PAPUC

Electric Power Outlook for Pennsylvania 2023-2028

August 2024

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.

Pennsylvania Public Utility Commission

ELECTRIC POWER OUTLOOK FOR PENNSYLVANIA 2023–2028

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Executive Summary

Introduction

Section 524(a) of the Public Utility Code (Code) requires jurisdictional electric distribution companies (EDCs) to submit annually 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.

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 2033, 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 2024, the PJM reserve margin requirement is 14.7% with an anticipated reserve of 36.8%, as compared to a reserve margin requirement of 14.8% and anticipated available reserve of 35.7% in 2023. NERC also projects PJM will have enough generation capacity to meet its reserve margin requirements through 2033 but notes that there is potential for resource adequacy risks to emerge in PJM as we approach 2033 and beyond. PJM has found risks due to the potential mismatch between retirements, load growth and the pace of new generation entry.[5]

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 and heat. 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 and heat events. As noted in Section 1 of this report under the NERC subsection,

[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, *2023 Long-Term Reliability Assessment*, December 2023, available at: https://www.nerc.com/pa/RAPA/ra/Pages/default.aspx.

extreme weather, and especially extreme cold weather, can have significant impacts on electric generation.

Section 1 of this report also details how both NERC and PJM are studying and evaluating the impact of accelerating deployment of renewable and variable energy resources (VER) on the bulk power system (BPS). This acceleration, in conjunction with the continued retirement of thermal resources (coal, gas, etc.), can put stress on the continuing reliability of the BPS if there is not adequate planning by BPS owners/operators and helpful policies enacted by state and federal decision makers.

Pennsylvania's aggregate electrical net energy usage (residential, commercial, industrial, sales for resale, and other) in 2023 was 138,744 gigawatt hours (GWh) as compared to: 143,511 GWh in 2022; 142,827 GWh in 2021; 139,185 GWh in 2020; and 138,042 GWh in 2019. Year-over-year (YOY) electric usage decreased by -3.44%. In general, residential, commercial, and industrial usage changed YOY by -6.74%, -2.55% and -0.40%, respectively. Pennsylvania's 2023 GDP saw a smaller YOY increase of 5.84%, as compared to 2022 when the GDP experienced a YOY increase of 7.98%.[6]

The total average annual aggregate five-year energy usage growth projection for the residential, commercial, and industrial classes is projected to increase by 0.76% per year. This includes an annual growth rate for residential of 1.39%, a commercial growth rate of 0.64%, and an industrial growth rate increase of 0.22% for the entire five-year projected period.

[6] 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 2023-2028* discusses the current and future electric power supply and demand needs 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.

Note that by the Order entered on Dec. 7, 2023, the Commission granted certain approvals and certificates of public convenience for the unification of the four FirstEnergy Company EDCs that operated in Pennsylvania (Metropolitan Edison Company, Pennsylvania Electric Company, Pennsylvania Power Company, and West Penn Power Company) into one EDC, FirstEnergy Pennsylvania Electric Company (FE PA).[7] The former EDCs are now rate districts of FE PA. FE PA assumed all responsibilities and requirements of the former EDCs, including, *inter alia*, for electric reliability (for reliability performance and reporting requirements).[8] FE PA reports as one EDC but reports data for each rate district. In order to avoid confusion and to allow comparison to previous electric reliability reports, the FE PA rate districts are referred to as EDCs throughout this report.

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.[9]

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 2023-2028. The state's seven largest EDCs[10] 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.

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[7] *See, Joint Application of Metropolitan Edison Company, Pennsylvania Electric Company, Pennsylvania Power Company, West Penn Power Company, Keystone Appalachian Transmission Company, Mid-Atlantic Interstate Transmission, LLC, and FirstEnergy Pennsylvania Electric Company*, at Docket Nos. A-2023-3038771, et al.

[8] *Id. See also,* at the same Docket Nos., *Joint Petition for Approval of Settlement of All Issues*, filed Aug. 30, 2023, and *Recommended Decision of Administrative Law Judge Conrad A. Johnson and Administrative Law Judge Emily I. DeVoe*, dated Oct. 19, 2023.

[9] The reports are available at : http://www.puc.pa.gov/utility_industry/electricity/electric_reports.aspx.

[10] Those EDCs with at least 100,000 customers.

Data for the report is submitted annually by EDCs, pursuant to the Commission's regulations.[11] Additionally, the Commission relies on reports and analyses of regional entities, including 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 NERC, which is subsequently forwarded to the U.S. Energy Information Administration (EIA).

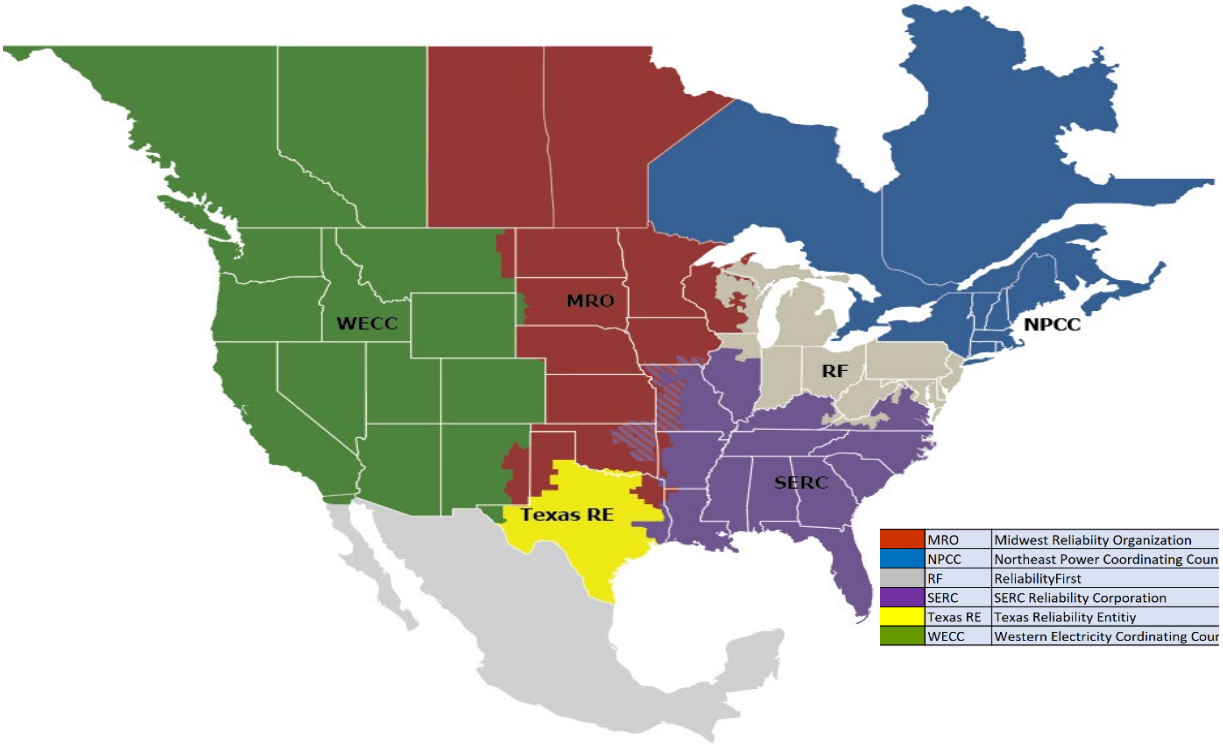
Regional Reliability Organizations

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

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 1,071 gigawatts (GW) and supplied over 4,687 gigawatt hours (GWh) of electricity in 2023. 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.[12]

North American Electric Reliability Corporation NERC Regional Reliability Entities

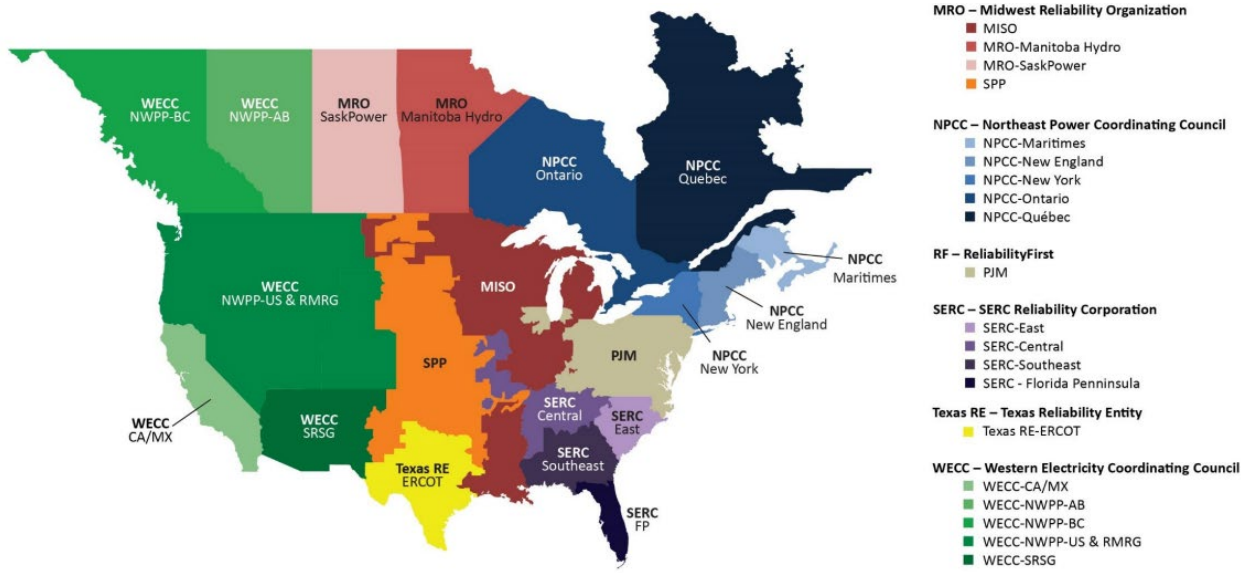


[11] *See,* 52 Pa. Code §§ 57.141—57.154.
[12] *See,* NERC, *2024 State of Reliability*, available at: https://www.nerc.com/pa/RAPA/PA/Performance%2520Analysis%2520DL/NERC_SOR_2024_Overview.pdf.

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 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 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 *2023 Long–Term Reliability Assessment*[13] (LTRA) is NERC's independent assessment and comprehensive report on the adequacy of planned North American 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 indicated that the findings presented in the LTRA are vitally important to understanding the reliability risks to the North American BPS as it is currently

[13] *See,* NERC, *2023 Long-Term Reliability Assessment*, December 2023, available at: https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2023.pdf.

planned and being influenced by government policies, regulations, consumer preferences, and economic factors.

NERC reported that the North American BPS is on the cusp of large-scale growth, bringing reliability challenges and opportunities to a grid that was already amid unprecedented change due to the increasing amounts of renewable and variable energy resources (VER), *i.e.*, solar, wind, solar storage, etc. NERC noted that key measures of transmission development and future electricity peak demand and energy needs, which it tracks and reports annually in the LTRA, are rising faster than at any time in the past five or more years. New resource projects continue to enter the interconnection planning process at a faster rate than existing projects are concluded; this increases the backlog of resource additions and prompts some RTOs and Independent System Operators (ISOs) to adapt their processes to manage expansion. The industry faces mounting pressures to keep pace with accelerating electricity demand, energy needs, and transmission system adequacy as the resource mix transitions.

Capacity and Risk Assessment

NERC noted that the LTRA found clear evidence of growing resource adequacy concerns over the next 10 years. Capacity deficits are projected in areas where future generator retirements are expected before enough replacement resources are in service to meet rising demand forecasts. Energy risks are projected in areas where the future resource mix could fail to deliver the necessary supply of electricity under energy-constrained conditions.

For example, NERC noted that subfreezing temperatures can create energy-limiting conditions by disrupting the natural gas fuel supplies to generators, leading to fuel-related derates or outages and potentially insufficient electricity supply. NERC stated that disruptions in electricity supplies can further exacerbate the availability of natural gas, which is dependent on the delivery of this electrical energy. Periods of low wind are another example of potentially energy-constrained conditions if the resource mix is not sufficiently balanced with dispatchable resources to prevent electricity shortfalls. NERC noted that while the outlook is improving for some assessment areas where resource additions and delayed generator retirements are alleviating previously identified near-term supply shortfalls, a growing number of areas in the BPS face resource capacity or energy risks over this assessment period. NERC classifies the risk categories as High, Elevated, and Normal Risk. The RTO that manages the BPS in Pennsylvania, PJM, is in the Normal Risk Areas. However, as detailed in the *Energy Transition in PJM* section below, PJM is studying the potential impact on reliability due to the substantial integration of renewable generation resources.

- High Risk Areas: The NERC LTRA states that most of the 20 assessment areas are projected to have adequate electricity supply resources to meet demand forecasts associated with normal weather. However, the MISO and SERC-Central areas 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, NERC noted that market responses to higher capacity prices in 2022 and new resource additions have overcome the planning reserve deficits that were projected to occur in 2023 and reported in the 2022 LTRA. The 2023 LTRA noted that MISO's summer anticipated reserve margin (ARM) is projected to be above Reference Margin Levels (RML) established by Midcontinent Independent System Operator (MISO) for reliability through the 2027 summer. However, beginning in 2028, MISO is projected to have a 4.7 GW shortfall if expected generator retirements occur, despite the addition of new resources that total over 12 GW.

- In the SERC-Central area NERC noted that there is a potential shortfall in planned reserves over the 2025–2027 period as demand forecasts increase faster than the transitioning resource mix grows. SERC-Central will add over 7 GW of natural gas generation and retire over 5 GW of coal generation over the period. Nearly 4 GW of BPS-connected solar projects are expected in the next 10 years. The period of projected shortfall is occurring in a mid-point of the assessment period from generator retirements that are currently slated to take place before new resources are added. SERC-Central was not identified as a risk area in the 2022 LTRA.

- Elevated Risk Areas: NERC noted that extreme temperatures and prolonged severe weather conditions are increasingly impacting the BPS. Extreme heat and subfreezing temperatures can impact the BPS by increasing electricity demand and threatening electricity supplies by forcing vulnerable generation offline and simultaneously disrupting the flow of the natural gas fuel supply to generators. While a given assessment area may have sufficient capacity to meet resource adequacy requirements, it may not have sufficient availability and energy from resources during extreme and prolonged weather events and abnormal atmospheric conditions, *i.e*., smoke, smog, and wind extremes that affect output from solar and wind resources. Therefore, long-duration extreme weather events increase the risk of electricity supply shortfalls.

  - NERC noted that as forecasted peak electricity demand rises across the BPS, many areas are also experiencing increasing complexity in load models that adds to operating risk. Extreme heat and cold temperatures and irregular weather patterns can cause demand for electricity to deviate significantly from historical forecasts. Electrification of the heating sector is increasing temperature-sensitive load components while increasing levels of variable-output solar photovoltaic (PV) distributed energy resources (DER) add to the load forecast uncertainty. Underestimating electricity demand prior to the arrival of extreme temperatures can lead to ineffective operations planning and insufficient resources being scheduled. Generator performance and fuel issues are more likely to occur when generators are called upon with short notice; this can expose Balancing Authorities (BA) to potential resource shortfalls. Electrification and DER trends can be expected to further contribute to demand growth and sensitivity to weather patterns.

  - 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, WECC-British Columbia, Texas RE-ERCOT, NPCC-Maritimes, NPCC-New England, NPCC-New York, NPCC-Ontario, and SPP. Further details on each of the Elevated Risk Areas can be found in the LTRA.

- Normal Risk Areas: NERC noted that in these areas, resource adequacy criteria are met, and it is unlikely for electricity supply shortfalls to occur even when demand is above forecasts or resource performance is abnormally low, *e.g.*, above-normal forced outages or low VER performance. PJM is in the Normal Risk Areas.

Emerging Issues

While developing the LTRA, NERC noted that it and the industry considered trends and developments that have the potential to impact the future reliability of the BPS over the next 10 years and beyond. Discussed below are emerging issues and trends not previously covered in LTRAs that have the potential to impact future long-term projections or resource availability and operations.

- Cryptocurrency Impacts on Load and Resources: Due to unique characteristics of the operations associated with cryptocurrency mining, potential growth can have a significant effect on demand and resource projections as well as system operations. Computer operations for cryptocurrency mining are energy intensive, and mining operators can interrupt or scale operations in response to energy costs. RE-ERCOT continues to see a large volume of interconnect requests from cryptocurrency mining: 9 GW have had planning studies approved of 41 GW that are currently requested. This new category of large flexible loads is leading some areas to update load forecasting methods to capture the flexibility and price-responsiveness of cryptocurrency mining operations. In anticipation of further growth in large flexible loads, RE-ERCOT and its stakeholders are assessing further operational issues that could emerge, such as the effect on system frequency of sudden changes in large flexible loads.

- Blackstart Resources for Restoration in Extreme Conditions: Blackstart generation resources are a critical element of BPS resilience that enables the orderly restoration of grid sections following a blackout.[14] System restoration plans rely on the ability of designated fossil-fuel generators to provide blackstart service. Recent extreme winter weather has exposed vulnerabilities to generating units and fuel sources that are not adapted to cold temperatures, raising concerns for blackstart unit readiness. The changing resource mix is cause for additional awareness of blackstart capabilities. Currently, few inverter-based resources (IBRs) on the system, such as solar and wind, are capable of grid forming control, one of the necessary components for blackstart resources. Industry is working to incorporate IBR grid-forming technology to address system stability and performance needs, apart from blackstart capabilities.

[14] A blackstart resource is a generating unit(s) and its associated set of equipment which has the ability to be started without support from the BPS or is designed to remain energized without connection to the remainder of the BPS, with the ability to energize a bus, meeting the transmission operator's restoration plan needs for real and reactive power capability, frequency and voltage control, and that has been included in the transmission operator's restoration plan.

- Distribution Transformer Supply Chains: NERC noted that the electric industry reported that distribution transformers are in short supply as manufacturer production is unable to keep pace with demand; lead times often exceed two years. NERC stated that low inventories of replacement distribution transformers could slow restoration efforts following hurricanes and severe storms. New efficiency standards for distribution transformers proposed by the U.S. Department of Energy could further exacerbate the transformer supply shortages by adding new requirements on manufacturers.

- Localized Load Growth: NERC noted that some areas are experiencing concentrated load growth from industrial and commercial development. Examples of large industrial loads include data centers, smelters, manufacturing centers, hydrogen electrolyzers, and future electrified mass transit or shipping charging stations. Adding large parcels of load on the system can add new uncertainties to peak and hourly load forecasting.

Continuing Resource Mix Changes and Reliability Implications

NERC noted that wind, solar PV, and hybrid generation are projected to be the primary additions to the resource mix over the 10-year assessment period. NERC stated that this drives the continued energy transition as older thermal generators retire. NERC noted that maintaining a reliable BPS throughout the transition requires unwavering attention to ensure the resource mix satisfies capacity, energy, and essential reliability service (ERS) needs under designed conditions.[15] It will also require significant planning and development of the interconnected transmission system to have a deliverable electricity supply from new resources to changing types of loads and the ability to withstand system contingencies.

NERC accounted for over 83 GW of fossil-fired and nuclear generator retirements that are currently anticipated through 2033. An additional 30 GW of fossil-fired generators have announced plans to retire over the decade but have yet to enter deactivation processing with the planning authorities. NERC noted that these additional retirements can exacerbate energy, capacity, or ERS issues in the High Risk and Elevated Risk Areas and potentially affect the projected sufficiency of resources in the Normal Risk Areas. NERC stated that regulators and policymakers need to consider effects on the electric grid in their rules and policies and design provisions that safeguard grid reliability because energy policies that are overly rigid and lack provisions for electric grid reliability have the potential to influence generators to seek deactivation despite a projected resource adequacy or operating reliability risk.

Trends and Implications for Reliability

- Demand Trends: NERC noted that electricity peak demand and energy growth forecasts over the 10-year assessment period are higher than at any point in the past decade. Electrification and projections for growth in electric vehicles (EV) over this assessment period are a component of the demand and energy estimates provided by each assessment

[15] ERS are those resources that provide sufficient voltage control, frequency support, and ramping capability to the BPS. For more detail, see here: https://www.nerc.com/comm/Other/essntlrlbltysrvcstskfrcDL/ERSTF%20Framework%20Report%20-%20Final.pdf.

area. Since the 2022 LTRA, the peak season compound area growth rate has risen in nearly all assessment areas, contributing to an overall trend to lower reserve margins. NERC stated that some of the sharpest peak demand forecast increases and growth rates can be seen in winter seasons as heating system and transportation electrification influence forecasts. Dual-peaking or changing from summer to winter peaking is anticipated in several areas, requiring resource and system planners to shift the focus of adequacy planning. Planners and operators can prepare by considering robust demand and energy scenarios, carefully monitoring and refining demand forecasts, and developing operational tools for peak load management.

- Transmission Trends: NERC noted that the number of BPS transmission projects reported to it as under-construction or in-planning-for-construction over the next 10 years has increased, indicating an overall increase in transmission development. New transmission projects are being driven to support new generation and enhance reliability. Siting and permitting challenges continue to inflict delays in transmission expansion planning. Regional transmission planning processes are adapting to manage the energy transition, but impediments to transmission development remain.

NERC Conclusions and Recommendations

NERC recommended the following four actions for consideration, not in any particular order of importance.

- Add New Resources with Needed Reliability Attributes and Make Existing Resources More Dependable: As BPS resources grow to meet rising demand and the resource mix changes, IBR performance issues as well as generator and fuel vulnerabilities to extreme temperatures must be addressed to have a reliable electricity supply.

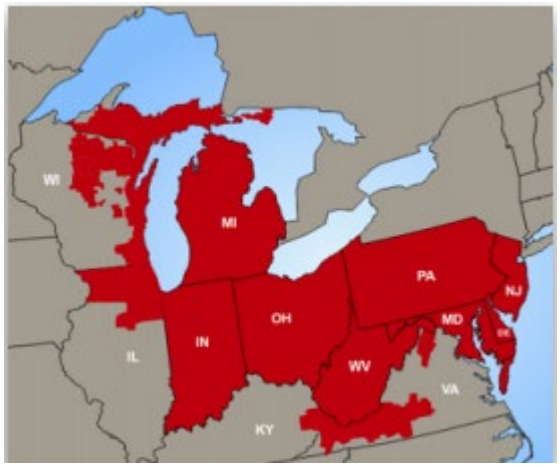
- Expand the Transmission Network to Deliver Supplies from New Resources and Locations to Serve Changing Loads: A strong, flexible transmission system that is capable of coping with a wide variety of system conditions is key for the reliable supply and delivery of electricity. The rapidly changing resource mix requires access and deliverability of new resources, including transmission availability, to maintain reliability.

- Adapt BPS Planning, Operations, and Resource Procurement Markets and Processes to the Realities of a More Complex Power System: The addition of VER and the retirement of conventional generation are fundamentally changing how the BPS is planned and operated. With electricity supplies coming increasingly from VERs and natural-gas-fired generators, there is a growing risk that supplies can fall short of demand during some periods. To ensure energy shortfall risks are identified and addressed, resource contributions to serving load must be accurately represented in resource planning and operating models as well as in the design of wholesale electricity market designs.

- Strengthen Relationships Among Reliability Stakeholders and Policymakers: Making informed policies and decisions in matters that have the potential to affect electric grid reliability requires a high level of awareness as future electricity resource reserves shrink in

the face of demand growth and the interconnected nature of the electric and natural gas systems are more pronounced.

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 87 million people in a 247,863 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.[16] Its membership includes load-serving entities (LSEs),[17] RTOs, suppliers, and transmission companies.

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.

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 2023, RFC focused on eliminating older open violations. More than 94% of open violations in the first quarter of 2024 were identified between 2022 and 2024. Consistent with prior years, more than 86% of noncompliances discovered in 2023 were either self-reported or self-logged, showing continued diligence and transparency of entities in identifying and reporting issues. The majority of the noncompliances in 2023 were compliance exceptions that were NERC Critical Infrastructure Protection (CIP)-related.[18]

[16] **See,** RFC, *ReliabilityFirst Regional Risk Assessment 2023-2024*, available at: https://www.rfirst.org/wp-content/uploads/2024/03/RF-Regional-Risk-Assessment-2023-24.pdf.
[17] 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).
[18] *See*, RFC, *2023 Impact Report*, available here: https://www.rfirst.org/wp-content/uploads/2024/06/RF-Impact-Report-2023.pdf.

Regional Transmission Organization: PJM Interconnection

The two RTOs within the RFC footprint are PJM and 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 electric power generators with more than 180,000 megawatts (MW) of generating capacity. PJM's peak customer load of 165,563 MW was recorded during Summer of 2006. According to the 2024 Summer forecast, PJM is prepared to serve a forecasted summer peak demand for electricity of approximately 151,000 MW, but has performed reliability studies at even higher loads in excess of 164,000 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 its associated infrastructure and for managing changes and additions to the grid to accommodate both new and deactivating generating plants. 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, 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 follows:[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

[19] *See,* PJM, *2023 PJM Annual Report,* available at: https://services.pjm.com/annualreport2023/.
[20] *See,* PJM, https://www.pjm.com/-/media/about-pjm/newsroom/2024-releases/20240502-pjm-summer-outlook-adequate-resources-available-to-meet-summer-demand-under-anticipated-conditions.ashx.
[21] http://www.pjm.com/about-pjm/who-we-are.aspx.

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 1,090 at the end of 2023. In 2023, the PJM market amount billed decreased to $48.6 billion as compared to: $86.3 billion in 2022; $54.1 billion in 2021; $36.2 billion in 2020; $39.2 billion in 2019; and $49.8 billion in 2018.[22]

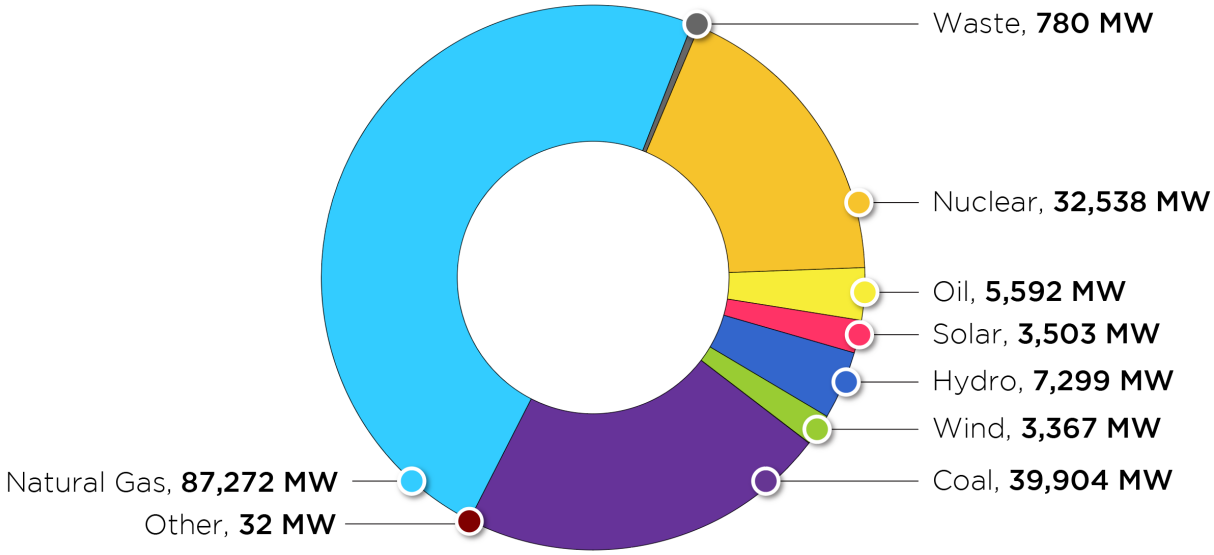
In terms of generator deactivations, more than 36,000 MW of coal-fired generation has retired since 2011. The economic impacts of environmental public policy, coupled with the age of these plants − many more than 40 years old – make ongoing operation prohibitively expensive.

Throughout 2023, PJM received 30 generator deactivation notices totaling 5,885 MW, as compared to: 5,119 MW in 2022; 10,607 MW in 2021; 4,428 MW in 2020; 7,650 MW in 2019; and 10,882 MW in 2018.

As of Dec. 31, 2023, PJM's 180,287 MW of eligible existing installed capacity reflects a fuel mix comprising 48.4% natural gas, 22.1% coal and 18.1% nuclear, as shown in Figure 1 below. Hydro, wind, solar, oil, waste fuels, and other constitute the remaining approximate 12%. Nameplate capacity values represent the full power output of the generators.[23]

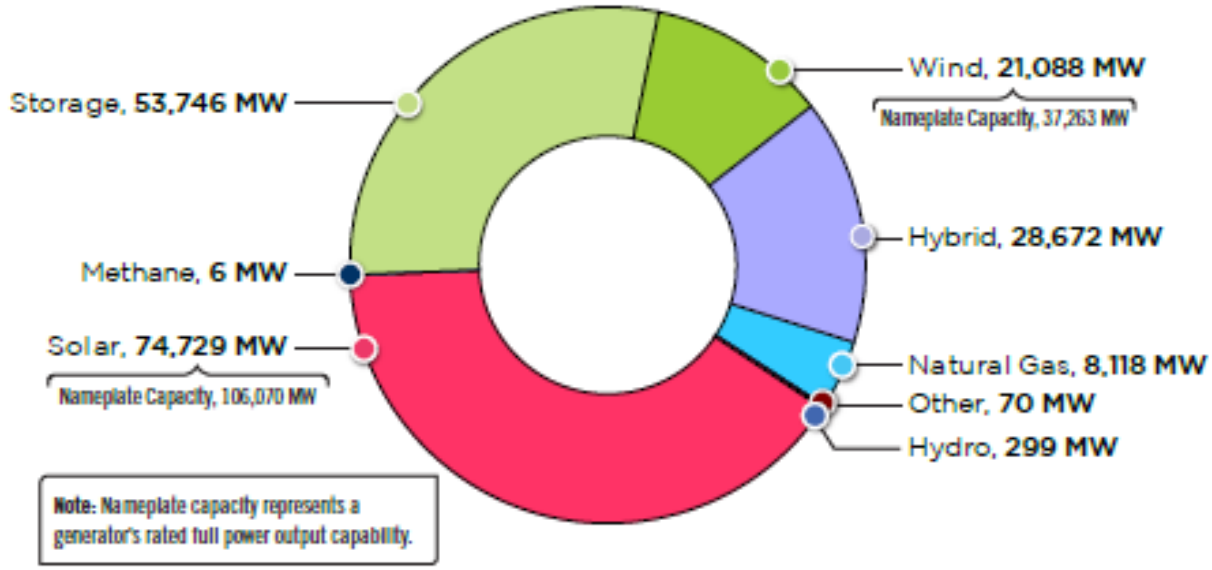
[22] *See,* PJM, *2023 PJM Annual Report,* available at: https://services.pjm.com/annualreport2023/.
[23] *See,* PJM, *PJM 2023 Regional Transmission Expansion Plan Report*, Book 1, available at: https://www.pjm.com/-/media/library/reports-notices/2023-rtep/2023-rtep-report.ashx, and *2023 Pennsylvania State Infrastructure Report*, available at: https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2023/pennsylvania.ashx.

Figure 1: Existing Installed Capacity Mix within PJM as of Dec. 31, 2023



Totaling over 125,000 MW of Capacity Interconnection Rights (CIRs), renewable and hybrid fuels are changing the landscape of PJM's interconnection queue. Solar energy and storage make up approximately 68.8% 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 as of Dec. 31, 2023.[24]

Figure 2: PJM Interconnection Service Request Generation Fuel Mix – Requested CIRs



[24] *See,* PJM, PJM 2023 Regional Transmission Expansion Plan Report, Book 1, available at: https://www.pjm.com/-/media/library/reports-notices/2023-rtep/2023-rtep-report.ashx.

PJM Load Growth and Projections

Net energy for load growth for the PJM RTO is projected to average 2.3% per year over the next 10-year period, and 2.2% over the next 15 years. Total PJM RTO energy is forecasted to be 1,021,955 GWh in 2034, a 10-year increase of 208,627 GWh, and 1,120,928 GWh by 2039, a 15-year increase of 307,600 GWh. Annualized 10-year growth rates for individual transmission zones in PJM range from 0.1% to 7.3% with a median of 0.7%.[25]

Summer peak load growth for the PJM RTO is projected to average 1.6% per year over both the next 10-year and 15-year periods. The PJM RTO summer peak is forecasted to be 176,822 MW in 2034, which is a 10-year increase of 25,575 MW, and the summer peak reaches 190,752 MW in 2039, which is a 15-year increase of 39,505 MW. Annualized 10-year growth rates for individual zones range from 0% to 5.5% with a median of 0.5%.

Winter peak load growth for PJM RTO is projected to average 1.9% per year over the next 10-year period, and 1.8% over the next 15 years. The PJM RTO winter peak load for the 2033/34 winter is forecasted to be 163,069 MW, which is a 10-year increase of 28,410 MW, and the winter peak reaches 176,195 MW in 2038/39 winter, which is a 15-year increase of 41,536 MW. Annualized 10-year growth rates for individual zones range from 0% to 5.0%, with a median of 0.7%.[26]

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.

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[25] *See,* PJM, *PJM Load Forecast Report January 2024,* available at https://www.pjm.com/-/media/library/reports-notices/load-forecast/2024-load-report.ashx.

[26] *Id.*

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**:** [27]

- Existing Capacity: generating capacity in 2023 Pennsylvania totaled 44,889 MW as compared to: 46,977 MW in 2022; 47,633 MW in 2021; 46,941 MW in 2020; 44,705 MW in 2019; and 44,660 MW in 2018.

- Natural gas represents approximately 52% of the total installed capacity in the Pennsylvania service territory while coal represents approximately 16.8% and nuclear 19.9%. See Figure 3 below. In the PJM region, natural gas and coal are 48.4% and 22.1% of total installed capacity, respectively, while nuclear represents 18.1%. In terms of actual electrical generation in 2023 for Pennsylvania, natural gas generated 55.2% of the load, coal 9.3% and nuclear 33.6%. See Figure 4 below.

- Interconnection Requests: Solar represents 74% of new interconnection requests in Pennsylvania, and storage represents 24%, while natural gas represents less than 1% of new requests. See Figure 5, below.

- Deactivations: 1,937 MW[28] in Pennsylvania gave notification of deactivation in 2023, as compared to: 832 MW in 2022; 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) 2023**:** Pennsylvania's 2023 RTEP project total represents approximately $898.47 million in investment, as compared to Pennsylvania's 2022 RTEP projects that totaled $664.35 million. A listing of PJM RTEP projects, and those specific to Pennsylvania, may be found in PJM's RTEP.[29] 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.[30]

- Load Forecast: Depending on the transmission zone, Pennsylvania's summer peak load growth is projected to range between 0.1% and 2% annually over the next ten years, while the winter peak load growth is projected to range between 0.1% and 2.1% annually over the next ten years.

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[27] *See,* PJM, *2023 Pennsylvania State Infrastructure Report,* available at: https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2023/pennsylvania.ashx.

[28] Note that a total of 2,696.6 MW total gave notice in 2023, but only 1,937 MW actually deactivated in 2023. 760 MW will deactivate in 2025.

[29] *Id.*, Pennsylvania-specific information begins on page 204.

[30] See here: https://www.pjm.com/planning/m/project-construction.

- Calendar Year 2023 Market Performance: Pennsylvania's average hourly locational marginal prices (LMPs) were generally lower than the PJM average hourly LMP.

- No Base Residual Auction (BRA) was conducted in 2023, but the most recent auction results are below.

- 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 2023/24 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 2024/25 Base Residual Auction.

- 2025/26 Capacity Market: Pennsylvania's service territory cleared at the RTO price of $269.92/MW-day. The BGE zone in Maryland and the Dominion zones in Virgina and North Carolina cleared at $466.35/MW-day and $444.26/MW-day, respectively. The higher prices for those zones were due to insufficient resources inside those regions and constraints on the transmission system that limit the ability to import capacity. PJM noted that the higher clearing price of the 2025/26 BRA could be perceived as the market sending a price signal that should incentivize more investment in generation resources. Note that capacity is just one factor in the price of electric to the end-use customer and it is not clear at this time what the impact will be of the higher BRA prices.[31]

- Emissions: Pennsylvania's average CO2 emissions decreased in 2023 as compared to the 2022 levels.

[31] PJM, *PJM Capacity Auction Procures Sufficient Resources To Meet RTO Reliability Requirement*, available here: https://insidelines.pjm.com/pjm-capacity-auction-procures-sufficient-resources-to-meet-rto-reliability-requirement/.

Figure 3: Pennsylvania Installed Electric Generation Capacity by Fuel Type as of Dec. 31, 2023

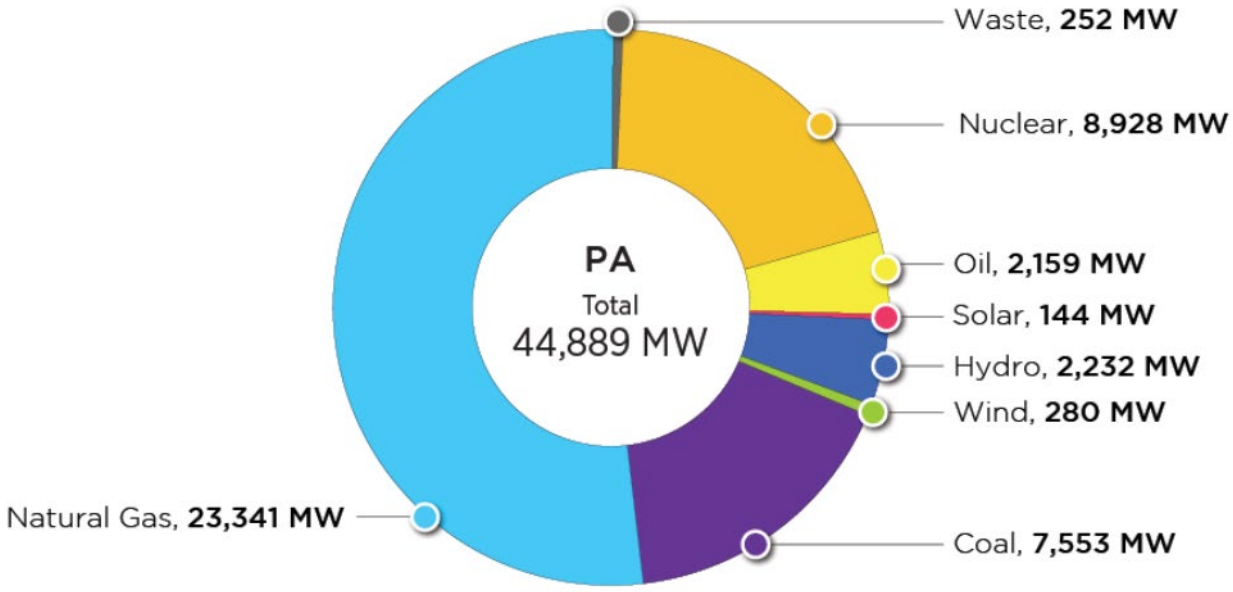


Figure 4: Pennsylvania Electric Generation by Fuel Type as of Dec. 31, 2023

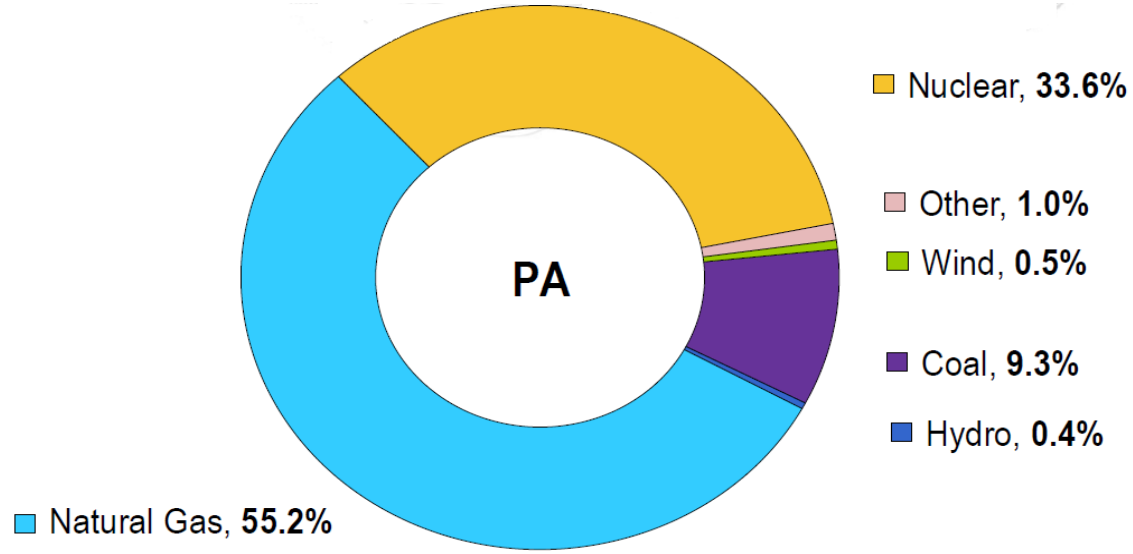
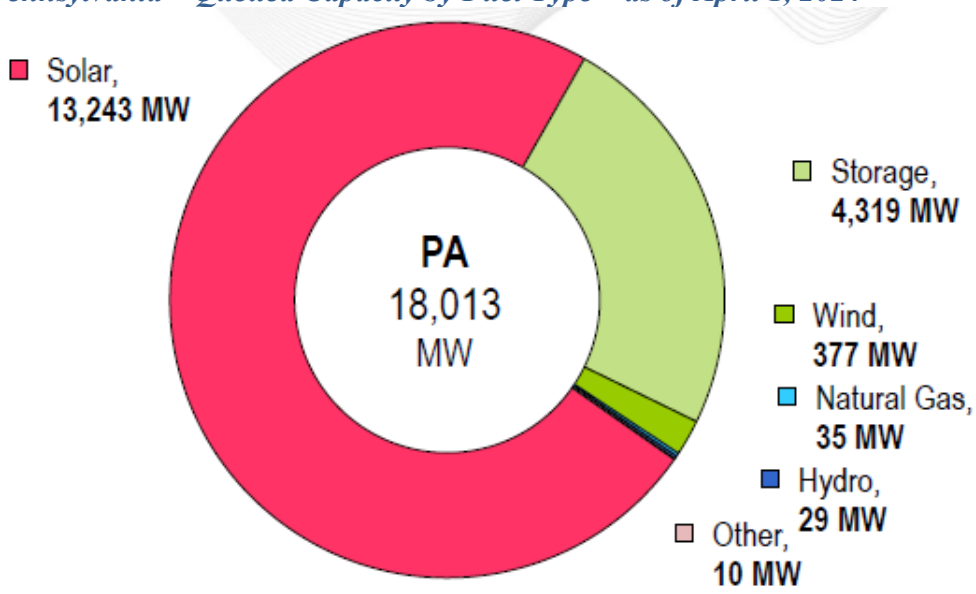


Figure 5: Pennsylvania – Queued Capacity by Fuel Type – as of April 1, 2024 [32]



Energy Transition in PJM[33]

On Jun. 24, 2024, PJM released its fourth installment in its multiphase effort to study the impacts of renewable integration and is intended to continue to inform stakeholders and policymakers. The first two phases of the study focused on energy and ancillary services, essential reliability services, and impacts to Effective Load Carrying Capability (ELCC) in 2035 and beyond. The third phase focused on resource adequacy in the near term through 2030 and raised concerns about a mismatch between retirements, demand growth and the pace of new generation entry.[34] The fourth phase of PJM's effort shifted focus to the longer term to identify and examine the challenges that may arise if current state and federal energy policy goals are met or accelerated. PJM used certain assumptions to represent the evolving system outlook for 2035, including modeling of retirements and the rate of renewable integration in neighboring regions and the resulting impact on regional interchange.

PJM's assumptions reflected evolving energy and environmental policies. This resulted in three scenarios: Base, Policy and Accelerated. PJM assumed that carbon-free generation served 40%, 54% and 93% of annual energy in each scenario, respectively.[35] This was increased from PJM's second phase study where the assumptions were 40%, 50% and 70%, respectively. The Base

[32] *See*, PJM, *2023 Pennsylvania State Infrastructure Report*, available at: https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2023/pennsylvania.ashx.
[33] All information in the following section is based on the PJM report, *Energy Transition in PJM: Flexibility for the Future*, available at: https://www.pjm.com/-/media/library/reports-notices/special-reports/2024/20240624-energy-transition-in-pjm-flexibility-for-the-future.ashx.
[34] All of the previous reports on energy transition may be found in the "Special Reports" section of PJM's website page on reports and notices, available here: https://www.pjm.com/library/reports-notices.aspx.
[35] Carbon-free generation includes wind, solar, storage, solar-storage hybrid, hydro and nuclear generation. Renewable generation excludes nuclear and stand-alone storage.

scenario provided a benchmark for today's system. The Policy scenario reflected existing state and federal policies coming to fruition by 2035. The Accelerated scenario aimed to simulate a more stressed view of the system with generation expansion and retirement beyond existing policies.

Findings

PJM had the following three findings in its report:

- Accelerating the Pace of New Entry Is Critical to Maintaining Reliability: PJM continued to track concerns raised in the previous phase of these studied – that as demand growth and thermal resource retirements accelerate and the pace of development and deployment of new resources continue to lag and may result in a shortfall in supply by 2030. The findings of this study add focus to system complexity anticipated beyond 2030, as unprecedented demand growth continues with the majority of the PJM interconnection queue made up of solar, wind, storage and hybrid resources.

  In the Policy scenario, 41 GW of retiring generators (coal, natural gas and oil) were replaced by 84 GW (nameplate capacity) of new entry by wind, solar, storage and hybrids resources. This portfolio met the various policy targets while maintaining resource adequacy (one-in-10 loss-of-load expectation (LOLE)). The Accelerated scenario extended the level of retirements to 71 GW, requiring a significantly larger 275 GW of buildout of renewable and storage.

  Moving from the Policy to the Accelerated portfolio resulted in the less-than-doubling of the amount of resource retirements, which required a quadrupling of the amount of new entry needed to maintain the same level of resource adequacy (84 GW as compared to 275 GW). Despite 275 GW of renewables and storage being built in the Accelerated scenario, 79 GW of flexible thermal resources are still needed to maintain resource adequacy at one-in-10 LOLE. This highlights that substituting thermal resources with renewable generation may get significantly more challenging as the energy transition progresses.

  Note that the demand in each scenario reflected growth from end-use electrification, electric vehicles and data centers. PJM noted that recent history of this anticipated growth has proven unprecedented and dynamic. Average growth estimates for PJM's summer peak, for example, have increased by 375% between the 2022 and 2024 load forecasts – from 0.4% per year to 1.6% per year. This trend adds to the complexity of ensuring reliability through the energy transition.

- Interregional Transfer Capability Is Increasingly Important: PJM found that increasing amounts of intermittent wind, solar and storage resources will change today's interactions between neighboring systems and raise new questions about the ability to lean on each other during times of system stress. To assess this, thermal retirements and renewable integration were reflected in PJM's neighboring regions alongside the trends in PJM. In the Accelerated scenario, PJM's neighbors have a total of 375 GW of wind, solar and storage, with coal, natural gas and oil down to 120 GW total.

The Policy scenario showed that adequate transfer capability exists to facilitate the renewable integration considering current state and federal policies. The large interfaces to the west were not constrained, while interfaces to the north and south bound less than 30% of the time. As the resource mix changes more substantially in the Accelerated scenario, interface limits are reached more often. As PJM and its neighbors look ahead to existing policies coming to fruition, focus must be placed not just on total transfer capability available, but on how well that existing capability is being managed and coordinated.

The ability to continue to rely on and support neighbors will require increased coordination to manage a new range of extremes with respect to interchange variability. The study showed an increase in total interchange between PJM and its neighbors of 35% between the Base and Accelerated scenarios. In addition, the Accelerated scenario showed periods where PJM went from exporting to importing 10 GW or more in small time frames. This variability is driven by increases in intermittent generation, particularly wind.

In general, the varying renewable output between PJM and its neighbors is complementary. Complementary behavior occurs in 83% of hours in the Accelerated scenario and can benefit each region's needs for balancing and ramping. This increased reliance across the Eastern Interconnection demonstrates the need for enhanced coordination and dovetails with efforts already underway between PJM and MISO.

- Multiday, Dispatchable Resources Are Needed: Increasing levels of intermittent resources create significant variability and uncertainty to be managed by flexible resources. In the Accelerated scenario, renewable generation instantaneously represented as much as 118% of the RTO load (with exports) and as little as 3% of the RTO load. From the Base to Policy scenario, natural gas resource capacity factors increased to manage thermal retirements. Moving into the Accelerated scenario, natural gas utilization decreased as the combined cycles operated as flexible peakers rather than baseload. Adding to the complexity, the need for flexible resources, in particular to meet ramping needs, varies drastically by season. Average capacity factors of the combined cycle fleet range from 5% in April to 45% in July. If the gas fleet of today remains as is, or decreases due to regulatory pressures, but additional storage resources do not get built at pace, immense pressure will be placed on natural gas to supply the ramping needs for the system. Changes to market mechanisms should be evaluated to ensure that adequate resources are incentivized to help PJM manage increasing system uncertainty and volatility.

Section 2 – Pennsylvania Electric Outlook

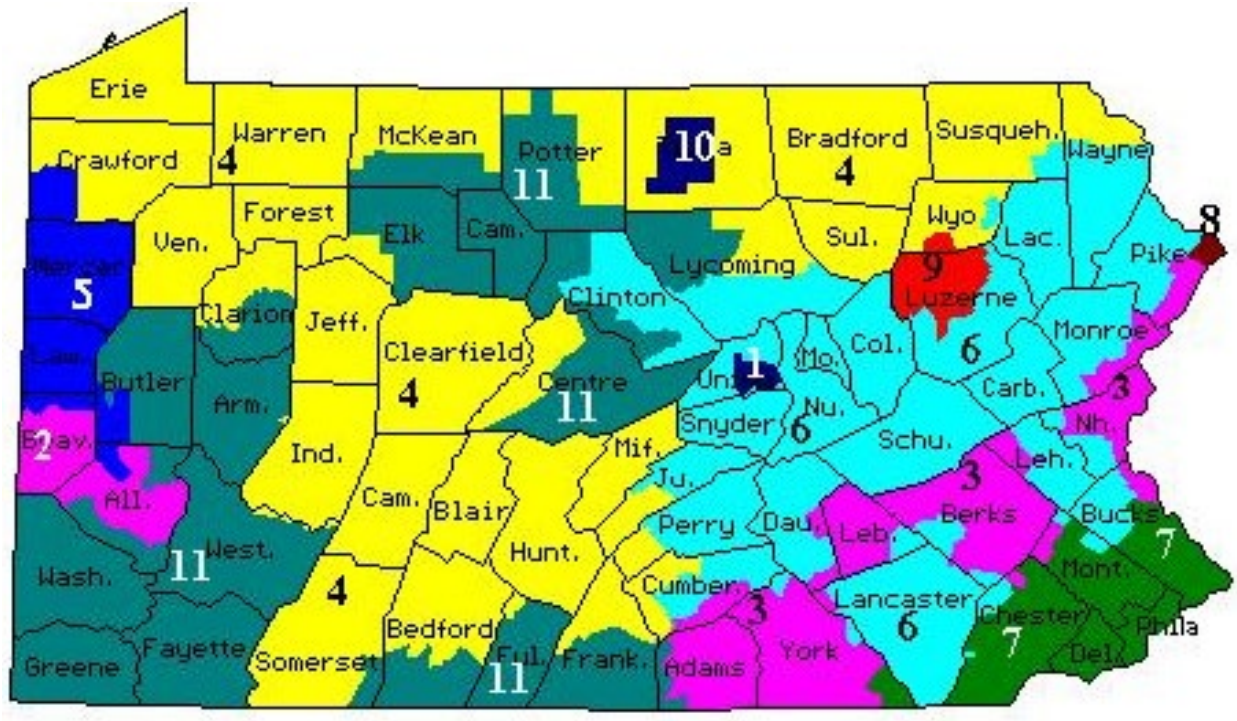
Electric Distribution Companies

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[36] shown in Figure 7 below are:

1. Citizens' Electric Company
2. Duquesne Light Company
3. Metropolitan Edison Company (FE PA)
4. Pennsylvania Electric Company (FE PA)
5. Pennsylvania Power Company (FE PA)
6. PPL Electric Utilities Corporation
7. PECO Energy Company (Exelon)
8. Pike County Light & Power Company
9. UGI Utilities Inc. – Electric Division
10. Wellsboro Electric Company
11. West Penn Power Company (FE PA)

Figure 7: Map of EDC Service Territories



[36] Note that by the Order entered on Dec. 7, 2023, at Docket Nos. A-2023-3038771, *et al*., the Commission granted certain approvals and certificates of public convenience for the unification of the four FirstEnergy Company EDCs that operated in Pennsylvania (Metropolitan Edison Company, Pennsylvania Electric Company, Pennsylvania Power Company, and West Penn Power Company) into one EDC, FirstEnergy Pennsylvania Electric Company (FE PA). In order to avoid confusion and to allow comparison to previous electric reliability reports, the FE PA rate districts are referred to as EDCs throughout this report.

Each LSE is responsible for making provisions for adequate generating resources to serve its customers. The local EDC or a Commission approved alternative Default Service Provider (DSP)[37] 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.[38]

   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.[39]

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).[40] Act 213 requires 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.[41] 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)[42] 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,

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

purchased along with the electric commodity, or purchased separately through a tradable instrument.[43]

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.[44] The regulations also provide for required metering capabilities and a compensation mechanism that reimburses customer-generators for surplus energy supplied to the electric grid.[45] Act 35 of 2007 amended Act 213 by altering the reconciliation mechanism used to compensate resellers for surplus energy supplied through net metering.[46]

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.[47]

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.[48] On April 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.[49] 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.[50]

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[43] *See,* 52 Pa. Code §§ 75.61—75.70.
[44] 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.
[45] *See,* Docket No. L-00050174; 52 Pa. Code §§ 75.11-75.15.
[46] *Id.*
[47] *See,* Docket No. L-00050175; 52 Pa. Code §§ 75.21-75.40.
[48] *See,* Docket No. L-2014-2404361; 52 Pa. Code §§ 75.1-75.72.
[49] *See,* Docket No. M-2017-2631527.
[50] *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, 2023, Pennsylvania had certified 51,925[51] alternate energy facilities, of which 43,421 are located within the state. For additional information on Alternative Energy in Pennsylvania, please visit the Commission's website.[52]

Energy Efficiency and Conservation Program (Act 129)

Act 129 of 2008[53] required the seven EDCs[54] with at least 100,000 customers[55] 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.[56]

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. 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 EDCs service territories for a potential phase IV. The SWE submitted the final EEPDR and DDR Potential Studies to the Commission on Feb. 28, 2020.[57] [58]

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[51] *See, Alternative Energy Portfolio Standards Act of 2004: Compliance for Reporting Year 2022-2023*, available here: https://pennaeps.com/reports/.

[52] http://www.puc.pa.gov/consumer_info/electricity/alternative_energy.aspx.

[53] Act 129 of 2008, effective Nov. 14, 2008; 66 Pa. C.S. §§2806.1-2806.2.

[54] 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.

[55] *See,* 66 Pa.C.S. § 2806.1.

[56] 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/

[57] *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.

[58] *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.

The EEPDR and DDR Potential Studies were released publicly via a Commission Secretarial Letter served Mar. 2, 2020.[59] 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 Jun.18, 2020, the Commission adopted the Final Implementation Order prescribing targets for Phase IV of the Act 129 EE&C Program.[60] 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.[61] For these reasons, Phase IV includes Peak Demand Reduction targets but does not include a DDR target.

Phase IV began on Jun. 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), PY 14, and the first six months of PY15 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	228,931	62	37.83
Met-Ed	463,215	312,975	76	27.09
PECO	1,380,837	819,362	256	132.11
Penelec	437,676	275,233	80	25.28
Penn Power	128,909	110,184	20	7.31
PPL	1,250,157	840,003	229	87.52
West Penn	504,951	328,500	86	26.47

PY13: Jun. 1, 2021 – May 31, 2022
PY14: Jun. 1, 2022 – May 31, 2023
PY15: Jun. 1, 2022 – May 31, 2024

[59] *See,* Secretarial Letter, at Docket No. M-2020-3015229, served Mar. 2, 2020.
[60] *See, Energy Efficiency and Conservation Program Implementation Order*, Order entered Jun. 19, 2020, at Docket No. M-2020-3015228, at 7-8.
[61] *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.[62]

The EDCs filed their semiannual reports for the third year of Phase IV, PY15, in January 2024.[63] Final annual reports for PY15 are due to the Commission by Sept. 30, 2024.

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. The SWE submitted the final residential and non-residential baseline studies to the Commission in February and March 2024.[64] The studies were released publicly via a Commission Secretarial Letter served March 25, 2024.[65]

The Commission further directed the SWE to perform an energy efficiency market potential study to inform the Commission of the energy savings potential remaining in the EDCs' service territories. This data will be used to assist the Commission to determine energy efficiency and conservation consumption reduction targets for Phase V.

In addition, the Commission tasked the SWE to conduct a demand response market potential study to determine if cost-effective demand response potential remains in the EDCs service territories for the next phase of Act 129.

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 below, Pennsylvania's Total electrical consumption energy usage (residential, commercial, industrial, sales for resale, and other) in 2023 was 138,744 GWh, as compared to: 143,551 GWh in 2022; 142,827 GWh in 2021; 139,185 GWh in 2020; and 145,090 GWh in 2019. The year-over-year (YOY) decrease for electrical usage in 2023 was -3.34%. In general, residential, commercial, and industrial usage changed YOY by -6.74%, -2.25% and -0.40%, respectively. Pennsylvania's 2023 GDP saw a smaller YOY increase of 5.84%, as compared to 2022 when the GDP experienced a YOY increase of 7.98%.[66] In 2023, the total number of electrical customers increased to 5,951,573 from 5,933,749 in 2022, which is a YOY increase of 0.30%.

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[62] *Id.* at 102-103.
[63] *See,* the EDCs semiannual reports for PY15 at: http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_information/electric_distribution_company_act_129_reporting_requirements.aspx
[64] The 2023 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/
[65] *See,* Secretarial Letter, at Docket No. M-2023-3044490, served Mar. 25, 2024.
[66] US Bureau of Economic Analysis*:* https://www.bea.gov/.

Table 2: PA EDC customers served, energy usage, and peak load (2023)

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	612,125	3,800,148	5,532,394	2,829,366	53,067	22,689	12,237,664	856,888	29,928	13,124,480	2,534
Met-Ed	588,329	5,490,295	2,000,508	6,159,394	26,179	538,950	14,215,326	842,389	0	15,057,715	2,890
Penelec	588,212	4,165,417	2,224,603	6,485,207	32,845	2,775,062	15,683,134	901,762	0	16,584,896	2,763
Penn Power	171,046	1,558,620	643,645	2,225,266	3,240	162,549	4,593,320	159,286	0	4,752,606	900
PPL	1,472,472	13,927,692	13,754,926	8,681,064	77,024	0	36,440,706	2,627,547	52,995.00	39,121,248	6,953
PECO	1,700,223	13,261,972	7,367,235	13,638,234	611,545	3,440	34,882,426	1,781,073	25,576	36,689,075	8,163
West Penn	737,355	6,768,904	2,552,879	9,332,983	21,837	732,383	19,408,986	1,139,456	0	20,548,442	3,714
UGI	62,879	537,077	308,794	103,258	4,868	126	954,123	67,422	1,856	1,023,401	195
Citizens'	7,143	82,450	25,615	42,995	300	0	151,360	4,132	128	155,620	42
Pike County	5,333	33,495	45,108	0	395	0	78,998	0	28	79,026	20
Wellsboro	6,456	41,669	30,833	24,793	68	94	97,457	6,335	217	104,009	19
Total	**5,951,573**	**49,667,739**	**34,486,540**	**49,522,560**	**831,368**	**4,235,293**	**138,743,500**	**8,386,290**	**110,728**	**147,240,518**	**28,192**
% of Total		35.80%	24.86%	35.69%	0.60%	3.05%	100%				

Table 3: 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%				

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 0.76% per year. This includes a 1.39% growth rate for residential, a commercial growth rate increase of 0.64%, and an industrial growth rate increase of 0.22% 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
2024	52,656	35,528	49,741	137,925
2025	52,484	35,373	49,768	137,625
2026	52,561	35,298	49,837	137,696
2027	52,717	35,351	49,944	138,012
2028	53,059	35,492	49,995	138,546
Average annual growth (%)	1.39%	0.64%	0.22%	0.76%

Figure 8 below represents, in GWh, the Pennsylvania historic usage for residential, commercial, and industrial retail from 1972 through 2023, and forecasted GWh usage from 2024 through 2028.

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

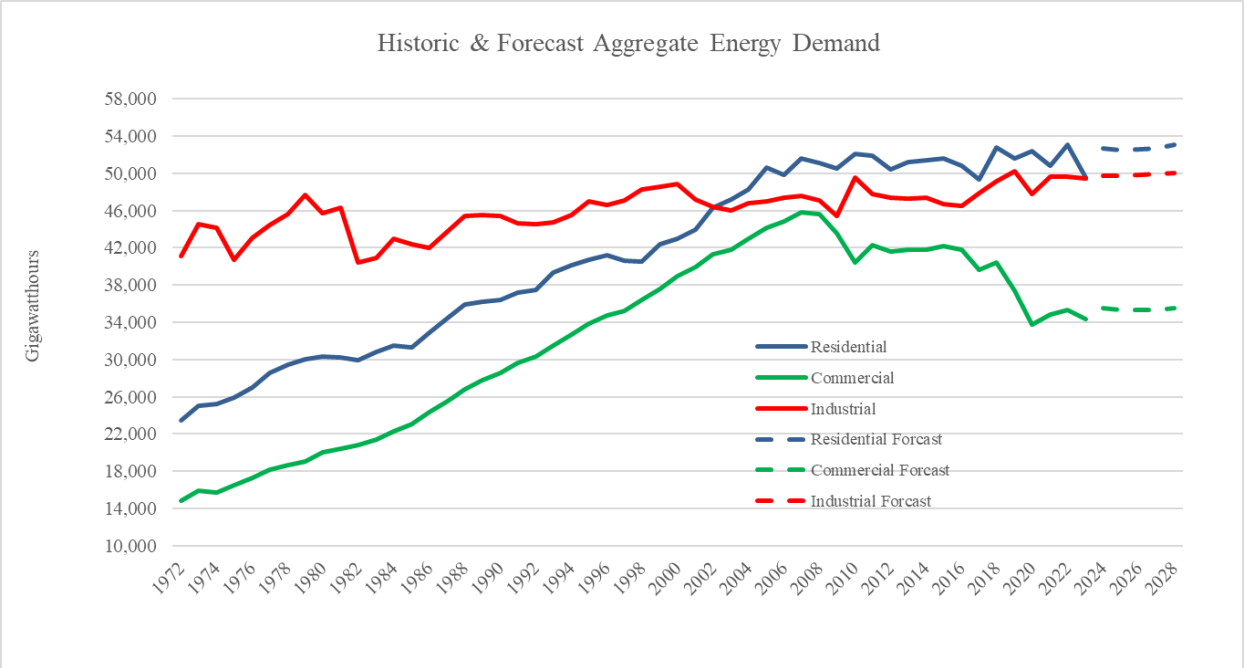


Figure 9 below shows average residential usage and nominal cost from 1940 to 2023. Between 1970 and 2010, average residential yearly usage in Pennsylvania increased 1.4% each year, while average yearly cost increased 4.1% each year during this period.

During the last 10 years, residential usage decreased at an average of -0.86% each year, while the yearly cost increased at an average of 5.23% each year. Note that these are not weighted averages (accounting for customer counts of each utility) and are only for the large EDCs. The past two years have seen the yearly average cost ($ per kWh) increase significantly, primarily due to the increase in generation and transmission costs for residential electric retail customers in Pennsylvania. As the majority of electric generation in PJM is powered by natural gas, the price of natural gas has a significant impact on electric prices in PJM. The market price of natural gas increased significantly in 2021 and 2022, which impacted the price of competitive electric suppliers. The natural gas price increases tend to have a lagging impact of about one year on electric prices for residential customers as the EDCs bid for their default supply contracts and residential customers shop for competitive electric supply contracts.[67] Electric supply contracts are forward-looking and thus the lag in price impact from the natural gas prices as can be seen when comparing Figure 9 and Figure 9-A, below. Note the fall in natural gas prices in 2023, which should lead to lower residential electric prices in 2024.

[67] As can be seen in the historical default rates (generation and transmission rates) for non-shopping residential service for EDCs, available at https://www.papowerswitch.com, the default rates in 2022 and 2023 were significantly higher. While customers may shop for competitive supply, the competitive rates also saw increases in 2022 and 2023, see the historical price comparison price charts available here: https://www.oca.pa.gov/electric-shopping-guide-archive/.

In 2023, the average Pennsylvania residential customer used 9.53 MWh as compared to: 10.21 MWh in 2022; 10.40 MWh in 2021; 10.13 MWh in 2020, and 10.45 MWh in 2019. In 2023, the average customer paid 15.69 cents per kWh, which increased from 13.37 cents per kWh in 2022.

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

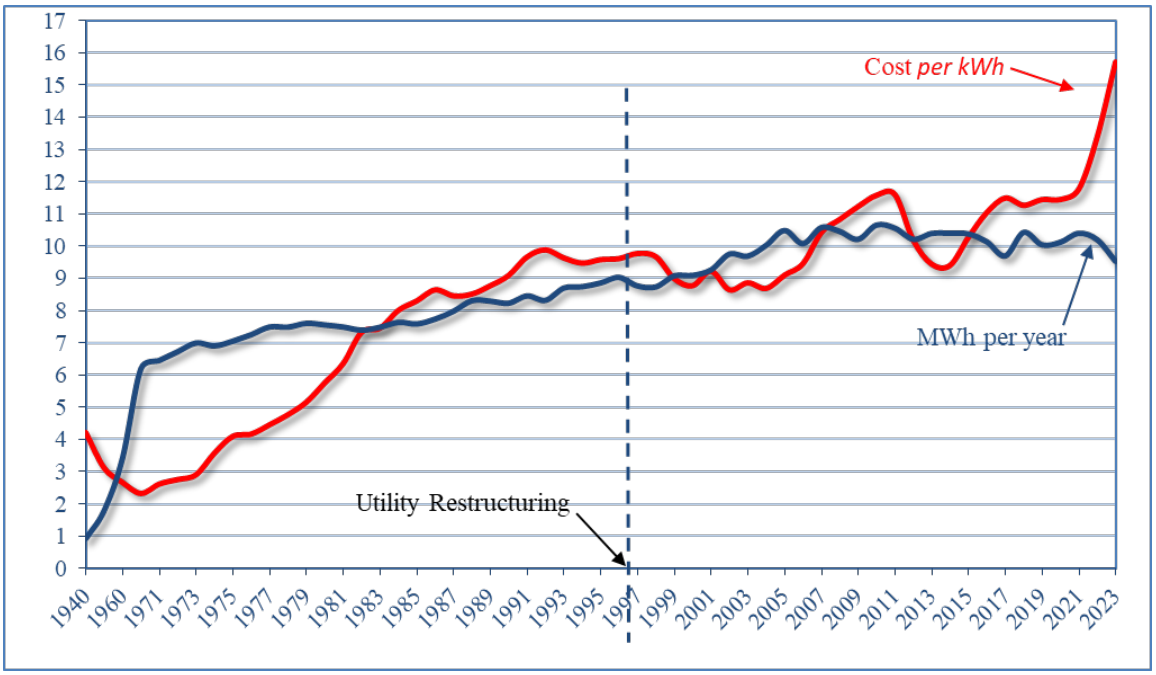
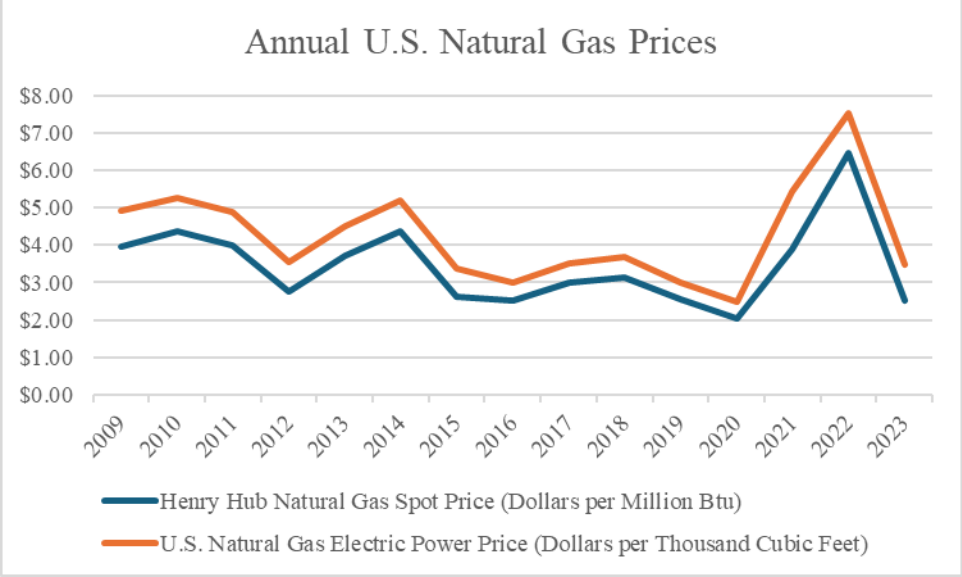


Figure 9-A: Annual U.S. Natural Gas Prices 2009 through 2023[68]



[68] EIA, natural gas prices data, available here: https://www.eia.gov/naturalgas/data.php#prices.

Figure 10 below shows the EDCs' aggregate non-coincidental peak load demand from 2014 through 2023 and the associated five-year projections estimated during the last three years.

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

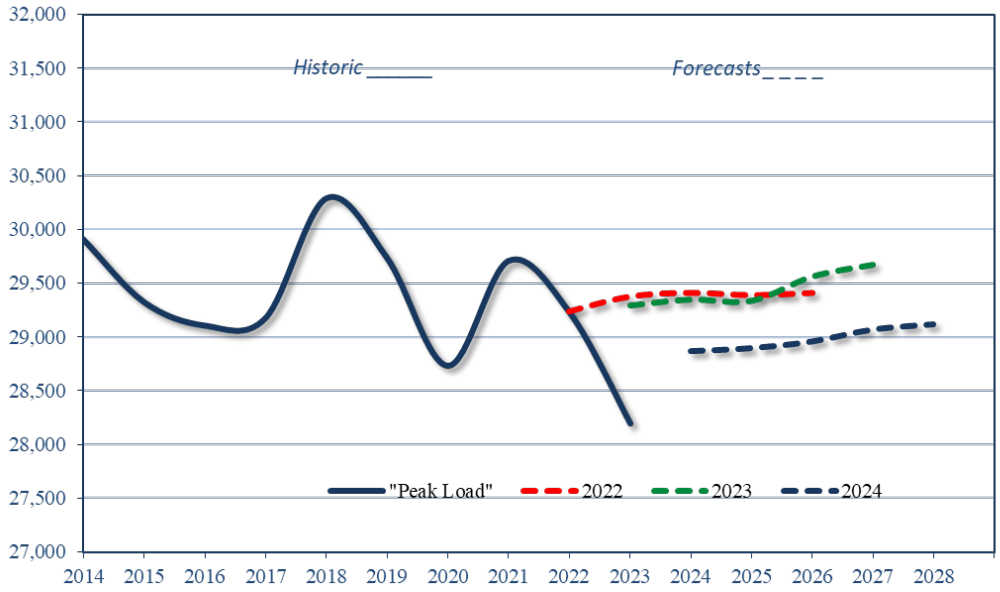
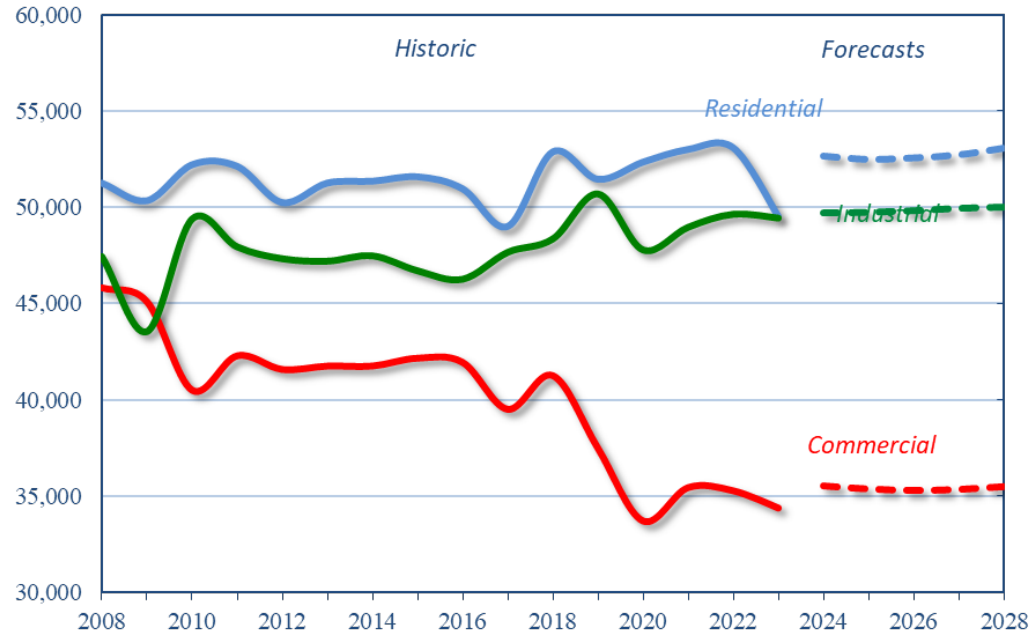


Figure 11 below shows the EDCs' aggregate energy demand from 2008 through 2023 and the associated five-year projections.

Figure 11: Pennsylvania Aggregate Energy Demand (GWh)



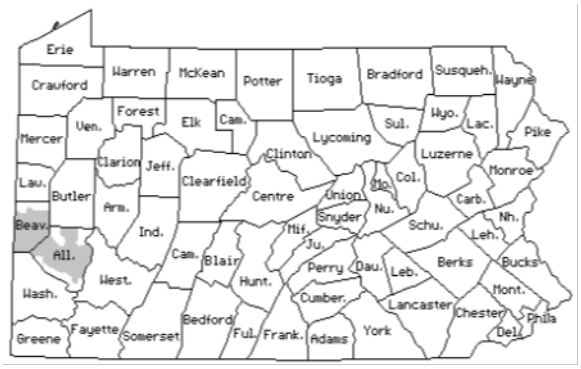
Summary of Data for the Seven Largest EDCs

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 612,125 customers in the City of Pittsburgh and portions of Allegheny and Beaver counties in Southwestern Pennsylvania. Duquesne's 2023 energy usage total was 12,237 GWh, as compared to: 12,527 in 2022: 12,581 GWh in 2021; 12,159 GWh in 2020; and 12,654 GWh in 2019. Year-over-year (YOY) energy usage decreased -2.31%. Duquesne's total usage mix consisted of residential (31.1%), commercial (45.2%), industrial (23.1%), other (0.4%) and sales for resale (0.2%).



Over the next five years, total energy usage is projected to increase at an average annual rate of 0.56%. This includes a residential usage average annual increase of 0.90%, commercial usage increase of 0.30%, and an industrial usage increase by 0.61%, as shown in Figure 12 below.

Duquesne's highest peak load in 2023 was 2,534 MW, which represents a YOY decrease of -6.67% from the previous year's peak load of 2,715 MW. The five-year peak load forecast is projected to increase by an average 1.55% 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 2014 through 2023.

Figure 12: Duquesne energy usage (GWh)

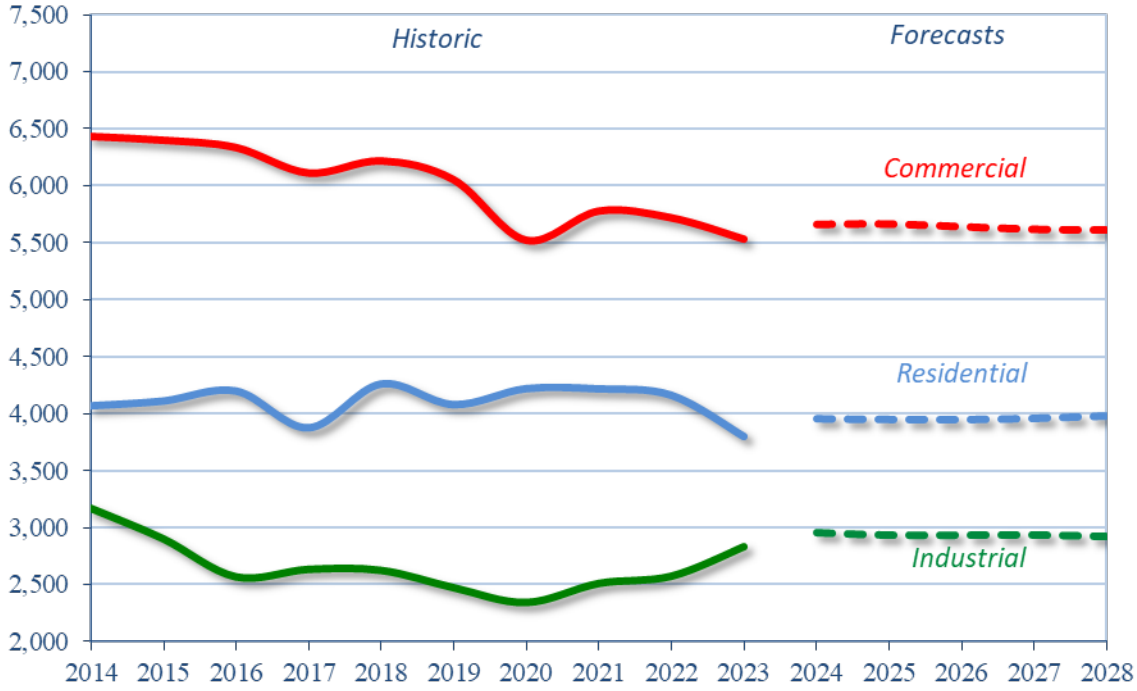
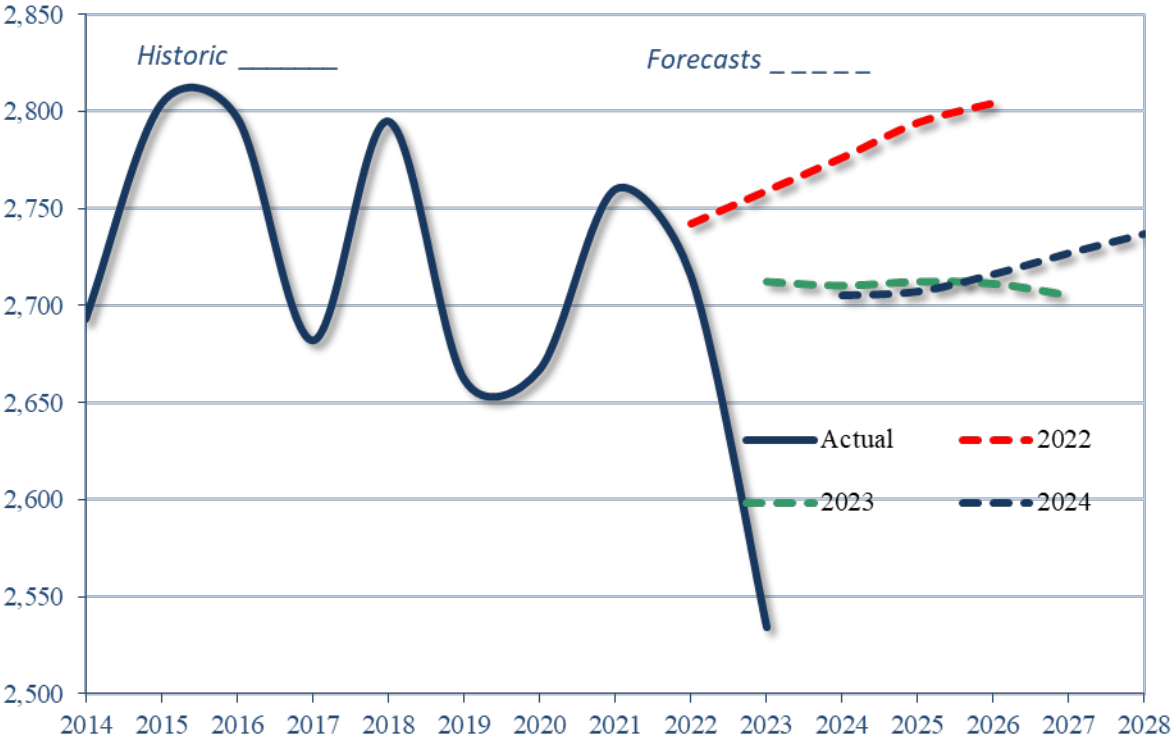
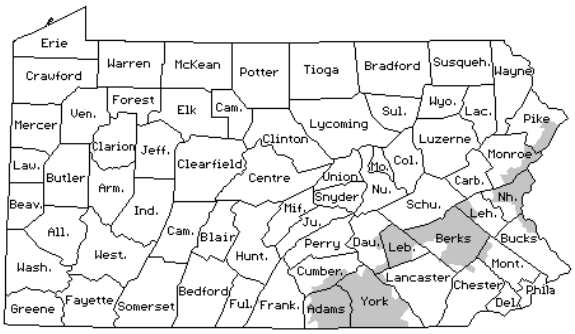


Figure 13: Duquesne peak load (MW)



Metropolitan Edison Company (Met-Ed)

Met-Ed provides electric service to about 588,329 customers in all or portions of 14 counties in Eastern and Southcentral Pennsylvania. Met-Ed's 2023 energy usage total was 14,215 GWh, as compared to: 14,949 in 2022 14,748 GWh in 2021; 14,291 GWh in 2020; and 14,787 GWh in 2019. Year-over-year (YOY) energy usage decreased -4.91%. Met-Ed's total usage mix consisted of residential (38.6%), commercial (14.1%), industrial (43.3%) and sales for resale (3.8%).



Over the next five years, total energy usage is projected to increase at an average annual rate of 0.89%. This includes a residential usage average annual increase of 1.68%, commercial usage increase of 0.75%, and industrial usage increase of 0.22% as shown in Figure 14 below.

Met-Ed's highest summer peak load in 2023 was 2,890 MW. This represents a YOY decrease of -4.34% from the previous year's peak of 3,021 MW. The five-year peak load forecast is projected to increase by 1.06% 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 2014 through 2023.

Figure 14: Met-Ed energy usage (GWh)

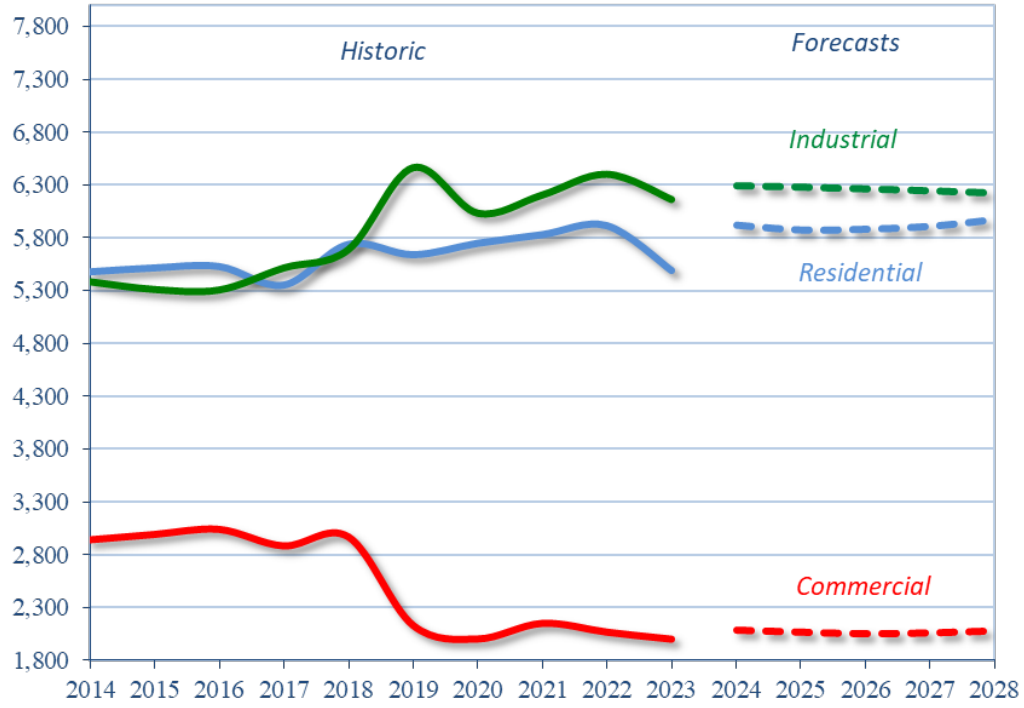
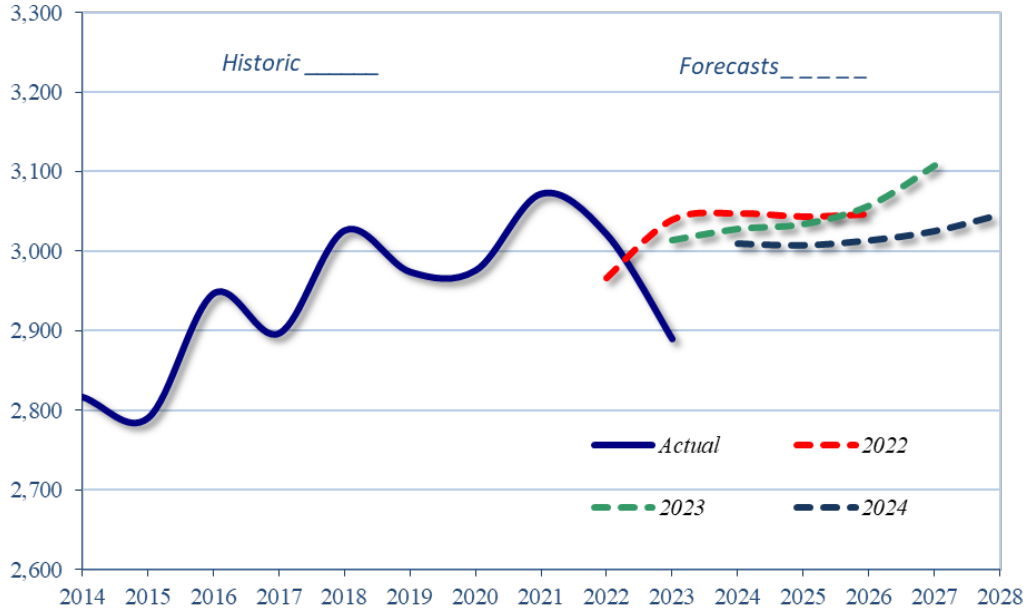
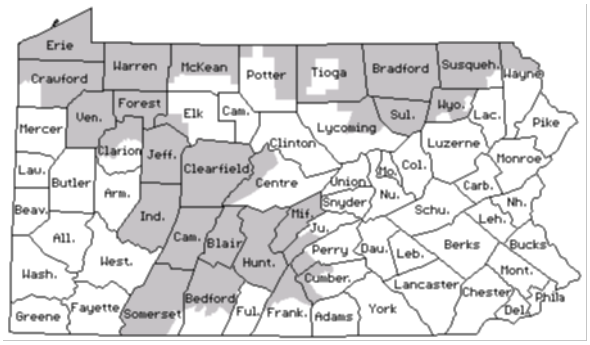


Figure 15: Met-Ed peak load (MW)



Pennsylvania Electric Company (Penelec)



Penelec provides electric service to about 588,212 customers in all or portions of 29 counties in Western and Northern Pennsylvania. Penelec's 2023 energy usage total was 15,683 GWh, as compared to: 16,091 GWh in 2022; 15,972 GWh in 2021; 15,715 GWh in 2020; and 16,182 GWh in 2019. Year-over-year (YOY) energy usage decreased -2.54%. Penelec's total usage mix consisted of residential (26.6%), commercial (14.2%), industrial (41.4%), and sales for resale (17.7%).

Over the next five years, total energy usage is projected to decrease at an average annual rate of -0.6%. This includes a residential usage average annual increase of 1.20%, commercial usage increase of 1.06%, and an industrial usage decrease of -2.45%, as shown in Figure 16 below.

Penelec's highest summer peak load in 2023 was 2,763 MW. This represents a YOY decrease of -1.07% from the previous year's peak of 2,793 MW. The five-year peak load forecast is projected to decrease by an average of -0.28% 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 2014 through 2023.

Figure 16: Penelec energy usage (GWh)

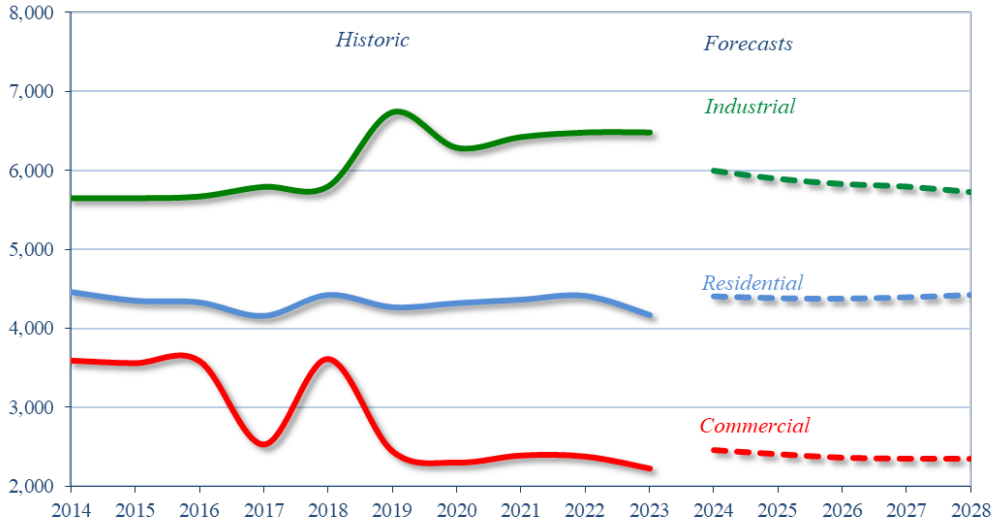
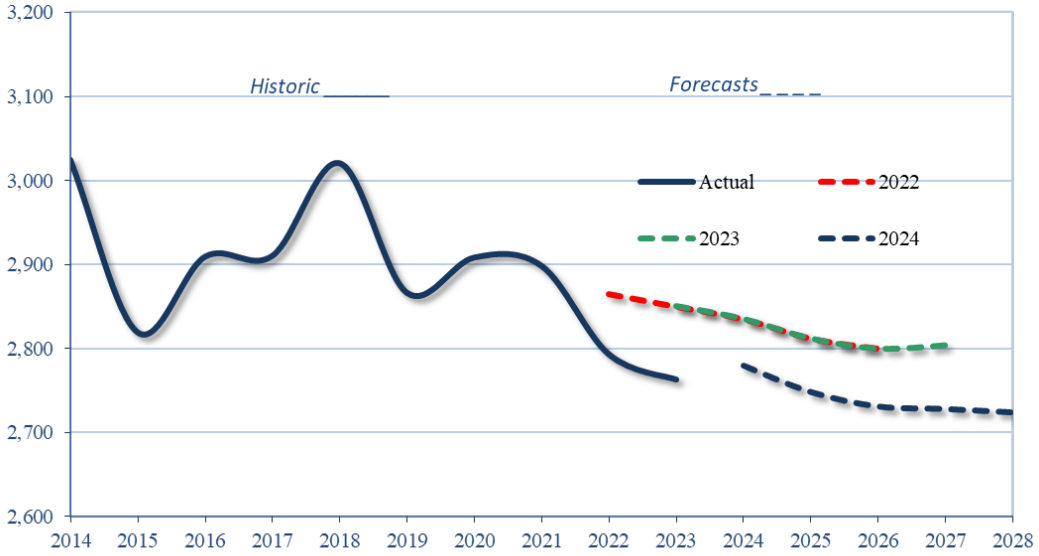
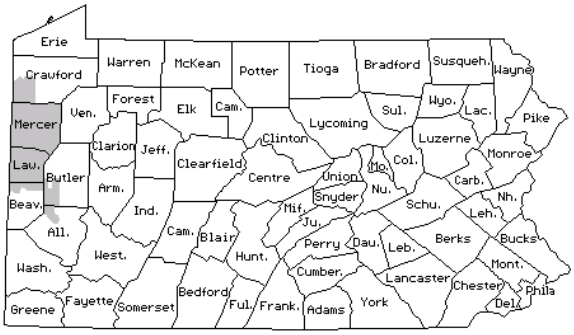


Figure 17: Penelec peak load (MW)



Pennsylvania Power Company (Penn Power)

Penn Power provides electric service to about 171,046 customers in all or portions of six counties in Western Pennsylvania. Penn Power's 2023 energy usage total was 4,594 GWh, as compared to: 4,752 GWh in 2022; 4,600 GWh in 2021; 4,427 GWh in 2020; and 4,833 GWh in 2019. Year-over-year (YOY) energy usage decreased -3.34%. Penn Power's total usage mix consisted of residential (33.93%), commercial (14.02%), industrial (48.43%), and sales for resale (3.55%).



Over the next five years, total energy usage is projected to increase at an average annual rate of 1.48%. This includes residential usage increasing at an average annual rate of 2.39%, a commercial average annual usage increase of 0.73%, and an industrial usage increase of 1.04% as shown in Figure 18 below.

Penn Power's highest summer peak load in 2023 was 900 MW. This represents a YOY decrease of -4.66% from the previous year's peak of 944 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 2014 through 2023.

Figure 18: Penn Power energy usage (GWh)

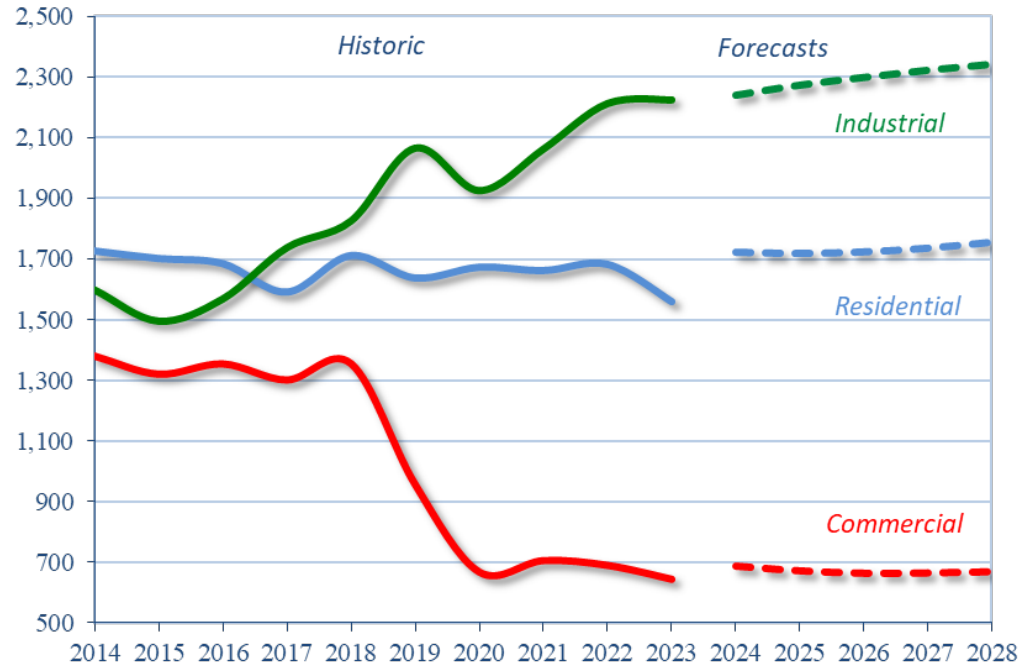
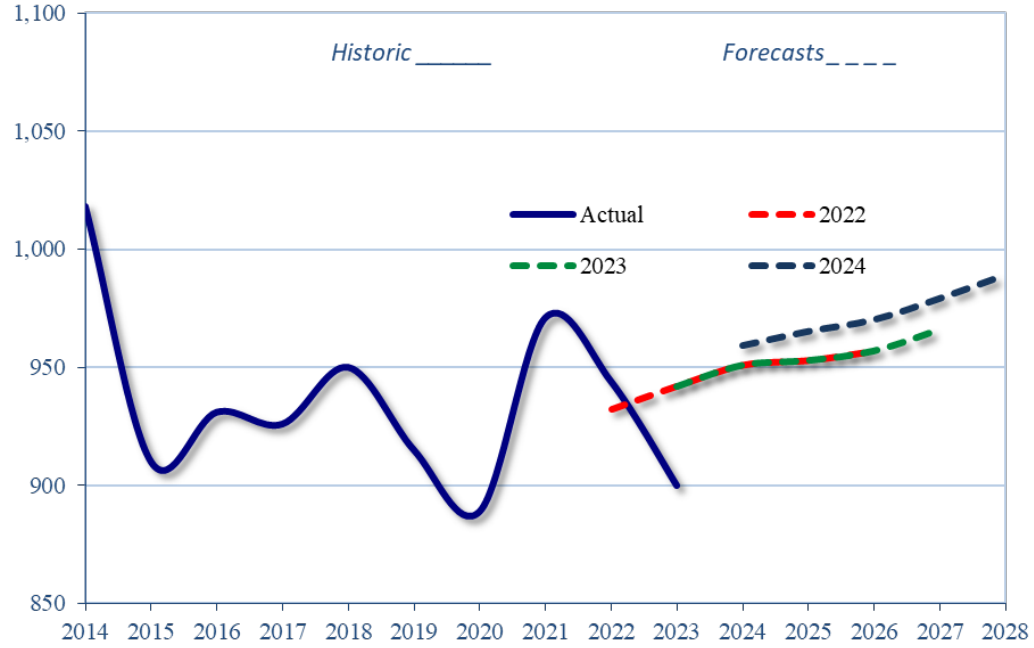
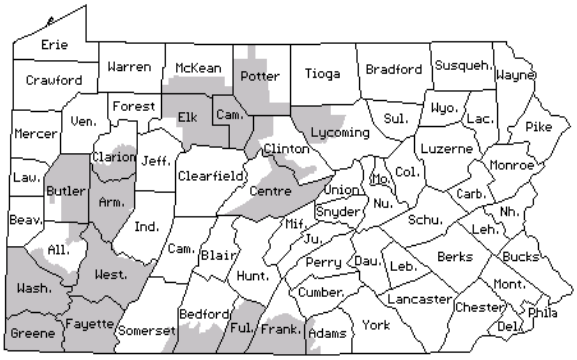


Figure 19: Penn Power peak load (MW)



West Penn Power Company (West Penn)



West Penn provides electric service to 737,355 customers in all or portions of 24 counties in Western, North and South-Central Pennsylvania. West Penn's 2023 energy usage total was 19,409 GWh, as compared to: 20,353 in 2022; 20,050 GWh in 2021; 19,598 in 2020; and 20,809 in 2019. Year-over-year (YOY) energy usage decreased by -4.59%. West Penn's total usage mix consisted of residential (34.88%), commercial (13.15%), industrial (48.09%), and sales for resale (3.77%).

Over the next five years, total energy usage is projected to increase at an average annual rate of 1.47%. This includes a residential usage average annual increase of 1.62%, commercial usage increase of 0.99%, and industrial usage increase by 1.49%. See Figure 20 below.

West Penn's highest peak load in 2023 was 3,714 MW. This represents a YOY decrease of -2.95% from the previous year's peak of 3,827 MW. The five-year peak load forecast is projected to increase by an average of 0.58% 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 2014 through 2023.

Figure 20: West Penn energy usage (GWh)

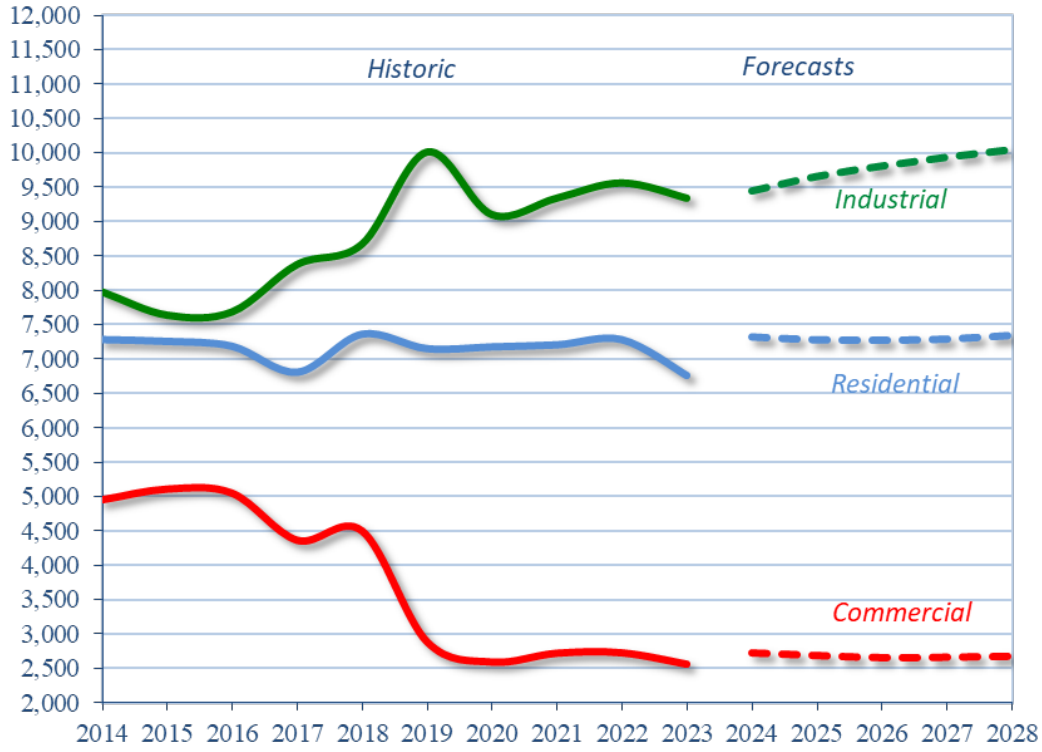
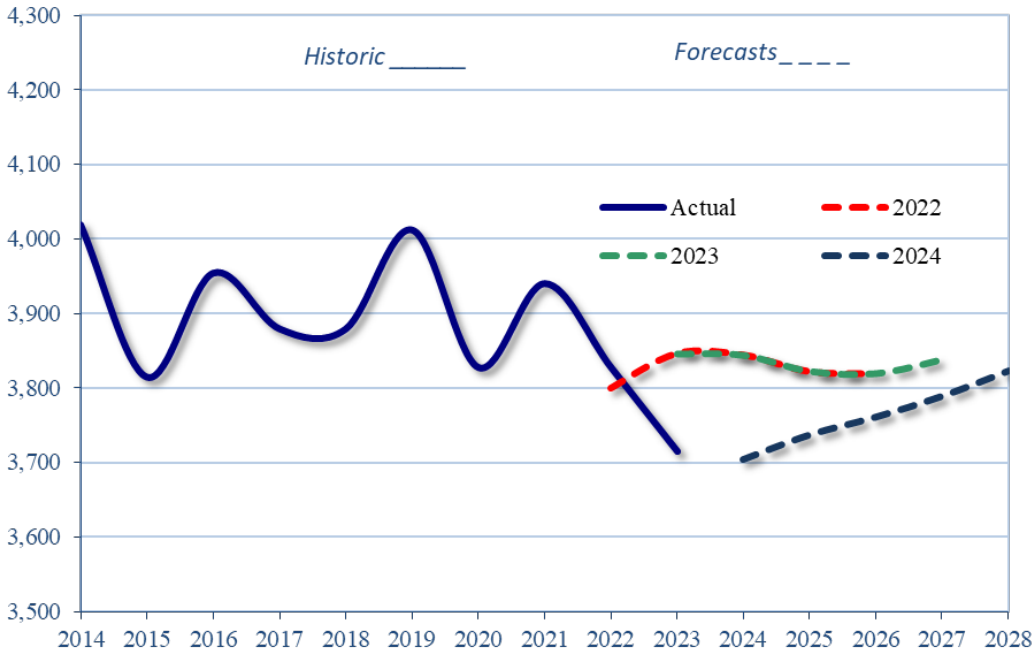
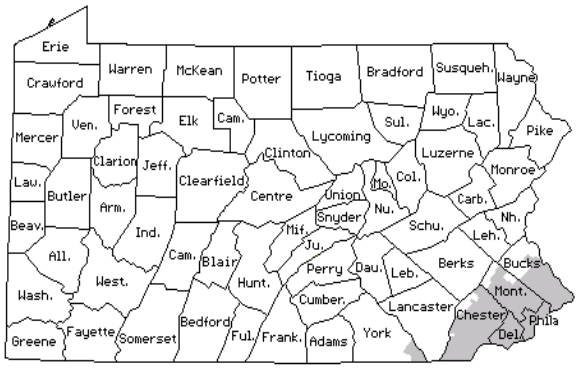


Figure 21: West Penn peak load (MW)



PECO Energy Company (PECO)



PECO is the largest electric utility in Pennsylvania, providing service to about 1,700,223 customers in the City of Philadelphia and all or portions of six counties in Southeastern Pennsylvania. PECO's 2023 energy usage total was 34,882 as compared to: 39,773 in 2022; 36,431 GWh in 2021: 35,507 GWh in 2020; and 37,327 GWh in 2019. Year-over-year (YOY) energy usage decreased -5.14%. PECO's total usage mix consisted of residential (38.02%), commercial (21.12%), industrial (39.10%), 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 1.15%. This includes a residential usage average annual increase of 2.21%, commercial usage average annual increase of 0.75% and an industrial usage increase of 0.36% as shown in Figure 22 below.

PECO's highest peak load in 2023 was 8,163 MW. This represents a YOY decrease of -4.89% from the previous year's peak of 8,583 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 2014 through 2023.

Figure 22: PECO Energy Company energy usage (GWh)

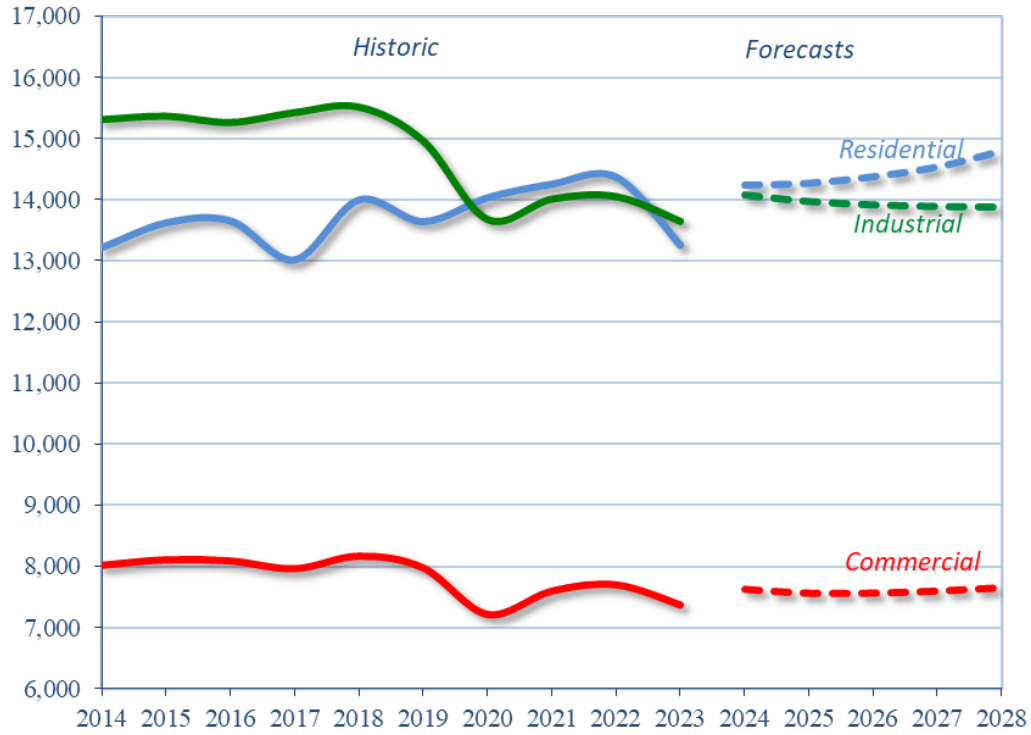
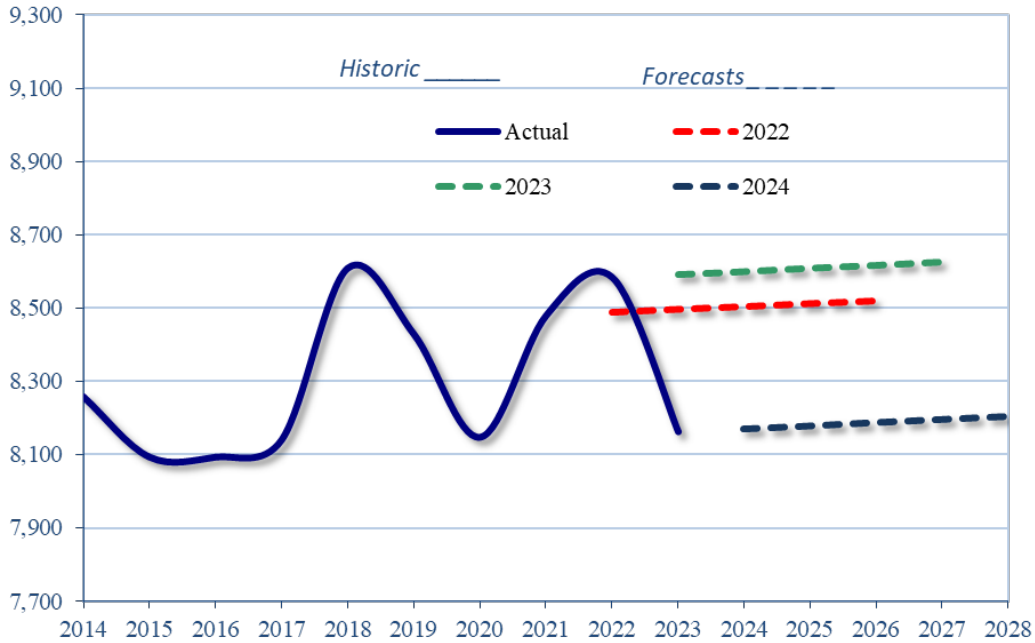
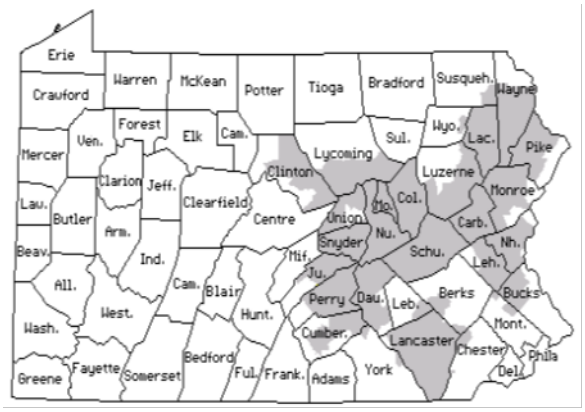


Figure 23: PECO Energy Company peak load (MW)



PPL Electric Utilities Corporation (PPL)



PPL provides service to about 1,472,472 customers over a 10,000-square-mile area in all or portions of 29 counties in Central Eastern Pennsylvania. PPL's 2023 energy total usage was 36,441 GWh as compared to: 39,729 GWh in 2022; 37,104 in 2021; 36,171 GWh in 2020; and 37,196 GWh in 2019. Year-over-year (YOY) energy usage decreased by -0.79%. PPL's total usage mix consisted of residential (38.22%), commercial (37.75%), industrial (23.82%), and other less than 1%.

Over the next five years, total energy usage is projected to increase at an average annual rate of 0.42%. This includes a residential usage average annual increase of 0.46%, commercial usage increase of 0.56%, and industrial usage increase of 0.13% as shown in Figure 24 below.

PPL's highest annual peak load in 2023 was 6,953 MW. This represents a YOY decrease of -0.79% from the previous year's peak of 7,065 MW. The five-year peak load forecast is projected to increase by an average of 1.24% 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 2014 through 2023.

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

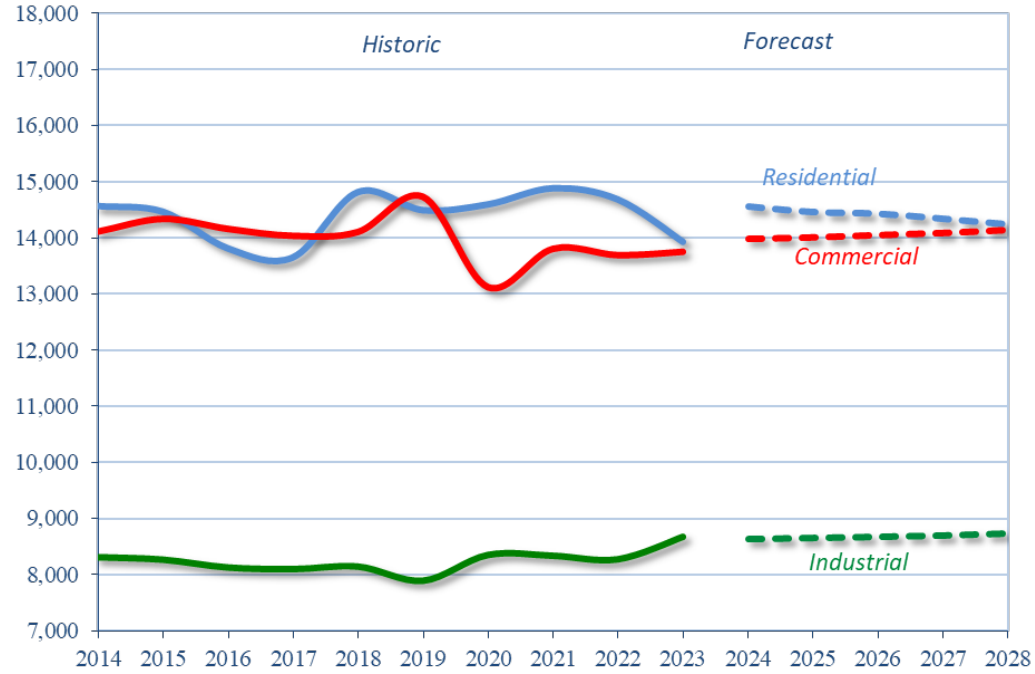
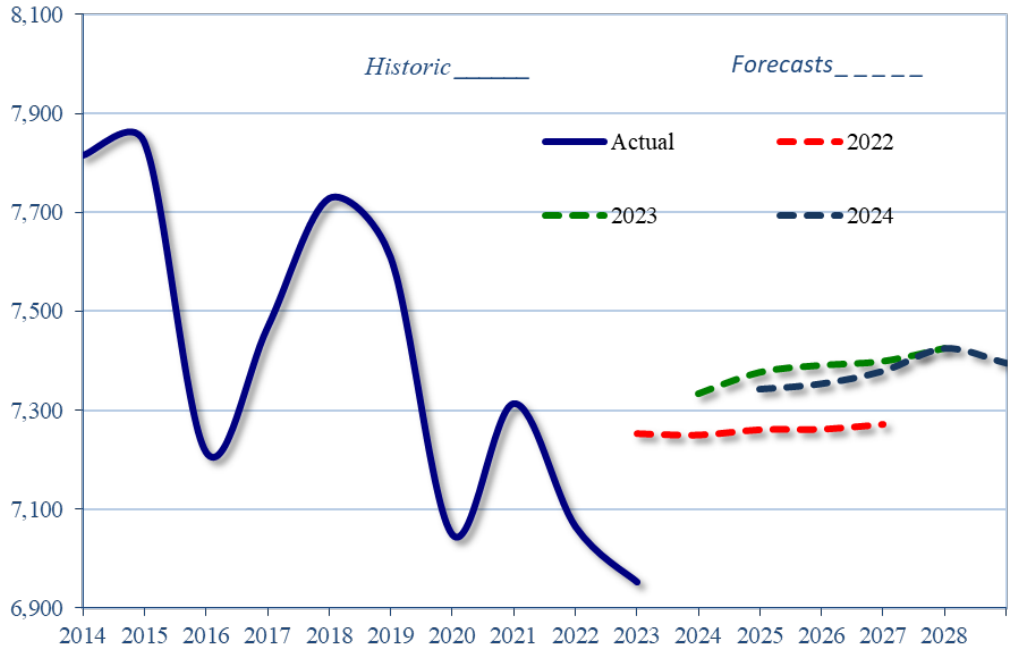
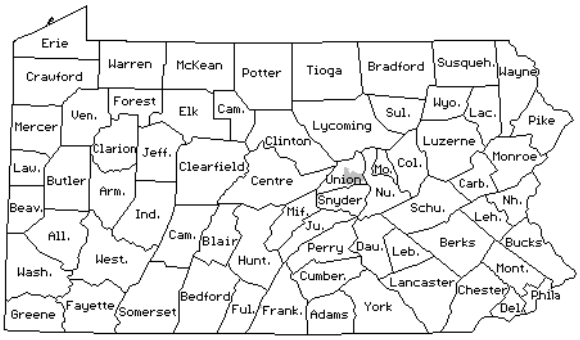


Figure 25: PPL Electric Utilities Corporation peak load (MW)



Summary of Data for the Four Smallest EDCs

Citizens' Electric Company (Citizens')

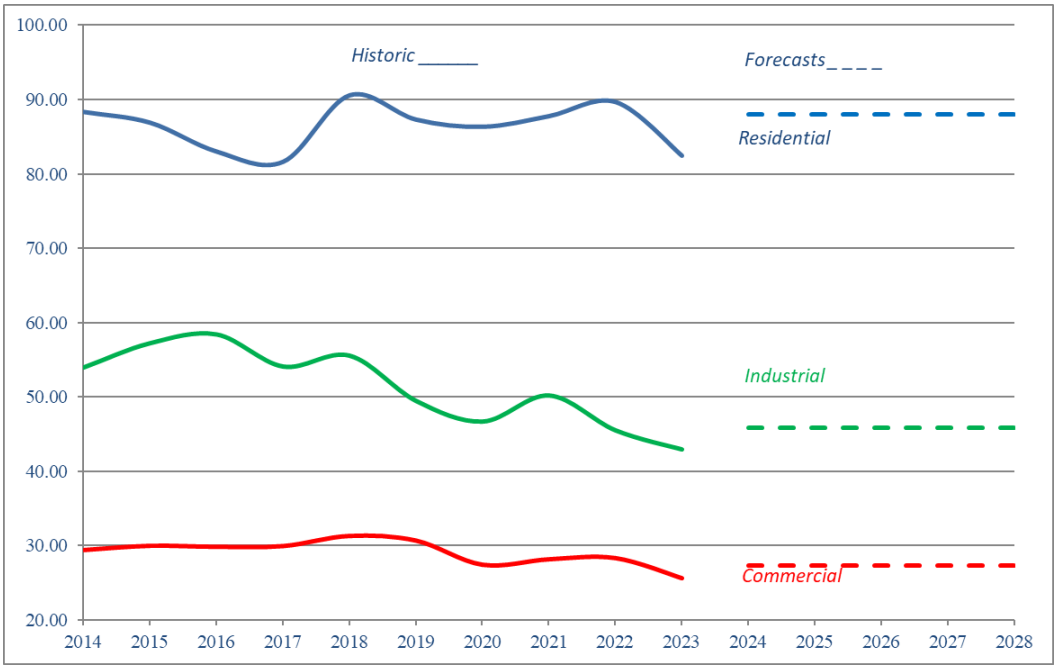


Citizens' provides service to about 7,143 customers in Union County, Pennsylvania. Citizens' 2023 energy usage total was 151 GWh, as compared to: 164 GWh in 2022; 167 GWh in 2021; 161 GWh in 2020; and 168 GWh in 2019. Year-over-year (YOY) energy usage decreased by -7.66%. Citizens' total usage mix consisted of residential (54.47%), commercial (16.93%), industrial (28.41%), and other (less than 1%).

Over the next five years, total energy usage is projected to increase at an average annual rate of 1.31%. This includes a residential usage average annual increase of 1.31%, commercial usage increase of 1.31%, and industrial usage increase of 1.31% as shown in Figure 26 below.

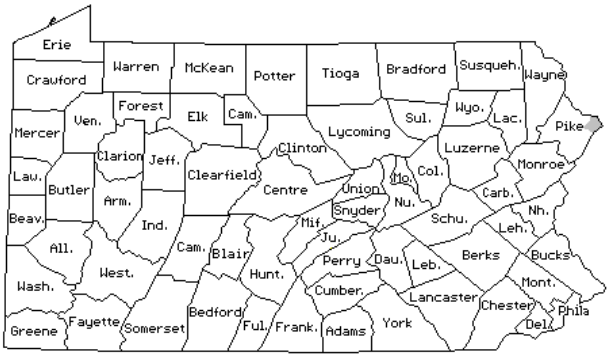
Citizens' highest winter peak load in 2023 was 41.7 MW. This represents a YOY decrease of -7.54% from the previous year's peak of 45.1 MW. The five-year peak load forecast is projected to decrease by an average of -0.83% per year.

Figure 26: Citizens' energy usage (GWh)



Pike County Light & Power Company (Pike)

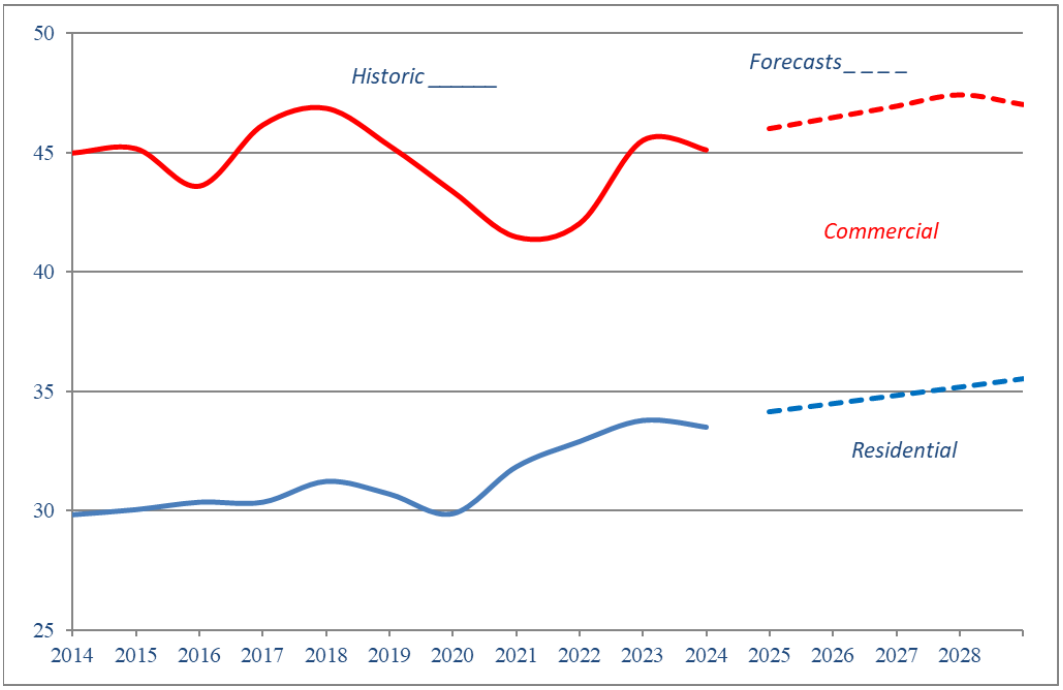
Pike provides service to about 5,302 customers in Eastern Pike County, Northeastern Pennsylvania. Pike's 2023 energy usage total was 79.0 GWh, as compared to 79.7 GWh in 2022; 75.4 GWh in 2021; as compared to 73.7 GWh in 2020; and 73.4 GWh in 2019. Year-over-year (YOY) energy usage decreased by -0.90%. Pike's total usage mix consisted of residential (42.41%), commercial (57.10%), 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 0.98%. This includes a residential usage average annual increase of 1.20%, and a commercial usage increase of 0.83% as shown in Figure 27 below.

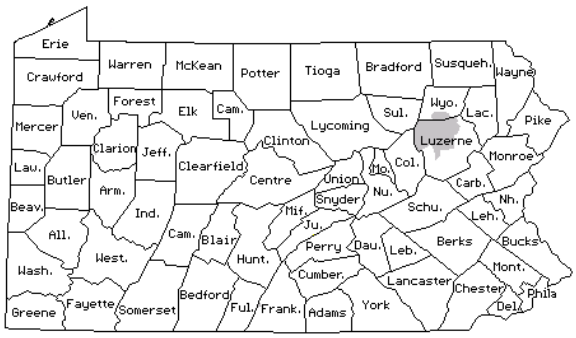
Pike's peak load in 2023 was 19.6 MW. This represents a YOY increase of 4.97% from the previous year's peak of 18.7 MW. The five-year peak load forecast is projected to increase by an average of 2.00% per year.

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



UGI Utilities Inc.—Electric Division (UGI)

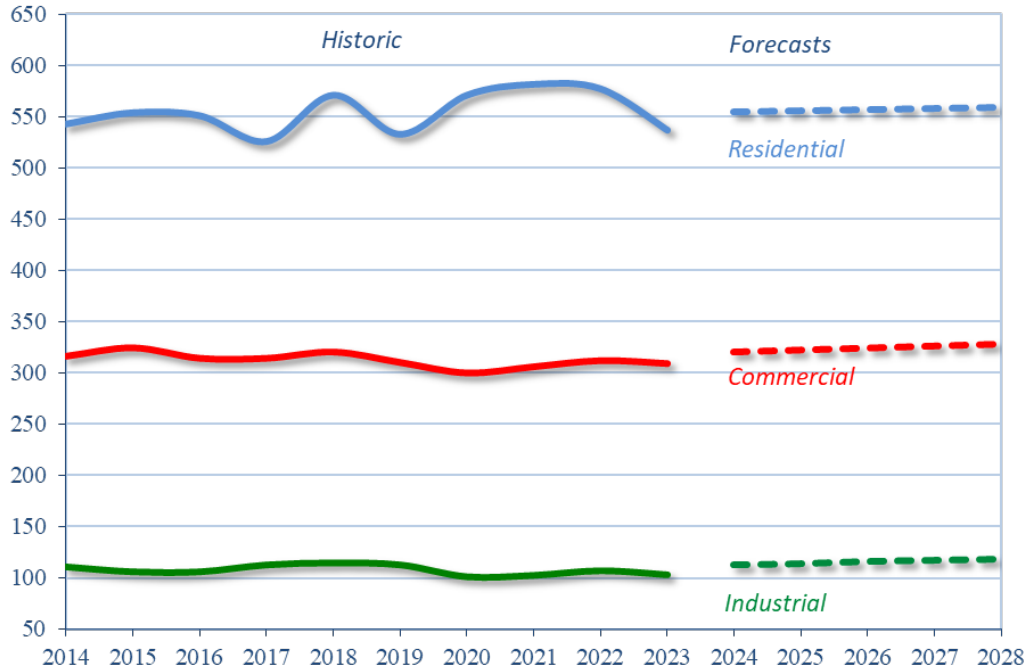
UGI provides electric service to about 62,879 customers in Northwestern Luzerne and Southern Wyoming counties in Pennsylvania. UGI's 2023 energy usage total was 954 GWh, as compared to: 1,001 GWh in 2022; 996 GWh in 2021; 977 GWh in 2020; and 958 GWh in 2019. Year-over-year (YOY) energy usage decreased by -4.70%. UGI's total usage mix consisted of residential (56.23%), commercial (32.39%), industrial (10.80%), 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 0.66%. This includes a residential average annual increase of 0.84%, commercial usage increase of 0.45%, and industrial usage increase by 0.39% as shown in Figure 28 below.

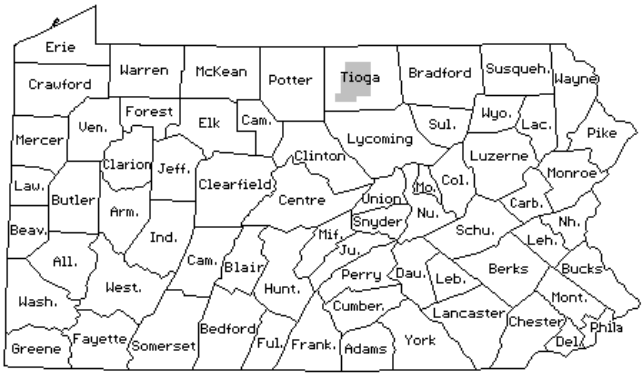
UGI's highest summer peak load in 2023 was 195 MW. This represents a YOY decrease of -5.80% from the previous year's peak of 203 MW. The five-year peak load forecast is projected to increase by an average of 0.31% per year.

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 2023 energy use was 98 GWh, as compared to: 102 GWh in 2022; 104 GWh in 2021; 103 GWh in 2020; and 104 GWh in 2019. Year-over-year (YOY) energy usage decreased by approximately -4.14%. Wellsboro's total usage mix consisted of residential (42.53%), commercial (31.47%), industrial (25.30%), and other/sales for resale (less than 1%).

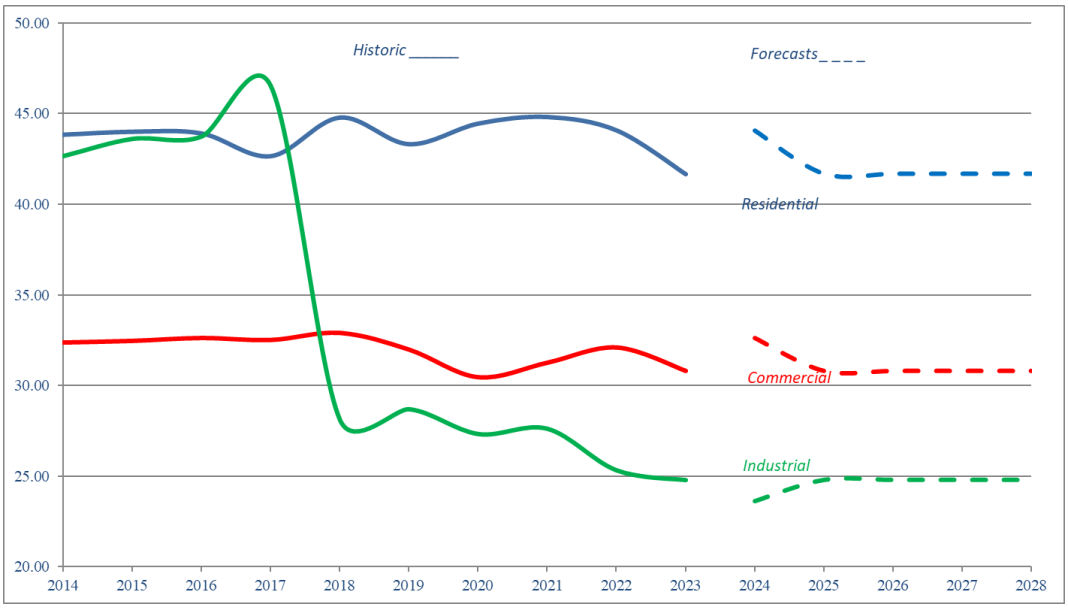


Over the next five years, total energy usage is projected to remain essentially flat at an average annual rate of 0.0% for residential, commercial and industrial customers as shown in Figure 29 below. Wellsboro expects little to no load growth over the next five years.

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 2023 was 18.9 MW. This represents a YOY decrease of -12.9% from the previous year's peak of 21.7 MW. The five-year peak load forecast is projected to increase by an average of 0.52% per year.

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 2014 through 2023 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 2024 through 2028.

.01 Duquesne Light Company
and Projected Peak Load (MW)

		Projected Peak Load Requirments (Year Forecast Was Filed)										
Year	**Actual**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
2014	2693	2997										
2015	2804	3056	2969									
2016	2797	3094	3005	2893								
2017	2682	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	2534						2866	2807	2832	2759	2712	
2024								2818	2855	2776	2710	2705
2025									2875	2794	2712	2707
2026										2804	2711	2716
2027											2705	2727
2028												2737

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	**Actual**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
2014	6432	6600										
2015	6399	6621	6494									
2016	6335	6648	6503	6371								
2017	6112	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	5532						5804	5807	5624	5666	5625	
2024								5754	5556	5603	5622	5663
2025									5463	5508	5720	5666
2026										5419	5840	5644
2027											5806	5622
2028												5616

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	**Actual**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
2014	4068	4217										
2015	4109	4230	4176									
2016	4197	4266	4202	4081								
2017	3876	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	3800						3816	3864	3834	3934	4136	
2024								3821	3782	3887	4125	3954
2025									3722	3836	4120	3948
2026										3791	4110	3947
2027											4103	3957
2028												3975

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	**Actual**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
2014	3164	2787										
2015	2898	2778	2909									
2016	2566	2762	2896	2890								
2017	2632	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	2829						2692	2485	2367	2318	2608	
2024								2457	2343	2291	2583	2961
2025									2312	2253	2547	2933
2026										2225	2518	2933
2027											2492	2935
2028												2917

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	**Actual**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
2014	2817	2958										
2015	2791	2965	2975									
2016	2947	2974	2979	2987								
2017	2897	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	2890						2883	2949	2935	3039	3014	
2024								2971	2960	3047	3028	3009
2025									2977	3043	3034	3007
2026										3046	3057	3013
2027											3107	3025
2028												3046

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	**Actual**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
2014	5477	5354										
2015	5515	5421	5533									
2016	5528	5438	5378	5190								
2017	5351	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	5490						5203	5428	5573	5702	5898	
2024								5553	5628	5749	5901	5920
2025									5666	5701	5917	5879
2026										5726	5899	5885
2027											5972	5910
2028												5968

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	**Actual**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
2014	2944	2914										
2015	2995	2931	2983									
2016	3043	2964	2929	2919								
2017	2886	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	2001						2880	2089	1956	2031	2147	
2024								2146	1969	2021	2133	2083
2025									1965	1982	2093	2064
2026										1960	2070	2049
2027											2067	2057
2028												2077

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	**Actual**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**
2014	5382	5322										
2015	5309	5381	5413									
2016	5304	5456	5472	5350								
2017	5512	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	6159						5472	6507	6577	6677	6315	
2024								6876	6625	6733	6363	6295
2025									6611	6735	6342	6283
2026										6732	6413	6267
2027											6578	6249
2028												6228

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	3024	2927										
2015	2819	2935	2888									
2016	2909	2946	2896	2890								
2017	2910	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	2763						2817	2873	2880	2850	2850	
2024								2866	2882	2835	2835	2779
2025									2886	2812	2812	2748
2026										2800	2800	2731
2027											2804	2728
2028												2724

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	4462	4469										
2015	4350	4513	4491									
2016	4328	4525	4373	4145								
2017	4153	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	4165						4112	4104	4244	4240	4341	
2024								4112	4256	4223	4325	4403
2025									4259	4125	4308	4381
2026										4147	4293	4375
2027											4318	4391
2028												4420

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	3591	3553										
2015	3558	3552	3649									
2016	3587	3582	3582	3539								
2017	2529	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	2225						3397	2440	2364	2446	2575	
2024								2449	2403	2418	2558	2461
2025									2390	2354	2505	2408
2026										2307	2470	2361
2027											2452	2348
2028												2345

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	5647	5696										
2015	5647	5808	5747									
2016	5668	5867	5822	5723								
2017	5792	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	6485						5854	6394	6513	5988	6245	
2024								6327	6481	6011	6295	5999
2025									6463	5977	6280	5896
2026										5990	6278	5831
2027											6284	5798
2028												5728

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	1018	867										
2015	910	873	931									
2016	931	880	940	992								
2017	926	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	900						976	937	924	942	942	
2024								945	932	951	951	959
2025									940	953	953	965
2026										957	957	970
2027											966	979
2028												989

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	1728	1677										
2015	1703	1685	1752									
2016	1686	1691	1689	1597								
2017	1591	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	1559						1614	1616	1647	1659	1684	
2024								1657	1662	1682	1687	1722
2025									1672	1657	1683	1718
2026										1668	1692	1723
2027											1735	1735
2028												1754

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	1381	1345										
2015	1321	1322	1180									
2016	1355	1326	1048	1311								
2017	1302	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	644						1221	967	908	724	744	
2024								1023	940	720	725	686
2025									931	699	705	671
2026										684	686	663
2027											680	664
2028												668

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	1599	1596										
2015	1496	1743	1847									
2016	1569	1739	2079	1637								
2017	1738	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	2225						1866	2220	2141	2297	2240	
2024								2298	2182	2346	2242	2239
2025									2200	2357	2280	2273
2026										2340	2256	2299
2027											2294	2323
2028												2343

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	7816	7352										
2015	7842	7477	7220									
2016	7216	7573	7314	7209								
2017	7468	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	6953						7294	7497	7513	7249	7334	
2024								7541	7552	7260	7377	7342
2025									7584	7261	7391	7353
2026										7271	7399	7379
2027											7425	7425
2028												7395

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	14563	13588										
2015	14462	13644	13647									
2016	13810	13769	13720	13721								
2017	13650	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	13928						13827	14382	14115	14565	14714	
2024								14382	14102	14604	14727	14557
2025									14056	14588	14691	14462
2026										14653	14708	14433
2027											14718	14346
2028												14249

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	14111	14414										
2015	14336	14570	14235									
2016	14160	14742	14234	14214								
2017	14037	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	13755						13802	14803	13926	14140	14121	
2024								14827	13976	14196	14196	13975
2025									13950	14195	14201	14003
2026										14187	14199	14046
2027											14205	14085
2028												14142

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	8313	8092										
2015	8269	8171	7966									
2016	8128	8260	8066	8283								
2017	8098	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	8681						7965	7872	8724	8533	8612	
2024								7891	8783	8589	8668	8629
2025									8787	8607	8686	8651
2026										8624	8703	8674
2027											8725	8700
2028												8739

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	8258	8627										
2015	8094	8635	8259									
2016	8094	8644	8267	8102								
2017	8141	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	8163						8651	8462	8172	8496	8592	
2024								8470	8181	8504	8600	8171
2025									8189	8513	8609	8179
2026										8521	8617	8188
2027											8626	8196
2028												8204

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	13222	13343										
2015	13630	13346	13288									
2016	13664	13349	13355	13366								
2017	13024	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	13262						13762	13599	13672	14135	14140	
2024								13671	13804	14304	14281	14227
2025									13848	14393	14367	14260
2026										14508	14496	14369
2027											14655	14532
2028												14796

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	8025	7858										
2015	8118	7936	8021									
2016	8099	8015	8017	8044								
2017	7968	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	7367						8163	7892	7866	7818	7709	
2024								7882	7857	7813	7692	7620
2025									7809	7757	7643	7557
2026										7739	7647	7559
2027											7672	7592
2028												7646

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	15310	15609										
2015	15365	15844	15302									
2016	15263	16081	15294	15547								
2017	15425	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	13638						15431	14715	14692	14511	14146	
2024								14687	14623	14604	14158	14075
2025									14587	14611	14106	13974
2026										14698	14116	13922
2027											14133	13897
2028												13886

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	4019	4075										
2015	3814	3945	3793									
2016	3954	4012	3842	3793								
2017	3879	4065	3927	3840	3776							
2018	3879	4077	4020	3886	3789	3828						
2019	4012		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	3714						3704	3894	3884	3846	3846	
2024								3891	3894	3844	3844	3704
2025									3891	3822	3822	3737
2026										3819	3819	3761
2027											3838	3789
2028												3823

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	7281	7311										
2015	7255	7302	7383									
2016	7186	7303	7157	6775								
2017	6817	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	6769						6864	6846	6897	7081	7233	
2024								6862	6926	7179	7232	7315
2025									6916	7016	7241	7277
2026										7076	7205	7270
2027											7289	7286
2028												7337

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	4956	4860										
2015	5112	4897	4996									
2016	5051	4932	4957	4900								
2017	4364	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	2553						4279	2868	2786	2729	2998	
2024								2861	2819	2734	2942	2728
2025									2805	2626	2915	2691
2026										2585	2788	2662
2027											2795	2668
2028												2682

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
2014	7972	7946										
2015	7635	8161	8053									
2016	7684	8331	8492	8287								
2017	8371	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	9333						8813	10375	10258	10077	9351	
2024								10857	10273	10219	9807	9438
2025									10237	10249	10013	9653
2026										10282	10146	9806
2027											10257	9937
2028												10049

Appendix B – Plant Additions and Upgrades

Table B-1 below provides detail of PJM interconnection requests for new generating resources located in Pennsylvania.[69] Currently Pennsylvania has 1,340 MW under construction as compared to: 1,153 MW in 2022; 1,563 in 2021; 2,503 MW in 2020: 2,831 MW in 2019, and 6,600 MW in 2018.

Table B-2 below details the generation deactivation requests for Pennsylvania from Jan. 1, 2023, through Dec. 31, 2023. In 2023 there were 8 deactivation notices comprising approximately 2,697 MW (760 MW of that amount is to deactivate in 2025), as compared to: 832 MW in 2022; 920.8 MW in 2021; 78.3 MW in 2020; 931.1 MW in 2019; and 76.1 MW in 2018.[70]

Table B-1: New Generation Queue for Pennsylvania – Interconnection Requests (Dec. 31, 2023)

		In Queue						Complete				Grand Total	
		Active		Suspended		Under Construction		In Service		Withdrawn			
		Projects	Capacity (MW)	Projects	Capacity (MW)	Projects	Capacity (MW)	Projects	Capacity (MW)	Projects	Capacity (MW)	Projects	Capacity (MW)
Non-Renewable	Coal	0	0.0	0	0.0	0	0.0	16	229.0	28	14,354.6	44	14,583.6
	Diesel	1	0.0	0	0.0	0	0.0	4	37.4	13	51.5	18	88.9
	Natural Gas	3	95.0	0	0.0	1	2.5	124	21,710.8	260	92,554.5	388	114,362.8
	Nuclear	0	0.0	0	0.0	1	44.0	14	2,565.0	14	1,731.0	29	4,340.0
	Oil	0	0.0	0	0.0	0	0.0	9	16.9	9	1,307.0	18	1,323.9
	Other	1	2.9	0	0.0	0	0.0	2	306.5	6	344.0	9	653.4
	Storage	67	4,498.6	3	101.0	1	32.0	5	0.0	64	1,249.6	140	5,881.1
Renewable	Biomass	0	0.0	0	0.0	0	0.0	1	6.4	4	36.5	5	42.9
	Hydro	4	224.3	0	0.0	3	35.0	12	480.8	19	715.4	38	1,455.4
	Methane	0	0.0	0	0.0	0	0.0	23	125.9	37	201.3	60	327.2
	Solar	449	9,849.2	53	855.7	68	1,191.4	22	172.9	426	6,308.1	1,018	18,377.5
	Wind	13	387.7	0	0.0	2	34.5	40	299.0	140	1,791.9	195	2,513.1
	Wood	0	0.0	0	0.0	0	0.0	0	0	1	16.0	1	16.0
	Grand Total	538	15,057.7	56	956.7	76	1,339.5	272	25,950.5	1,021	120,661.4	1,963	163,965.8

Table B-2: 2023 Pennsylvania Actual Generation Deactivations in 2023

Unit	TO Zone	Fuel Type	Request Received to Deactivate	Actual or Projected Deactivation Date	Age (Years)	Capacity (MW)
EDDYSTONE 4	PECO	Oil	12/1/23	5/31/2025	53	380
EDDYSTONE 3						380
HOMER CITY 3	PENELEC	Coal	3/31/23	7/1/2023	46	650
HOMER CITY 2					54	614
HOMER CITY 1						620
Martins Creek CT 1	PPL	Oil	2/10/2022	6/1/2023	50	18
Martins Creek CT 2						17.3
Martins Creek CT 4	PPL	Natural Gas				17.3

[69] *See,* PJM, *PJM Regional Transmission Expansion Plan 2023*, available at: https://www.pjm.com/library/reports-notices/rtep-documents.

[70] *See,* PJM, *2023 Pennsylvania State Infrastructure Report,* available at: https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2023/pennsylvania.ashx.

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 2018 through 2023.[71] Chart C on the next page represents the 2023 and 2022 Pennsylvania installed capacity percentage by energy source.[72] Table C-2 starting on page 65 represents existing generating facilities by fuel type located in Pennsylvania.[73]

Table C-1 PJM Region Electrical Power Supply Mix

PJM Region Electrical Power Supply Mix 2023/2022/2021/2020/2019/2018

Energy Source	Capacity						Generation					
	2023	2022	2021	2020	2019	2018	2023	2022	2021	2020	2019	2018
Coal	21.8	23.4	26.1	27	30.5	32.7	14.7	20	22.2	19.3	23.8	28.6
Nuclear	18.1	17.4	17.4	17.5	17.5	17.6	33.3	32.3	32.8	34.2	33.6	34.2
Natural Gas	49.3	47.9	46.1	45.6	42.3	40.3	44.3	40	37.9	39.8	36.2	30.9
Hydro, Wind, Solar & Other	8.5	8.4	7.9	7	6.3	6.1	7.5	7.4	6.8	6.4	5.9	5.9
Oil	2.5	2.8	3	3	3.4	3.2	0.3	0.3	0.3	0.2	0.2	0.4

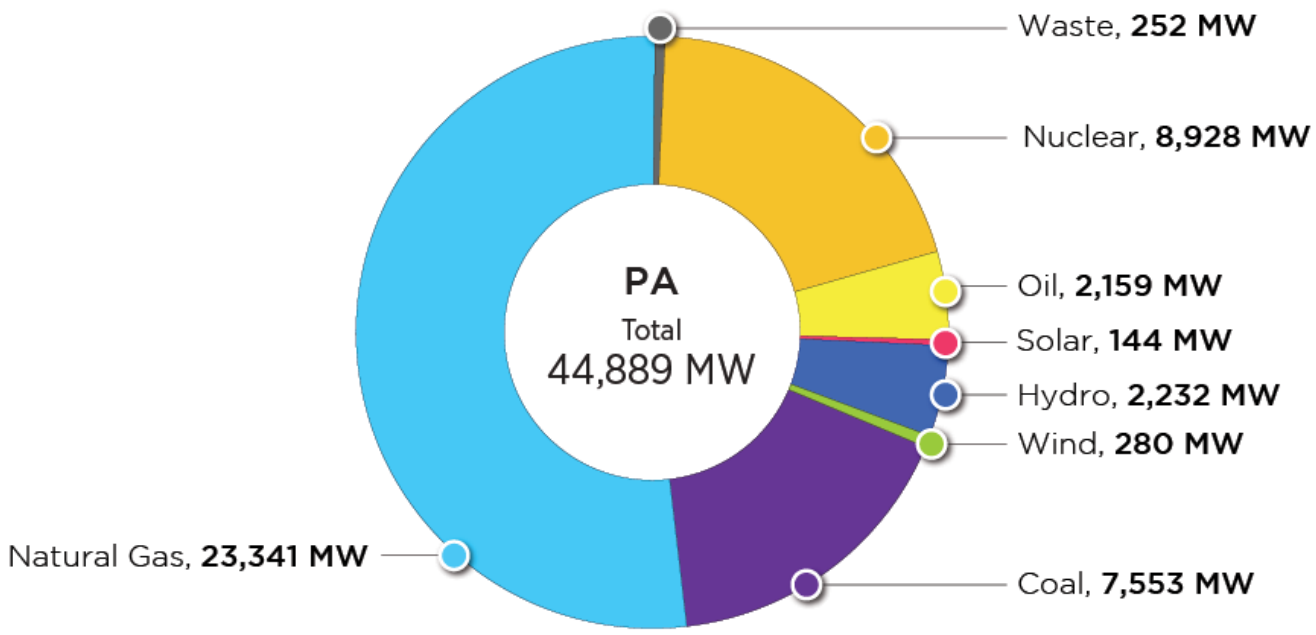
[71] *See*, PJM, *State of the Market Report for PJM*, Volume II, Sections 3 & 5 reporting years 2023, 2022, 2021, 2020, 2019, and 2018. Available at: www.monitoringanalytics.com.

[72] *See,* PJM, *2023 PJM Pennsylvania State Infrastructure Report*, available at: https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2023/pennsylvania.ashx, and also, 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.

[73] Data accessed through S&P Global Market Intelligence as of Mar. 1, 2024. 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

2023 Pennsylvania Installed Capacity



2022 Pennsylvania Installed Capacity

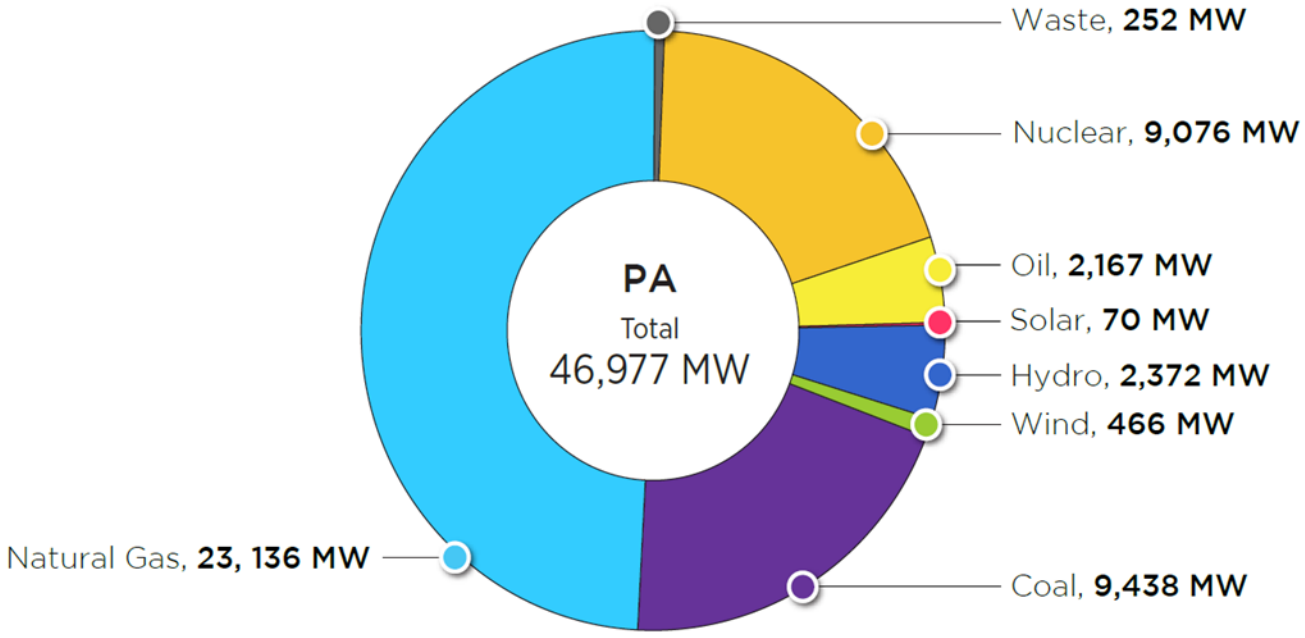


Table C-2 Electric Generating Facilities in Pennsylvania

Power Plant	Owner Name	Ultimate Parent	Fuel Type	Operating Capacity (MW)	State	First Unit Online	Last Unit Online
Allenwood (PPLRE Lycoming County Landfill Projec	Talen Renewable Energy	Energy Power Partners LLC	Biomass	3.2	PA	10/2012	10/2012
Andromeda One A Biomass Plant	Andromeda Green Energy	Andromeda Green Energy	Biomass	4.0	PA	2/2016	2/2016
Archbald Cogeneration	PEI Power Corporation	Energy Transfer LP	Biomass	20.0	PA	9/1988	9/1988
Arden Landfill	WM Renewable Energy LLC	Waste Management Inc.	Biomass	4.8	PA	2/2009	2/2009
Covanta Plymouth (Montenay Montgomery)	Covanta Plymouth Renewable	EQT AB (publ)	Biomass	28.0	PA	12/1991	12/1991
Dart Container Corp Cogen	Dart Container Corp.	Dart Container Corp.	Biomass	10.4	PA	12/2012	12/2012
Delaware County Resource Recovery Facility	Covanta Delaware Valley	EQT AB (publ)	Biomass	80.0	PA	4/1991	4/1991
Frey Farm Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	1.6	PA	1/2006	1/2006
Gettysburg Energy & Nutrient Recovery Facility (GEN	EnergyWorks BioPower	EnergyWorks BioPower	Biomass	Out of Serv.	PA	6/2013	6/2013
Glades Pike Cogeneration Plant IC	State Correctional Inst (Laure	State Correctional Inst (Laure	Biomass	3.2	PA	10/2011	10/2011
Greater Lebanon Refuse Authority Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	3.2	PA	9/2007	9/2007
Green Knight Energy Center	Waste Management Inc.	Waste Management Inc.	Biomass	8.7	PA	2/2001	2/2001
Honey Brook Generating Station (Granger)	Granger Electric Co	Granger Electric Co	Biomass	3.2	PA	12/2006	8/2010
IESI Blue Ridge Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	6.4	PA	1/2013	1/2013
Johnsonburg Mill	Domtar Paper Co. LLC	First Mgmt Ltd.	Biomass	49.0	PA	2/1993	2/1993
Lakeview Gas Recovery	WM Renewable Energy LLC	Waste Management Inc.	Biomass	6.0	PA	5/1997	6/1997
Lancaster County Resource Recovery	Covanta Lancaste	EQT AB (publ)	Biomass	32.4	PA	5/1991	5/1991
Lycoming County Landfill Project (PPL Renewable)	Talen Renewable Energy	Energy Power Partners LLC	Biomass	3.0	PA	10/2012	10/2012
Morgantown Generating Station	Granger Electric Co	Granger Electric Co	Biomass	1.6	PA	5/2016	5/2016
Mountain View Landfill	CCI Power Holdings	Energy Trading Innovations	Biomass	14.4	PA	3/2003	3/2003
Northern Tier Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	1.6	PA	1/2009	1/2009
Pioneer Crossing Landfill	Fortistar LLC	Fortistar LLC	Biomass	8.0	PA	10/2008	11/2013
SECCRA Community Landfill	Southeastern Chester County Re	Southeastern Chester County Re	Biomass	2.5	PA	1/2007	11/2010
Shippensburg (Cumberland County) Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	6.4	PA	1/2009	1/2009
Susquehanna RMC (Harrisburg Facility Cogen)	Covanta Harrisburg, Inc.	EQT AB (publ)	Biomass	16.7	PA	10/1986	4/2006
Tullytown Landfill Gas Facility	WM Renewable Energy LLC	Waste Management Inc.	Biomass	1.6	PA	3/2013	3/2013
Wheelabrator Falls	Wheelabrator Falls Inc.	Macquarie Group	Biomass	43.9	PA	5/1994	5/1994
York County Resource Recovery Center	Covanta York Renewable Energy	EQT AB (publ)	Biomass	36.5	PA	11/1989	11/1989
Zook Generating Station (L&S Sweetners)	Granger Electric Co	Granger Electric Co	Biomass	3.2	PA	10/2013	10/2013
Colver Power Project	Colver Green Energy LLC	Generation Holdings LP	Coal	110.0	PA	2/1995	2/1995
Conemaugh	ArcLight Capital Partners LLC	ACHP L.P.	Coal	1,700.0	PA	5/1970	5/1971
Ebensburg Power Company	Ebensburg Power Co.	Babcock & Wilcox Enterprises	Coal	50.0	PA	5/1991	5/1991
John B Rich Memorial Power Station	RI-CORP Development	RI-CORP Development	Coal	80.0	PA	2/1988	2/1988
Keystone	ArcLight Capital Partners LLC	ACHP L.P.	Coal	1,700.0	PA	8/1967	7/1968
Mount Carmel Cogeneration	Mt Carmel Co-Gen	Mt Carmel Co-Gen	Coal	43.0	PA	1/1990	1/1990
P.H. Glatfelter Company - Pennsylvania	Glatfelter Corp.	Glatfelter Corp.	Coal	85.0	PA	5/1948	1/1994
Seward Waste Coal	Robindale Energy Services Inc	Robindale Energy Services Inc	Coal	521.0	PA	11/2004	11/2004
St. Nicholas Cogeneration	Schuylkill Energy Resources In	Schuylkill Energy Resources In	Coal	86.0	PA	9/1990	9/1990
Westwood Generating Station	WPS Westwood Generation LLC	Olympus Holdings LLC	Coal	30.0	PA	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)	State	First Unit Online	Last Unit Online
AE Hunlock 4	UGI Development Company	UGI Corp.	Natural Gas	50.5	PA	12/2000	12/2000
Allegheny Energy 3, 4 and 5 (Springdale)	Aspen Generating LLC	LS Power Dev. LLC	Natural Gas	604.0	PA	7/2003	7/2003
Allegheny Energy Units 1 and 2 (Springdale)	Aspen Generating LLC	LS Power Dev. LLC	Natural Gas	98.3	PA	12/1999	12/1999
Allegheny Energy Units 12 & 13 (Chambersburg)	Aspen Generating LLC	LS Power Dev. LLC	Natural Gas	99.0	PA	11/2001	11/2001
Allegheny Energy Units 8 and 9 (Gans Plant)	Aspen Generating LLC	LS Power Dev. LLC	Natural Gas	97.9	PA	11/2000	11/2000
Alpaca Gas Project	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	20.4	PA	4/2017	4/2017
Archbald Power Station	PEI Power Corporation	Energy Transfer LP	Natural Gas	59.2	PA	5/2001	2/2010
Armstrong County	Ihi Power Services Corp.	Ihi Power Services Corp.	Natural Gas	829.7	PA	5/2002	5/2002
Beaver Dam Gas Project	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	21.0	PA	5/2016	5/2016
Bethlehem CC	Calpine Corp.	ECP ControlCo LLC	Natural Gas	1,134.0	PA	1/2003	1/2003
Birdsboro Combined Cycle Plant	NAES Corp	ITOCHU Corp.	Natural Gas	485.0	PA	5/2019	5/2019
Brunner Island	Talen Generation LLC	Riverstone Holdings LLC	Natural Gas	1,411.0	PA	5/1961	6/1969
Brunot Island CC	GenOn Power Midwest, LP	GenOn Holdings Inc.	Natural Gas	270.0	PA	6/1973	7/1974
Bucknell University	Bucknell University	Bucknell University	Natural Gas	6.7	PA	10/1991	6/1998
Chester Operations CC	Kimberly-Clark Corp.	Kimberly-Clark Corp.	Natural Gas	65.2	PA	8/2020	8/2020
CPV Fairview Energy Center	NAES Corp	ITOCHU Corp.	Natural Gas	1,094.2	PA	12/2019	12/2019
East Campus Plant	The PA State University	The PA State University	Natural Gas	8.9	PA	6/2011	6/2011
Fairless Works Energy Center	Lotus Infrastructure	Lotus Infrastructure	Natural Gas	1,355.4	PA	5/2004	6/2004
Falling Spring	Chambersburg Borough of	Chambersburg Borough of	Natural Gas	7.1	PA	12/1967	6/2001
Fayette Energy Facility	Vistra Corp.	Vistra Corp.	Natural Gas	716.0	PA	6/2003	6/2003
Grays Ferry Cogeneration	Grays Ferry Cogeneration Ptnsh	Antin Infrastructure Ptnrs US	Natural Gas	183.6	PA	10/1997	10/1997
Handsome Lake Energy	Handsome Lake Energy, LLC	Handsome Lake Energy, LLC	Natural Gas	267.5	PA	7/2001	8/2001
Hazleton Cogeneration	NAES Corp	ITOCHU Corp.	Natural Gas	150.9	PA	1/1989	6/2002
Hickory Run Energy Station	NAES Corp	ITOCHU Corp.	Natural Gas	1,076.9	PA	5/2020	5/2020
Hill at Whitemarsh	Talen Renewable Energy	Energy Power Partners LLC	Natural Gas	1.6	PA	5/2007	5/2007
Hill Top Energy Center	Hill Top Energy Center LLC	Hill Top Energy Center LLC	Natural Gas	624.6	PA	7/2021	7/2021
Hunlock Repowering	UGI Development Company	UGI Corp.	Natural Gas	128.9	PA	7/2011	7/2011
Hunterstown CC	NAES Corp	ITOCHU Corp.	Natural Gas	930.0	PA	7/2003	7/2003
Indiana University of Pennsylvania	IN University PA	IN University PA	Natural Gas	24.0	PA	3/1988	3/1988
Jefferson Torresdale Hospital IC Project (Cogen)	Jefferson Torresdale Hospital	Jefferson Torresdale Hospital	Natural Gas	1.1	PA	5/2016	5/2016
Juniata Locomotive Shop GT Project	Norfolk Southern Corporation	Norfolk Southern Corporation	Natural Gas	1.5	PA	4/2015	4/2015
Lackawanna Energy Center	Invenergy LLC	Invenergy LLC	Natural Gas	1,467.0	PA	3/2018	1/2019
Liberty Electric Power	Liberty Electric Power LLC	Vistra Corp.	Natural Gas	562.0	PA	5/2002	5/2002
Lower Mount Bethel	Talen Energy Corporation	Riverstone Holdings LLC	Natural Gas	601.6	PA	2/2004	3/2004
Marcus Hook	FPL Energy Marcus Hook LP	NextEra Energy Inc.	Natural Gas	898.0	PA	12/2004	12/2004
Martins Creek 3 and 4	Talen Generation LLC	Riverstone Holdings LLC	Natural Gas	1,700.0	PA	10/1975	3/1977
Mehoopany	Procter & Gamble Paper Product	Procter & Gamble Paper Product	Natural Gas	1.6	PA	10/1984	10/1984
Mehoopany CT	Procter & Gamble Paper Product	Procter & Gamble Paper Product	Natural Gas	123.0	PA	6/1985	4/2013
Milan Gas Project	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	20.4	PA	4/2017	4/2017
Montour	Talen Generation LLC	Riverstone Holdings LLC	Natural Gas	1,504.0	PA	3/1972	4/1973

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

Power Plant	Owner Name	Ultimate Parent	Fuel Type	Operating Capacity (MW)	State	First Unit Online	Last Unit Online
Mount Joy Wire	Mount Joy Wire Corp.	Mount Joy Wire Corp.	Natural Gas	1.1	PA	12/2011	12/2011
Navy Yard Natural Gas Plant	Ameresco Inc.	Ameresco Inc.	Natural Gas	8.0	PA	1/2018	11/2018
New Castle	GenOn Power Midwest, LP	GenOn Holdings Inc.	Natural Gas	327.0	PA	11/1939	6/1964
Newman & Company Inc.	Newman & Co.	Newman & Co.	Natural Gas	1.8	PA	5/1964	5/1964
Ontelaunee Energy Center	Dynegy Power	Vistra Corp.	Natural Gas	622.5	PA	5/2002	5/2002
Orchard Park	Chambersburg Borough of	Chambersburg Borough of	Natural Gas	23.2	PA	12/2003	12/2003
Oxbow Creek Energy	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	21.0	PA	12/2019	12/2019
Panda Liberty Generating Station (Moxie Liberty)	The Carlyle Group	The Carlyle Group	Natural Gas	850.0	PA	10/2016	10/2016
Patriot Power Generation Plant (Moxie Patriot)	The Carlyle Group	The Carlyle Group	Natural Gas	850.0	PA	7/2016	7/2016
Phoenix Contact - CCHP Plant	Phoenix Contact USA, Inc.	Phoenix Contact USA, Inc.	Natural Gas	1.0	PA	3/2014	3/2014
PPL Ironwood	Helix Generation LLC	LS Power Dev. LLC	Natural Gas	769.2	PA	12/2001	12/2001
Roundtop	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	21.0	PA	10/2015	10/2015
Shell Chemical Appalachia Cogen	Shell Chemical Appalachia LLC	Shell plc	Natural Gas	291.1	PA	7/2021	10/2021
Spring House IC Plant	Janssen Pharmaceuticals Inc.	Johnson & Johnson	Natural Gas	3.8	PA	4/2013	4/2013
Temple SEGF Plant	Temple University	Temple University	Natural Gas	16.0	PA	5/1993	5/1993
Tenaska Westmoreland Generating Station	Tenaska Operations, Inc.	Tenaska Energy Inc.	Natural Gas	1,032.0	PA	12/2018	12/2018
West Campus Plant	The PA State University	The PA State University	Natural Gas	7.1	PA	1/1938	12/2021
West Campus Steam Plant CHP Expansion	The PA State University	The PA State University	Natural Gas	6.4	PA	12/2021	12/2021
West Point Facility	Merck & Co.	Merck & Co.	Natural Gas	66.0	PA	1/1989	4/2001
West Point Facility IC	Merck & Co.	Merck & Co.	Natural Gas	13.8	PA	1/1972	4/2022
Wolf Run Energy Project	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	22.0	PA	6/2019	6/2019
York 2 Energy Center	Calpine Corp.	ECP ControlCo LLC	Natural Gas	858.9	PA	3/2019	3/2019
York Energy Center (Delta Power Project)	Conectiv Mid Merit LLC	ECP ControlCo LLC	Natural Gas	545.0	PA	3/2011	3/2011
Clairton Works	U.S. Steel Corp.	U.S. Steel Corp.	Other Fuel	26.0	PA	1/1955	1/1955
Mon Valley Works	U.S. Steel Corp.	U.S. Steel Corp.	Other Fuel	67.9	PA	6/1943	2/2002
Brunot Island	GenOn Power Midwest, LP	GenOn Holdings Inc.	troleum Produ	18.1	PA	3/1972	3/1972
Conemaugh IC	ArcLight Capital Partners LLC	ACHP L.P.	troleum Produ	11.2	PA	2/1970	2/1970
Ephrata PA BTM IC Power Plant	American Mun Power Inc	American Mun Power Inc	troleum Produ	5.4	PA	11/2021	11/2021
General Electric Company	General Electric Co.	General Electric Co.	troleum Produ	4.3	PA	6/1984	6/1984
Girard (PA) RTO BTM	American Mun Power Inc	American Mun Power Inc	troleum Produ	2.7	PA	3/2022	3/2022
Hatfield PA BTM IC Power Plant	American Mun Power Inc	American Mun Power Inc	troleum Produ	2.7	PA	12/2022	12/2022
Keystone IC	ArcLight Capital Partners LLC	ACHP L.P.	troleum Produ	11.2	PA	11/1968	11/1968
New Castle IC	GenOn Power Midwest, LP	GenOn Holdings Inc.	troleum Produ	2.5	PA	12/1968	12/1968
Perkasie PA BTM IC Project	American Mun Power Inc	American Mun Power Inc	troleum Produ	4.4	PA	4/2022	4/2022
Pine Grove Landfill	CCI Power Holdings	Energy Trading Innovations	troleum Produ	5.4	PA	2/2008	2/2008
PPG Monroeville Chemicals Center	PPG Monroeville Chemicals	PPG Industries Inc.	troleum Produ	1.1	PA	10/1998	9/2000
PPG Place	PPG Industries Inc.	PPG Industries Inc.	troleum Produ	2.3	PA	5/1990	6/1998
Quakertown Power Plant	American Mun Power Inc	American Mun Power Inc	troleum Produ	8.1	PA	11/2023	11/2023
Schuylkill Haven BTM PA Generation Project	American Mun Power Inc	American Mun Power Inc	troleum Produ	5.4	PA	6/2023	6/2023
Sunbury CT	Sunbury Generation LP	Corona Power	troleum Produ	36.0	PA	11/1971	11/1971

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

Power Plant	Owner Name	Ultimate Parent	Fuel Type	Operating Capacity (MW)	State	First Unit Online	Last Unit Online
Sunbury IC	Sunbury Generation LP	Corona Power	troleum Produ	5.0	PA	4/1967	4/1967
Vitro Architectural Glass (PA)	PPG Industries Inc.	PPG Industries Inc.	troleum Produ	7.0	PA	7/1972	11/2021
500 Virginia Solar	500 Virginia Solar Lp	500 Virginia Solar Lp	Solar	1.0	PA	7/2011	7/2011
ABE4 Solar Project	Mid-River PA LLC	Mid-River PA LLC	Solar	3.0	PA	9/2020	9/2020
Air Products Solar (Trexlertown Solar)	Air Products Energy Entrprs	Air Products & Chemicals Inc.	Solar	1.9	PA	6/2011	6/2011
Aqua Ingrams Mill Solar	Essential Utilities Inc.	Essential Utilities Inc.	Solar	0.9	PA	12/2009	12/2009
Beaver Solar	Tangent Energy Solutions Inc.	Tangent Energy Solutions Inc.	Solar	1.3	PA	12/2012	12/2012
Conshohocken -Solar	Sun Power Electric	TPG Capital L.P.	Solar	0.1	PA	4/1999	4/1999
Crayola Solar Park	Talen Renewable Energy	Energy Power Partners LLC	Solar	2.8	PA	5/2010	11/2011
Dickinson Solar Project (Carlisle)	Dickinson Solar LLC	NextEra Energy Inc.	Solar	3.0	PA	12/2016	12/2016
Elizabethtown Solar	Community Energy Solar LLC	The AES Corp.	Solar	2.0	PA	2/2016	2/2016
Elk Hill Solar 1	Lightsource bp Renewable Energ	Lightsource bp Renewable Energ	Solar	20.0	PA	12/2022	12/2022
Elk Hill Solar 2 Project	Elk Hill Solar 2, LLC	Elk Hill Solar 2, LLC	Solar	15.0	PA	12/2020	12/2020
ER Bison Solar CSG Project	Greenbacker Renewable Energy	Greenbacker Renewable Energy	Solar	1.4	PA	1/2023	1/2023
Exelon-Conergy Solar Energy Center	Mf Mesa Lane, LLC	Mf Mesa Lane, LLC	Solar	1.5	PA	11/2008	11/2008
Fort Indiantown Gap Solar Project (FTIG)	Standard Solar Inc.	Brookfield Corp.	Solar	3.0	PA	1/2019	1/2019
Franklin Solar	Hecate Energy	Hecate Energy	Solar	20.0	PA		
GSK York RDC Solar Facility	GlaxoSmithKline Cnsmr Hlthcr L	Glaxosmithkline Consumer Healt	Solar	1.6	PA	12/2010	12/2010
Hunker Solar River Project	Hunker Solar River LLC	Hunker Solar River LLC	Solar	3.3	PA	10/2021	10/2021
IKEA Conshohocken Rooftop PV System	IKEA Energy US LLC	Stichting INGKA Foundation	Solar	1.0	PA	7/2012	7/2012
Keystone Solar Project	Keystone Solar LLC	Keystone Solar LLC	Solar	5.0	PA	9/2012	9/2012
Knouse Foods Solar Plant	Knouse Foods Co-Operative Inc	Knouse Foods Co-Operative Inc	Solar	3.0	PA	12/2010	12/2010
Longwood Gardens Solar Plant	Ecogy Pennsylvania Systems Llc	Ecogy Pennsylvania Systems Llc	Solar	1.3	PA	5/2010	5/2010
Maple Hill Solar Project	Competitive Power Ventures Inc	Competitive Power Ventures Inc	Solar	100.0	PA	11/2023	11/2023
Marlboro Mushrooms Solar Field	Marlborough Mushrooms	Marlborough Mushrooms	Solar	1.0	PA	11/2011	11/2011
Martin Limestone Solar Array Plant	Sunstream Energy Llc	Sunstream Energy Llc	Solar	1.0	PA	12/2012	12/2012
Masser Farms Realty Solar	Masser Farms Realty, Ltd.	Masser Farms Realty, Ltd.	Solar	1.0	PA	5/2011	5/2011
Merck-Upper Gwynedd Solar Array	Ray Angelini, Inc.	Ray Angelini, Inc.	Solar	1.5	PA	5/2011	5/2011
PA Solar Park II Project	Con Edison Development	RWE Aktiengesellschaft	Solar	10.0	PA	1/2020	1/2020
PA Solar Park Project	Con Edison Development	RWE Aktiengesellschaft	Solar	10.0	PA	10/2012	10/2012
PA4 Solar Farm	DEPCOM Power Inc.	DEPCOM Power Inc.	Solar	3.6	PA	5/2019	5/2019
Pickering Solar	Essential Utilities Inc.	Essential Utilities Inc.	Solar	1.4	PA	1/2012	1/2012
Pocono Raceway Solar Project	EDF Renewables Inc.	France	Solar	2.5	PA	8/2010	8/2010
Romark PA Solar	Romark Logistics Of Pa, Inc.	Romark Logistics Of Pa, Inc.	Solar	1.8	PA	11/2011	11/2011
Susquehanna University Solar Project	TerraForm Power Inc	Brookfield Corp.	Solar	3.0	PA	9/2018	9/2018
Temple Solar Arrays Project	UGI Energy Services LLC	UGI Corp.	Solar	2.2	PA	5/2011	5/2011
TPE Pennsylvania Solar 1	DEPCOM Power Inc.	DEPCOM Power Inc.	Solar	3.6	PA	8/2019	8/2019
University Park Solar Project	SS Pa II PSU LLC	SS Pa II PSU LLC	Solar	1.5	PA	12/2018	12/2018
Whitetail Solar 1	Whitetail Solar 1 LLC	BP p.l.c.	Solar	13.5	PA	12/2019	12/2019
Whitetail Solar 2	Lightsource bp Renewable Energ	Lightsource bp Renewable Energ	Solar	20.0	PA	9/2020	9/2020

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

Power Plant	Owner Name	Ultimate Parent	Fuel Type	Operating Capacity (MW)	State	First Unit Online	Last Unit Online
Whitetail Solar 3	Lightsource bp Renewable Energ	Lightsource bp Renewable Energ	Solar	20.0	PA	8/2020	8/2020
Beaver Valley	Energy Harbor Nuclear Corp	Energy Harbor Corp	Uranium	1,872.0	PA	9/1976	11/1987
Peach Bottom	Constellation Energy Corp.	Constellation Energy Corp.	Uranium	2,694.8	PA	7/1974	12/1974
Susquehanna Nuclear	Susquehanna Nuclear, LLC	Riverstone Holdings LLC	Uranium	2,494.0	PA	6/1983	2/1985
Allegheny 5	Ontario Power Generation Inc.	Province of Ontario	Water	10.0	PA	10/1988	10/1988
Allegheny 6	Ontario Power Generation Inc.	Province of Ontario	Water	12.0	PA	11/1988	11/1988
Conemaugh Hydroelectric	Pennsylvania Renewable Resourc	Pennsylvania Renewable Resourc	Water	15.0	PA	2/1989	2/1989
Holtwood Hydroelectric Plant	Talen Energy Supply LLC	Riverstone Holdings LLC	Water	249.0	PA	10/1910	11/2013
Kinzua Pumped Storage Project (Seneca)	PE Hydro Generation LLC	LS Power Dev. LLC	Water	474.4	PA	1/1970	1/1970
Mahoning Creek	Ontario Power Generation Inc.	Province of Ontario	Water	6.7	PA	12/2013	12/2013
Piney	Brookfield Power Piney & Deep	Brookfield Power Piney & Deep	Water	33.2	PA	6/1924	2/1928
Safe Harbor	Safe Harbor Water Power Corp.	Brookfield Corp.	Water	417.5	PA	12/1931	4/1986
Townsend Hydro	Beaver Falls Municipal Authori	Beaver Falls Municipal Authori	Water	4.2	PA	10/1987	10/1987
Wallenpaupack	Brookfield Renewable	Brookfield Corp.	Water	44.0	PA	6/1926	6/1926
Warrior Ridge Hydroelectric	American Hydro Power Co.	American Hydro Power Co.	Water	2.8	PA	12/1985	12/1985
Wm F Matson Generating Station	Allegheny Electric Coop	Allegheny Electric Coop	Water	21.7	PA	6/1988	6/1988
York Haven	Ontario Power Generation Inc.	Province of Ontario	Water	19.0	PA	12/1905	12/1905
Yough Hydro Power	D/R Hydro Co.	D/R Hydro Co.	Water	12.2	PA	12/1989	12/1989
Allegheny Ridge Wind Farm	Allegheny Ridge Wind Farm LLC	OMERS Administration Corp.	Wind	80.0	PA	6/2007	6/2007
Armenia Mountain Wind	ALLETE Clean Energy	ALLETE Inc.	Wind	100.5	PA	12/2009	12/2009
Big Level Wind Project (Cunningham)	TransAlta Renewables Inc.	TransAlta Corp	Wind	90.0	PA	12/2019	12/2019
Casselman Wind	Avangrid Renewables LLC	Iberdrola SA	Wind	34.5	PA	12/2007	12/2007
Highland Wind Project (Krayn Wind)	Cambria Wind LLC	Corporación Masaveu	Wind	62.5	PA	8/2009	8/2009
Laurel Hill	Brookfield Renewable	Brookfield Corp.	Wind	69.0	PA	9/2012	9/2012
Locust Ridge II	Avangrid Renewables LLC	Iberdrola SA	Wind	102.0	PA	5/2009	5/2009
Locust Ridge Wind Farm	Avangrid Renewables LLC	Iberdrola SA	Wind	26.0	PA	2/2007	2/2007
MATS Wind	Electric City Wind Power Corp.	Electric City Wind Power Corp.	Wind	0.6	PA	2008	2008
Mehoopany Wind	BP Wind Energy North America	BP p.l.c.	Wind	140.8	PA	12/2012	12/2012
Meyersdale Wind Project	GlidePath Power Solutions	Quinbrook Infrastructure Ptnrs	Wind	30.0	PA	12/2003	12/2003
Mill Run Wind Farm	GlidePath Power Solutions	Quinbrook Infrastructure Ptnrs	Wind	15.0	PA	12/2001	12/2001
North Allegheny Wind	Brookfield Renewable	Brookfield Corp.	Wind	70.0	PA	9/2009	9/2009
Ringer Hill Wind Farm	Skyline Renewables LLC	Skyline Renewables LLC	Wind	38.3	PA	12/2016	12/2016
Sandy Ridge Wind 2 Plant	Liberty Power	Algonquin Power & Utilities	Wind	87.6	PA	9/2023	9/2023
Sandy Ridge Wind Farm	Gamesa Wind US LLC	Siemens Energy AG	Wind	48.2	PA	2/2012	2/2012
Somerset Wind Project	GlidePath Power Solutions	Quinbrook Infrastructure Ptnrs	Wind	9.0	PA	12/2001	12/2001
South Chestnut Wind Project	Avangrid Renewables LLC	Iberdrola SA	Wind	50.4	PA	4/2012	4/2012
Stony Creek Wind Farm	E.ON Climate & Renewables Nort	RWE Aktiengesellschaft	Wind	52.5	PA	11/2009	11/2009
Turkey Point Wind Project (Frey Farm Wind)	Talen Renewable Energy	Energy Power Partners LLC	Wind	3.2	PA	1/2011	1/2011
Twin Ridges Wind Farm	Senvion GmbH	Centerbridge Partners L.P.	Wind	139.4	PA	12/2012	12/2012
Waymart Wind Farm	GlidePath Power Solutions	Quinbrook Infrastructure Ptnrs	Wind	64.5	PA	10/2003	10/2003
Wind Park Bear Creek Project	Wind Park Bear CReek LLC	JPMorgan Chase & Co.	Wind	24.0	PA	3/2006	3/2006

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