission approved alternative Default Service Provider (DSP)[35] must acquire electricity, pursuant to a Commission approved competitive procurement process, for customers who:

1. Contract with a competitive Electric Generation Supplier (EGS). Contracting with an EGS allows customers to choose an electric provider in the competitive retail market. The Commission provides a website that provides a one source comparison of EGS electric offers and allows electric customer to directly link into an EGS website to switch electric services.[36]

   or,

2. Stay with the local EDC or Commission approved DSP. Under current law, the default electric generation prices are required to be based upon a "prudent mix" procurement strategy that will produce the least cost to customers over time.[37]

Alternative Energy Portfolio Standards

The PUC continues to implement procedures and guidelines necessary to carry out the requirements of the Alternative Energy Portfolio Standards Act (AEPS) of 2004 (Act 213).[38] Act 213 required annual increasing percentages of electricity sold to Pennsylvania retail customers be derived from alternative energy resources. The amount of electricity to be supplied by alternative resources increased to its peak total of 18% in 2021, including 8% from Tier I resources, including solar, and 10% from Tier II resources. In 2008, the Commission adopted regulations pertaining to the AEPS obligations of EDCs and EGSs.[39] All EDCs and EGSs have been required to comply since Jan. 1, 2011.

Eligible resources are categorized as Tier I and Tier II. Tier I resources include solar, wind, low-impact hydropower, geothermal, biologically derived methane gas, fuel cells, biomass (including electricity generated in Pennsylvania utilizing by-products of the pulping process and wood manufacturing process, including bark, wood chips, sawdust and lignin's in spent pulping liquors)[40] and coal mine methane. Tier II resources include waste coal, demand side management, distributed generation, large-scale hydropower, by-products of wood pulping and wood manufacturing, municipal solid waste, and integrated combined coal gasification technology.

To meet the requirements of Act 213, EDCs and EGSs acquire alternative energy credits (AECs) in quantities commensurate with the required tier percentage and the electricity sold to retail customers. AECs are separate from the electricity sold to customers. An AEC represents one megawatt hour (MWh) of qualified alternative electric generation or conservation, whether self-generated,

[35] *See*, 66 Pa.C.S. § 2803.
[36] http://www.papowerswitch.com.
[37] *See*, 66 Pa.C.S. § 2807(e)(3).
[38] Alternative Energy Portfolio Standards Act, effective Feb. 28, 2005; 73 P.S. §§ 1648.1—1648.8.
[39] *See*, Docket No. L-00060180; 52 Pa. Code §§ 75.61-75.70.
[40] *See*, 66 Pa.C.S. § 2814(b).

purchased along with the electric commodity, or purchased separately through a tradable instrument.[41]

AECs are earned when a qualified facility generates one MWh of electricity. An AEC is a serialized, tradable, and tracked certificate that represents the characteristics of electricity generated from a facility. PJM EIS' Generation Attribute Tracking System (GATS) is the alternative energy credit registry used by the Commission to create, track, transfer, and retire alternative energy credits.

An AEC can be sold or traded separately from the power. AECs are generally purchased by EDCs and EGSs to meet the AEPS requirements for any given year. AECs can also be obtained and retired to comply with the private sector's voluntary commitments. AECs can be moved (sold or traded) multiple times until they are ultimately retired for regulatory or voluntary compliance purposes, but they can only be used for compliance purposes (retired) once. The Commission, together with its Pennsylvania AEPS Program Administrator, verifies that EGSs and EDCs are complying with the requirements of Act 213.

Under Act 213, the Commission adopted regulations promoting onsite generation by customer-generators using renewable resources and eliminated previously existing barriers to net metering.[42] The regulations also provide for required metering capabilities and a compensation mechanism that reimburses customer-generators for surplus energy supplied to the electric grid.[43] Act 35 of 2007 amended Act 213 by altering the reconciliation mechanism used to compensate resellers for surplus energy supplied through net metering.[44]

The Commission also adopted regulations that govern interconnection for customer-generators. The regulations strive to eliminate barriers which may have previously existed with regard to interconnection, while ensuring that interconnection by customer-generators will not pose unnecessary risks to the Commonwealth's electric distribution systems.[45]

On Oct. 27, 2016, the Commission adopted regulations to revise and update existing regulations to comply with Act 129 of 2008, and Act 35 of 2007, and to clarify certain issues of law, administrative procedure, and policy.[46] On Apr. 19, 2018, the Commission adopted a Final Implementation Order to provide the Commission's interpretation and implementation of Section 11.1 of Act 40 of 2017.[47] Effective Oct. 30, 2017, Act 40 contained a section that further amended Act 213 by establishing geographical limits on solar photovoltaic (solar PV) systems that qualify for the solar PV share requirements of the AEPS. On May 6, 2021, the Commission adopted a Final Implementation Order to provide the Commission's interpretation as well as implementation of Sections 10 and 14 of Act 114.[48]

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[41] *See*, 52 Pa. Code §§ 75.61—75.70.
[42] Net metering measures the difference between the electricity supplied by an electric utility or EGS and the electricity generated by a customer-generator when any portion of the electricity generated by the alternative energy generating system is used to offset part or all of the customer-generator's requirements for electricity. *See* 52 Pa. Code § 75.12.
[43] *See*, Docket No. L-00050174; 52 Pa. Code §§ 75.11-75.15.
[44] *Id.*
[45] *See*, Docket No. L-00050175; 52 Pa. Code §§ 75.21-75.40.
[46] *See*, Docket No. L-2014-2404361; 52 Pa. Code §§ 75.1-75.72.
[47] *See*, Docket No. M-2017-2631527.
[48] *See*, Docket No. M-2020-3023323.

Effective Nov. 23, 2020, Act 114 at Section 10 amended Act 213 by revising the definition of customer-generator. Section 10 added the following to the definition of customer-generator: net-metered distributed generation systems owned, operated, or supporting the Department of Military and Veterans Affairs (DMVA) on property owned or leased and operated by the DMVA with a nameplate capacity not exceeding the DMVA's annual electric needs to support the DMVA's facilities on its property. Furthermore, Act 114 at Section 14 amended Act 213 by establishing geographic limits on Tier II alternative energy resource systems that qualify for the Tier II share requirements of the AEPS.

As of May 31, 2022, Pennsylvania had certified 42,831[49] alternate energy facilities, of which 35,297 are located within the state. For additional information on Alternative Energy in Pennsylvania, please visit the Commission's website.[50]

Energy Efficiency and Conservation Program (Act 129)

Act 129 of 2008[51] required the seven electric distribution companies (EDCs)[52] with at least 100,000 customers[53] to establish an energy efficiency and conservation (EE&C) plan. The Act is being implemented in phases. Phases I through III are complete. Phase IV of Act 129, the current five-year phase, began on Jun. 1, 2021, and will end on May 31, 2026.

In its planning for Phase IV, the Commission directed the Statewide Evaluator (SWE) to perform electric baseline studies to establish baseline energy use and building characteristics for the residential, commercial, and industrial sectors. The SWE submitted the final residential and non-residential baseline studies to the Commission on Feb. 12, 2019.[54]

The Commission further directed the SWE to perform an EE and Peak Demand Reduction (EEPDR) potential study to inform the Commission of the energy savings potential remaining in the EDCs' service territories. This data was used to assist the Commission to determine EE&C consumption reduction targets for Phase IV. The SWE submitted the final EEPDR potential study to the Commission on Feb. 28, 2020.[55]

In addition, the Commission tasked the SWE to conduct a Dispatchable Demand Response (DDR) potential study to determine if cost-effective dispatchable demand response potential remains in the

[49] *See, Alternative Energy Portfolio Standards Act: Compliance for Reporting Year 2021-2022*, available here: https://pennaeps.com/wp-content/uploads/2023/03/aeps-2022-report-final-032223-_dm.pdf.
[50] http://www.puc.pa.gov/consumer_info/electricity/alternative_energy.aspx.
[51] Act 129 of 2008, effective Nov. 14, 2008; 66 Pa. C.S. §§2806.1-2806.2.
[52] The seven EDCs with Act 129 Energy Efficiency and Conservation obligations are Duquesne Light Company, Metropolitan Edison Company, PECO Energy Company, Pennsylvania Electric Company, Pennsylvania Power Company, PPL Electric Utilities Corporation, and West Penn Power Company.
[53] *See*, 66 Pa.C.S. § 2806.1.
[54] The 2018 Pennsylvania Residential and Non-Residential Baseline Studies are available at: https://www.puc.pa.gov/filing-resources/issues-laws-regulations/act-129/act-129-statewide-evaluator-swe/
[55] *See, Pennsylvania Act 129 Phase IV Energy Efficiency and Peak Demand Reduction Market Potential Study Report*, filed by NMR Group, Inc. on Feb. 28, 2020, at Docket No. M-2020-3015229.

EDCs service territories for a potential Phase IV. The SWE submitted the final DDR potential study to the Commission on Feb. 28, 2020.[56]

The EEPDR and DDR Potential Studies were released publicly via a Commission Secretarial Letter served March 2, 2020.[57] Following a review of the SWE's EEPDR and DDR Potential Studies, the Commission determined that additional consumption and peak demand reduction targets were cost-effective.

On June 18, 2020, the Commission adopted the Final Implementation Order prescribing targets for Phase IV of the Act 129 EE&C Program.[58] The Commission found that peak demand reductions from EE measures were more cost-effective and longer lasting than DDR programming, persisting for years after Phase IV has ended. In addition, peak demand reductions from EE measures are available every day rather than just a small number of DR event days and can be recognized in PJM's Forward Capacity Market.[59] For these reasons, Phase IV includes Peak Demand Reduction targets but does not include a DDR target.

Phase IV began on June 1, 2021, and will end on May 31, 2026. The EDCs' Phase IV electric consumption and peak demand reduction requirements and compliance for Program Year 13 (PY13) and the first six months of Program Year 14 (PY14) are provided in Table 1 below.

Table 1: Phase IV Electric Consumption and Peak Demand Reduction Targets

EDC	Phase IV Electric Consumption Reduction Targets (MWh)	Phase IV Electric Consumption Reduction Compliance to Date (MWh)	Phase IV Peak Demand Reduction Targets (MW)	Phase IV Peak Demand Reduction Compliance to Date (MW)
Duquesne	348,126	123,008	62	17.28
Met-Ed	463,215	224,152	76	13.18
PECO	1,380,837	478,807	256	70.26
Penelec	437,676	195,073	80	13.49
Penn Power	128,909	92,893	20	4.56
PPL	1,250,157	573,854	229	44.37
West Penn	504,951	245,920	86	12.86

PY13: Jun. 1, 2021 – May 31, 2022
PY14: Jun. 1, 2022 – May 31, 2023

[56] *See*, Pennsylvania Act 129 Phase IV Demand Response Potential Study, filed by NMR Group, Inc. on Feb. 28, 2020, at Docket No. M-2020-3015229.
[57] *See*, Secretarial Letter, at Docket No. M-2020-3015229, served Mar. 2, 2020.
[58] *See*, *Energy Efficiency and Conservation Program Implementation Order*, at Docket No. M-2020-3015228, entered June 18, 2020, at 7-8.
[59] *Id.* at 62.

For Phase IV, the Commission concluded that it was unnecessary to continue requiring preliminary annual reports. Therefore, to streamline the reporting process, only semiannual and final annual reports are required. In addition, in the interest of providing the final annual reports to the public in a much timelier fashion, the Commission required the EDCs to submit the final annual reports by Sept. 30 of each year and semiannual reports by Jan. 15 of each year.[60]

The EDCs filed their semiannual reports for the second year of Phase IV, PY14, in Jan. 2023.[61] Final annual reports for PY14 are due to the Commission by Sept. 30, 2023.

In its planning for a potential Phase V, the Commission directed the SWE to perform electric consumption baseline studies to establish baseline energy use and building characteristics for the residential, commercial, and industrial sectors.

Phase V, if implemented by the Commission, would begin June 1, 2026, and end May 31, 2031.

Statewide Review of Electrical Energy Usage

As shown on Tables 2 and 3 on the next page, Pennsylvania's Total electrical consumption energy usage (residential, commercial, industrial, sales for resale, and other) in 2022 was 143,551 GWh, as compared to: 142,827 GWh in 2021; 139,185 GWh in 2020; and 145,090 GWh in 2019. The year-over-year (YOY) increase for electrical usage in 2022 was 0.48%. In general, residential, commercial, and industrial usage changed YOY by 0.17%, -0.46% and 1.36%, respectively. Pennsylvania's 2022 GDP saw a smaller YOY increase of 1.9%, as compared to 2021 when the GDP experienced a YOY increase of 8.75%.[62]
In 2022, the total number of electrical customers increased to 5,933,749 from 5,918,122 in 2021, which is a YOY increase of 0.26%.

Table 2: PA EDC customers served, energy usage, and peak load (2022)

Company	Total Customers Served	Residential (MWh)	Commercial (MWh)	Industrial (MWh)	Other (MWh)	Sales For Resale (MWh)	Total Consumption (MWh)	System Losses (MWh)	Company Use (MWh)	Net Energy For Load (MWh)	Peak Load (MW)
Duquesne	609,522	4,159,817	5,719,062	2,572,183	53,916	22,085	12,527,063	798,339	19,090	13,344,492	2,715
Met-Ed	586,829	5,917,905	2,067,917	6,397,086	26,418	539,943	14,949,269	940,223	0	15,889,492	3,021
Penelec	588,463	4,411,526	2,377,426	6,485,075	33,265	2,783,902	16,091,194	1,221,285	0	17,312,479	2,793
Penn Power	170,695	1,683,471	690,058	2,213,044	3,216	162,228	4,752,017	207,039	0	4,959,056	944
PPL	1,469,426	14,680,299	13,696,114	8,275,732	76,916	0	36,729,061	2,648,110	50,238.00	39,427,409	7,065
PECO	1,690,627	14,379,155	7,701,403	14,045,694	642,303	4,892	36,773,447	1,853,517	20,631	38,647,595	8,583
West Penn	736,603	7,280,755	2,719,370	9,554,137	21,664	766,615	20,342,541	1,277,856	0	21,620,397	3,827
UGI	62,733	577,130	311,771	107,110	5,049	140	1,001,200	75,738	1,527	1,078,465	207
Citizens'	7,116	89,686	28,351	45,554	320	0	163,911	10,582	131	174,624	45
Pike County	5,302	33,783	45,505	0	430	0	79,718	0	28	79,746	19
Wellsboro	6,433	44,077	32,116	25,328	71	74	101,666	7,117	217	109,000	22
Total	**5,933,749**	**53,257,604**	**35,389,093**	**49,720,943**	**863,568**	**4,279,879**	**143,511,087**	**9,039,806**	**91,862**	**152,642,755**	**29,241**
% of Total		37.11%	24.66%	34.65%	0.60%	2.98%	100%				

[60] *Id.* at 102-103.
[61] *See* the EDCs semiannual reports for PY14 at: http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_information/electric_distribution_company_act_129_reporting_requirements.aspx
[62] US Bureau of Economic Analysis: https://www.bea.gov/.

Table 3: PA EDC customers served, energy usage, and peak load (2021)

Company	Total Customers Served	Residential (MWh)	Commercial (MWh)	Industrial (MWh)	Other (MWh)	Sales For Resale (MWh)	Total Consumption (MWh)	System Losses (MWh)	Company Use (MWh)	Net Energy For Load (MWh)	Peak Load (MW)
Duquesne	607,349	4,214,577	5,778,492	2,509,208	55,025	23,975	12,581,277	556,932	18,308	13,156,517	2,760
Met-Ed	583,251	5,832,422	2,151,245	6,201,037	26,511	536,842	14,748,057	1,006,954	0	15,755,011	3,072
Penelec	588,548	4,362,887	2,389,755	6,426,713	33,179	2,759,650	15,972,184	1,254,866	0	17,227,050	2,898
Penn Power	169,954	1,662,849	705,941	2,062,762	3,263	164,714	4,599,529	254,890	0	4,854,419	971
PPL	1,466,277	14,879,215	13,807,121	8,339,688	77,690	0	37,103,714	2,675,386	54,430.00	39,833,530	7,314
PECO	1,686,527	14,262,461	7,597,167	14,002,669	565,755	3,372	36,431,424	1,973,908	30,212	38,435,544	8,479
West Penn	734,971	7,206,217	2,714,385	9,333,865	22,081	773,022	20,049,570	1,305,049	0	21,354,619	3,940
UGI	62,714	581,522	305,921	102,408	5,568	189	995,608	67,825	1,381	1,064,814	216
Citizens'	7,085	87,772	28,193	50,227	364	0	166,556	6,532	128	173,216	43
Pike County	5,047	32,899	42,041	0	430	0	75,370	0	0	75,370	16
Wellsboro	6,399	44,815	31,276	27,616	66	90	103,863	7,385	211	111,459	21
Total	**5,918,122**	**53,167,636**	**35,551,537**	**49,056,193**	**789,932**	**4,261,854**	**142,827,152**	**9,109,727**	**104,670**	**152,041,549**	**29,730**
PA ELECTRIC USE by % of T		37.23%	24.89%	34.35%	0.55%	2.98%	100%				

As shown on Table 4, below, the total average annual aggregate five-year energy usage growth projection for the residential, commercial, and industrial classes is projected to increase by 0.31% per year. This includes a 0.11% growth rate for residential, a commercial growth rate increase of 0.41%, and an industrial growth rate increase of 0.49% for the entire five-year projected period.

Table 4: Average Aggregate Five-year Electrical Energy Projection

PA Energy Usage Projection (GWh)				
Year	Residential	Commercial	Industrial	Total
2023	52,727	36,231	49,626	138,584
2024	52,860	36,180	50,227	139,267
2025	52,910	36,097	50,367	139,373
2026	52,988	36,014	50,543	139,545
2027	53,375	35,992	50,879	140,246
Average annual growth (%)	0.11%	0.41%	0.49%	0.31%

Figure 8 below represents, in Gigawatt-hours, the Pennsylvania historic usage for residential, commercial, and industrial retail from 1972 through 2022, and forecasted Gigawatt-hours usage from 2023 through 2027.

Figure 8: Pennsylvania Retail Energy Usage and Five-year Forecast (GWh)

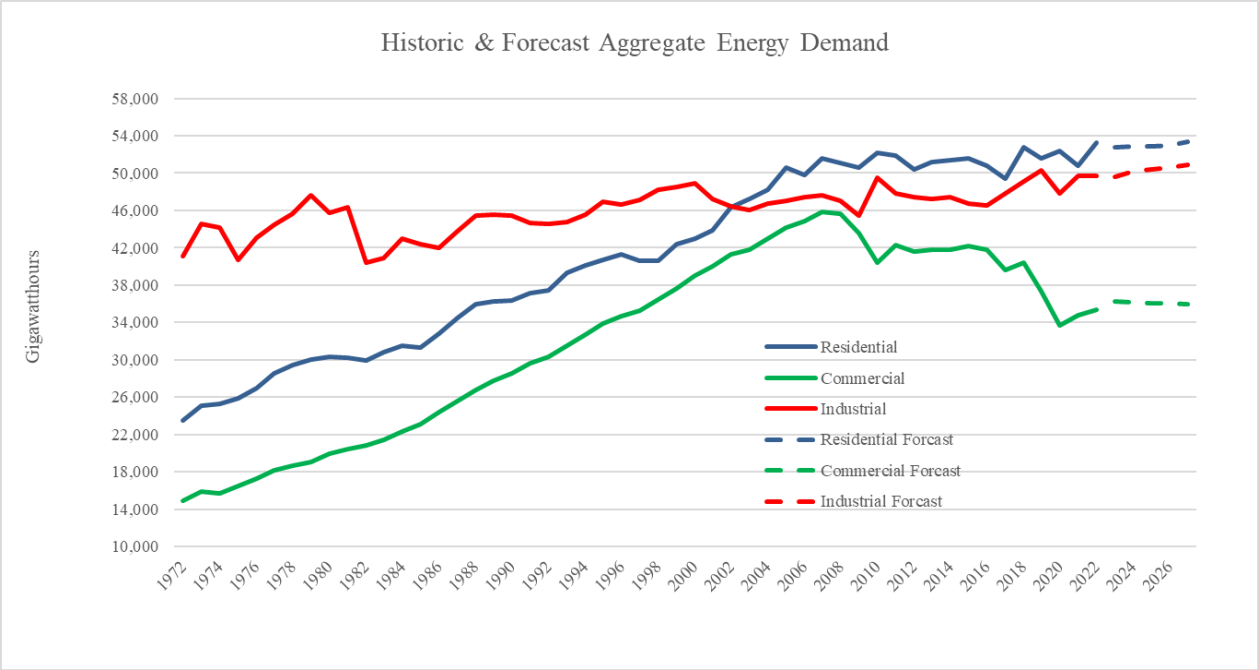


Figure 9 on the next page shows average residential usage and nominal cost from 1940 to 2022. Between 1970 and 2010, average residential yearly usage in Pennsylvania increased 1.4% each year, while average yearly cost increased 4.1% each year during this period.

During the last 10 years, average residential yearly usage decreased -0.03% each year, while average yearly cost increased 5.63% a year. Note that these are not weighted averages (accounting for customer counts of each utility) and are only for the large EDCs.

In 2022, the average Pennsylvania residential customer used 10.21 MWh as compared to: 10.40 MWh in 2021; 10.13 MWh in 2020, and 10.45 MWh in 2019. In 2022, the average customer paid 13.37 cents per kWh which increased from 11.75 cents per kWh in 2021, which increased from 11.43 cents per kWh in 2020 and 2019.

Figure 9: Average Residential Nominal Cost (cents/kWh) and Usage (MWh/year)

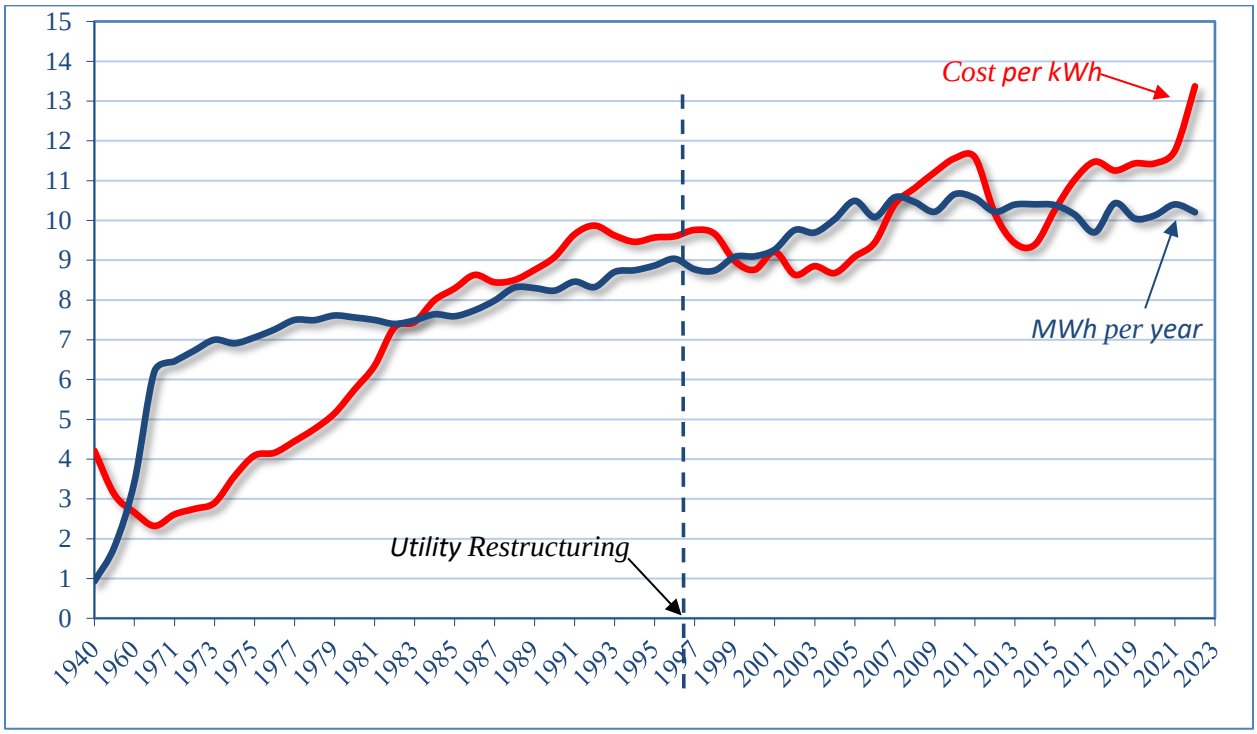


Figure 10 below shows Pennsylvania's aggregate non-coincidental peak load demand from 2013 through 2023 and the associated five-year projections estimated during the last three years.

Figure 10: Pennsylvania Aggregate Non-Coincidental Peak Load (MW)

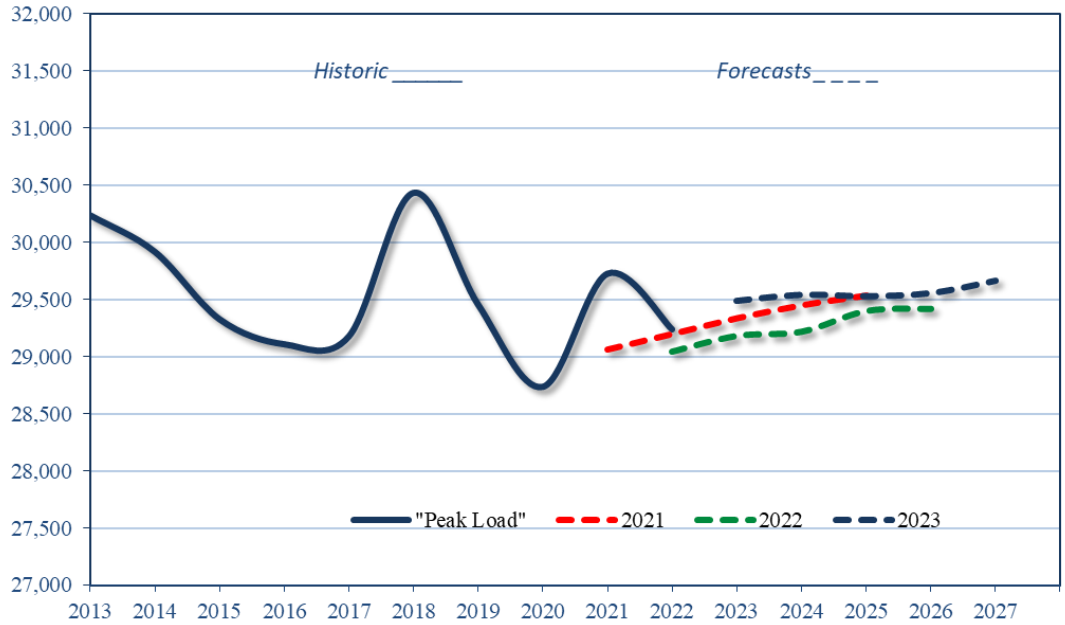
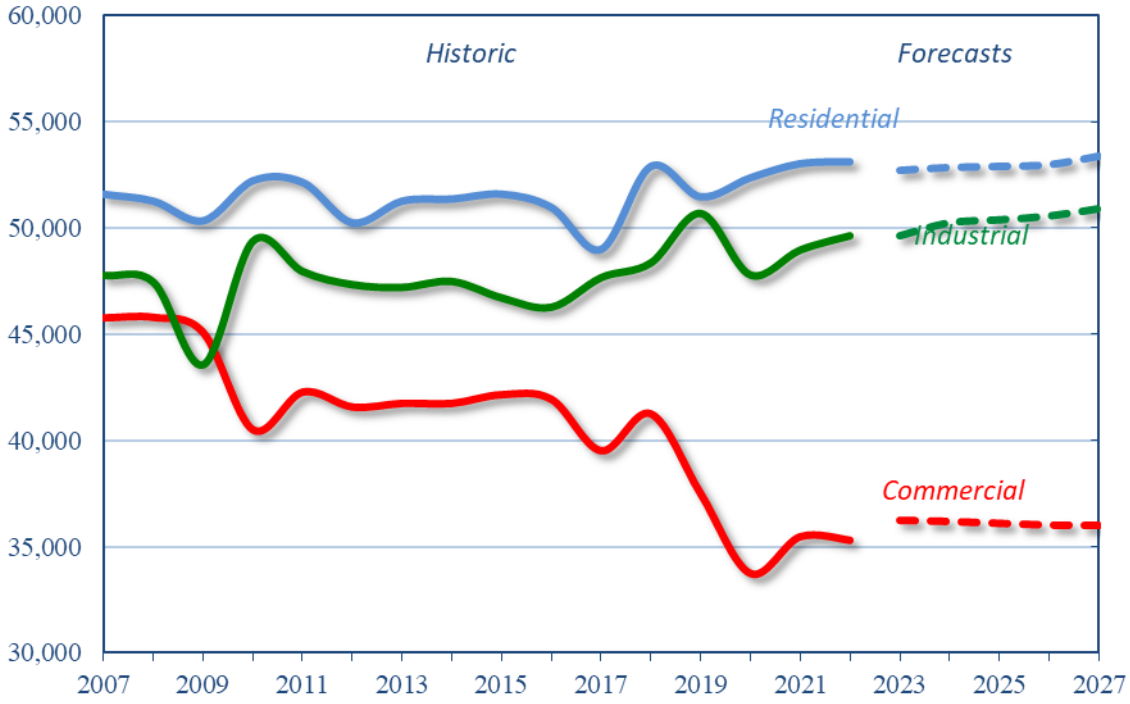


Figure 11 shows Pennsylvania's aggregate energy demand from 2007 through 2023 and the associated five-year projections.

Figure 11: Pennsylvania Aggregate Energy Demand (GWh)

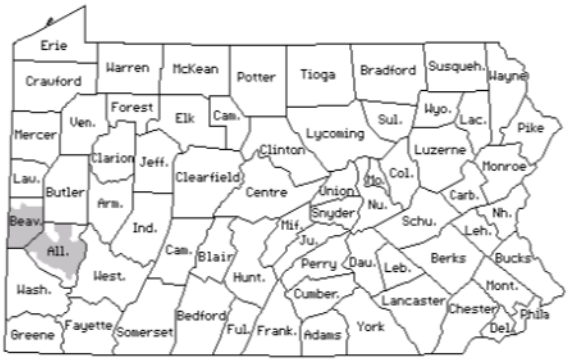


Summary of Data for the Seven Largest EDCs

Individual EDC forecasts are more specific to customers and geographical areas. Each EDC bases its forecasts on financial forecasts of its choosing. The EDCs' forecasts are more specific for each territory than the PJM forecast, which is a broader forecast that includes all Pennsylvania EDC territories.

The following section provides historic and projected energy usage and peak load demand statistics for Pennsylvania's seven largest EDCs.

Duquesne Light Company (Duquesne)



Duquesne provides electric service to about 609,522 customers in the City of Pittsburgh and portions of Allegheny and Beaver counties in Southwestern Pennsylvania. Duquesne's 2022 energy usage total was 12,527 GWh, as compared to: 12,581 GWh in 2021; 12,159 GWh in 2020; 12,654 GWh in 2019; and 13,178 GWh in 2018. Year-over-year (YOY) energy usage decreased -0.4%. Duquesne's total usage mix consisted of residential (33.2%), commercial (45.7%), industrial (20.5 %), other (0.4%) and sales for resale (0.2%).

Over the next five years, total energy usage is projected to decrease at an average annual rate of -0.08%. This includes a residential usage average annual decrease of -0.28%, commercial usage increase of 0.30%, and an industrial usage decrease by -0.63%, as shown in Figure 12 below.

Duquesne's highest summer peak load in 2022 was 2,715 MW, which represents a YOY decrease of -1.63% from the previous year's peak load of 2,760 MW. The five-year peak load forecast is projected to decrease by an average -0.07% per year as shown in Figure 13 below.

Refer to Appendix A, Tables A01-A04 for Duquesne's forecasts of peak load and residential, commercial, and industrial energy demand, filed with the Commission in the years 2013 through 2022.

Figure 12: Duquesne energy usage (GWh)

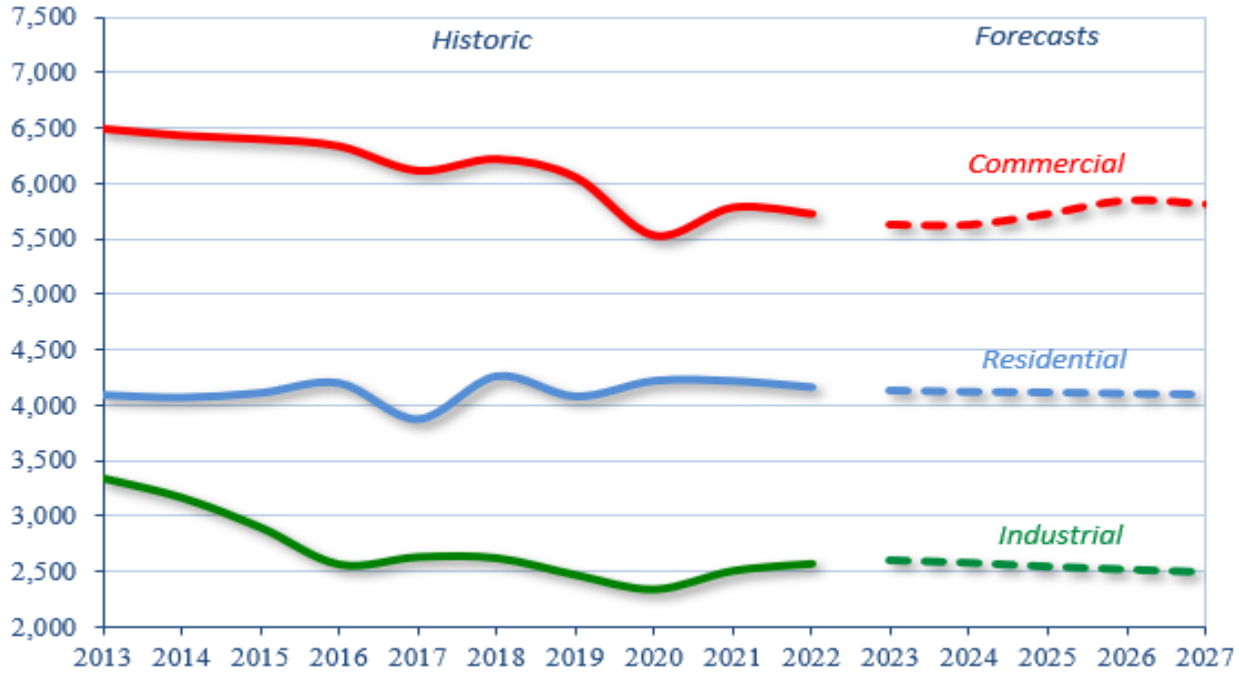
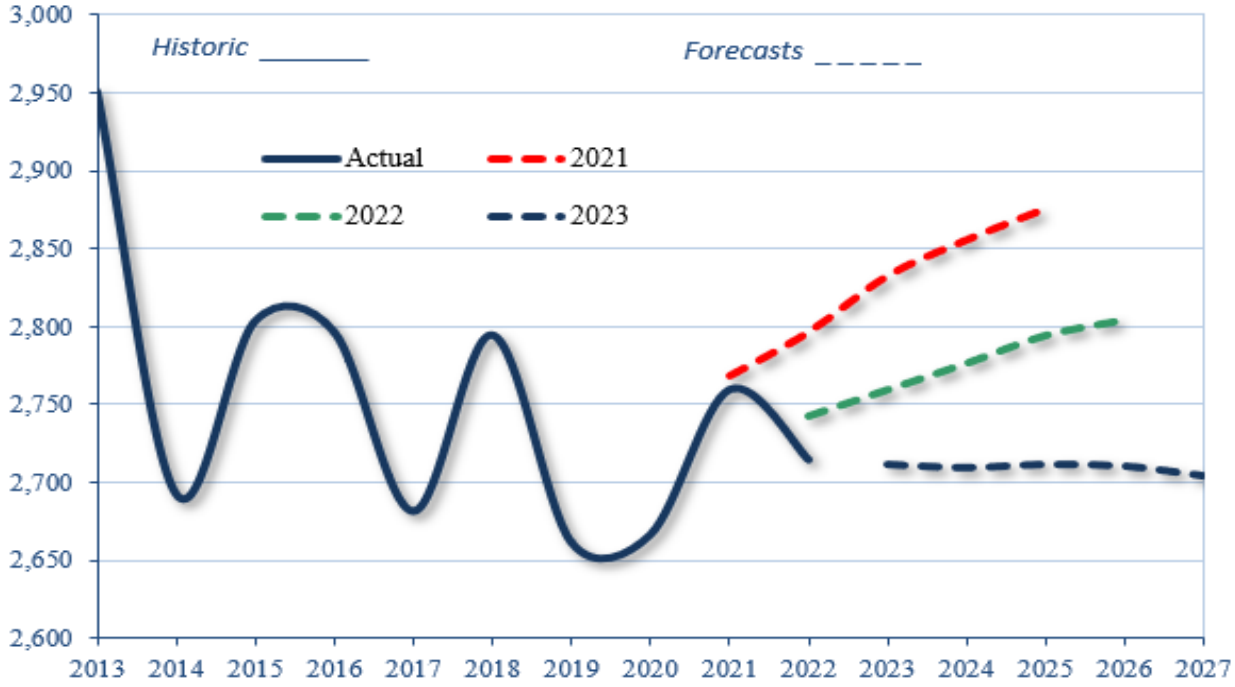
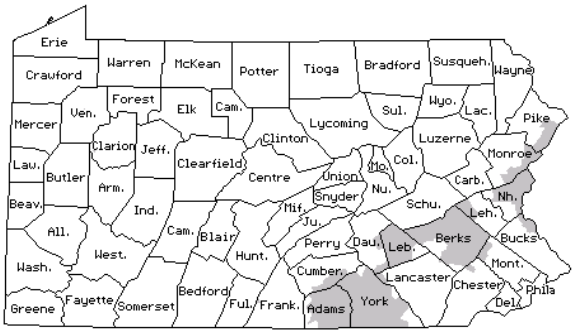


Figure 13: Duquesne peak load (MW)



Metropolitan Edison Company (Met-Ed)

Met-Ed provides electric service to about 586,829 customers in all or portions of 14 counties in Eastern and Southcentral Pennsylvania. Met-Ed's 2022 energy usage total was 14,949 GWh, as compared to: 14,748 GWh in 2021; 14,291 GWh in 2020; 14,787 GWh in 2019: and 14,974 GWh in 2018. Year-over-year (YOY) energy usage increased 1.36%. Met-Ed's total usage mix consisted of residential (39.6%), commercial (13.8%), industrial (42.8 %) and sales for resale (3.6%).



Over the next five years, total energy usage is projected to increase at an average annual rate of 0.32%. This includes a residential usage average annual increase of 0.18%, commercial usage remaining flat, and industrial usage increase by 0.56% as shown in Figure 14 below.

Met-Ed's highest summer peak load in 2022 was 3,021 MW. This represents a YOY decrease of -1.66% from the previous year's peak of 3,072 MW. The five-year peak load forecast is projected to slightly increase by 0.56% each year as shown in Figure 15 below.

Refer to Appendix A, Tables A05-A08 for Met-Ed's forecasts of peak load and residential, commercial, and industrial energy demand, filed with the Commission in the years 2013 through 2022.

Figure 14: Met-Ed energy usage (GWh)

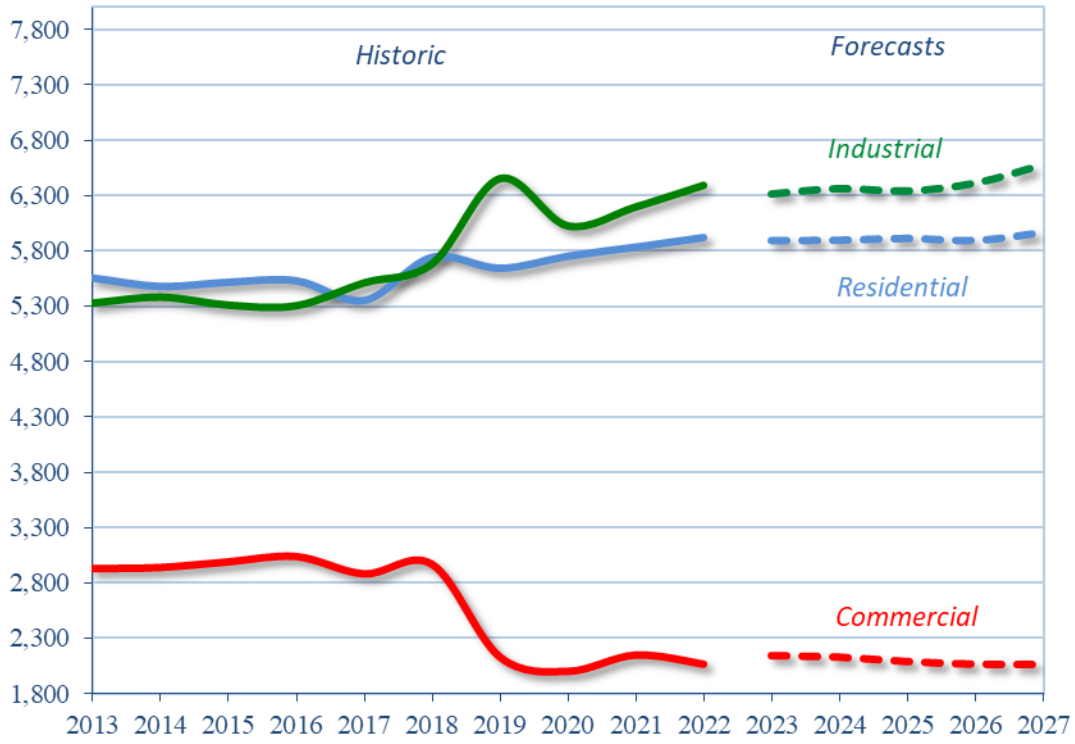
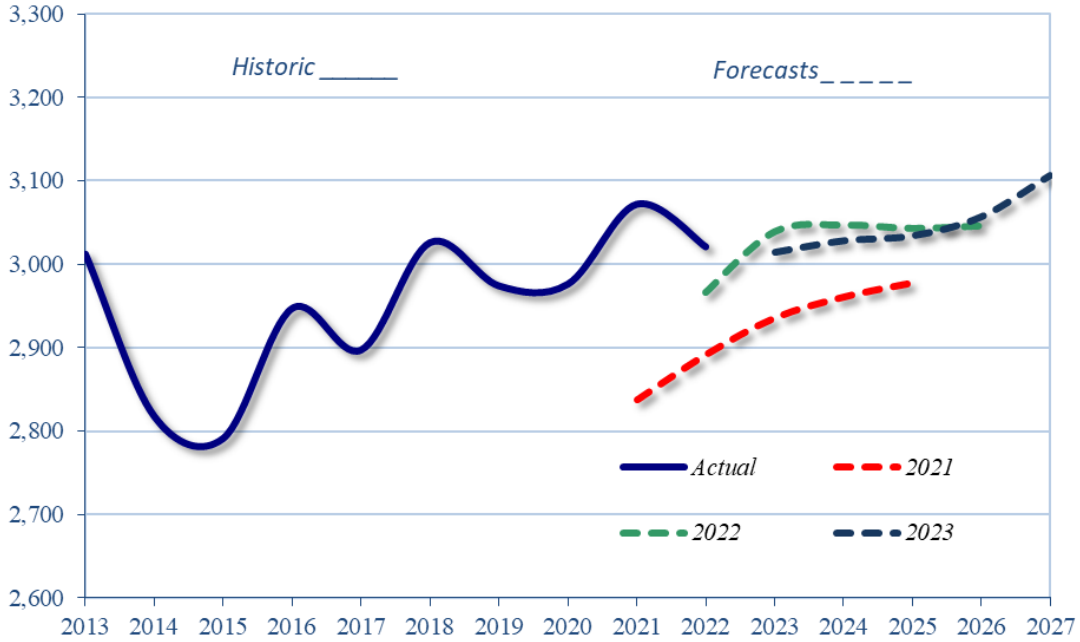
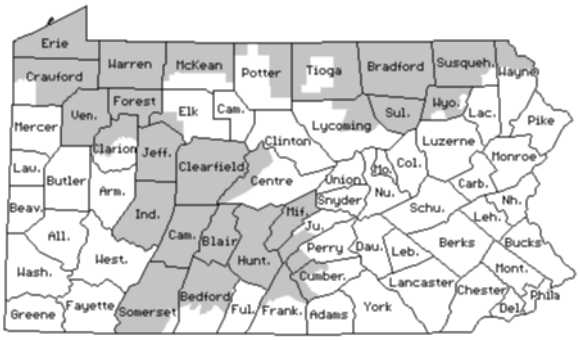


Figure 15: Met-Ed peak load (MW)



Pennsylvania Electric Company (Penelec)

Penelec provides electric service to about 588,463 customers in all or portions of 29 counties in Western and Northern Pennsylvania. Penelec's 2022 energy usage total was 16,091 GWh, as compared to: 15,972 GWh in 2021; 15,715 GWh in 2020; 16,182 GWh in 2019; and 16,600 GWh in 2018. Year-over-year (YOY) energy usage increased 0.75%. Penelec's total usage mix consisted of residential (27.4%), commercial (14.8%), industrial (40.3%), and sales for resale (17.3%).



Over the next five years, total energy usage is projected to decrease at an average annual rate of -0.35%. This includes a residential usage average annual decrease of -0.43%, commercial usage increase of 0.62%, and an industrial usage decrease by -0.63%, as shown in Figure 16 below.

Penelec's highest summer peak load in 2022 was 2,793 MW. This represents a YOY decrease of -3.62% from the previous year's peak of 2,898 MW. The five-year peak load forecast is projected to increase by an average of 0.08% per year as shown in Figure 17 below.

Refer to Appendix A, Tables A09-A12 for Penelec's forecasts of peak load and residential, commercial and industrial energy demand, filed with the Commission in the years 2013 through 2022.

Figure 16: Penelec energy usage (GWh)

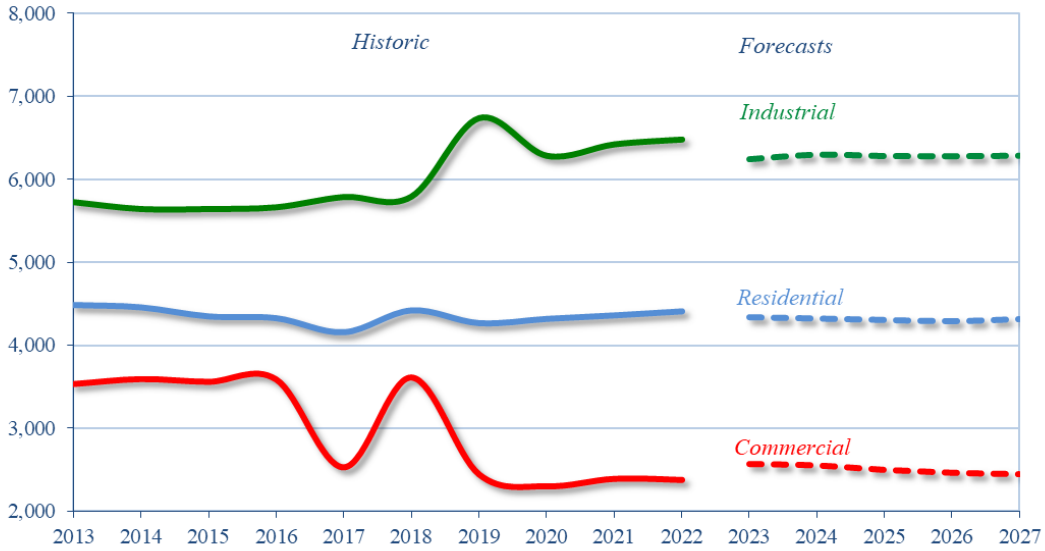
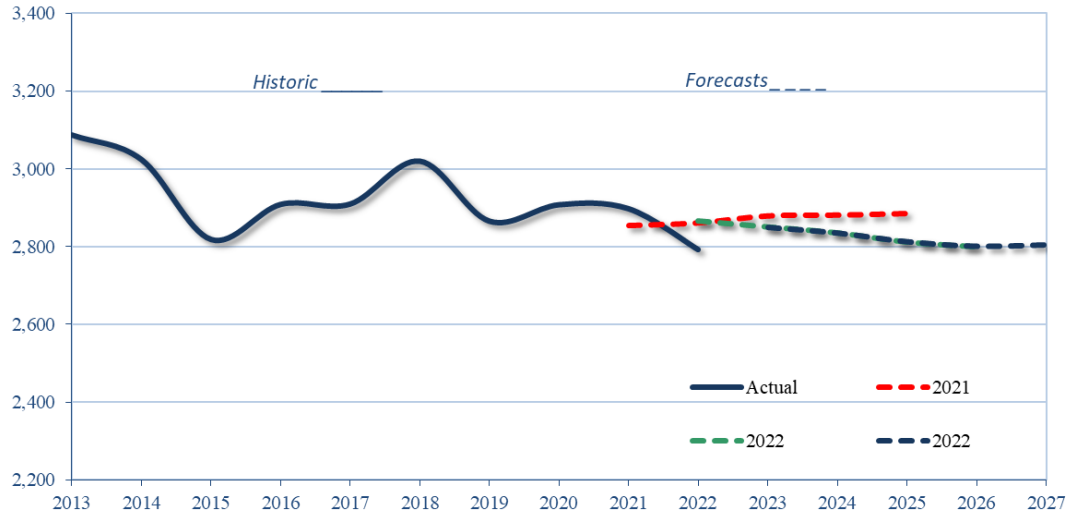
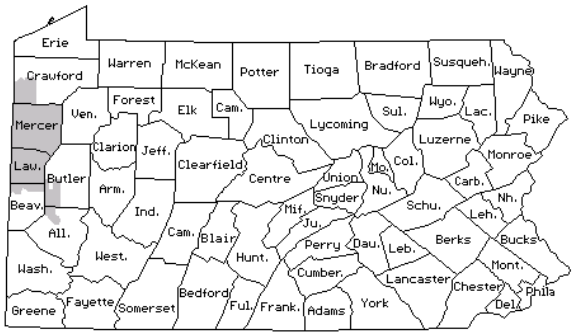


Figure 17: Penelec peak load (MW)



Pennsylvania Power Company (Penn Power)



Penn Power provides electric service to about 170,695 customers in all or portions of six counties in Western Pennsylvania. Penn Power's 2022 energy usage total was 4,752 GWh, as compared to: 4,600 GWh in 2021; 4,427 GWh in 2020; 4,833 GWh in 2019; and 5,074 GWh in 2018. Year-over-year (YOY) energy usage increased 3.32%. Penn Power's total usage mix consisted of residential (35.43%), commercial (14.52%), industrial (46.57%), and sales for resale (3.41%).

Over the next five years, total energy usage is projected to increase at an average annual rate of 0.53%. This includes residential usage increasing at an average annual rate of 0.61%, a commercial average annual usage decrease of -0.30%, and industrial usage increase by 0.72% as shown in Figure 18 below.

Penn Power's highest summer peak load in 2022 was 944 MW. This represents a YOY decrease of -2.78% from the previous year's peak of 971 MW. The five-year peak load forecast is projected to increase by an average of 0.46% per year as shown in Figure 19 below.

Refer to Appendix A, Tables A13-A16 for Penn Power's forecasts of peak load and residential, commercial, and industrial energy demand, filed with the Commission in years 2013 through 2022.

Figure 18: Penn Power energy usage (GWh)

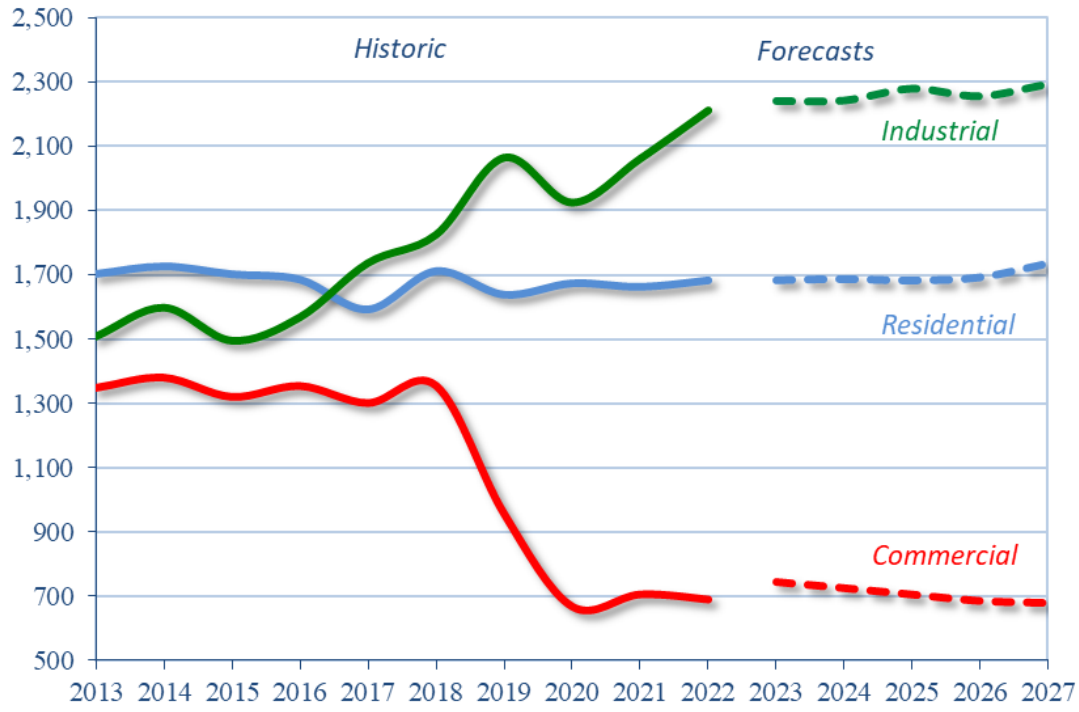
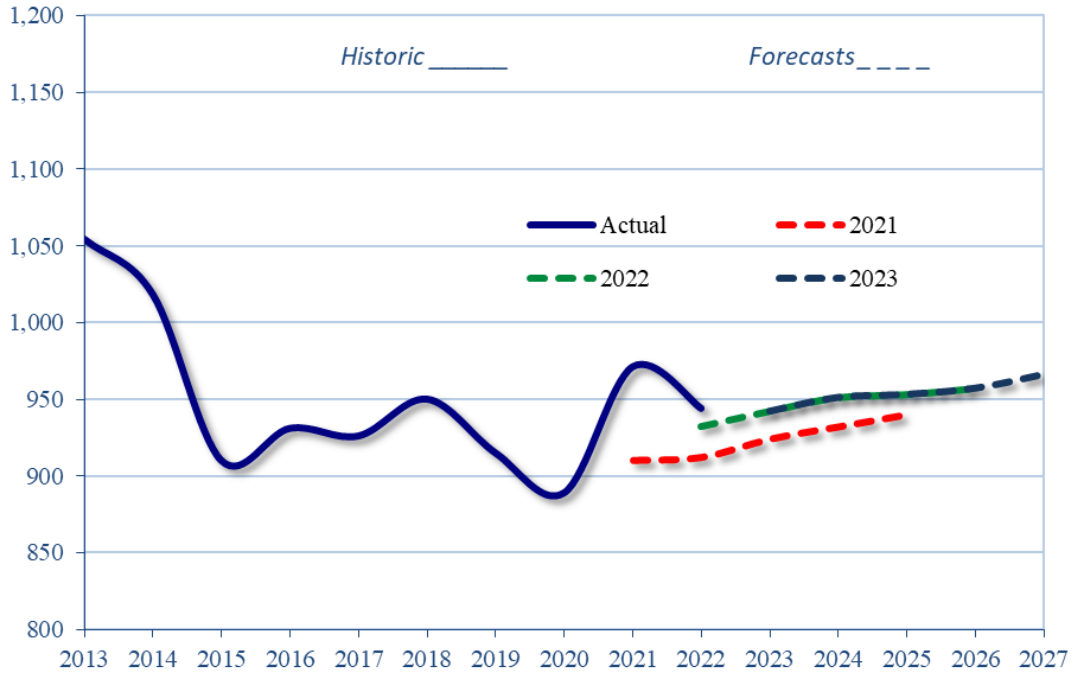
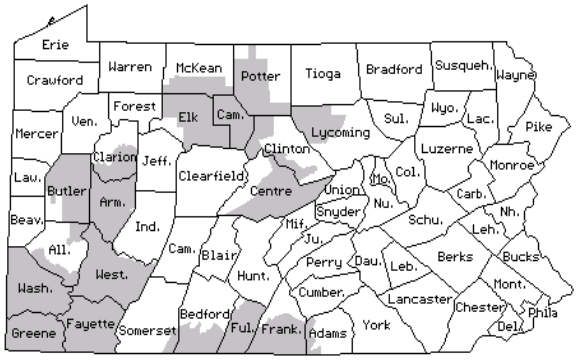


Figure 19: Penn Power peak load (MW)



West Penn Power Company (West Penn)



West Penn provides electric service to 736,603 customers in all or portions of 24 counties in Western, North and South-Central Pennsylvania. West Penn's 2022 energy usage total was 20,353 GWh, as compared to: 20,050 GWh in 2021; 19,598 in 2020; 20,809 in 2019; and 21,298 GWh in 2018. Year-over-year (YOY) energy usage increased by 1.46%. West Penn's total usage mix consisted of residential (35.79%), commercial (13.37%), industrial (46.97%), and sales for resale (3.77%).

Over the next five years, total energy usage is projected to increase at an average annual rate of 0.79%. This includes a residential usage average annual increase of 0.02%, commercial usage increase of 0.55%, and industrial usage increase by 1.43%. See Figure 20 below.

West Penn's highest peak load in 2022 was 3,827 MW. This represents a YOY decrease of -2.87% from the previous year's peak of 3,940 MW. The five-year peak load forecast is projected to increase by an average of 0.06% per year as shown in Figure 21 below.

Refer to Appendix A, Tables A25-A28 for West Penn's forecasts of peak load and residential, commercial, and industrial energy demand, filed with the Commission in the years 2013 through 2022.

Figure 20: West Penn energy usage (GWh)

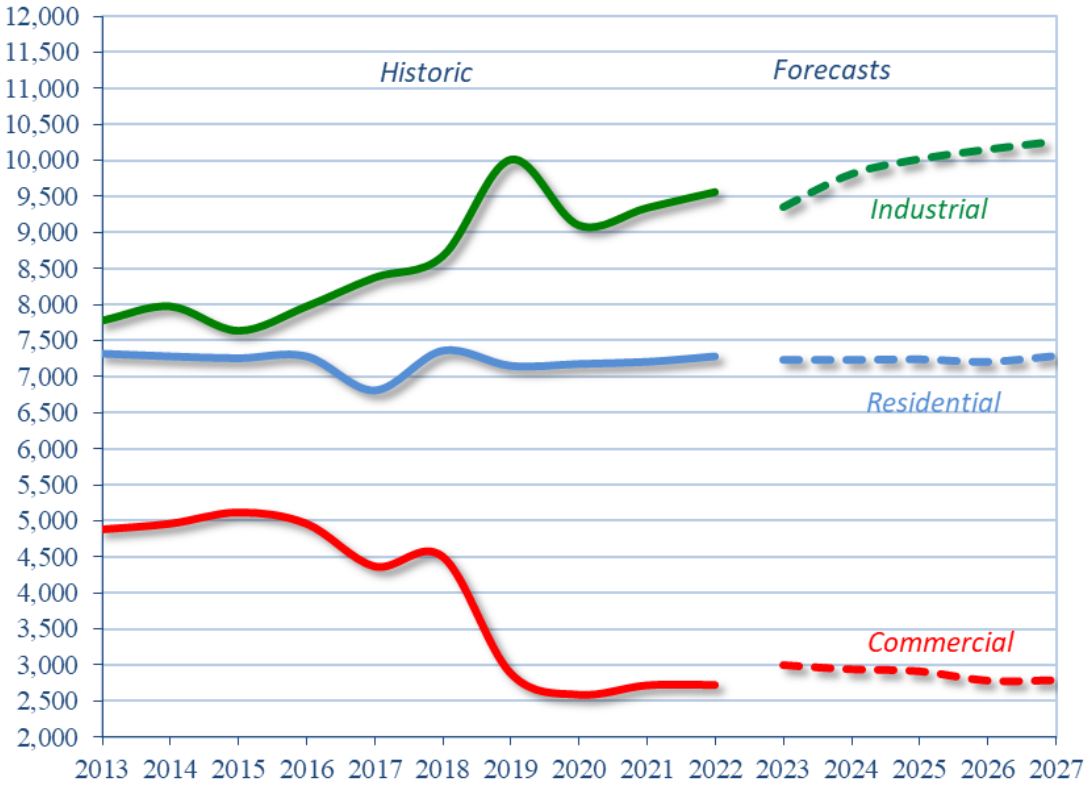
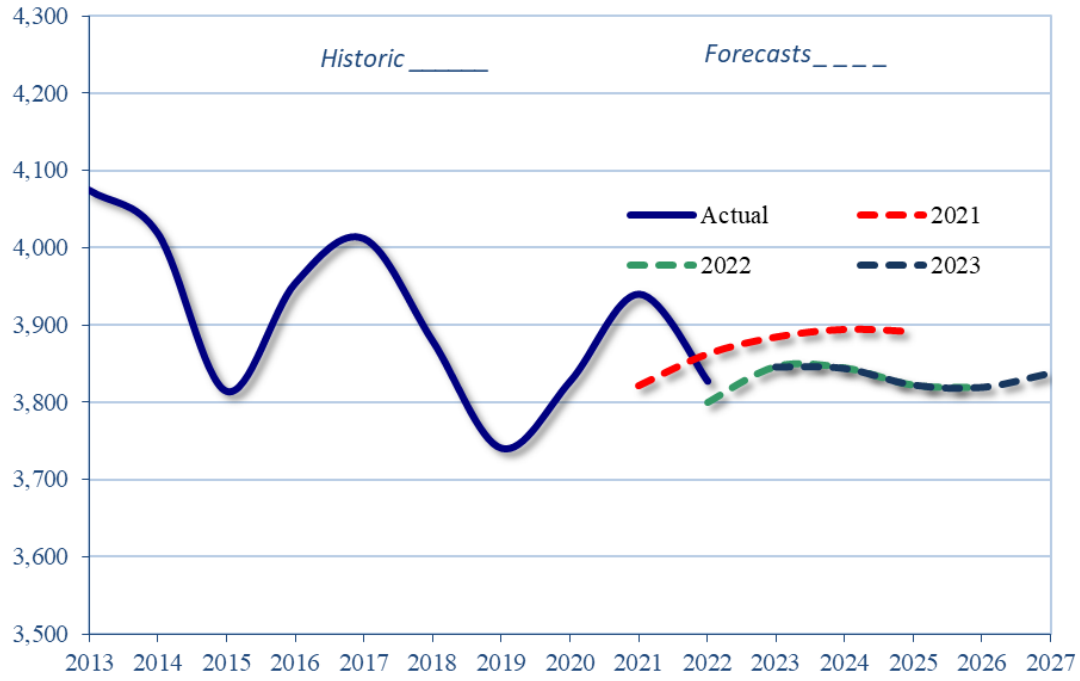
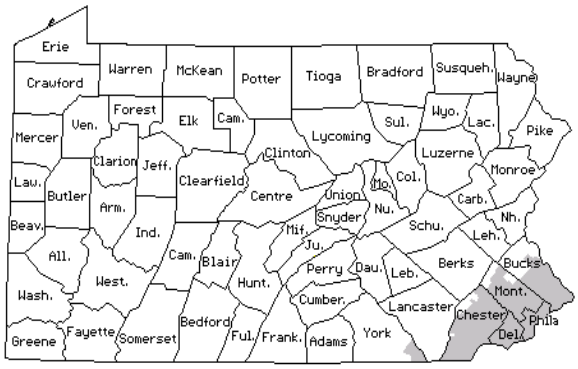


Figure 21: West Penn peak load (MW)



PECO Energy Company (PECO)



PECO is the largest electric utility in Pennsylvania, providing service to about 1,690,627 customers in the City of Philadelphia and all or portions of six counties in Southeastern Pennsylvania. PECO's 2022 energy usage total was 36,773, as compared to: 36,431 GWh in 2021: 35,507 GWh in 2020; 37,327 GWh in 2019; and 38,468 GWh in 2018. Year-over-year (YOY) energy usage increased 0.94%. PECO's total usage mix consisted of residential (39.10%), commercial (20.94%), industrial (38.20%), other (1.75%) and sales for resale (less than 1%).

Over the next five years, total energy usage is projected to increase at an average annual rate of 0.15%. This includes a residential usage average annual increase of 0.38%, commercial usage average annual decrease of -0.08% and an industrial usage increase of 0.12% as shown in Figure 22 below.

PECO's highest peak load in 2022 was 8,583 MW 2021. This represents a YOY increase of 1.23% from the previous year's peak of 8,479 MW. The five-year peak load forecast is projected to increase by an average of 0.10% per year as shown in Figure 23 below.

Refer to Appendix A, Tables A21-A24 for PECO's forecasts of peak load and residential, commercial, and industrial energy demand, filed with the Commission in years 2013 through 2022.

Figure 22: PECO Energy Company energy usage (GWh)

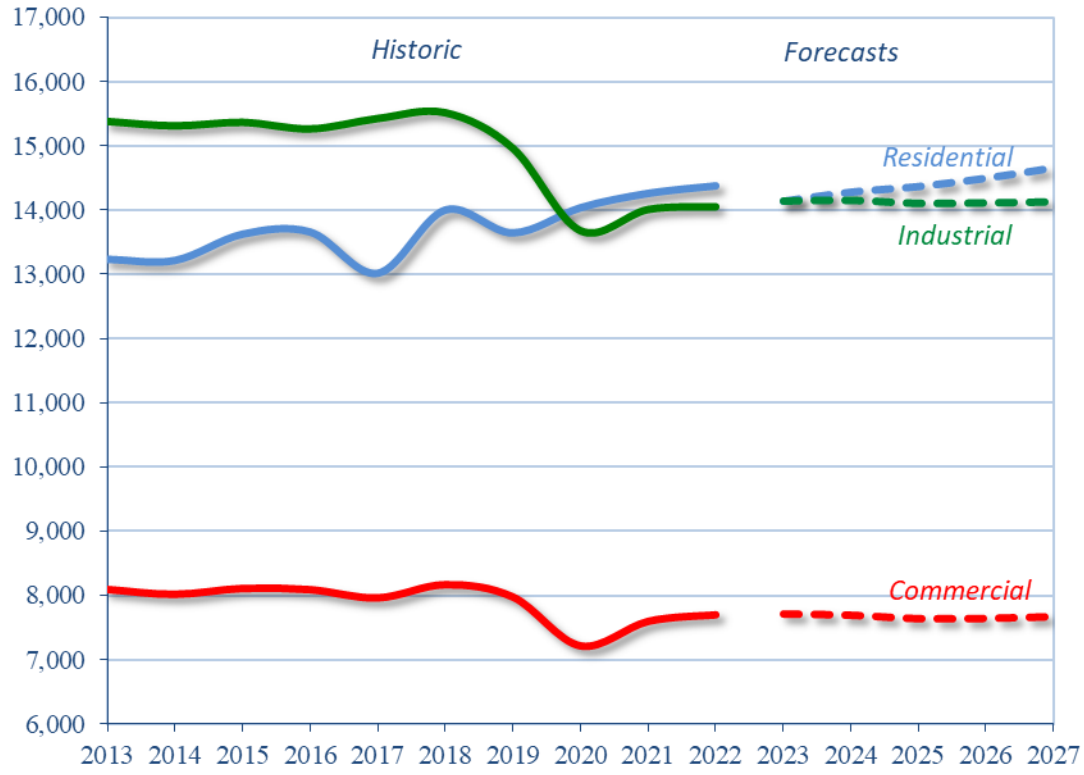
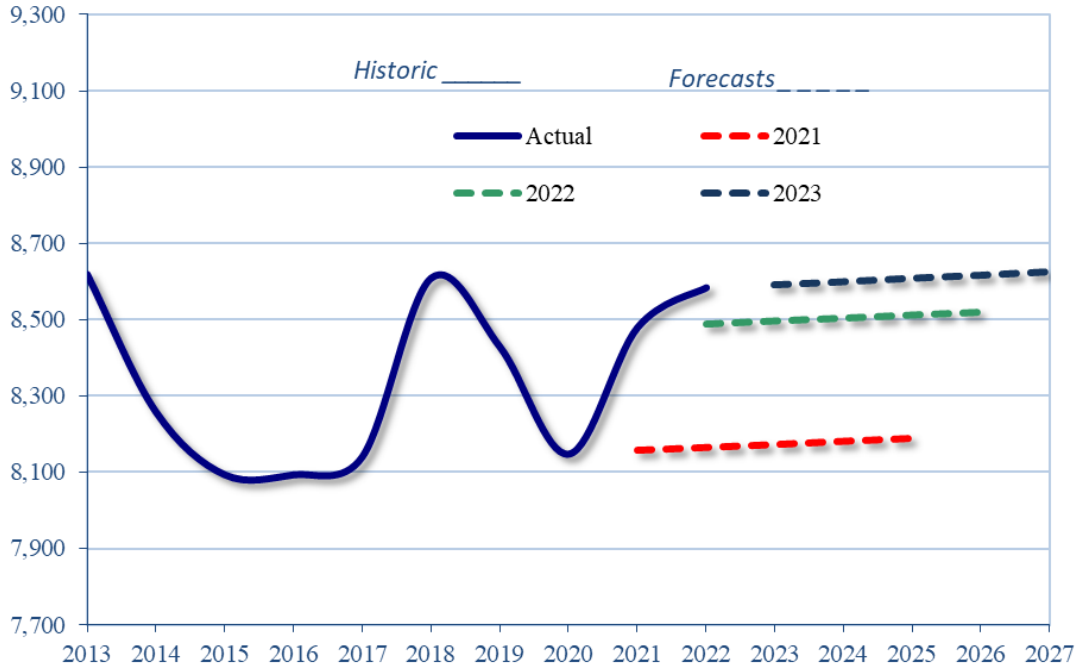
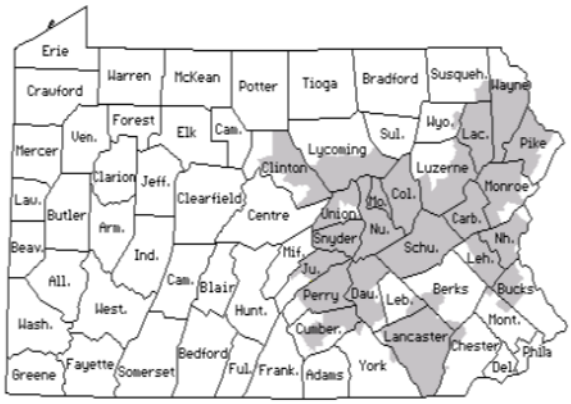


Figure 23: PECO Energy Company peak load (MW)



PPL Electric Utilities Corporation (PPL)



PPL provides service to about 1,469,426 customers over a 10,000-square-mile area in all or portions of 29 counties in Central Eastern Pennsylvania. PPL's 2022 energy total usage was 36,729 GWh as compared to: 37,104 in 2021; 36,171 GWh in 2020; 37,196 GWh in 2019; and 37,371 GWh in 2018. Year-over-year (YOY) energy usage decreased by -1.01%. PPL's total usage mix consisted of residential (39.97%), commercial (37.29%), industrial (22.53%), and other less than 1%.

Over the next five years, total energy usage is projected to increase at an average annual rate of 0.54%. This includes a residential usage average annual increase of 0.05%, commercial usage increase of 0.73%, and industrial usage increase of 1.06% as shown in Figure 24 below.

PPL's highest annual peak load was in summer peak at 7,065 MW. This represents a YOY decrease of -3.40% from the previous year's peak of 7,314 MW. The five-year peak load forecast is projected to increase by an average of 1.00% per year as shown in Figure 25 below.

Refer to Appendix A, Tables A17-A20 for PPL's forecasts of peak load and residential, commercial, and industrial energy demand, filed with the Commission in the years 2013 through 2022.

Figure 24: PPL Electric Utilities Corporation energy usage (GWh)

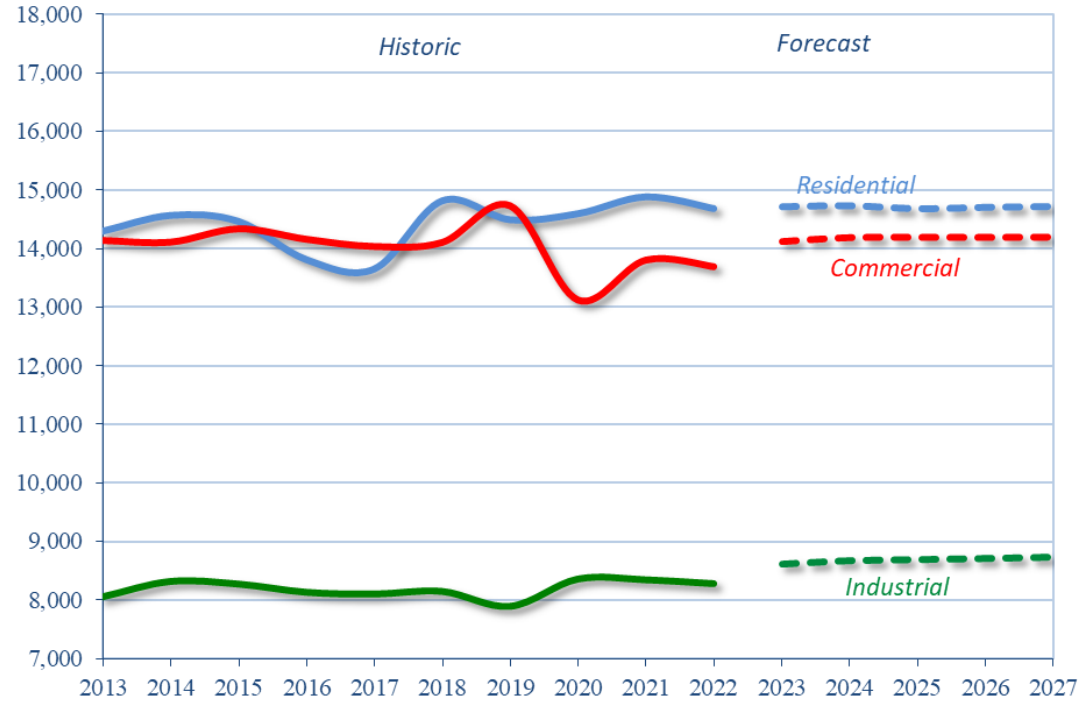
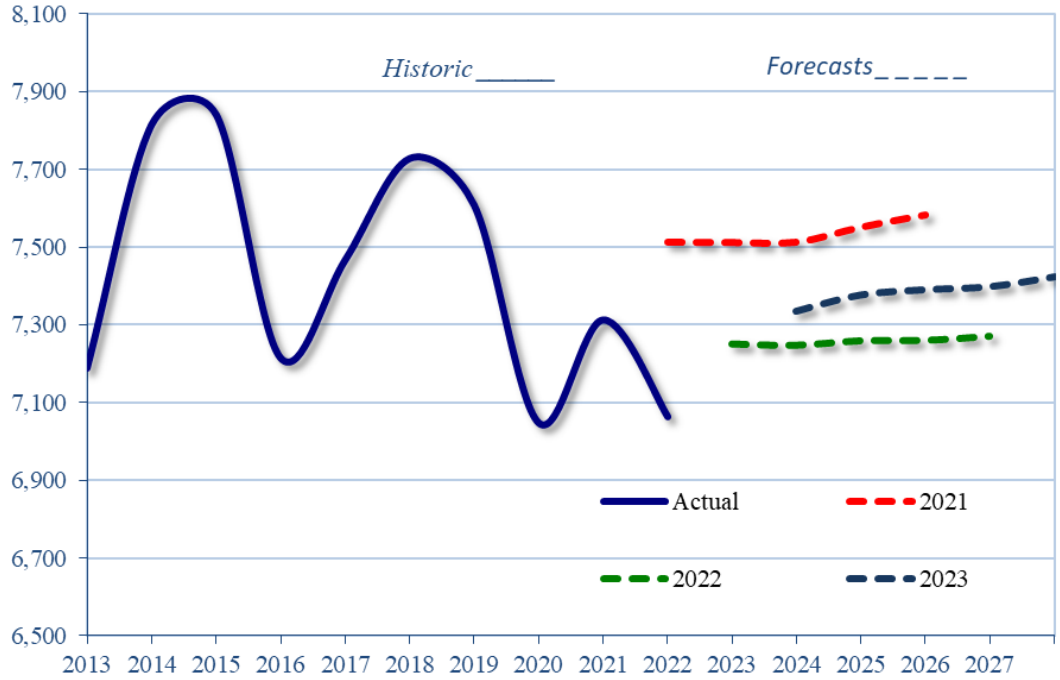
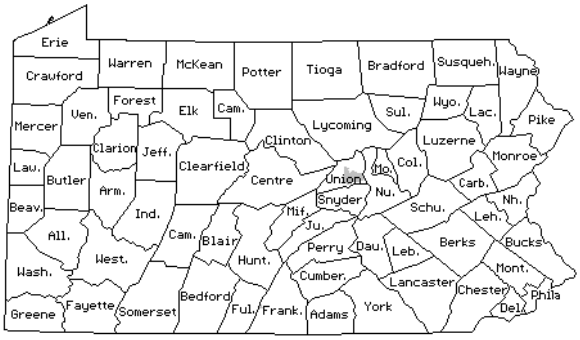


Figure 25: PPL Electric Utilities Corporation peak load (MW)



Summary of Data for the Four Smallest EDCs

Citizens' Electric Company (Citizens')

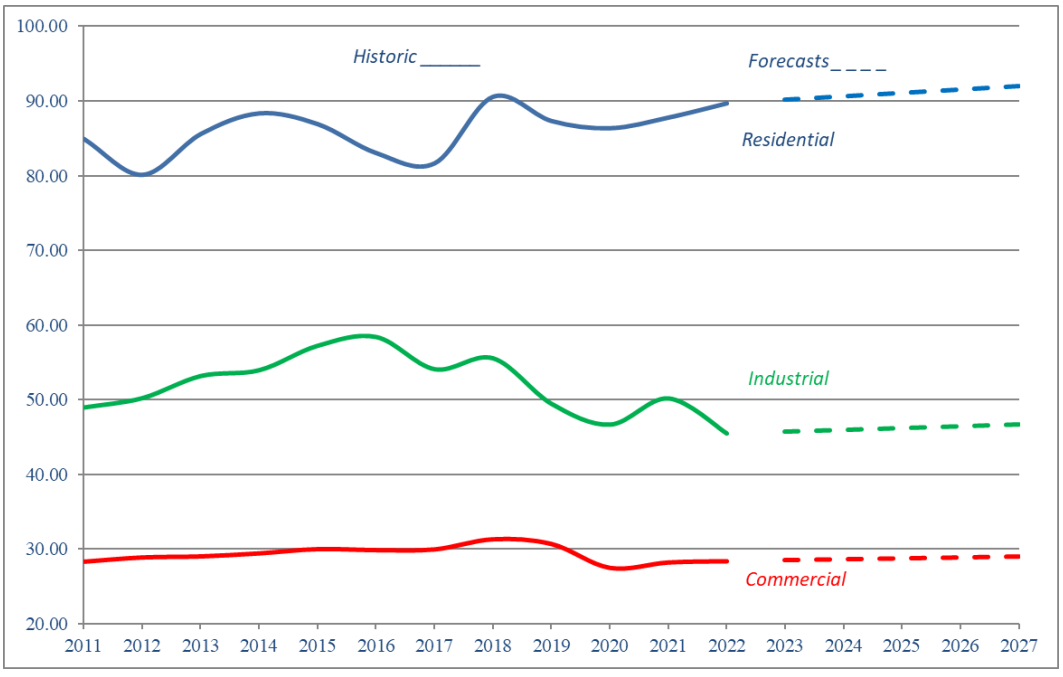


Citizens' provides service to about 7,116 customers in Union County, Pennsylvania. Citizens' 2022 energy usage total was 164 GWh, as compared to: 167 GWh in 2021; 161 GWh in 2020; 168 GWh in 2019; and 178 GWh in 2018. Year-over-year (YOY) energy usage decreased by -1.59%. Citizens' total usage mix consisted of residential (54.72%), commercial (17.30%), industrial (27.79%), and other (less than 1%).

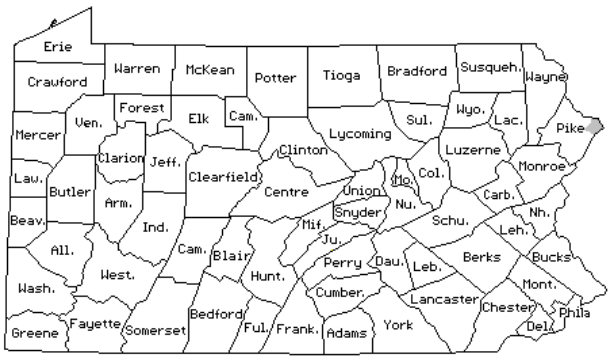
Over the next five years, total energy usage is projected to increase at an average annual rate of 0.50%. This includes a residential usage average annual increase of 0.50%, commercial usage increase of 0.50%, and industrial usage increase by 0.50% as shown in Figure 26 below.

Citizens' highest winter peak load in 2022 was 45.1 MW. This represents a YOY decrease of -1.31% from the previous year's peak of 45.7 MW. The five-year peak load forecast is projected to decrease by an average of -2.52% per year.

Figure 26: Citizens' energy usage (GWh)



Pike County Light & Power Company (Pike)

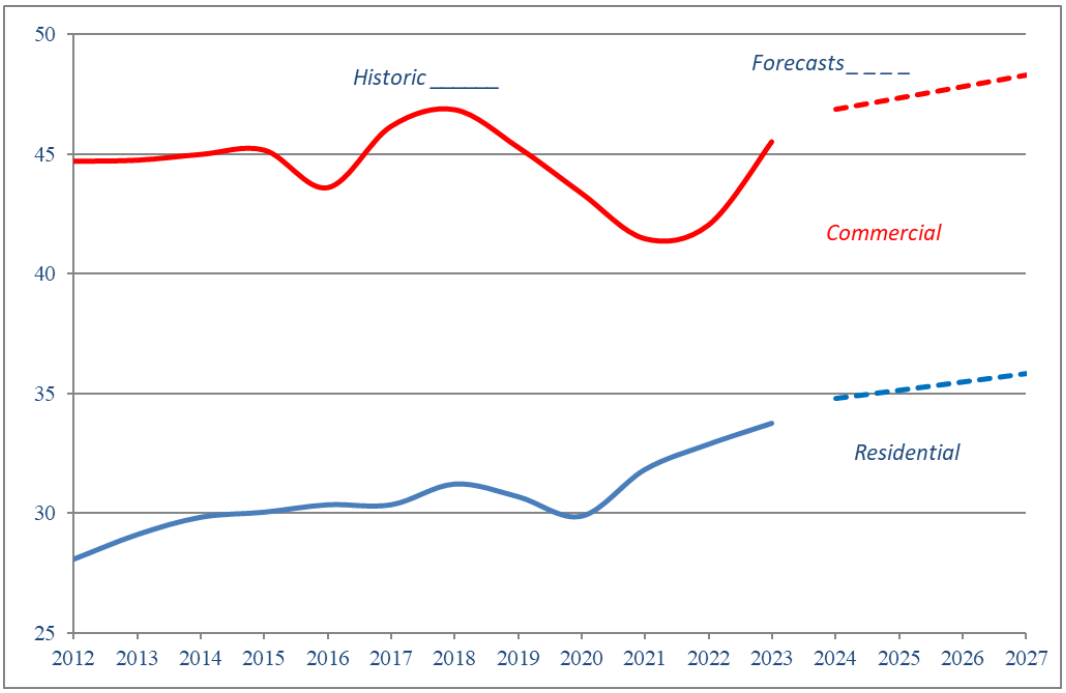


Pike provides service to about 5,302 customers in Eastern Pike County, Northeastern Pennsylvania. Pike's 2022 energy usage total was 79.7 GWh, as compared to 75.4 GWh in 2021; as compared to 73.7 GWh in 2020; 73.4 GWh in 2019; and 76.4 GWh in 2018. Year-over-year (YOY) energy usage increased by 5.77%. Pike's total usage mix consisted of residential (42.38%), commercial (57.08%), and other (0.5%). Pike has no industrial customers or sales for resale.

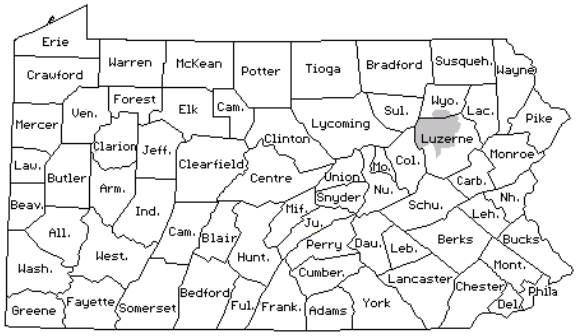
Over the next five years, total energy usage is projected to increase at an average annual rate of 1.39%. This includes a residential usage average annual increase of 1.40%, and a commercial usage increase of 1.40% as shown in Figure 27 below.

Pike's peak load in 2022 occurred in the winter at 18.7 MW. This represents a YOY increase of 14.0% from the previous year's peak of 16.4 MW. The five-year peak load forecast is projected to increase by an average of 1.62% per year.

Figure 27: Pike County Light & Power energy usage (GWh)



UGI Utilities Inc.—Electric Division (UGI)



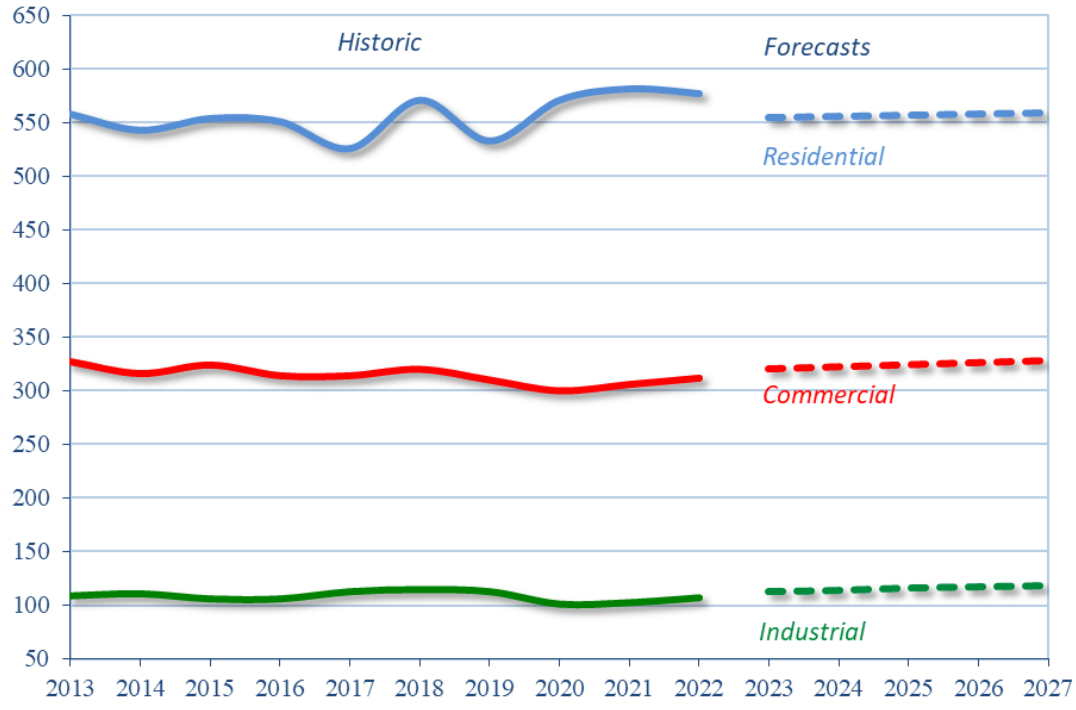
Erie, Warren, McKean, Potter, Tioga, Bradford, Susquehanna, Wayne, Crawford, Forest, Elk, Cameron, Wyoming, Sullivan, Lackawanna, Pike, Mercer, Venango, Clarion, Jefferson, Clinton, Luzerne, Monroe, Lawrence, Butler, Armstrong, Clearfield, Centre, Montour, Columbia, Carbon, Union, Snyder, Northumberland, Beaver, Indiana, Mifflin, Juniata, Schuylkill, Northampton, Allegheny, Cambria, Blair, Perry, Dauphin, Lehigh, Berks, Bucks, Washington, Westmoreland, Huntingdon, Cumberland, Lancaster, Chester, Montgomery, Philadelphia, Bedford, Fulton, Franklin, Adams, York, Delaware, Greene, Fayette, Somerset

UGI provides electric service to about 62,733 customers in Northwestern Luzerne and Southern Wyoming counties in Pennsylvania. UGI's 2022 energy usage total was 1,001 GWh, as compared to: 996 GWh in 2021; 977 GWh in 2020; 958 GWh in 2019; and 1,009 GWh in 2018. Year-over-year (YOY) energy usage increased 0.56%. UGI's total usage mix consisted of residential (57.64%), commercial (31.14%), industrial (10.70%), and sales for resale (less than 1%).

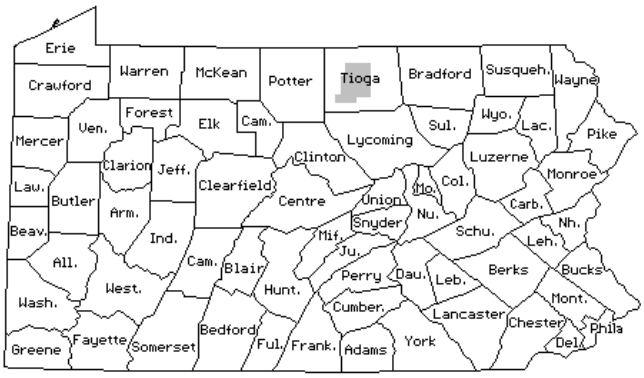
Over the next five years, total energy usage is projected to increase at an average annual rate of 0.39%. This includes a residential average annual increase of 0.29%, commercial usage increase of 0.21%, and industrial usage increase by 1.49% as shown in Figure 28 below.

UGI's highest summer peak load in 2022 was 207 MW. This represents a YOY decrease of -4.17% from the previous year's peak of 216 MW. The five-year peak load forecast is projected to decrease an average of -1.09% per year.

Figure 28: UGI Utilities Inc. energy usage (GWh)



Wellsboro Electric Company (Wellsboro)



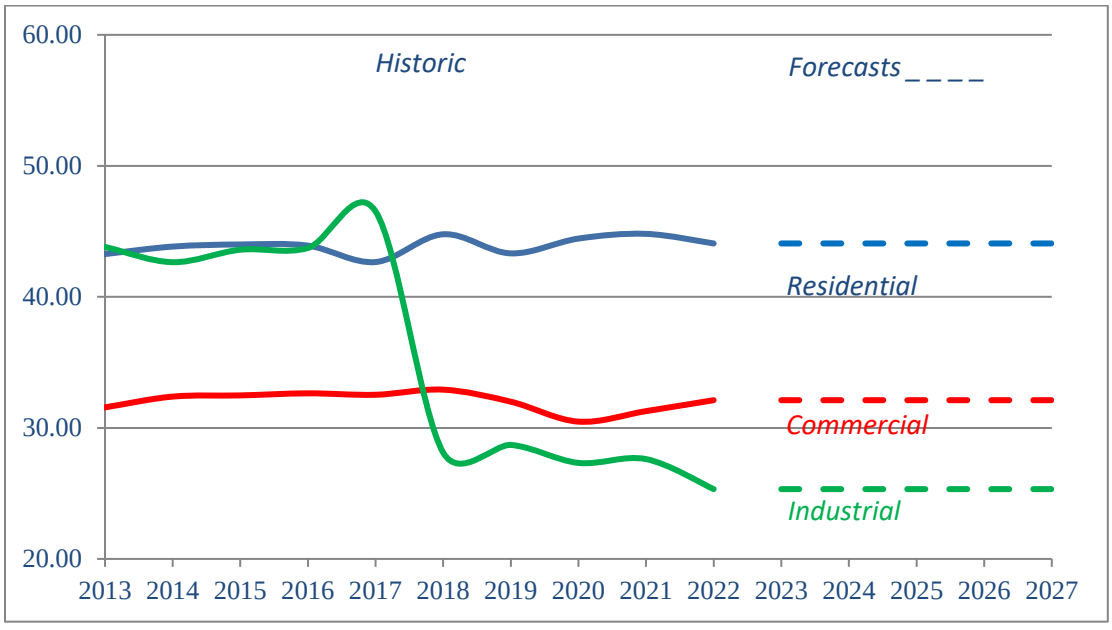
Wellsboro provides electric service to about 6,433 customers in Tioga County, North Central Pennsylvania. Wellsboro's 2022 energy use was 102 GWh, as compared to: 104 GWh in 2021; 103 GWh in 2020; 104 GWh in 2019; and 106 GWh in 2018. Year-over-year (YOY) energy usage decreased by approximately 2.12%. Wellsboro's total usage mix consisted of residential (43.45%), commercial (31.59%), industrial (24.91%), and other/sales for resale (less than 1%).

Over the next five years, total energy usage is projected to remain essentially flat at an average annual rate of 0.0%. This includes a residential usage average annual growth of 0.00%, commercial usage growth of 0.00%, and industrial usage growth of 0.00% as shown in Figure 29 below. Wellsboro expects little to no load growth over the next five years.

Note: the dramatic drop in Industrial usage in 2017 is due to two large industrial customers leaving the region in 2017.

Wellsboro's highest peak load in 2022 occurred in winter at 21.70 MW. This represents a YOY increase of 1.4% from the previous year's peak of 21.4 MW. The five-year peak load forecast is projected to remain the same at 21.70 MW.

Figure 29: Wellsboro Electric Company energy usage (GWh)



Appendix A – Data Tables

The following tables provide actual and projected peak load as well as residential, commercial and industrial energy demand by EDC. The five-year projections are filed each year by the large EDCs. Actual values are provided for the years 2013 through 2022 and values are listed in the second column labeled "Actual." The lower-right-most-column in the body of the table is the latest five-year projection for the years 2023 through 2027.

Table A01 Duquesne Light Company
Actual and Projected Peak Load (MW)

		Projected Peak Load Requirments (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	2951	2966										
2014	2693	3021	2997									
2015	2804	3083	3056	2969								
2016	2797	3135	3094	3005	2893							
2017	2682	3167	3118	3026	2918	2884						
2018	2795		3143	3042	2938	2895	2872					
2019	2662			3056	2950	2901	2874	2862				
2020	2667				2942	2890	2861	2852	2759			
2021	2760					2882	2862	2853	2781	2768		
2022	2715						2869	2865	2797	2796	2742	
2023								2866	2807	2832	2759	2712
2024									2818	2855	2776	2710
2025										2875	2794	2712
2026											2804	2711
2027												2705

Table A02 Duquesne Light Company
Actual and Projected Residential Energy Demand (GWh)

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	4091	4246										
2014	4068	4260	4217									
2015	4109	4265	4230	4176								
2016	4197	4284	4266	4202	4081							
2017	3876	4306	4266	4184	4068	4004						
2018	4258		4272	4172	4067	3987	3949					
2019	4078			4164	4053	3955	3915	4011				
2020	4217				4012	3908	3856	3971	4005			
2021	4215					3863	3797	3913	3951	4021		
2022	4160						3747	3862	3908	3895	3975	
2023								3816	3864	3834	3934	4136
2024									3821	3782	3887	4125
2025										3722	3836	4120
2026											3791	4110
2027												4103

Table A03 Duquesne Light Company
Actual and Projected Commercial Energy Demand (GWh)

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	6494	6642										
2014	6432	6640	6600									
2015	6399	6640	6621	6494								
2016	6335	6645	6648	6503	6371							
2017	6112	6641	6643	6472	6327	6261						
2018	6218		6654	6455	6299	6232	6072					
2019	6053			6430	6254	6187	6024	6098				
2020	5522				6210	6151	5980	6029	6057			
2021	5778					6082	5905	5973	5986	5645		
2022	5719						5833	5896	5881	5711	5707	
2023								5804	5807	5624	5666	5625
2024									5754	5556	5603	5622
2025										5463	5508	5720
2026											5419	5840
2027												5806

Table A04 Duquesne Light Company
Actual and Projected Industrial Energy Demand (GWh)

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	3337	3501										
2014	3164	3035	2787									
2015	2898	3032	2778	2909								
2016	2566	3031	2762	2896	2890							
2017	2632	3031	2734	2873	2852	2665						
2018	2623		2711	2851	2837	2658	2675					
2019	2472			2826	2819	2640	2656	2719				
2020	2343				2803	2638	2650	2783	2641			
2021	2509					2618	2627	2733	2553	2405		
2022	2572						2605	2712	2519	2399	2347	
2023								2692	2485	2367	2318	2608
2024									2457	2343	2291	2583
2025										2312	2253	2547
2026											2225	2518
2027												2492

Table A05 Metropolitan Edison Company
Actual and Projected Peak Load (MW)

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	3012	2881										
2014	2817	2887	2958									
2015	2791	2898	2965	2975								
2016	2947	2910	2974	2979	2987							
2017	2897	2932	2996	2985	2995	2901						
2018	3026		3017	2987	2997	2895	2926					
2019	2974			2986	2996	2872	2907	2921				
2020	2976				2995	2855	2874	2871	2934			
2021	3072					2856	2865	2868	2928	2837		
2022	3021						2875	2876	2940	2891	2966	
2023								2883	2949	2935	3039	3014
2024									2971	2960	3047	3028
2025										2977	3043	3034
2026											3046	3057
2027												3107

Table A06 Metropolitan Edison Company
Actual and Projected Residential Energy Demand (GWh)

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	5553	5297										
2014	5477	5159	5354									
2015	5515	5042	5421	5533								
2016	5528	4979	5438	5378	5190							
2017	5351	4993	5457	5392	5042	5316						
2018	5740		5476	5382	4925	5242	5347					
2019	5641			5351	4840	5154	5265	5318				
2020	5750				4760	5083	5201	5239	5460			
2021	5832					5044	5166	5201	5422	5577		
2022	5918						5172	5198	5418	5539	5763	
2023								5203	5428	5573	5702	5898
2024									5553	5628	5749	5901
2025										5666	5701	5917
2026											5726	5899
2027												5972

Table A07 Metropolitan Edison Company
Actual and Projected Commercial Energy Demand (GWh)*

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	2933	2900										
2014	2944	2930	2914									
2015	2995	2937	2931	2983								
2016	3043	2940	2964	2929	2919							
2017	2886	2956	2984	2938	2923	2953						
2018	2972		2989	2938	2927	2948	2952					
2019	2133			2923	2925	2941	2948	2940				
2020	2003				2921	2935	2924	2899	2101			
2021	2151					2925	2904	2873	2081	1906		
2022	2068						2912	2875	2083	1933	2074	
2023								2880	2089	1956	2031	2147
2024									2146	1969	2021	2133
2025										1965	1982	2093
2026											1960	2070
2027												2067

Table A08 Metropolitan Edison Company
Actual and Projected Industrial Energy Demand (GWh)*

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	5328	5411										
2014	5382	5521	5322									
2015	5309	5561	5381	5413								
2016	5304	5587	5456	5472	5350							
2017	5512	5612	5508	5507	5372	5360						
2018	5685		5524	5523	5467	5428	5449					
2019	6459			5532	5474	5408	5443	5451				
2020	6029				5467	5397	5396	5372	6396			
2021	6201					5458	5388	5409	6422	6302		
2022	6397						5419	5450	6466	6471	6570	
2023								5472	6507	6577	6677	6315
2024									6876	6625	6733	6363
2025										6611	6735	6342
2026											6732	6413
2027												6578

Table A09 Pennsylvania Electric Company
Actual and Projected Peak Load (MW)

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	3087	2938										
2014	3024	2942	2927									
2015	2819	2987	2935	2888								
2016	2909	3039	2946	2896	2890							
2017	2910	3081	2962	2904	2898	2797						
2018	3020		2968	2904	2906	2794	2823					
2019	2866			2902	2907	2775	2809	2849				
2020	2908				2907	2751	2779	2811	2892			
2021	2898					2739	2775	2811	2884	2855		
2022	2793						2779	2813	2884	2862	2865	
2023								2817	2873	2880	2850	2850
2024									2866	2882	2835	2835
2025										2886	2812	2812
2026											2800	2800
2027												2804

Table A10 Pennsylvania Electric Company
Actual and Projected Residential Energy Demand (GWh)

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	4491	4257										
2014	4462	4164	4469									
2015	4350	4145	4513	4491								
2016	4328	4157	4525	4373	4145							
2017	4153	4156	4554	4393	4011	4248						
2018	4424		4583	4394	3923	4229	4238					
2019	4266			4377	3856	4181	4157	4187				
2020	4319				3791	4133	4090	4134	4141			
2021	4363					4112	4056	4104	4111	4279		
2022	4412						4057	4104	4109	4247	4269	
2023								4112	4104	4244	4240	4341
2024									4112	4256	4223	4325
2025										4259	4125	4308
2026											4147	4293
2027												4318

Table A11 Pennsylvania Electric Company
Actual and Projected Commercial Energy Demand (GWh)*

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	3531	3512										
2014	3591	3535	3553									
2015	3558	3510	3552	3649								
2016	3587	3503	3582	3582	3539							
2017	2529	3503	3604	3614	3545	3483						
2018	3610		3608	3619	3551	3454	3525					
2019	2443			3607	3553	3426	3516	3506				
2020	2300				3552	3392	3499	3459	2485			
2021	2390					3352	3473	3424	2459	2222		
2022	2377						3472	3406	2446	2296	2497	
2023								3397	2440	2364	2446	2575
2024									2449	2403	2418	2558
2025										2390	2354	2505
2026											2307	2470
2027												2452

Table A12 Pennsylvania Electric Company
Actual and Projected Industrial Energy Demand (GWh)*

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	5731	5883										
2014	5647	5993	5696									
2015	5647	6062	5808	5747								
2016	5668	6133	5867	5822	5723							
2017	5792	6130	5894	5931	5746	5602						
2018	5797		5896	6017	5721	5617	5822					
2019	6743			5998	5675	5602	5832	5807				
2020	6289				5623	5569	5757	5720	6520			
2021	6427					5548	5751	5770	6587	6473		
2022	6485						5790	5819	6474	6522	6049	
2023								5854	6394	6513	5988	6245
2024									6327	6481	6011	6295
2025										6463	5977	6280
2026											5990	6278
2027												6284

Table A13 Pennsylvania Power Company
Actual and Projected Peak Load (MW)

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	1054	929										
2014	1018	930	867									
2015	910	953	873	931								
2016	931	969	880	940	992							
2017	926	980	885	947	999	973						
2018	950		889	949	1003	965	983					
2019	915			949	1004	956	979	976				
2020	889				1006	951	975	965	923			
2021	971					945	977	968	926	910		
2022	944						985	973	927	912	932	
2023								976	937	924	942	942
2024									945	932	951	951
2025										940	953	953
2026											957	957
2027												966

Table A14 Pennsylvania Power Company
Actual and Projected Residential Energy Demand (GWh)

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	1704	1645										
2014	1728	1627	1677									
2015	1703	1619	1685	1752								
2016	1686	1625	1691	1689	1597							
2017	1591	1649	1699	1703	1563	1651						
2018	1713		1705	1713	1545	1632	1640					
2019	1638			1714	1532	1609	1617	1630				
2020	1674				1520	1593	1604	1612	1613			
2021	1663					1584	1595	1604	1604	1647		
2022	1683						1598	1606	1608	1636	1692	
2023								1614	1616	1647	1659	1684
2024									1657	1662	1682	1687
2025										1672	1657	1683
2026											1668	1692
2027												1735

Table A15 Pennsylvania Power Company
Actual and Projected Commercial Energy Demand (GWh)

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	1349	1337										
2014	1381	1347	1345									
2015	1321	1358	1322	1180								
2016	1355	1365	1326	1048	1311							
2017	1302	1374	1332	1049	1315	1345						
2018	1356		1332	1047	1319	1330	1317					
2019	957			1040	1321	1314	1312	1307				
2020	668				1321	1302	1303	1287	1016			
2021	706					1289	1295	1262	996	787		
2022	690						1293	1237	977	850	751	
2023								1221	967	908	724	744
2024									1023	940	720	725
2025										931	699	705
2026											684	686
2027												680

Table A16 Pennsylvania Power Company
Actual and Projected Industrial Energy Demand (GWh)

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	1509	1473										
2014	1599	1518	1596									
2015	1496	1519	1743	1847								
2016	1569	1488	1739	2079	1637							
2017	1738	1485	1729	2202	1696	1513						
2018	1826		1731	2256	1742	1476	1702					
2019	2066			2278	1775	1465	1713	1727				
2020	1926				1790	1467	1726	1728	2088			
2021	2063					1460	1757	1781	2121	1970		
2022	2213						1794	1833	2153	2075	2250	
2023								1866	2220	2141	2297	2240
2024									2298	2182	2346	2242
2025										2200	2357	2280
2026											2340	2256
2027												2294

Table A17 PPL Electric Utilities Corporation
Actual and Projected Peak Load (MW)

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	7190	7313										
2014	7816	7403	7352									
2015	7842	7556	7477	7220								
2016	7216	7691	7573	7314	7209							
2017	7468	7785	7658	7408	7298	7209						
2018	7729		7711	7467	7385	7298	7248					
2019	7609			7511	7435	7385	7215	7250				
2020	7049				7427	7435	7194	7229	7336			
2021	7314					7427	7208	7267	7383	7513		
2022	7065						7243	7280	7449	7512	7252	
2023								7294	7497	7513	7249	7334
2024									7541	7552	7260	7377
2025										7584	7261	7391
2026											7271	7399
2027												7425

Table A18 PPL Electric Utilities Corporation
Actual and Projected Residential Energy Demand (GWh)

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	14295	13607										
2014	14563	13575	13588									
2015	14462	13602	13644	13647								
2016	13810	13695	13769	13720	13721							
2017	13650	13678	13814	13732	13750	13856						
2018	14811		13908	13781	13825	13940	13588					
2019	14490			13790	13826	13982	13499	14050				
2020	14592				13679	13853	13448	13960	14399			
2021	14879					13750	13253	13901	14383	14011		
2022	14680						13045	13845	14383	14075	14643	
2023								13827	14382	14115	14565	14714
2024									14382	14102	14604	14727
2025										14056	14588	14691
2026											14653	14708
2027												14718

Table A19 PPL Electric Utilities Corporation
Actual and Projected Commercial Energy Demand (GWh)

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	14140	14354										
2014	14111	14524	14414									
2015	14336	14740	14570	14235								
2016	14160	14998	14742	14234	14214							
2017	14037	15137	14859	14376	14257	14394						
2018	14105		14985	14440	14326	14517	14353					
2019	14728			14484	14357	14578	14372	13986				
2020	13129				14357	14560	14336	13880	14721			
2021	13807					14493	14307	13818	14776	13609		
2022	13696						14260	13810	14799	13807	14046	
2023								13802	14803	13926	14140	14121
2024									14827	13976	14196	14196
2025										13950	14195	14201
2026											14187	14199
2027												14205

Table A20 PPL Electric Utilities Corporation
Actual and Projected Industrial Energy Demand (GWh)

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	8052	8133										
2014	8313	8182	8092									
2015	8269	8281	8171	7966								
2016	8128	8407	8260	8066	8283							
2017	8098	8459	8324	8129	8354	8370						
2018	8144		8365	8168	8420	8467	8421					
2019	7889			8189	8450	8521	8486	8109				
2020	8354				8450	8520	8440	8058	7814			
2021	8340					8520	8406	8025	7836	8364		
2022	8276						8345	7997	7855	8585	8470	
2023								7965	7872	8724	8533	8612
2024									7891	8783	8589	8668
2025										8787	8607	8686
2026											8624	8703
2027												8725

Table A21 PECO Energy Company
Actual and Projected Peak Load (MW)

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	8618	8529										
2014	8258	8580	8627									
2015	8094	8631	8635	8259								
2016	8094	8683	8644	8267	8102							
2017	8141	8735	8653	8275	8110	8102						
2018	8608		8661	8284	8118	8110	8149					
2019	8428			8292	8126	8118	8157	8617				
2020	8148				8135	8126	8165	8625	8436			
2021	8479					8135	8174	8634	8445	8156		
2022	8583						8182	8642	8453	8164	8487	
2023								8651	8462	8172	8496	8592
2024									8470	8181	8504	8600
2025										8189	8513	8609
2026											8521	8617
2027												8626

Table A22 PECO Energy Company
Actual and Projected Residential Energy Demand (GWh)

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	13241	13392										
2014	13222	14463	13343									
2015	13630	14608	13346	13288								
2016	13664	14754	13349	13355	13366							
2017	13024	14902	13351	13422	13341	13436						
2018	14005		13354	13489	13352	13423	13266					
2019	13650			13556	13354	13404	13240	13581				
2020	14041				13360	13428	13182	13661	13600			
2021	14262					13346	13104	13718	13570	13809		
2022	14379						13009	13741	13580	13602	14037	
2023								13762	13599	13672	14135	14140
2024									13671	13804	14304	14281
2025										13848	14393	14367
2026											14508	14496
2027												14655

Table A23 PECO Energy Company
Actual and Projected Commercial Energy Demand (GWh)

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	8101	7821										
2014	8025	7790	7858									
2015	8118	7868	7936	8021								
2016	8099	7947	8015	8017	8044							
2017	7968	8026	8096	8013	8020	8132						
2018	8177		8177	8009	8016	8073	7992					
2019	7983			8005	8018	8063	8043	8143				
2020	7210				8019	8046	8049	8156	7976			
2021	7597					7995	8038	8163	7936	7638		
2022	7701						8042	8163	7917	7873	7809	
2023								8163	7892	7866	7818	7709
2024									7882	7857	7813	7692
2025										7809	7757	7643
2026											7739	7647
2027												7672

Table A24 PECO Energy Company
Actual and Projected Industrial Energy Demand (GWh)

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	15379	15481										
2014	15310	15714	15609									
2015	15365	15949	15844	15302								
2016	15263	16188	16081	15294	15547							
2017	15425	16431	16322	15287	15515	15016						
2018	15516		16567	15279	15513	15364	15421					
2019	14958			15271	15517	15320	15293	15385				
2020	13669				15529	15356	15306	15415	14430			
2021	14003					15355	15247	15431	14444	14173		
2022	14046						15217	15431	14598	14647	14367	
2023								15431	14715	14692	14511	14146
2024									14687	14623	14604	14158
2025										14587	14611	14106
2026											14698	14116
2027												14133

Table A25 West Penn Power Company
Actual and Projected Peak Load (MW)

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	4075	3784										
2014	4019	3846	4075									
2015	3814	3908	3945	3793								
2016	3954	3980	4012	3842	3793							
2017	4012	4015	4065	3927	3840	3776						
2018	3879		4077	4020	3886	3789	3828					
2019	3740			4031	3916	3775	3824	3764				
2020	3827				3917	3767	3804	3704	3821			
2021	3940					3762	3802	3690	3862	3821		
2022	3827						3821	3695	3884	3862	3800	
2023								3704	3894	3884	3846	3846
2024									3891	3894	3844	3844
2025										3891	3822	3822
2026											3819	3819
2027												3838

Table A26 West Penn Power Company
Actual and Projected Residential Energy Demand (GWh)

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	7318	7146										
2014	7281	7282	7311									
2015	7255	7369	7302	7383								
2016	7281	7431	7303	7157	6775							
2017	6817	7493	7319	7244	6634	7383						
2018	7358		7335	7298	6548	7157	6931					
2019	7152			7303	6473	7244	6906	6988				
2020	7178				6407	7298	6819	6901	6931			
2021	7206					7303	6756	6851	6844	6925		
2022	7281						6756	6858	6849	6877	7202	
2023								6864	6846	6897	7081	7233
2024									6862	6926	7179	7232
2025										6916	7016	7241
2026											7076	7205
2027												7289

Table A27 West Penn Power Company
Actual and Projected Commercial Energy Demand (GWh)

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	4878	4845										
2014	4956	4909	4860									
2015	5112	4946	4897	4996								
2016	4956	4979	4932	4957	4900							
2017	4364	5047	4962	5015	4915	4996						
2018	4500		4962	5029	4941	4957	4285					
2019	2880			5006	4952	5015	4246	4261				
2020	2584				4954	5029	4208	4260	2879			
2021	2714					5006	4184	4266	2882	2686		
2022	2719						4184	4273	2880	2738	2818	
2023								4279	2868	2786	2729	2998
2024									2861	2819	2734	2942
2025										2805	2626	2915
2026											2585	2788
2027												2795

Table A28 West Penn Power Company
Actual and Projected Industrial Energy Demand (GWh)

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
2013	7777	8087										
2014	7972	8303	7946									
2015	7635	8542	8161	8053								
2016	7972	8786	8331	8492	8287							
2017	8371	8879	8466	8903	8641	8053						
2018	8667		8495	9321	8798	8492	8785					
2019	10003			9700	8847	8903	8873	8617				
2020	9094				8852	9321	8865	8540	10074			
2021	9334					9700	8920	8651	10209	9889		
2022	9554						8920	8760	10306	10162	9726	
2023								8813	10375	10258	10077	9351
2024									10857	10273	10219	9807
2025										10237	10249	10013
2026											10282	10146
2027												10257

Appendix B – Plant Additions and Upgrades

Table B-1 below provides detail of PJM interconnection requests for new generating resources located in Pennsylvania.[63] Currently Pennsylvania has 1,153 MW under construction as compared to: 1,563 in 2021; 2,503 MW in 2020: 2,831 MW in 2019, 6,600 MW in 2018; and 9,636 MW in 2017.

Table B-2 on the next page details the generation deactivations for Pennsylvania from Jan. 1, 2021, through Dec. 31, 2022. In 2022 there were 20 deactivation notices comprising approximately 832 MW, as compared to: 920.8 MW in 2021; 78.3 MW in 2020; 931.1 MW in 2019; 76.1 MW in 2018; and 14 MW in 2017.[64]

Table B-1: New Generation Queue for Pennsylvania – Interconnection Requests (Dec. 31, 2022)

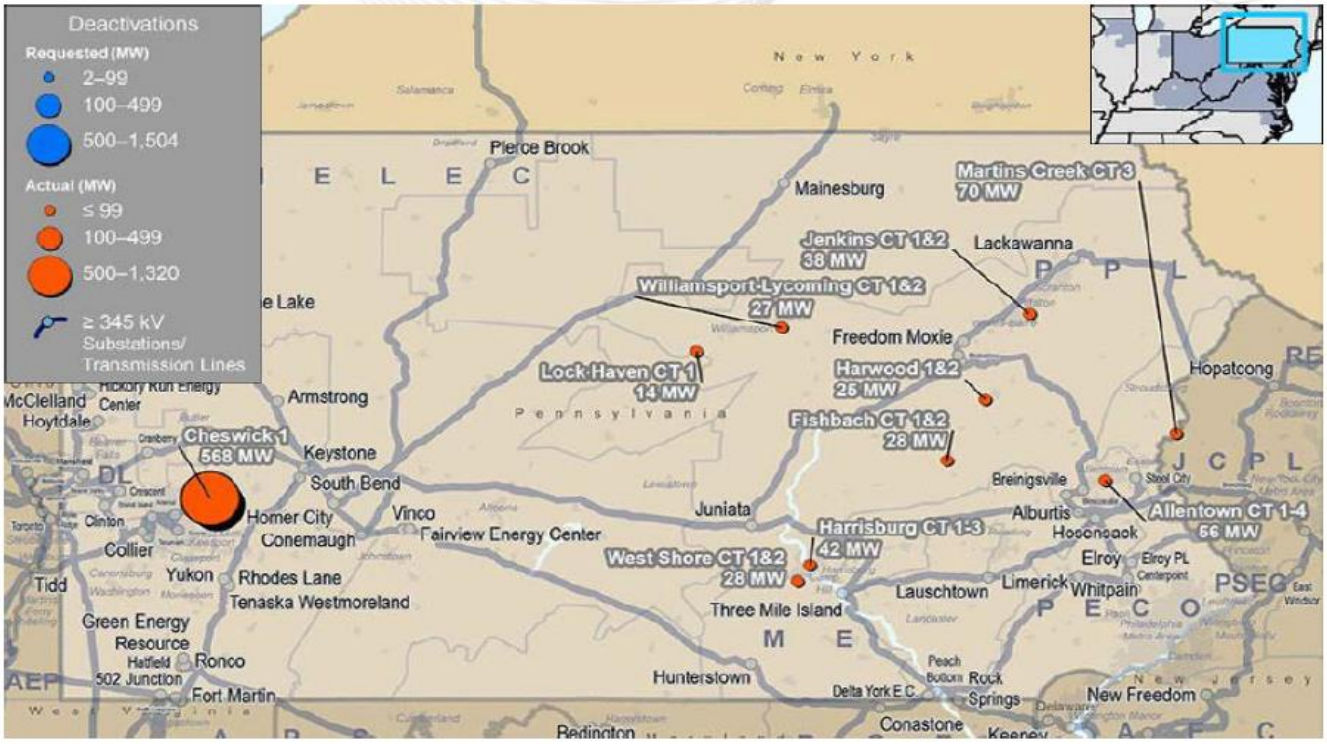
		In Queue				Complete					
		Active		Under Construction		In Service		Withdrawn		Total	
		Projects	Capacity (MW)	Projects	Capacity (MW)	Projects	Capacity (MW)	Projects	Capacity (MW)	Projects	Capacity (MW)
Non-Renewable	Coal	0	0.0	0	0.0	16	229.0	28	14,354.6	44	14,583.6
	Diesel	0	0.0	0	0.0	4	37.4	12	51.5	16	88.9
	Natural Gas	5	290.5	14	276.8	110	21,371.5	252	91,301.0	381	113,239.8
	Nuclear	2	0.0	1	44.0	14	2,565.0	12	1,731.0	29	4,340.0
	Oil	0	0.0	6	7.5	3	9.4	9	1,307.0	18	1,323.9
	Other	0	0.0	0	0.0	2	306.5	6	344.0	8	650.5
	Storage	34	1,010.9	0	0.0	5	0.0	47	798.4	86	1,809.3
Renewable	Biomass	0	0.0	0	0.0	2	15.4	4	36.5	6	51.9
	Hydro	4	468.8	2	21.5	12	480.8	18	465.4	36	1,436.4
	Methane	0	0.0	0	0.0	23	125.9	37	201.3	60	327.2
	Solar	287	5,839.5	74	772.0	15	65.3	252	4,271.2	628	10,948.1
	Wind	4	83.7	2	32.0	42	295.9	138	1,757.5	186	2,169.1
	Wood	0	0.0	0	0.0	0	0.0	1	16.0	1	16.0
	Grand Total	336	7,693.3	99	1,153.8	248	25,502.1	816	116,635.3	1,499	150,984.5

[63] *See*, PJM, *PJM Regional Transmission Expansion Plan 2022*, available at: https://pjm.com/-/media/library/reports-notices/2022-rtep/2022-rtep-report.ashx.

[64] *Id.*

Table B-2: 2022 Pennsylvania Actual Generation Deactivations in 2022

Unit	TO Zone	Fuel Type	Request Received to Deactivate	Actual or Projected Deactivation Date	Age (Years)	Capacity (MW)
Williamsport-Lycoming CT 2	PPL	Oil	9/30/2021	4/1/2022	54	13.4
Williamsport-Lycoming CT 1						13.2
West Shore CT 2					52	14.0
West Shore CT 1						14.0
Martins Creek CT 3				6/1/2022	50	18.0
Lock Haven CT 1				4/1/2022	52	14.0
Jenkins CT 2						13.8
Jenkins CT 1						13.8
Harrisburg CT 3	PPL	Oil	9/30/2021	6/1/2022	54	13.8
Harrisburg CT 2						13.9
Harrisburg CT 1						13.4
Fishbach CT 2					52	14.0
Fishbach CT 1						14.0
Allentown CT 4					54	14.0
Allentown CT 3						14.0
Allentown CT 2						14.0
Allentown CT 1	PPL					14.0
Cheswick 1	DLCO	Coal	7/14/2021	3/31/2022	51	567.5
Harwood 2	PPL	Oil	4/27/2021	5/31/2022	53	12.3
Harwood 1			10/29/2020			12.9



Appendix C – Pennsylvania Generation Capability/Facilities

Table C-1 below represents the PJM region installed electrical capacity percentage and actual generation percentage by energy source from 2017 through 2022.[65] Chart C on the next page represents the 2022 and 2021 Pennsylvania installed capacity percentage by energy source.[66] Table C-2 starting on page 65 represents existing generating facilities by fuel type located in Pennsylvania.[67]

Table C-1 PJM Region Electrical Power Supply Mix

PJM Region Electrical Power Supply Mix 2022/2021/2020/2019/2018/2017

Energy Source	Capacity						Generation					
	2022	2021	2020	2019	2018	2017	2022	2021	2020	2019	2018	2017
Coal	23.4	26.1	27	30.5	32.7	35.4	20	22.2	19.3	23.8	28.6	31.8
Nuclear	17.4	17.4	17.5	17.5	17.6	18	32.3	32.8	34.2	33.6	34.2	34.6
Natural Gas	47.9	46.1	45.6	42.3	40.3	36.8	40	37.9	39.8	36.2	30.9	27.1
Hydro, Wind, Solar & Other	8.4	7.9	7	6.3	6.1	6	7.4	6.8	6.4	5.9	5.9	5.7
Oil	2.8	3	3	3.4	3.2	3.6	0.3	0.3	0.2	0.2	0.4	0.3

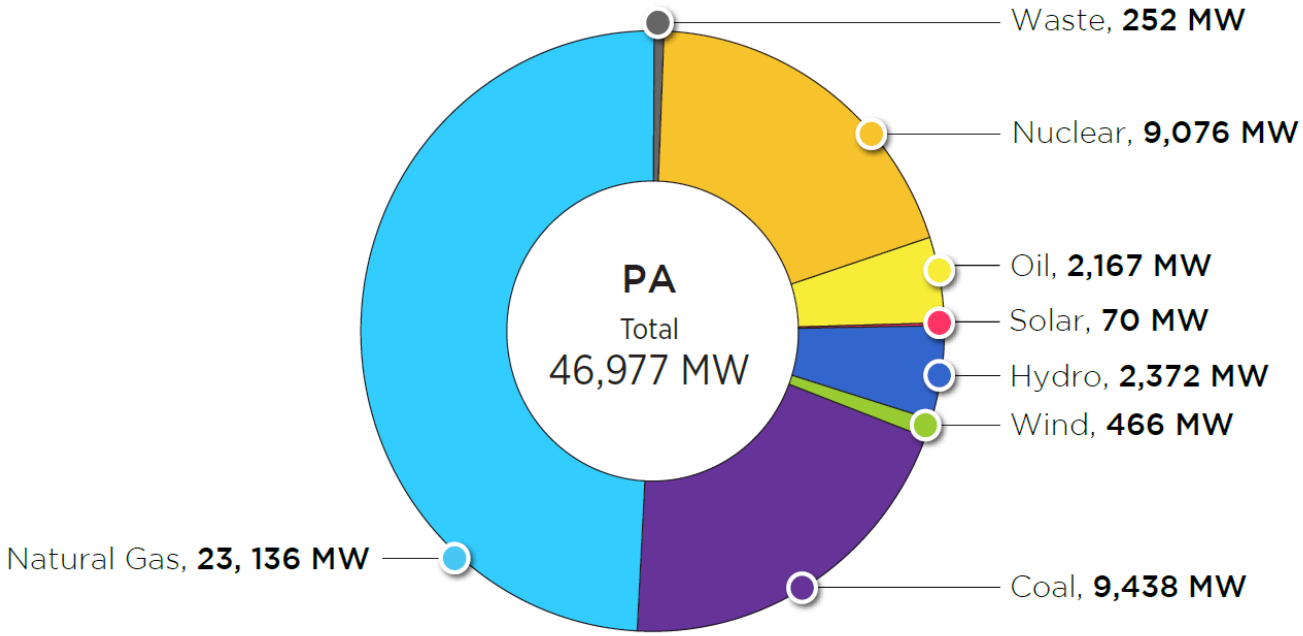
[65] *See*, PJM, *State of the Market Report for PJM*, Volume II, Sections 3 & 5 reporting years 2022, 2021, 2020, 2019, 2018, and 2017. Available at: www.monitoringanalytics.com.

[66] *See*, PJM, *2022 PJM Pennsylvania State Infrastructure Report*, available at: https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2022/2022-pennsylvania-state-infrastructure-report.ashx, and also, PJM, *2021 Pennsylvania State Infrastructure Report*, available at: https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2021/2021-pennsylvania-state-infrastructure-report.ashx.

[67] Data accessed through S&P Global Market Intelligence as of Jul. 1, 2023. Note: S&P Global Market Intelligence uses the best available data to estimate the power market region for each power plant unit and electric utility. Estimates are based on ownership, purchase power agreements, interconnected utilities, membership lists (load serving or transmission owning), and geographically based public information. Power plant units which belong to more than one power market region are allocated on a percentage basis of their operating capacity. Companies which belong to more than one power market region will be wholly placed into each region to which they are assigned.

Chart C – Electrical Power Capacity Mix

2022 Pennsylvania Installed Capacity



2021 Pennsylvania Installed Capacity

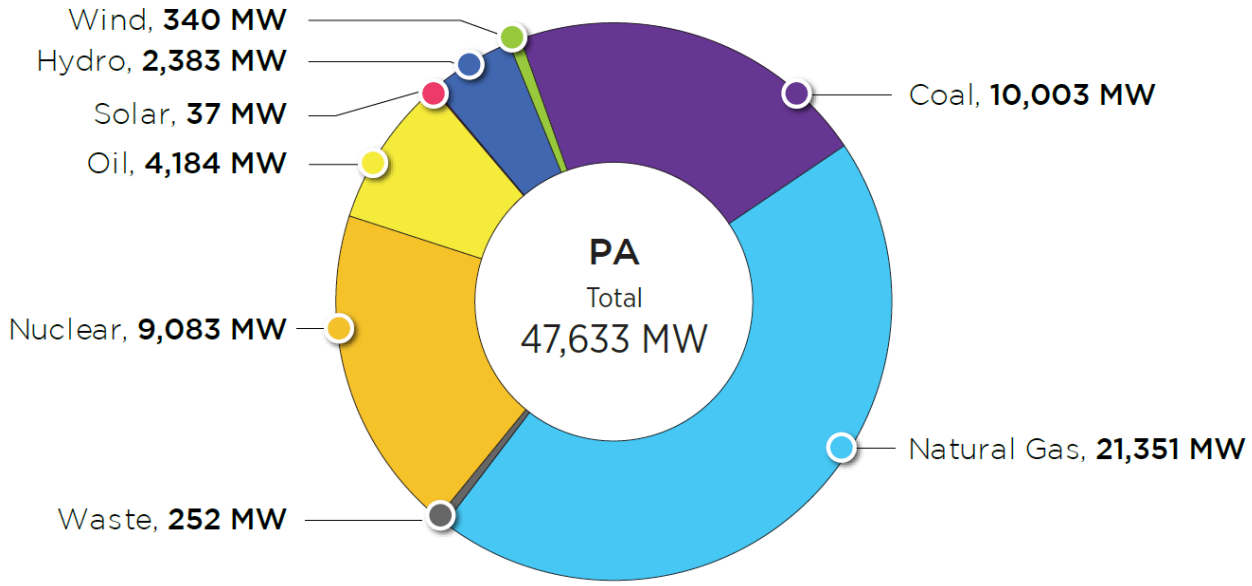


Table C-2 Electric Generating Facilities in Pennsylvania

Power Plant	*Owner Name*	*Ultimate Parent*	*Fuel Type*	*Operating Capacity (MW)*	*First Unit Online*	*Last Unit Online*
Allenwood (PPLRE Lycoming County Landfill Project)	Talen Renewable Energy	Energy Power Partners LLC	Biomass	3.2	10/2012	10/2012
Andromeda One A Biomass Plant	Andromeda Green Energy	Andromeda Green Energy	Biomass	4.0	2/2016	2/2016
Archbald Cogeneration	PEI Power Corporation	Energy Transfer LP	Biomass	20.0	9/1988	9/1988
Arden Landfill	WM Renewable Energy LLC	Waste Management Inc.	Biomass	4.8	2/2009	2/2009
Broad Mountain Landfill Facility	UGI Development Company	UGI Corp.	Biomass	9.8	1/2009	1/2009
Covanta Plymouth (Montenay Montgomery)	Covanta Plymouth Renewable	EQT AB (publ)	Biomass	28.0	12/1991	12/1991
Dart Container Corp Cogen	Dart Container Corp.	Dart Container Corp.	Biomass	10.4	12/2012	12/2012
Delaware County Resource Recovery Facility	Covanta Delaware Valley	EQT AB (publ)	Biomass	80.0	4/1991	4/1991
Frey Farm Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	1.6	1/2006	1/2006
Gettysburg Energy & Nutrient Recovery Facility (GENRF)	EnergyWorks BioPower	EnergyWorks BioPower	Biomass	Out of Service	6/2013	6/2013
Glades Pike Cogeneration Plant IC	State Correctional Inst (Laure	State Correctional Inst (Laure	Biomass	3.2	10/2011	10/2011
Greater Lebanon Refuse Authority Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	3.2	9/2007	9/2007
Green Knight Energy Center	Waste Management Inc.	Waste Management Inc.	Biomass	8.7	2/2001	2/2001
Honey Brook Generating Station (Granger)	Granger Electric Co	Granger Electric Co	Biomass	3.2	12/2006	8/2010
IESI Blue Ridge Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	6.4	1/2013	1/2013
Johnsonburg Mill	Domtar Paper Co. LLC	First Mgmt Ltd.	Biomass	49.0	2/1993	2/1993
Lakeview Gas Recovery	WM Renewable Energy LLC	Waste Management Inc.	Biomass	6.0	5/1997	6/1997
Lancaster County Resource Recovery	Covanta Lancaster Inc.	EQT AB (publ)	Biomass	32.4	5/1991	5/1991
Lycoming County Landfill Project (PPL Renewable)	Talen Renewable Energy	Energy Power Partners LLC	Biomass	3.0	10/2012	10/2012
Morgantown Generating Station	Granger Electric Co	Granger Electric Co	Biomass	1.6	5/2016	5/2016
Mountain View Landfill	CCI Power Holdings	Energy Trading Innovations	Biomass	14.4	3/2003	3/2003
Northern Tier Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	1.6	1/2009	1/2009
Pioneer Crossing Landfill	Fortistar LLC	Fortistar LLC	Biomass	8.0	10/2008	11/2013
SECCRA Community Landfill	Southeastern Chester County Re	Southeastern Chester County Re	Biomass	2.5	1/2007	11/2010
Shippensburg (Cumberland County) Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	6.4	1/2009	1/2009
Susquehanna Resource Management Complex (Harrisburg Facil	Covanta Harrisburg, Inc.	EQT AB (publ)	Biomass	16.7	10/1986	4/2006
Tullytown Landfill Gas Facility	WM Renewable Energy LLC	Waste Management Inc.	Biomass	1.6	3/2013	3/2013
Wheelabrator Falls	Wheelabrator Falls Inc.	Macquarie Holdings (USA) Inc.	Biomass	43.9	5/1994	5/1994
York County Resource Recovery Center	Covanta York Renewable Energy	EQT AB (publ)	Biomass	36.5	11/1989	11/1989
Zook Generating Station (L&S Sweetners)	Granger Electric Co	Granger Electric Co	Biomass	3.2	10/2013	10/2013
Brunner Island	Talen Generation LLC	Riverstone Holdings LLC	Coal	1,411.0	5/1961	6/1969
Colver Power Project	Colver Green Energy LLC	Generation Holdings LP	Coal	110.0	2/1995	2/1995
Conemaugh	ArcLight Capital Partners LLC	ACHP L.P.	Coal	1,700.0	5/1970	5/1971
Ebensburg Power Company	Ebensburg Power Co.	Babcock & Wilcox Enterprises	Coal	50.0	5/1991	5/1991
John B Rich Memorial Power Station	RI-CORP Development	RI-CORP Development	Coal	80.0	2/1988	2/1988
Keystone	ArcLight Capital Partners LLC	ACHP L.P.	Coal	1,700.0	8/1967	7/1968
Montour	Talen Generation LLC	Riverstone Holdings LLC	Coal	1,504.0	3/1972	4/1973
Mount Carmel Cogeneration	Mt Carmel Co-Gen	Mt Carmel Co-Gen	Coal	43.0	1/1990	1/1990
P.H. Glatfelter Company - Pennsylvania	Glatfelter Corp.	Glatfelter Corp.	Coal	85.0	5/1948	1/1994
Seward Waste Coal	Robindale Energy Services Inc	Robindale Energy Services Inc	Coal	521.0	11/2004	11/2004
St. Nicholas Cogeneration	Schuylkill Energy Resources In	Schuylkill Energy Resources In	Coal	86.0	9/1990	9/1990
Westwood Generating Station	WPS Westwood Generation LLC	Olympus Holdings LLC	Coal	30.0	6/1987	6/1987

Table C-2 Electric Generating Facilities in Pennsylvania (cont'd)

Power Plant	Owner Name	Ultimate Parent	Fuel Type	Operating Capacity (MW)	First Unit Online	Last Unit Online
AE Hunlock 4	UGI Development Company	UGI Corp.	Natural Gas	50.5	12/2000	12/2000
Allegheny Energy 3, 4 and 5 (Springdale)	Aspen Generating LLC	LS Power Group	Natural Gas	550.0	7/2003	7/2003
Allegheny Energy Units 1 and 2 (Springdale)	Aspen Generating LLC	LS Power Group	Natural Gas	88.0	12/1999	12/1999
Allegheny Energy Units 12 & 13 (Chambersburg)	Aspen Generating LLC	LS Power Group	Natural Gas	88.0	11/2001	11/2001
Allegheny Energy Units 8 and 9 (Gans Plant)	Aspen Generating LLC	LS Power Group	Natural Gas	88.0	11/2000	11/2000
Alpaca Gas Project	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	20.4	4/2017	4/2017
Archbald Power Station	PEI Power Corporation	Energy Transfer LP	Natural Gas	59.2	5/2001	2/2010
Armstrong County	Ihi Power Services Corp.	Ihi Power Services Corp.	Natural Gas	829.7	5/2002	5/2002
Beaver Dam Gas Project	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	21.0	5/2016	5/2016
Bethlehem CC	Calpine Corp.	CPN Mgmt LP	Natural Gas	1,134.0	1/2003	1/2003
Birdsboro Combined Cycle Plant	NAES Corp	ITOCHU Corp.	Natural Gas	485.0	5/2019	5/2019
Brunot Island CC	GenOn Power Midwest, LP	GenOn Holdings Inc.	Natural Gas	270.0	6/1973	7/1974
Bucknell University	Bucknell University	Bucknell University	Natural Gas	6.7	10/1991	6/1998
Chester Operations CC	Kimberly-Clark Corp.	Kimberly-Clark Corp.	Natural Gas	65.2	8/2020	8/2020
CPV Fairview Energy Center	NAES Corp	ITOCHU Corp.	Natural Gas	1,106.4	12/2019	12/2019
East Campus Plant	The PA State University	The PA State University	Natural Gas	8.9	6/2011	6/2011
Eddystone 3-4	Exelon Power Corp	Constellation Energy Corp.	Natural Gas	760.0	9/1974	6/1976
Fairless Works Energy Center	Lotus Infrastructure	Starwood Cap Operations LLC	Natural Gas	1,355.4	5/2004	6/2004
Falling Spring	Chambersburg Borough of	Chambersburg Borough of	Natural Gas	7.1	12/1967	6/2001
Fayette Energy Facility	Vistra Corp.	Vistra Corp.	Natural Gas	716.0	6/2003	6/2003
Grays Ferry Cogeneration	Grays Ferry Cogeneration Ptnsh	Antin Infrastructure Ptnrs US	Natural Gas	183.6	10/1997	10/1997
Handsome Lake Energy	Handsome Lake Energy, LLC	Handsome Lake Energy, LLC	Natural Gas	267.5	7/2001	8/2001
Hazleton Cogeneration	NAES Corp	ITOCHU Corp.	Natural Gas	150.9	1/1989	6/2002
Hickory Run Energy Station	NAES Corp	ITOCHU Corp.	Natural Gas	1,045.4	5/2020	5/2020
Hill at Whitemarsh	Talen Renewable Energy	Energy Power Partners LLC	Natural Gas	1.6	5/2007	5/2007
Hill Top Energy Center	Hill Top Energy Center LLC	Hill Top Energy Center LLC	Natural Gas	624.5	7/2021	7/2021
Hunlock Repowering	UGI Development Company	UGI Corp.	Natural Gas	129.0	7/2011	7/2011
Hunterstown CC	NAES Corp	ITOCHU Corp.	Natural Gas	855.0	7/2003	7/2003
Indiana University of Pennsylvania	IN University PA	IN University PA	Natural Gas	24.0	3/1988	3/1988
Jefferson Torresdale Hospital IC Project (Cogen)	Jefferson Torresdale Hospital	Jefferson Torresdale Hospital	Natural Gas	1.1	5/2016	5/2016
Juniata Locomotive Shop GT Project	Norfolk Southern Corporation	Norfolk Southern Corporation	Natural Gas	1.5	4/2015	4/2015
Lackawanna Energy Center	Invenergy LLC	Invenergy LLC	Natural Gas	1,467.0	3/2018	1/2019
Liberty Electric Power	Liberty Electric Power LLC	Vistra Corp.	Natural Gas	562.0	5/2002	5/2002
Lower Mount Bethel	Talen Energy Corporation	Riverstone Holdings LLC	Natural Gas	601.6	2/2004	3/2004
Marcus Hook	FPL Energy Marcus Hook LP	NextEra Energy Inc.	Natural Gas	898.0	12/2004	12/2004
Martins Creek 3 and 4	Talen Generation LLC	Riverstone Holdings LLC	Natural Gas	1,700.0	10/1975	3/1977
Mehoopany	Procter & Gamble Paper Product	Procter & Gamble Paper Product	Natural Gas	1.6	10/1984	10/1984
Mehoopany CT	Procter & Gamble Paper Product	Procter & Gamble Paper Product	Natural Gas	123.0	6/1985	4/2013
Milan Gas Project	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	20.4	4/2017	4/2017
Mount Joy Wire	Mount Joy Wire Corp.	Mount Joy Wire Corp.	Natural Gas	1.1	12/2011	12/2011
Navy Yard Natural Gas Plant	Ameresco Inc.	Ameresco Inc.	Natural Gas	8.0	1/2018	11/2018
New Castle	GenOn Power Midwest, LP	GenOn Holdings Inc.	Natural Gas	327.0	11/1939	6/1964

Table C-2 Electric Generating Facilities in Pennsylvania (cont'd)

Power Plant	Owner Name	Ultimate Parent	Fuel Type	Operating Capacity (MW)	First Unit Online	Last Unit Online
Newman & Company Inc.	Newman & Co.	Newman & Co.	Natural Gas	1.8	5/1964	5/1964
Ontelaunee Energy Center	Dynegy Power	Vistra Intermediate Co. LLC	Natural Gas	624.7	5/2002	5/2002
Orchard Park	Chambersburg Borough of	Chambersburg Borough of	Natural Gas	23.2	12/2003	12/2003
Oxbow Creek Energy	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	21.0	12/2019	12/2019
Panda Liberty Generating Station (Moxie Liberty)	The Carlyle Group	The Carlyle Group	Natural Gas	850.0	10/2016	10/2016
Patriot Power Generation Plant (Moxie Patriot)	The Carlyle Group	The Carlyle Group	Natural Gas	850.0	7/2016	7/2016
Phoenix Contact - CCHP Plant	Phoenix Contact USA, Inc.	Phoenix Contact USA, Inc.	Natural Gas	1.0	3/2014	3/2014
PPL Ironwood	Helix Generation LLC	LS Power Group	Natural Gas	777.9	12/2001	12/2001
Roundtop	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	21.0	10/2015	10/2015
Shell Chemical Appalachia Cogen	Shell Chemical Appalachia LLC	Shell Chemical Appalachia LLC	Natural Gas	291.1	7/2021	10/2021
Spring House IC Plant	Janssen Pharmaceuticals Inc.	Johnson & Johnson	Natural Gas	3.8	4/2013	4/2013
Temple SEGF Plant	Temple University	Temple University	Natural Gas	16.0	5/1993	5/1993
Tenaska Westmoreland Generating Station	Tenaska Operations	Tenaska Energy Inc.	Natural Gas	1,032.0	12/2018	12/2018
West Campus Plant	The PA State University	The PA State University	Natural Gas	7.8	1/1938	12/2021
West Campus Steam Plant CHP Expansion	The PA State University	The PA State University	Natural Gas	6.1	12/2021	12/2021
West Point Facility	Merck & Co.	Merck & Co.	Natural Gas	66.0	1/1989	4/2001
West Point Facility IC	Merck & Co.	Merck & Co.	Natural Gas	13.8	1/1972	4/2022
Wolf Run Energy Project	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	22.0	6/2019	6/2019
York 2 Energy Center	Calpine Corp.	CPN Mgmt LP	Natural Gas	858.9	3/2019	3/2019
York Energy Center (Delta Power Project)	Conectiv Mid Merit LLC	CPN Mgmt LP	Natural Gas	545.0	3/2011	3/2011
Clairton Works	U.S. Steel Corp.	U.S. Steel Corp.	Other Fuel	26.0	1/1955	1/1955
Erie Coke Corporation	Erie Coke Corp.	Erie Coke Corp.	Other Fuel	1.3	1/1953	1/1953
Mon Valley Works	U.S. Steel Corp.	U.S. Steel Corp.	Other Fuel	67.9	6/1943	2/2002
Brunot Island	GenOn Power Midwest, LP	GenOn Holdings Inc.	Petroleum Products	18.1	3/1972	3/1972
Chester	Exelon Power Corp	Constellation Energy Corp.	Petroleum Products	54.0	2/1969	5/1969
Conemaugh IC	ArcLight Capital Partners LLC	ACHP L.P.	Petroleum Products	11.2	2/1970	2/1970
Croydon	Exelon Power Corp	Constellation Energy Corp.	Petroleum Products	512.0	6/1974	8/1974
Delaware CT	Exelon Power Corp	Constellation Energy Corp.	Petroleum Products	74.0	4/1969	7/1970
Eddystone CT	Exelon Power Corp	Constellation Energy Corp.	Petroleum Products	76.0	5/1967	6/1970
Falls	Exelon Power Corp	Constellation Energy Corp.	Petroleum Products	60.0	5/1970	6/1970
General Electric Company	General Electric Co.	General Electric Co.	Petroleum Products	4.3	6/1984	6/1984
Keystone IC	ArcLight Capital Partners LLC	ACHP L.P.	Petroleum Products	11.2	11/1968	11/1968
Moser	Exelon Power Corp	Constellation Energy Corp.	Petroleum Products	60.0	5/1970	6/1970
New Castle IC	GenOn Power Midwest, LP	GenOn Holdings Inc.	Petroleum Products	2.5	12/1968	12/1968
Pine Grove Landfill	CCI Power Holdings	Energy Trading Innovations	Petroleum Products	5.4	2/2008	2/2008
PPG Monroeville Chemicals Center	PPG Monroeville Chemicals	PPG Industries Inc.	Petroleum Products	1.1	10/1998	9/2000
PPG Place	PPG Industries Inc.	PPG Industries Inc.	Petroleum Products	2.3	5/1990	6/1998
Richmond CT	Exelon Power Corp	Constellation Energy Corp.	Petroleum Products	132.0	6/1973	6/1973
Schuylkill CT	Exelon Power Corp	Constellation Energy Corp.	Petroleum Products	38.0	5/1969	6/1971
Southwark	Exelon Power Corp	Constellation Energy Corp.	Petroleum Products	72.0	6/1967	11/1968
Sunbury CT	Sunbury Generation LP	Corona Power	Petroleum Products	36.0	11/1971	11/1971
Sunbury IC	Sunbury Generation LP	Corona Power	Petroleum Products	5.0	4/1967	4/1967

Table C-2 Electric Generating Facilities in Pennsylvania (cont'd)

Power Plant	Owner Name	Ultimate Parent	Fuel Type	Operating Capacity (MW)	First Unit Online	Last Unit Online
Vitro Architectural Glass (PA)	PPG Industries Inc.	PPG Industries Inc.	Petroleum Products	5.0	7/1972	5/1996
500 Virginia Solar	500 Virginia Solar Lp	500 Virginia Solar Lp	Solar	1.0	7/2011	7/2011
ABE4 Solar Project	Mid-River PA LLC	Mid-River PA LLC	Solar	3.0	9/2020	9/2020
Air Products Solar (Trexlertown Solar)	Air Products Energy Entrprs	Air Products & Chemicals Inc.	Solar	1.9	6/2011	6/2011
Aqua Ingrams Mill Solar	Essential Utilities Inc.	Essential Utilities Inc.	Solar	0.9	12/2009	12/2009
Beaver Solar	Tangent Energy Solutions Inc.	Tangent Energy Solutions Inc.	Solar	1.3	12/2012	12/2012
Conshohocken -Solar	Sun Power Electric	Conservation Services Group	Solar	0.1	4/1999	4/1999
Crayola Solar Park	Talen Renewable Energy	Energy Power Partners LLC	Solar	2.8	5/2010	11/2011
Dickinson Solar Project (Carlisle)	Dickinson Solar LLC	NextEra Energy Inc.	Solar	3.0	12/2016	12/2016
Elizabethtown Solar	Community Energy Solar LLC	AES Clean Energy Dev. LLC	Solar	2.0	2/2016	2/2016
Elk Hill Solar 1	Lightsource bp Renewable Energ	BP p.l.c.	Solar	20.0	12/2022	12/2022
Elk Hill Solar 2 Project	Elk Hill Solar 2 LLC	Elk Hill Solar 2 LLC	Solar	15.0	12/2020	12/2020
ER Bison Solar CSG Project	Greenbacker Renewable Energy	Greenbacker Renewable Energy	Solar	1.4	1/2023	1/2023
Exelon-Conergy Solar Energy Center	Mf Mesa Lane Llc	Mf Mesa Lane Llc	Solar	1.5	11/2008	11/2008
Fort Indiantown Gap Solar Project (FTIG)	Standard Solar Inc.	Brookfield Renewable	Solar	3.0	1/2019	1/2019
GSK York RDC Solar Facility	GlaxoSmithKline Cnsmr Hlthcr L	Glaxosmithkline Consumer Healt	Solar	1.6	12/2010	12/2010
Hunker Solar River Project	Hunker Solar River LLC	Hunker Solar River LLC	Solar	3.3	10/2021	10/2021
IKEA Conshohocken Rooftop PV System	IKEA Energy US LLC	Stichting INGKA Foundation	Solar	1.0	7/2012	7/2012
Keystone Solar Project	Keystone Solar LLC	Keystone Solar LLC	Solar	5.0	9/2012	9/2012
Knouse Foods Solar Plant	Knouse Foods Co-Operative Inc	Knouse Foods Co-Operative Inc	Solar	3.0	12/2010	12/2010
Longwood Gardens Solar Plant	Ecogy Pennsylvania Systems Llc	Ecogy Pennsylvania Systems Llc	Solar	1.3	5/2010	5/2010
Marlboro Mushrooms Solar Field	Marlborough Mushrooms	Marlborough Mushrooms	Solar	1.0	11/2011	11/2011
Martin Limestone Solar Array Plant	Sunstream Energy Llc	Sunstream Energy Llc	Solar	1.0	12/2012	12/2012
Masser Farms Realty Solar	Masser Farms Realty, Ltd.	Masser Farms Realty, Ltd.	Solar	1.0	5/2011	5/2011
Merck-Upper Gwynedd Solar Array	Ray Angelini, Inc.	Ray Angelini, Inc.	Solar	1.5	5/2011	5/2011
PA Solar Park II Project	Con Edison Development	RWE Aktiengesellschaft	Solar	10.0	1/2020	1/2020
PA Solar Park Project	Con Edison Development	RWE Aktiengesellschaft	Solar	10.0	10/2012	10/2012
PA4 Solar Farm	DEPCOM Power Inc.	DEPCOM Power Inc.	Solar	3.6	5/2019	5/2019
Pickering Solar	Essential Utilities Inc.	Essential Utilities Inc.	Solar	1.4	1/2012	1/2012
Pocono Raceway Solar Project	EDF Renewables Inc.	France	Solar	3.0	8/2010	8/2010
Romark PA Solar	Romark Logistics Of Pa, Inc.	Romark Logistics Of Pa, Inc.	Solar	1.8	11/2011	11/2011
Susquehanna University Solar Project	TerraForm Power Inc	Brookfield Renewable	Solar	3.0	9/2018	9/2018
Temple Solar Arrays Project	UGI Energy Services LLC	UGI Corp.	Solar	2.2	5/2011	5/2011
TPE Pennsylvania Solar 1	DEPCOM Power Inc.	DEPCOM Power Inc.	Solar	3.6	8/2019	8/2019
University Park Solar Project	SS Pa II PSU LLC	SS Pa II PSU LLC	Solar	1.5	12/2018	12/2018
Whitetail Solar 1	Whitetail Solar 1 LLC	BP p.l.c.	Solar	13.5	12/2019	12/2019
Whitetail Solar 2	Lightsource bp Renewable Energ	BP p.l.c.	Solar	20.0	9/2020	9/2020
Whitetail Solar 3	Lightsource bp Renewable Energ	BP p.l.c.	Solar	20.0	8/2020	8/2020
Beaver Valley	Energy Harbor Nuclear Corp	Energy Harbor Corp	Uranium	1,872.0	9/1976	11/1987
Limerick	Exelon Nuclear	Constellation Energy Corp.	Uranium	2,368.2	2/1986	1/1990
Peach Bottom	Constellation Energy Corp.	Constellation Energy Corp.	Uranium	2,694.8	7/1974	12/1974
Susquehanna Nuclear	Susquehanna Nuclear, LLC	Riverstone Holdings LLC	Uranium	2,494.0	6/1983	2/1985

Table C-2 Electric Generating Facilities in Pennsylvania (cont'd)

Power Plant	*Owner Name*	*Ultimate Parent*	*Fuel Type*	*Operating Capacity (MW)*	*First Unit Online*	*Last Unit Online*
Allegheny 5	Ontario Power Generation Inc.	Province of Ontario	Water	10.0	10/1988	10/1988
Allegheny 6	Ontario Power Generation Inc.	Province of Ontario	Water	12.0	11/1988	11/1988
Conemaugh Hydroelectric	Pennsylvania Renewable Resourc	Pennsylvania Renewable Resourc	Water	15.0	2/1989	2/1989
Holtwood Hydroelectric Plant	Talen Energy Supply LLC	Riverstone Holdings LLC	Water	249.0	10/1910	11/2013
Kinzua Pumped Storage Project (Seneca)	PE Hydro Generation LLC	LS Power Group	Water	482.0	1/1970	1/1970
Mahoning Creek	Ontario Power Generation Inc.	Province of Ontario	Water	6.7	12/2013	12/2013
Muddy Run Pumped Storage Facility	Exelon Power Corp	Constellation Energy Corp.	Water	1,070.0	4/1967	2/1968
Piney	Brookfield Power Piney & Deep	Brookfield Power Piney & Deep	Water	33.2	6/1924	2/1928
Safe Harbor	Safe Harbor Water Power Corp.	Brookfield Renewable	Water	417.5	12/1931	4/1986
Townsend Hydro	Beaver Falls Municipal Authori	Beaver Falls Municipal Authori	Water	4.2	10/1987	10/1987
Wallenpaupack	Brookfield Renewable	Brookfield Renewable	Water	44.0	6/1926	6/1926
Warrior Ridge Hydroelectric	American Hydro Power Co.	American Hydro Power Co.	Water	2.8	12/1985	12/1985
Wm F Matson Generating Station	Allegheny Electric Coop	Allegheny Electric Coop	Water	21.7	6/1988	6/1988
York Haven	Ontario Power Generation Inc.	Province of Ontario	Water	19.0	12/1905	12/1905
Yough Hydro Power	D/R Hydro Co.	D/R Hydro Co.	Water	12.2	12/1989	12/1989
Allegheny Ridge Wind Farm	Allegheny Ridge Wind Farm LLC	OMERS Administration Corp.	Wind	80.0	6/2007	6/2007
Armenia Mountain Wind	ALLETE Clean Energy	ALLETE Inc.	Wind	100.5	12/2009	12/2009
Big Level Wind Project (Cunningham)	TransAlta Renewables Inc.	TransAlta Corp	Wind	90.0	12/2019	12/2019
Casselman Wind	Avangrid Renewables LLC	Iberdrola SA	Wind	34.5	12/2007	12/2007
Chestnut Flats Windfarm	Chestnut Flats Lessee Llc	France	Wind	38.0	12/2011	12/2011
Highland Wind Project (Krayn Wind)	Cambria Wind LLC	Corporación Masaveu	Wind	62.5	8/2009	8/2009
Laurel Hill	Laurel Hill Wind Energy	Duke Energy Corp	Wind	69.0	9/2012	9/2012
Locust Ridge II	Avangrid Renewables LLC	Iberdrola SA	Wind	102.0	5/2009	5/2009
Locust Ridge Wind Farm	Avangrid Renewables LLC	Iberdrola SA	Wind	26.0	2/2007	2/2007
MATS Wind	Electric City Wind Power Corp.	Electric City Wind Power Corp.	Wind	0.6	2008	2008
Mehoopany Wind	BP Wind Energy North America	BP p.l.c.	Wind	140.8	12/2012	12/2012
Meyersdale Wind Project	GlidePath Power Solutions	Quinbrook Infrastructure Ptnrs	Wind	30.0	12/2003	12/2003
Mill Run Wind Farm	GlidePath Power Solutions	Quinbrook Infrastructure Ptnrs	Wind	15.0	12/2001	12/2001
North Allegheny Wind	Duke Energy Generation Service	Duke Energy Corp	Wind	70.0	9/2009	9/2009
Ringer Hill Wind Farm	Skyline Renewables LLC	Skyline Renewables LLC	Wind	38.3	12/2016	12/2016
Sandy Ridge Wind Farm	Gamesa Wind US LLC	Siemens Energy AG	Wind	48.2	2/2012	2/2012
Somerset Wind Project	GlidePath Power Solutions	Quinbrook Infrastructure Ptnrs	Wind	9.0	12/2001	12/2001
South Chestnut Wind Project	Avangrid Renewables LLC	Iberdrola SA	Wind	50.4	4/2012	4/2012
Stony Creek Wind Farm	E.ON Climate & Renewables Nort	RWE Aktiengesellschaft	Wind	52.5	11/2009	11/2009
Turkey Point Wind Project (Frey Farm Wind)	Talen Renewable Energy	Energy Power Partners LLC	Wind	3.2	1/2011	1/2011
Twin Ridges Wind Farm	Senvion GmbH	Centerbridge Partners L.P.	Wind	139.4	12/2012	12/2012
Waymart Wind Farm	GlidePath Power Solutions	Quinbrook Infrastructure Ptnrs	Wind	64.5	10/2003	10/2003
Wind Park Bear Creek Project	Wind Park Bear Creek LLC	JPMorgan Chase & Co.	Wind	24.0	3/2006	3/2006

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