PAPUC

Electric Power Outlook for Pennsylvania 2021-2026

August 2022

Pennsylvania Public Utility Commission

ELECTRIC POWER OUTLOOK FOR PENNSYLVANIA 2021–2026

August 2022

Published by:
Pennsylvania Public Utility Commission
400 North Street
Harrisburg, PA 17105-3265
www.puc.pa.gov

Technical Utility Services

Paul T. Diskin, *Director*

Executive Summary

Introduction

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

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

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

Overview

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

Regional generation adequacy and reserve margins of the mid-Atlantic will be satisfied through 2031, 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 2022, the PJM reserve margin requirement is 14.7% with an anticipated available reserve of 30.6%, as compared to a reserve margin requirement of 15.1% and anticipated available reserve of 39.1% in 2021, as compared to a reserve margin requirement of 15.9% and anticipated available reserve of 39.43% in 2020. NERC also projects PJM will have enough generation capacity to meet its reserve margin requirements through 2031.[5]

---

[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] 66 Pa.C.S. §§ 2801—2812.
[5] *See* NERC, *2021 Long-Term Reliability Assessment*, December 2021, available at: https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2021.pdf

Pennsylvania's aggregate electrical net energy usage (residential, commercial, industrial, sales for resale, and other) in 2021 was 142,827 gigawatt hours (GWh) as compared to: 139,185 GWh in 2020; 145,090 GWh in 2019; 148,333 GWh in 2018; 142,740 GWh in 2017. Year-over-year (YOY) electric usage increased by 2.62%. In general, residential, commercial, and industrial usage increased YOY by 1.26%, 5.15% and 2.46%, respectively. The increase in residential, commercial, and industrial usage is likely indicative of rebound of the economy from the economic impacts of the COVID-19 pandemic. Pennsylvania's GDP for 2021 saw a YOY increase of 8.75%, as compared to Pennsylvania's GDP in 2020, which experienced a YOY decrease of 3.5%.[6]

The total average annual aggregate five-year energy usage growth projection for the residential, commercial, and industrial classes is projected to increase by 0.6% per year. This includes an essentially flat growth rate for residential, a commercial growth rate decrease of 0.55%, and an industrial growth rate increase of 0.55% 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 2021-2026* discusses the current and future electric power supply and demand situation for the 11 investor-owned jurisdictional electric distribution companies (EDCs) operating in the state and the entities responsible for maintaining the reliability of the bulk electric supply system within the region that encompasses the state.

Pursuant to Title 66, Pennsylvania Consolidated Statutes, Section 524(b), the PUC annually submits this report to the General Assembly, the Governor, the Office of Consumer Advocate and affected public utilities. It also is posted on the Commission's website.[7]

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 2021-2026. The state's seven largest EDCs[8] represent 99% of both jurisdictional electricity customers and electrical energy consumption in Pennsylvania. Accordingly, information regarding the other four smallest EDCs contained in this report is limited. The report also provides a regional perspective with statistical information on the projected resources and aggregate peak loads for the region that impacts Pennsylvania.

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

Data for the report is submitted annually by EDCs, pursuant to the Commission's regulations.[9] Additionally, the Commission relies on reports and analyses of regional entities, including the ReliabilityFirst Corporation (RFC) and PJM, to obtain a more complete assessment of the current and future status of the electric power supply within the region. Sources also include data submitted by regional reliability councils to the North American Electric Reliability Corporation (NERC), which is subsequently forwarded to the U.S. Energy Information Administration (EIA).

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

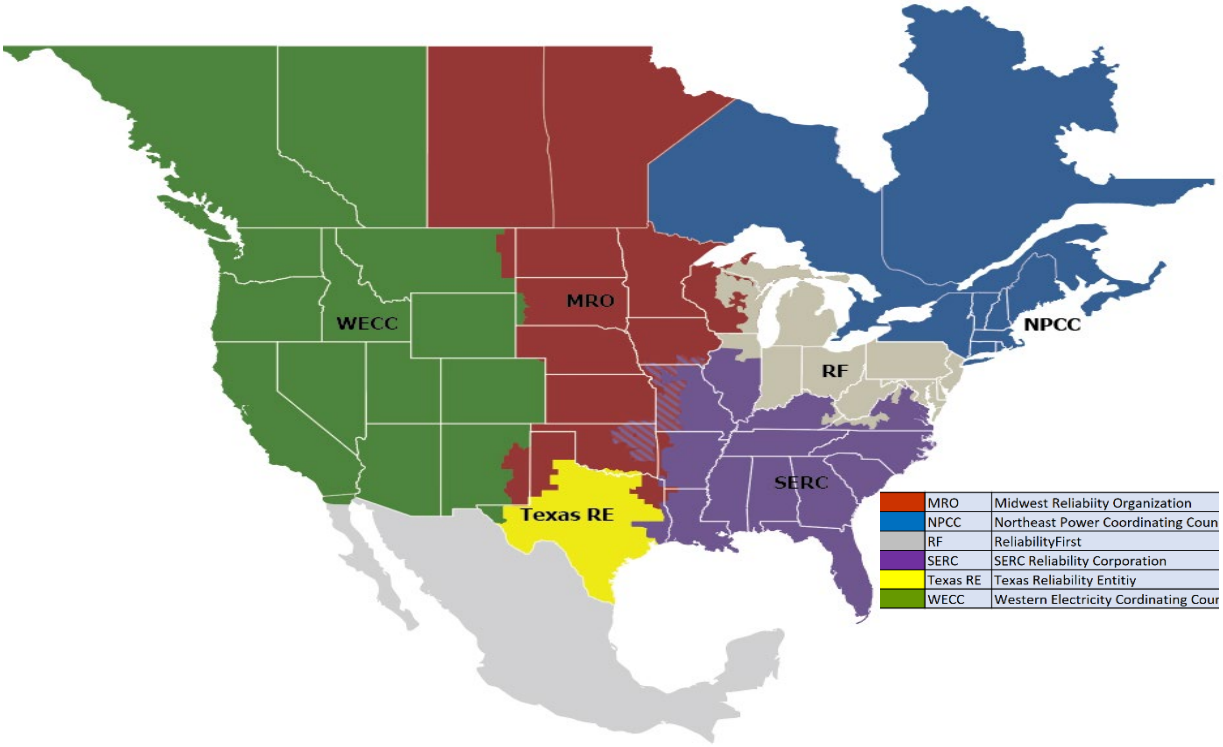
Regional Reliability Organizations

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

North American Electric Reliability Corporation

The North American Electric Reliability Corporation (NERC) has been granted legal authority by the Federal Energy Regulatory Commission (FERC) to enforce reliability standards and to mandate compliance with those standards. NERC oversees the reliability of the bulk power system that provides electricity to nearly 400 million people, has a total demand of over 830 gigawatts (GW), has approximately 211,000 miles of high-voltage transmission lines (230,000 volts and greater), and represents more than $1 trillion worth of assets.

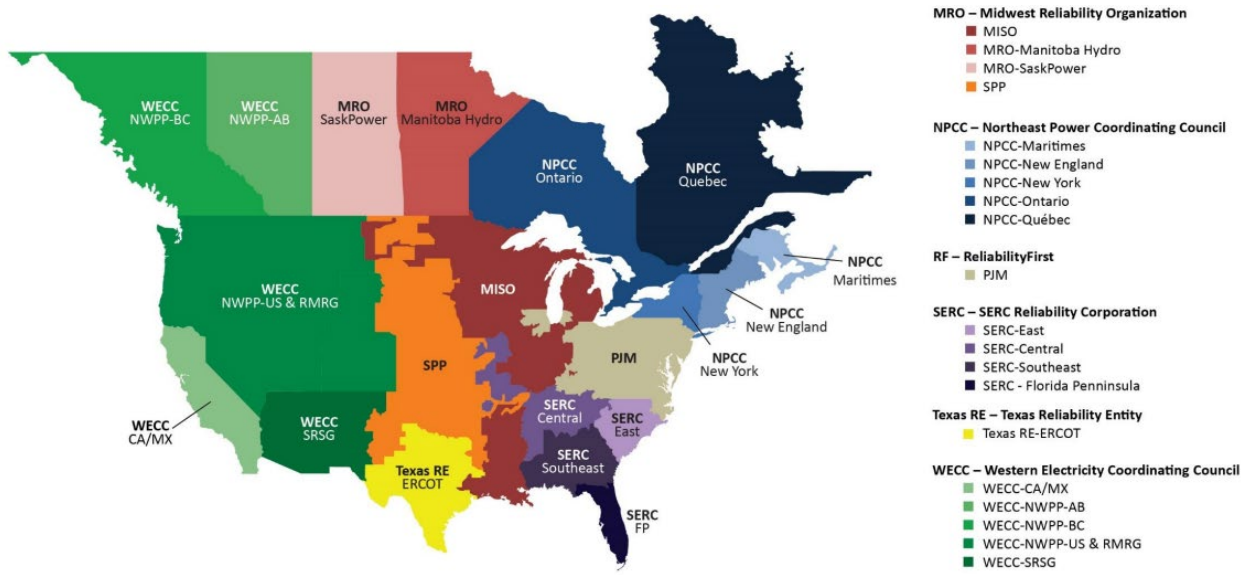
North American Electric Reliability Corporation NERC Regional Reliability Entities



As shown above, NERC's members operate in six regional reliability entities. Members include investor-owned utilities, federal and provincial entities, rural electric cooperatives, state/municipal and provincial utilities, independent power producers, independent system operators, merchant electricity generators, power marketers and end-use electricity customers. The membership accounts for virtually all the electricity supplied in the United States, Canada, and a portion of Baja California Norte, Mexico. The regional entity operating in Pennsylvania is ReliabilityFirst Corporation (RFC).

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

North American Electric Reliability Corporation Assessment Areas



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

NERC Reliability Assessment

The *2021 Long–Term Reliability Assessment*[10] (LTRA) is NERC's independent assessment and comprehensive report on the adequacy of planned North American bulk power system (BPS) resources to reliably meet the electricity demand across North America over the next 10 years. The LTRA also identifies reliability trends, emerging issues, and potential risks that could impact the long-term reliability, resilience and security of the BPS.

The LTRA noted that governmental policies, changes in comparative resource economics, and customer demand for clean energy are driving the rapidly changing resource mix within the BPS; the BPS has already seen a great deal of change, and more is underway. The LTRA also noted that managing this pace of change presents the greatest challenge to reliability. As the system transitions, changing weather systems present new challenges and fuel becomes inherently less secure. The FERC, NERC, and RE staff report *The February 2021 Cold Weather Outages in Texas and South-Central United States* (The February 2021 Cold Weather Outages Report)

[10] https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2021.pdf

highlighted the deadly impacts of these risks if reliability is not prioritized in BPS resource planning and policy considerations.[11]

The LTRA identified numerous risks that stakeholders and policymakers need to focus on over the next 10 years. While the LTRA calls out the assessment areas in the U.S. Western Interconnection and MISO for resource adequacy and energy sufficiency concerns, all Interconnections face reliability challenges. Key findings and recommendations are summarized as follows.

NERC Key Findings

- Reserve Margins – NERC noted that anticipated reserves fall below the Reference Margin Level (RML) in MISO beginning in 2024, NPCC-Ontario beginning in 2025, and California (WECC-CA/MX) beginning in 2026. For all other areas, anticipated capacity reserves are above their respective RMLs for the first five years of this assessment period, indicating that there will be sufficient electric resources to meet peak demand. Note, however, that this reserve margin analysis does not explicitly account for resource energy limitations due to fuel uncertainty. Details include the following:

    - MISO could face the loss of over 13 gigawatts (GW) of resource capacity from 2021 to 2024 based on its annual survey of members. These unconfirmed retirements include 10.5 GW of coal-fired and 2.4 GW of natural-gas-fired generation. A capacity shortfall of over 560 megawatts (MW) in 2024 would result if all of these unconfirmed retirements were to occur without additional new generation resources (on top of the 8 GW already in development for interconnection by 2024).

    - The planned retirement of the 2,200 MW Diablo Canyon Power Plant generating stations in 2024 and 2025 contributes to a projected capacity shortfall in WECC-CA/MX beginning in 2026. Reserve margins in WECC-CA/MX are also declining because of the energy limitations of solar photovoltaic (PV) resources at the peak demand hour, which occurs later in the day when solar PV resource output is lower.

    - In Ontario, results of the Independent Electricity System Operator (IESO) capacity auction held in December 2020 as well as the delayed retirement of a nuclear generating station have alleviated near-term capacity concerns identified in the 2020 LTRA. IESO expects to meet the 2025 reserve margin shortfall projected in this year's assessment with capacity obtained through a series of recently announced procurement mechanisms and increased participation in the capacity auction.

    - NPCC-Maritimes reserve margins fluctuate around RML over the assessment period; results of annual and short-term capacity procurements are expected to mitigate these small shortfalls.

[11] https://www.ferc.gov/media/february-2021-cold-weather-outages-texas-and-south-central-united-states-ferc-nerc-and

- Energy Risks – Since the publication of the ERO's probabilistic assessment (Prob A) in 2020, additional analysis indicates that risk of load loss and energy shortfalls persist in the Western Interconnection and MISO areas. Details include the following:

  The 2020 Prob A identified elevated load-loss risk in MISO, Saskatchewan (MRO-SaskPower) and the Northwest-Rocky Mountain (WECC-NWPP-RMRG). It also identified high risk in WECCCA/MX for 2022 and beyond. While conditions in MRO-SaskPower have improved, concerns remain in the other areas.

  The risk of unserved energy and loss of load hours (LOLH) in MISO in the near-term horizon has increased due to the declining resources since the 2020 Prob A. Reserve margins could fall below the RMLs beginning in 2024. This indicates that, without additional resources from the interconnection planning queue or other sources, the projected resources in MISO after 2023 are not sufficient to meet a 1-day-in-10-year loss of load criteria under current forecasts.

  - The two largest U.S. assessment areas in the Western Interconnection, California/Mexico and the Northwest-Rocky Mountain (WECC-NWPP-US & RMRG), have potential for high load-loss hours and energy shortfalls for 2022 and beyond. In updated probabilistic studies of demand and resource scenarios for 2022, WECC-CA/MX shows 10 potential hours of load loss, and the NWPP-US & RMRG area shows 23. Higher load-loss metrics were seen in the 2024 study year for all U.S. areas of the Western Interconnection.

- Extreme Weather Risks – Parts of North America are exposed to energy shortfall risks in the near-term assessment period from wide-area and long duration extreme weather events like the 2020/2021 western heat wave and winter storm Uri in 2021. Details include the following:

  - Extreme weather can cause challenging grid operating conditions by both diminishing the supply of electricity and driving actual demand above forecasts. Near-term demand forecasts, resource projections, and other trends suggest that even parts of North America that are considered resource adequate at the traditional peak hour evaluation are becoming increasingly exposed to energy shortfall risks in extreme weather events.

  - The increasing volatility and uncertainty of electricity demand makes accurate load forecasting a challenge, increasing the risk that Balancing Authorities (BA) may be unprepared for the peak demands that can accompany extreme weather events. In extreme temperatures, areas with relatively high seasonal load forecast uncertainty (LFU) and low Planning Reserve Margins (PRM) are at risk of capacity shortfall and the WECC-CA/MX and NWPP-US & RMRG areas near-term summer projections fall into this category.

  - Areas that rely on variable energy resources (VER) like wind or solar, or imports to meet peak or other high-risk periods, face greater risk in wide-area, long-duration weather events and when weather-dependent generation is impacted by abnormal

atmospheric conditions, such as smoke or wind drought. Where extended drought increases the risk of wildfires, transmission lines can be impacted, curtailing electricity transfers that are needed to serve demand. Texas, California and the U.S. Northwest currently or in the near term depend on a combination of transfers, wind, and solar generation to meet projected peak demand. MISO and the U.S. Southwest are approaching similar thresholds in near-term projections. In the event that one or more of these resources fall short of forecast at peak conditions, other resources must make up the gap, or load will need to be shed.

- Reliable operation of thermal generating units and fuel assurance is critically important, especially during extreme weather events.

- Frequency Response – Frequency response is expected to remain adequate through 2023. Details include the following:

  - Despite increasing amounts of asynchronous resources and less inertia due to retirement of rotating generation, each of the four Interconnections expects to have adequate and diverse sources of frequency response, and all have a low likelihood of activating under-frequency load shedding (UFLS) schemes.

  - Maintaining interconnection frequency within acceptable boundaries following the sudden loss of generation or load can be accomplished by using the control functions of inverters, which includes energy storage and load-shedding relays; this is generally known as fast frequency response (FFR). The application of FFR is expected to continue and support frequency when synchronous inertia is insufficient.

  - Future changes to the resource mix will continue to impact the level of inertia.

- Resource Mix Changes – VERs continue to grow and thermal resource capacity declines in most areas throughout this assessment period; as a result, increased attention on planning and operating a more complex resource mix is required. Details include the following:

  - Projects to develop solar and wind generation for the BPS continue to grow in the interconnection planning queues. Since the 2020 LTRA, the nameplate capacity of solar projects in all stages of development has increased from 390 GW to 504 GW for the next 10 years. Wind projects are projected to total 360 GW of nameplate capacity over the next 10 years, up from 250 GW since the 2020 LTRA projection.

  - Texas RE-ERCOT, PJM, and MISO have the most solar capacity in planning. MISO, NPCC-New England, PJM, SPP, and Texas RE-ERCOT have the most wind capacity in planning.

  - Existing battery resources and projects in interconnection queues at various stages of development through 2024 now total over 113 GW—a substantial increase from the 47 GW reported for the same period in the 2020 LTRA. Flexible resources

refer to dispatchable conventional as well as dispatchable variable resources, energy storage devices, and dispatchable loads.

- Distributed energy resource (DER) growth continues with cumulative solar PV DERs expected to reach over 60 GW by the end of this 10-year assessment period. A total of 15 of the 20 assessment areas expect to double their total solar DER footprint by 2031. This growth highlights the need for the ERO as well as planners and operators in growth areas to take actions that ensure planning processes and operating measures are in place to ensure reliability.

- In many areas, VERs are increasingly important to meet electricity demand. Operators must have flexible resources, including adequate dispatchable, fuel-assured, and weatherized generation, at their disposal. This is especially true in areas with high levels of variable generation to avoid shortfalls when VER output is insufficient to meet demand.

- Inverter-based resources (IBRs), including most solar and wind as well as new battery or hybrid generation, respond to disturbances and dynamic conditions based on programmed logic and inverter controls. Maintaining a reliable system as the penetration of IBRs increase requires planners and operators to be cognizant of potential disturbance-related performance issues.

NERC Recommendation

- NERC recommends that regulators and policymakers in risk areas should coordinate with electric industry planning and operating entities to develop policies that prioritize reliability, including those that would promote the development and use of flexible resources and maintain a sustainable and diverse generation mix.

- NERC recommends that regulators and policymakers should review the scope of their resource adequacy requirements to ensure that they address risks of both energy and capacity shortfalls and consider both peak and non-peak demand hours. They should also consider limitations from neighboring systems during wide-area, long-duration extreme weather events and potential generator fuel supply limitations.

- NERC notes that industry planners should pay close attention to the ramping and load-following requirements for their system as VERs increase as well as to commit flexible resources to meet the system reliability needs.

- NERC and industry should develop processes and techniques to assess the adequacy of energy supplies and ensure that the changing resource mix can meet operational needs. Capacity-based resourced adequacy measures and criteria (e.g., PRMs and RMLs) do not ensure that sufficient amounts of energy will be available for a variety of potential weather and environmental conditions. Energy metrics, such as expected unserved energy (EUE) levels, are also an important part of assessing BPS reliability. NERC and the industry should develop tools to incorporate energy considerations into planning and operational assessments. They should also explore desired energy performance levels and evaluate

NERC Reliability Standards for enhancements necessary to ensure energy adequacy in planning and operating time horizons.

- NERC and the industry should continue to strengthen their winterization and cold weather preparedness and coordination as well as enhance reliability standards to reduce the risks to electric reliability from extreme winter weather events. Regulators and policymakers should adopt policies that promote hardening electric generation and transmission facilities as well as fuel supplies to operate in specified temperatures for their areas.

- NERC recommends that Generator Operators and Generator Owners as well as BAs should increase coordination on seasonal operating plans. BAs must be aware of the performance expectations of all generators at forecast ambient conditions, and the BAs' plans should only depend upon generators that have a reasonable expectation of performing during forecast conditions.

- NERC notes that industry planners should update interconnection agreements to address the performance specifications for IBRs covered in the NERC reliability guidelines to ensure that all resources are consistently and effectively being interconnected to the BPS.[12] FERC should also update its pro forma interconnection agreement for large and small generators to include IBR performance specifications. These updates should also be accompanied by clear requirements for accurate modeling and sufficiently detailed studies during time of interconnection, and they should include electromagnetic transient (EMT) studies where necessary.

- NERC should continue advancing the efforts to modernize NERC Reliability Standards to account for IBR performance characteristics. This includes promptly reviewing industry's voluntary application of guidance and recommended practices contained in NERC Reliability Guidelines for IBR performance. Where reliability gaps are identified, NERC should develop standard requirements that support the delivery of achievable performance capabilities from BPS-connected IBRs that benefit system reliability.

- NERC and industry should continue to focus on the improvements needed in the area of modeling and studies for reliably integrating IBRs into the BPS. This includes verifying that IBR models used for steady state and dynamic power systems analysis agree with the as-built, plant-specific settings, controls, and behaviors of the facility. NERC and industry should also develop techniques and procedures for more advanced EMT studies capable of identifying the full scope of abnormal performance issues during the interconnection study process. These issues can be corrected before the plants are connected to the grid.

- NERC should continue working with the Eastern, Western, and Texas Interconnection study groups to assess forward-looking Interconnection frequency response. The analysis should continue to evolve and reflect low-inertia conditions that may be anticipated by the current and future generation resource mix.

[12] *Reliability Guideline: Improvements to Interconnection Requirements for BPS-Connected Inverter-Based Resources:* https://www.nerc.com/comm/RSTC_Reliability_Guidelines/Reliability_Guideline_IBR_Interconnection_Requirements_Improvements.pdf

ReliabilityFirst Corporation

ReliabilityFirst Corporation (RFC), headquartered in Fairlawn, Ohio, is one of six NERC regional entities serving North America, and is the regional reliability entity for Pennsylvania. Its service territory consists of more than 72 million people in a 238,000 square-mile area covering New Jersey, Delaware, Pennsylvania, Maryland, District of Columbia, West Virginia, Ohio, Indiana; and parts of Michigan, Wisconsin, Illinois, Kentucky, Tennessee, and Virginia. Its membership includes load-serving entities (LSEs),[13] RTOs, suppliers, and transmission companies.

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

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 2021, RFC continued to process high volume to keep up with intake on noncompliances and processed 362 noncompliances in 2021. The majority were of minimal risk, but RFC processed more settlements than in previous years.[14] In 2020, RFC processed 461 noncompliances (excluding noncompliances where RFC was the Affected Regional Entity under the Multi-Regional Registered Entity program), the majority of which were NERC Critical Infrastructure Protection (CIP)-related, and the overwhelming majority of which were compliance exceptions. Entities self-reported 95% of noncompliances.[15]

Regional Transmission Organizations

The two RTOs within the RFC footprint are PJM Interconnection, LLC (PJM) and Midcontinent Independent System Operator, Inc. (MISO).

[13] 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).
[14] *See*: ReliabilityFirst Board Compliance Committee public materials, April 2022.
[15] https://rfirst.org/about/publicreports/Public%20Reports/2021%20Annual%20Report.pdf. .

PJM Interconnection

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 85,103 miles of transmission lines.[16] The PJM RTO coordinates the movement of electricity for over 65 million people through all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia. PJM coordinates the operation of 1,436 electric power generators with more than 185,442 megawatts (MW) of generating capacity. PJM's peak customer load of 165,563 MW was recorded during Summer of 2006. According to the 2022 Summer forecast, PJM is prepared to serve a forecasted summer peak demand for electricity of approximately 149,000 MW but has performed reliability studies at even higher loads in excess of 157,000 MW.[17] PJM manages a sophisticated regional planning process for generation and transmission expansion to ensure the continued reliability of the electric system. PJM is responsible for maintaining the integrity of the regional power grid and for managing changes and additions to the grid to accommodate deactivating and new generating plants, substations, and transmission lines. In addition, PJM analyzes and forecasts future electricity needs of the region. Its planning process ensures that the electric system growth is efficient and takes place in an orderly fashion. PJM supports market innovation through its active support for demand response markets for energy, capacity and ancillary services, and helps ensure that appropriate infrastructure and operational capabilities are in place to support newly installed renewable energy and other generation facilities.

PJM's mission can be described as below:[18]

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

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

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

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

---

[16] *See* PJM, *2021 PJM Annual Report,* available at 2021-annual-financial-report.ashx (pjm.com)
[17] https://insidelines.pjm.com/pjm-summer-outlook-forecasts-adequate-supplies-to-serve-electric-demand/
[18] http://www.pjm.com/about-pjm/who-we-are.aspx.

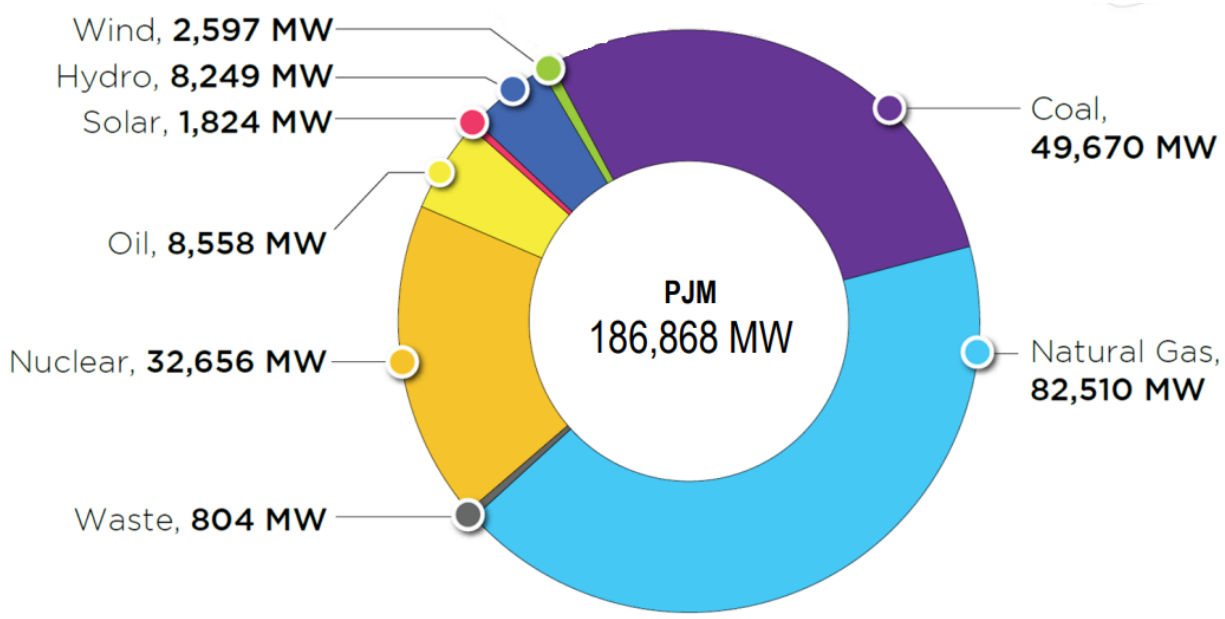
PJM membership was 1,060 on Dec. 31, 2021. In 2021, the PJM market amount billed increased to $54.1 billion as compared to: $36.2 billion in 2020; $39.2 billion in 2019; $49.8 billion in 2018; and $40.172 billion in 2017. PJM's 2021 transmission volumes were 821 terawatt hours (TWhs) as compared to: 757.3 TWhs in 2020; 787.3 TWhs in 2019; 806.5 TWhs in 2018; and 807 TWhs in 2017.[19]

In terms of generator deactivations, more than 31,000 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 2021, PJM received 52 deactivation notices, including new requests and revisions to existing requests, totaling 10,607 MW as compared to: 4,428 MW in 2020; 7,650 MW in 2019; 10,882 MW in 2018; 4,800 MW in 2017; 5,605 MW in 2016; 1,626 MW in 2015; and 4,291 in 2014.

As of Dec. 31, 2021, PJM's 186,868 MW of RPM-eligible existing installed capacity reflects a fuel mix comprising 44% natural gas, 27% coal and 17% nuclear, as shown in Figure 1 below. Hydro, wind, solar, oil and waste fuels constitute the remaining 12%. Nameplate capacity values represent the full power output of the generators.[20]

Figure 1: Existing RPM-Eligible Installed Capacity Mix within PJM as of Dec. 31, 2021

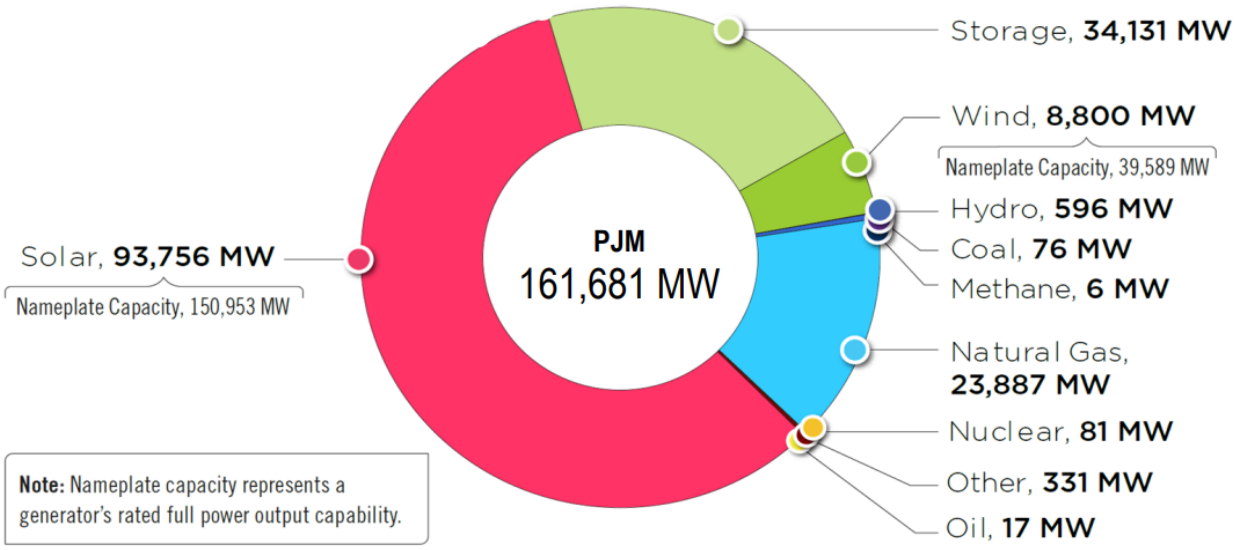


Totaling over 137,000 MW of Capacity Interconnection Rights (CIRs), renewable fuels are changing the landscape of PJM's interconnection queue as shown in Figure 2 below. Solar energy comprises 58% of the generation in PJM's interconnection queue. An increase in solar generation interconnection requests is attributable to state policies encouraging renewable generation. Figure 2

[19] *See* PJM, *2021 PJM Annual Report*, available at https://services.pjm.com/annualreport2021/.
[20] *See* PJM, *PJM 2021 Regional Transmission Expansion Plan Report*, Book 1, available at: https://www.pjm.com/-/media/library/reports-notices/2021-rtep/2021-rtep-report.ashx

below shows PJM's fuel mix based on requested CIRs for generation that was active, under construction or suspended as of Dec. 31, 2021.[21]

Figure 2: Generation Projects requesting Capacity Interconnection Rights in PJM Queue as of Dec. 31, 2021



PJM Load Growth and Projections

Net energy for load growth for PJM RTO is projected to average 0.8% per year over the next 10-year period, and 0.7% over the next 15 years. Total PJM RTO energy is forecasted to be 845,133 GWh in 2032, which is a 10-year increase of 63,815 GWh, and is forecasted to reach 877,586 GWh in 2037, for a 15-year increase of 96,268 GWh. Annualized 10-year growth rates for individual zones in PJM range from -0.2% to 3.4%.[22]

PJM Bulk Power System Status – Summer and Winter Performance

Summer peak load growth for the PJM RTO is projected to average 0.4% per year over the next 10 years, and 0.4% over the next 15 years. The PJM RTO summer peak is forecasted to be 154,381 MW in 2032, a 10-year increase of 5,443 MW, and reaches 157,689 MW in 2037, a 15-year increase of 8,751 MW. Winter peak load growth for PJM RTO is projected to average 0.7% per year over the next 10-year period, and 0.6% over the next 15-years. The PJM RTO winter peak load in 2031/32 is forecasted to be 141,516 MW, a 10-year increase of 9,414 MW, and reaches 145,220 MW in 2036/37, a 15-year increase of 13,118 MW. Annualized 10-year growth rates for individual zones range from -0.3% to 2.6%.[23]

---

[21] *See* PJM, *PJM 2021 Regional Transmission Expansion Plan Report*, Book 1, available at: https://www.pjm.com/-/media/library/reports-notices/2021-rtep/2021-rtep-report.ashx

[22] *See PJM, PJM Load Forecast Report January 2022,* available at: *PJM LOAD FORECAST REPORT*

[23] *See PJM Load Forecast Report: January 2022 available at:* https://pjm.com/-/media/library/reports-notices/load-forecast/2022-load-report.ashx

PJM Pennsylvania State Infrastructure

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.

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

All new generation that anticipates interconnecting and operating in parallel with the PJM transmission grid and participating in the PJM capacity and/or energy markets must submit an interconnection request to PJM for technical evaluation and approval. A summary of key information related to generation capacity and usage for the PJM RTO area and information specific to electric generation in Pennsylvania are provided in Appendices B and C of this report.

PJM Pennsylvania State Infrastructure Summary: [24]

- Existing Capacity: Natural gas represents approximately 44.8% of the total installed capacity in the Pennsylvania service territory while coal represents approximately 21% and nuclear 19.1 %. In PJM natural gas and coal are 44.2 and 26.6 % of total installed capacity, while nuclear represents 17.5 %. In terms of actual electrical generation in 2021, natural gas generated 53.4% of the load and nuclear 33%. See Figures 3 and 4 below.

- Interconnection Requests: Solar represents 62% of new interconnection requests in Pennsylvania, while natural gas represents approximately 20.2% and storage 19.8 % of new requests. See Figure 5 below.

- Deactivations: 920.8 MW in Pennsylvania gave notification of deactivation in 2021, as compared to 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.

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

- Regional Transmission Expansion Plan (RTEP) 2021:[25] PJM's 2021 RTEP projects approximately $176.9 million in investment in Pennsylvania as compared to Pennsylvania's 2020 RTEP projects that totaled $752.7 million. A listing of all RTEP projects over $10 million, as well as those specific to Pennsylvania, may be found in PJM's RTEP.[26] 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.[27]

- Load Forecast: Pennsylvania's summer peak load growth is projected to range between -0.1 and 0.4% annually over the next ten years, based on the service territory. The overall PJM RTO projected load growth rate is 0.4% over the next 10 years.

- Calendar Year 2021 Market Performance: Pennsylvania's average hourly LMPs were slightly below PJM's average hourly LMPs.

- Emissions: Pennsylvania's average CO2 emissions slightly increased in 2021 compared to 2020 levels.

- The existing generating capacity in Pennsylvania totals 47,633 MW in 2021 as compared to 46,941 MW in 2020; 44,705 MW in 2019; 44,660 MW in 2018; 42,257 MW in 2017; and 45,700 MW in 2016.

- 2022-23 Capacity Market: PJM completed a successful Base Residual Auction (BRA) in early 2021.[28] The BRA procured 144,477 MW of resources for the period of Jun. 1, 2022, through May 31, 2023, at a total cost of $3.9 billion. This total is $4.4 billion less than in the previous auction, for the 2021/2022 Delivery Year, when adjusted for changes in Fixed Resource Requirement (FRR) elections.

- 2022/23 Capacity Market: 45,886 MW in Pennsylvania cleared in the 2022/23 Base Residual Auction.

- 2023/2024 Capacity Market: PJM completed a successful BRA in June of 2022.[29] Prices for the 2023/2024 Delivery Year were lower than in the previous auction for the 2022/2023 Delivery Year. As a result, sufficient resources plus robust reserve levels were procured at a cost of $2.2 billion, compared with approximately $4 billion for the current 2022/2023 Delivery Year. Of note, more than 5,300 additional MW of nuclear generation cleared than in the prior auction. The BRA produced a price of $34.13/MW-day for much of the PJM footprint, as compared to $50/MW-day for the 2022/2023 BRA.

[25] *See PJM, PJM Regional Transmission Plan (RTEP) 2021, available at:* 2021-rtep-report.ashx (pjm.com)
[26] *Id.*, Pennsylvania-specific information begins on page 205.
[27] https://www.pjm.com/planning/project-construction.
[28] https://www.prnewswire.com/news-releases/pjm-successfully-clears-capacity-auction-to-ensure-reliable-electricity-supplies-301304562.html.
[29] https://insidelines.pjm.com/pjm-capacity-auction-secures-electricity-supplies-at-competitive-prices/.

Figure 3: Pennsylvania Electric Generation by Fuel Type as of Dec. 31, 2021

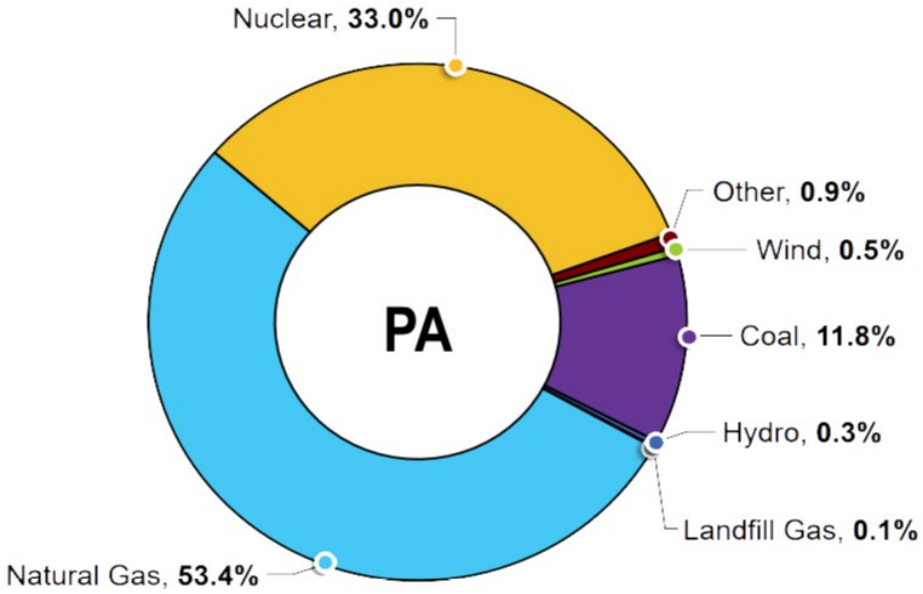


Figure 4: Pennsylvania Installed Electric Generation Capacity by Fuel Type as of Dec. 31, 2021

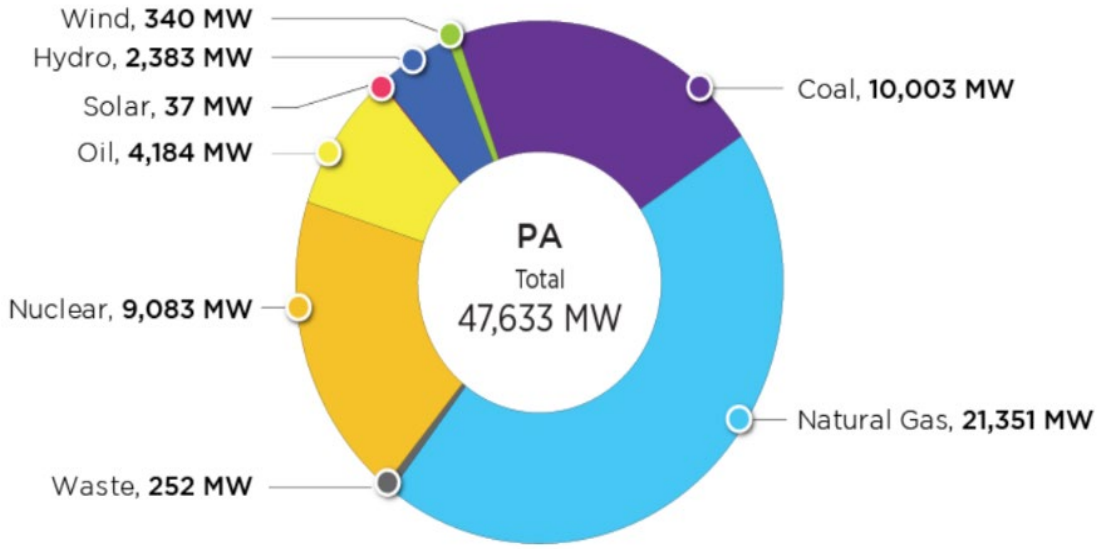
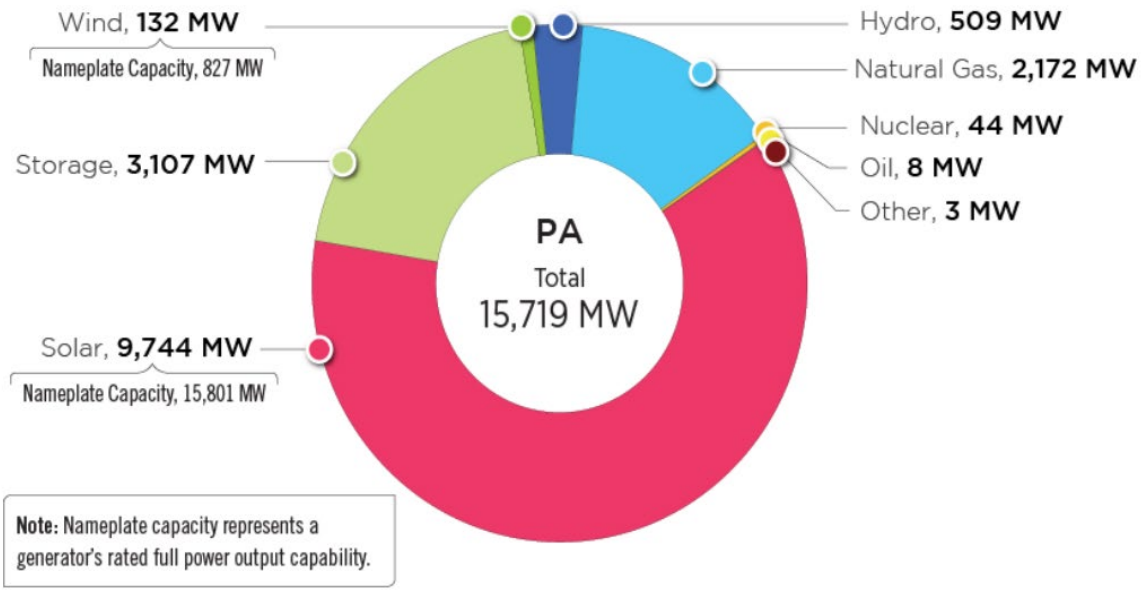


Figure 5: Pennsylvania – Queued Capacity by Fuel Type (Requested CIRs – as of Dec. 31, 2021)



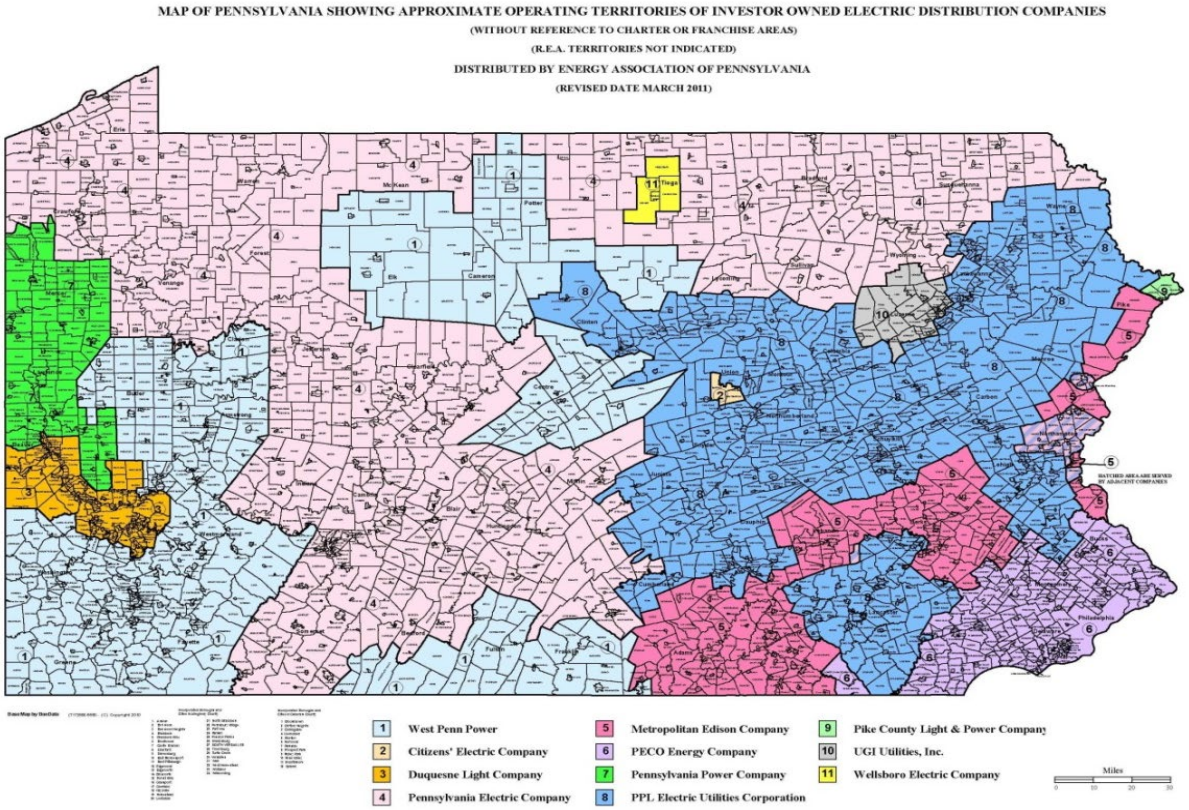
Section 2 – Pennsylvania Electric Outlook

Electric Distribution Companies

Eleven EDCs currently serve the electricity needs of most Pennsylvania's homes, businesses and industries. Cooperatives and municipal systems provide service to several rural and urban areas. The Commission does not regulate the cooperative and municipal electric systems. The 11 jurisdictional EDCs shown in Figure 6 below are:

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

Figure 6: Map of EDC Service Territories



Each Load Serving Entity (LSE) is responsible to make provisions for adequate generating resources to serve its customers. The local EDC or a Commission approved alternative Default Service Provider (DSP)[30] 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.[31]

   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.[32]

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).[33] Act 213 requires that an annually increasing percentage 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. In 2008, the Commission adopted regulations pertaining to the AEPS obligations of EDCs and EGSs.[34]

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)[35] 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.

Act 213 requires that by 2021, 8% of the electricity sold in each EDC service territory be derived from Tier I resources, including solar, and 10% from energy derived from Tier II resources. Act 213 set forth a 15-year schedule for complying with its mandates, as shown in Table 1 below. All EDCs and EGSs have been required to comply since Jan. 1, 2011.

[30] 66 Pa.C.S. § 2803.
[31] http://www.papowerswitch.com.
[32] 66 Pa.C.S. § 2807(e)(3).
[33] Alternative Energy Portfolio Standards Act, effective Feb. 28, 2005; 73 P.S. §§ 1648.1—1648.8.
[34] *See* Docket No. L-00060180; 52 Pa. Code §§ 75.61-75.70.
[35] *See* 66 Pa.C.S. § 2814(b).

Table 1: Alternative Energy Portfolio Standards

Year	Period	Tier I (incl. Solar)	Tier II	Solar PV
1	June 1, 2006 through May 31, 2007	1.50%	4.20%	0.0013%
2	June 1, 2007 through May 31, 2008	1.50%	4.20%	0.0030%
3	June 1, 2008 through May 31, 2009	2.00%	4.20%	0.0063%
4	June 1, 2009 through May 31, 2010	2.50%	4.20%	0.0120%
5	June 1, 2010 through May 31, 2011	3.00%	6.20%	0.0203%
6	June 1, 2011 through May 31, 2012	3.50%	6.20%	0.0325%
7	June 1, 2012 through May 31, 2013	4.00%	6.20%	0.0510%
8	June 1, 2013 through May 31, 2014	4.50%	6.20%	0.0840%
9	June 1, 2014 through May 31, 2015	5.00%	6.20%	0.1440%
10	June 1, 2015 through May 31, 2016	5.50%	8.20%	0.2500%
11	June 1, 2016 through May 31, 2017	6.00%	8.20%	0.2933%
12	June 1, 2017 through May 31, 2018	6.50%	8.20%	0.3400%
13	June 1, 2018 through May 31, 2019	7.00%	8.20%	0.3900%
14	June 1, 2019 through May 31, 2020	7.50%	8.20%	0.4433%
15	June 1, 2020 through May 31, 2021	8.00%	10.00%	0.5000%

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, purchased along with the electric commodity, or purchased separately through a tradable instrument.[36]

AECs are earned when a qualified facility generates one MWh of electricity through either estimated or actual metered production. An AEC is a tradable certificate that represents the characteristics of electricity generated from a facility. An AEC can be sold or traded separately from the power. AECs are generally purchased by EDCs and EGSs in order to meet the percentages required under AEPS for any given year. However, AECs can be voluntarily retired – often in the interest of claiming the associated attributes. AECs can be traded multiple times until they are retired for compliance purposes. An AEC can only be retired once and may not be used to satisfy any other obligations, whether voluntarily or mandated by a renewable energy portfolio standard in another state.

The Commission, through its Pennsylvania AEC program administrator, verifies that EGSs and EDCs are complying with the minimum requirements of Act 213. PJM EIS' Generation Attribute Tracking System (GATS) is the alternative energy credit registry used to track alternative energy credit creation and transfer among qualified alternative energy systems. GATS is used by EDCs and EGSs to verify compliance 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.[37]

[36] *See* 52 Pa. Code §§ 75.61—75.70.

[37] 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.

The regulations also provide for required metering capabilities and a compensation mechanism that reimburses customer-generators for surplus energy supplied to the electric grid.[38] Act 35 of 2007 amended Act 213. One aspect of Act 35 altered the reconciliation mechanism used to compensate resellers for surplus energy supplied through net metering.[39]

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.[40]

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.[41] On Apr. 19, 2018, the Commission adopted a Final Implementation Order to provide the Commission's interpretation and implementation of Section 11.1 of Act 40 of 2017.[42] 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.[43]

Effective Nov. 23, 2020, Act 114 at Section 10 amended the 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, 2021, Pennsylvania had certified 37,149[44] alternate energy facilities, of which 30,263 are located within the state. For additional information on Alternative Energy in Pennsylvania, please visit the Commission's website.[45]

[38] *See* Docket No. L-00050174; 52 Pa. Code §§ 75.11-75.15.
[39] *Id.*
[40] *See* Docket No. L-00050175; 52 Pa. Code §§ 75.21-75.40.
[41] *See* Docket No. L-2014-2404361; 52 Pa. Code §§ 75.1-75.72.
[42] *See* Docket No. M-2017-2631527.
[43] *See* Docket No. M-2020-3023323.
[44] *See* Reports – Pennsylvania Alternative Energy Portfolio Standard Program (pennaeps.com).
[45] http://www.puc.pa.gov/consumer_info/electricity/alternative_energy.aspx.

Energy Efficiency and Conservation Program (Act 129)

Act 129 of 2008[46] required the seven EDCs[47] with at least 100,000 customers[48] 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.

Phase III began on Jun. 1, 2016, and ended on May 31, 2021. The EDCs' consumption and peak demand reduction requirements are provided in Table 2 below. While the EDCs were required to implement energy efficiency programs all five years of Phase III, the Commission required demand response programs only during the last four years of the phase, recognizing the time necessary to develop and implement such programs.[49] Using the design and budgetary allocation information provided by the Commission, the Act 129 Statewide Evaluator (SWE)[50] found no cost-effective demand response potential in the Penelec service territory and, therefore, the Commission did not prescribe a peak demand reduction requirement for Penelec.

Table 2: Phase III Electric Consumption and Peak Demand Reduction Targets

EDC	Phase III Five-Year Electric Consumption Reduction Targets (MWh)	Phase III Four-Year Peak Demand Reduction Targets – Average Annual Potential Savings (MW)
Duquesne	440,916	42
Met-Ed	599,352	49
PECO	1,962,659	161
Penelec	566,168	0
Penn Power	157,371	17
PPL	1,443,035	92
West Penn	540,986	64

[46] Act 129 of 2008, effective Nov. 14, 2008; 66 Pa. C.S. §§2806.1-2806.2.
[47] 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.
[48] *See* 66 Pa.C.S. § 2806.1.
[49] *See* Energy Efficiency and Conservation Program Implementation Order, Docket No. M-2014-2424864, entered June 19, 2015.
[50] The Act 129 Statewide Evaluator (SWE) is a contractor for the Commission that evaluates the EDCs energy efficiency and conservations programs.

For Phase III, the Commission required that all EDCs file semiannual, preliminary annual, and final annual reports, which provide the reported savings for that program year. The EDCs filed their final annual reports for the fifth year of Phase III, Program Year 12 (PY 12) as required.[51]

The SWE monitors and verifies data collection, quality assurance and the results of each EDCs EE&C Plan. Their final annual report for Phase III, including PY 12 savings, was filed on Mar. 31, 2022.[52]

Table 3, below, summarizes the final SWE verified and Commission approved electric consumption and peak demand reduction savings for Phase III. Due to COVID-19, the original Phase III Implementation Order was amended on Jun. 3, 2020, and only PY 9 through PY 11 peak demand savings were used to determine EDC Phase III compliance.[53]

Table 3: Phase III Final Compliance Results

EDC	Phase III Electric Consumption Savings (MWh)	% of Phase III Electric Consumption Target	Phase III Peak Demand Average Annual Savings (MW)	% of Phase III Peak Demand Average Annual Savings
Duquesne	569,520	129	55.2	131
Met-Ed	777,137	130	53.0	108
PECO	2,068,877	105	167.1	104
Penelec *	745,888	132	0.0	0
Penn Power	237,814	151	39.9	235
PPL	1,749,310	121	112.8	123
West Penn	730,006	135	112.4	176

* The Commission did not prescribe a peak demand reduction requirement for Penelec.
PY 8: June 1, 2016 – May 31, 2017
PY 9: June 1, 2017 – May 31, 2018
PY 10: June 1, 2018 – May 31, 2019
PY 11: June 1, 2019 – May 31, 2020
PY 12: June 1, 2020 – May 31, 2021

On May 12, 2022, the Commission adopted the Phase III Energy Efficiency and Conservation Program Compliance Order which determines whether the EDCs are in compliance with the targets adopted in the Phase III Implementation Order. The Commission reviewed the results provided by the EDCs in their PY 12 final annual reports and the SWE's Phase III final annual

[51] *See* the EDCs final annual reports for PY 12 and Phase III at: http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_information/electric_distribution_company_act_129_reporting_requirements.aspx.
[52] *See* the SWE final annual report for PY 12 and Phase III at: https://www.puc.pa.gov/filing-resources/issues-laws-regulations/act-129/act-129-statewide-evaluator-swe/.
[53] *See* Phase III Modification Order, Docket No. M-2014-2424864, entered June 3, 2020.

report, and it was determined that all seven EDCs were in compliance with their Phase III electric consumption and primary peak demand reduction requirements.

In addition, in the Phase III Implementation Order the Commission also established that the EDCs must achieve at least 85% of the primary peak demand reduction requirement in each peak demand response event. The Commission determined that only five of the seven EDCs were in compliance with the 85% peak demand reduction requirement and deemed PECO and West Penn Power to be non-compliant. PECO's event on July 18, 2019, and West Penn Power's event on July 21, 2017, missed the 85% per event peak demand reduction target and the matter was referred to the Commission's Bureau of Investigation and Enforcement for investigation and further proceedings as necessary.[54]

In its planning for Phase IV, the Commission directed the 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.[55]

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 energy efficiency and conservation consumption reduction targets for Phase IV. The SWE submitted the final EEPDR potential study to the Commission on Feb. 28, 2020.[56]

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 the next phase of Act 129. The SWE submitted the final DDR potential study to the Commission on Feb. 28, 2020.[57] The EEPDR and DDR Potential Studies were released publicly via a Commission Secretarial Letter served Mar. 2, 2020.[58] Following a review of the SWE's EEPDR and DDR Potential Studies, the Commission determined that additional consumption and peak demand reduction targets were cost-effective.

On June 18, 2020, the Commission adopted the Final Implementation Order prescribing targets for Phase IV of the Act 129 EE&C Program.[59] Phase IV does not include a dedicated target for DDR. The Commission found that peak demand reductions from EE measures are longer lasting than DDR programming and will persist 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.[60]

---

[54] *See* Phase III Energy Efficiency and Conservation Program Compliance Order, Docket No. M-2014-2424864, entered May 12, 2022.
[55] 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/
[56] *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.
[57] *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.
[58] *See* Secretarial Letter, at Docket No. M-2020-3015229, served Mar. 2, 2020.
[59] *See* Energy Efficiency and Conservation Program Implementation Order, at Docket No. M-2020-3015228, entered Jun. 18, 2020, at 7-8.
[60] *Id.* at 62.

Phase IV began on June 1, 2021, and will end on May 31, 2026. The EDCs' Phase IV electric consumption and peak demand reduction requirements and compliance through the first six months of PY 13 are provided in Table 4 below.

Table 4: 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	39,131	62	1.98
Met-Ed	463,215	154,711	76	1.71
PECO	1,380,837	219,524	256	20.80
Penelec	437,676	134,792	80	0.99
Penn Power	128,909	68,514	20	0.53
PPL	1,250,157	333,948	229	5.56
West Penn	504,951	175,683	86	1.55

For Phase IV, the Commission concluded that it was unnecessary to continue requiring preliminary annual reports in addition to the final annual reports. Therefore, to streamline the reporting process, the preliminary annual report was eliminated, while maintaining the semiannual and final annual reporting process. 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 September 30 of each year. Semiannual reports are due to the Commission by January 15 of each year.[61] The EDCs filed their semiannual reports for the first year of Phase IV, Program Year 13 (PY 13) in January 2022.[62]

[61] *Id.* at 102-103.

[62] *See* the EDCs semiannual reports for PY 13 at: http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_information/electric_distribution_company_act_129_reporting_requirements.aspx

Statewide Review of Electrical Energy Usage

As shown on Tables 5 and 6 below, Pennsylvania's Total electrical consumption energy usage (residential, commercial, industrial, sales for resale, and other) in 2021, was 142,827 GWh, as compared to: 139,185 GWh in 2020; and 145,090 GWh in 2019. The year-over-year (YOY) increase for electrical usage in 2021 was 2.62%. In general, commercial and industrial usage increased YOY by 5.15% and 2.46%, respectively. Residential usage increased by 1.26%. The increase in residential, commercial, and industrial usage is likely indicative of rebound of the economy from the economic impacts of the COVID-19 pandemic. Pennsylvania's GDP for 2021 saw a YOY increase of 8.75%, as compared to Pennsylvania's GDP in 2020, which experienced a YOY decrease of 3.5%.[63]

In 2021, the total number of electrical customers increased to 5,918,122 as compared to 5,876,336 in 2020, which is a YOY increase of 0.7%.

Table 5: PA EDC customers served, energy usage, and peak load (2021)

Company	Total Customers Served	Residential (MWh)	Commercial (MWh)	Industrial (MWh)	Other (MWh)	Sales For Resale (MWh)	Total Consumption (MWh)	System Losses (MWh)	Company Use (MWh)	Net Energy For Load (MWh)	Peak Load (MW)
Duquesne	607,349	4,214,577	5,778,492	2,509,208	55,025	23,975	12,581,277	556,932	18,308	13,156,517	2,760
Met-Ed	583,251	5,832,422	2,151,245	6,201,037	26,511	536,842	14,748,057	1,006,954	0	15,755,011	3,072
Penelec	588,548	4,362,887	2,389,755	6,426,713	33,179	2,759,650	15,972,184	1,254,866	0	17,227,050	2,898
Penn Power	169,954	1,662,849	705,941	2,062,762	3,263	164,714	4,599,529	254,890	0	4,854,419	971
PPL	1,466,277	14,879,215	13,807,121	8,339,688	77,690	0	37,103,714	2,675,386	54,430	39,833,530	7,314
PECO	1,686,527	14,262,461	7,597,167	14,002,669	565,755	3,372	36,431,424	1,973,908	30,212	38,435,544	8,479
West Penn	734,971	7,206,217	2,714,385	9,333,865	22,081	773,022	20,049,570	1,305,049	0	21,354,619	3,940
UGI	62,714	581,522	305,921	102,408	5,568	189	995,608	67,825	1,381	1,064,814	216
Citizens'	7,085	87,772	28,193	50,227	364	0	166,556	6,532	128	173,216	43
Pike County	5,047	32,899	42,041	0	430	0	75,370	0	0	75,370	16
Wellsboro	6,399	44,815	31,276	27,616	66	90	103,863	7,385	211	111,459	21
Total	**5,918,122**	**53,167,636**	**35,551,537**	**49,056,193**	**789,932**	**4,261,854**	**142,827,152**	**9,109,727**	**104,670**	**152,041,549**	**29,730**
% of Total		37.23%	24.89%	34.35%	0.55%	2.98%	100.00%				

Table 6: PA EDC customers served, energy usage, and peak load (2020)

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	605,732	4,217,353	5,521,887	2,343,244	50,910	26,245	12,159,639	777,429	18,212	12,955,280	2,667
Met-Ed	577,501	5,749,929	2,003,227	6,029,280	27,250	481,805	14,291,491	1,051,649	0	15,343,140	2,976
Penelec	587,567	4,318,774	2,293,017	6,288,631	34,998	2,779,572	15,714,992	1,248,980	0	16,963,972	2,908
Penn Power	168,118	1,674,333	668,421	1,925,925	3,240	156,133	4,428,052	233,212		4,661,264	889
PPL	1,449,702	14,591,706	13,128,561	8,353,642	97,401	0	36,171,310	2,608,158	53,112.00	38,832,580	7,049
PECO	1,676,350	14,040,747	7,210,182	13,668,658	582,817	4,142	35,506,546	1,877,755	33,516	37,417,817	8,148
West Penn	730,526	7,177,880	2,584,322	9,094,327	22,258	719,439	19,598,226	1,193,862	0	20,792,088	3,827
UGI	62,656	570,953	300,399	100,986	4,697	135	977,170	71,425	1,216	1,049,811	211
Citizens'	7,070	86,340	27,452	46,726	412	0	160,930	2,575	131	163,636	40
Pike County	4,736	31,835	41,479	0	390	0	73,704	0	28	73,732	18
Wellsboro	6,378	44,454	30,483	27,334	165	87	102,523	7,554	211	110,288	22
Total	**5,876,336**	**52,504,304**	**33,809,430**	**47,878,753**	**824,538**	**4,167,558**	**139,184,583**	**9,072,599**	**106,426**	**148,363,608**	**28,755**
% of Total		37.72%	24.29%	34.40%	0.59%	2.99%	100%				

As shown on Table 7 below, the total average annual aggregate five-year energy usage growth projection for the residential, commercial, and industrial classes is projected to increase by 0.6% per year. This includes an essentially flat growth rate for residential, a commercial growth rate decrease of 0.55%, and an industrial growth rate increase of 0.55% for the entire five-year projected period.

[63] US Bureau of Economic Analysis: https://www.bea.gov/.

Table 7: Average Aggregate Five-year Electrical Energy Projection

Energy Usage Projection (GWh)				
Year	Residential	Commercial	Industrial	Total
2022	52,145	36,011	49,887	138,043
2023	51,881	35,878	50,509	138,268
2024	52,194	35,852	50,900	138,947
2025	51,883	35,469	50,898	138,250
2026	52,138	35,231	51,001	138,369
average annual growth (%)	0.00	-0.55	0.55	0.06

Figure 7 below represents, in Gigawatt-hours, the Pennsylvania historic usage for residential, commercial, and industrial retail from 1972 through 2021 and forecasted Gigawatt-hours usage from 2022 through 2026.

Figure 7: Pennsylvania Retail Energy Usage and Five-year Forecast (GWh)

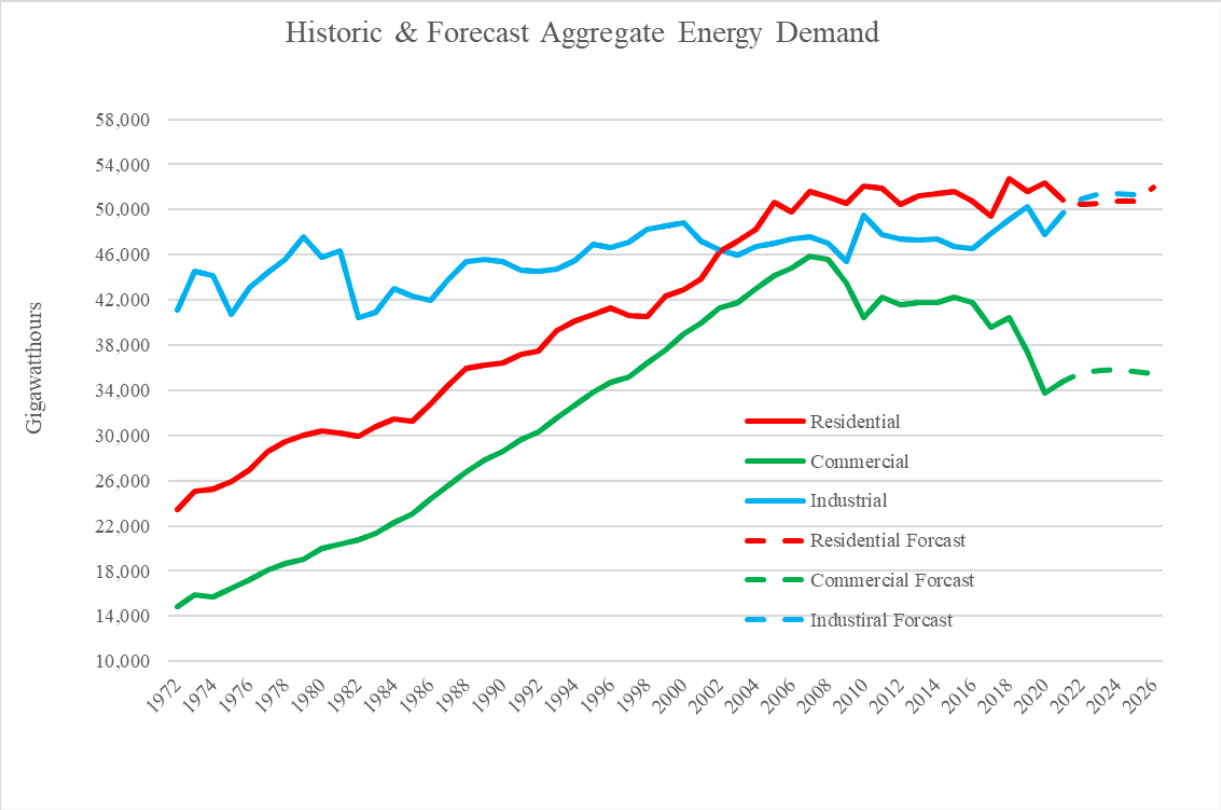


Figure 8 below shows average residential usage and nominal cost from 1940 to 2021. Between 1970 and 2010, average residential yearly usage in Pennsylvania increased 1.4% each year, while average yearly cost increased 4.1% each year during this period.

During the last 10 years, average residential yearly usage increased 0.36% each year, while average yearly cost increased 2.94% a year. Note that these are not weighted averages (accounting for customer counts of each utility) and are only for the large EDCs.

In 2021, the average Pennsylvania customer used 10.40 MWh as compared to 10.13 MWh in 2020, and 10.45 MWh in 2019. In 2021, the average Pennsylvania customer paid 11.75 cents per kWh, which increased from 11.43 cents per kWh in 2020 and 2018.

Figure 8: Average Residential Nominal Cost (cents/kWh) and Usage (MWh/year)

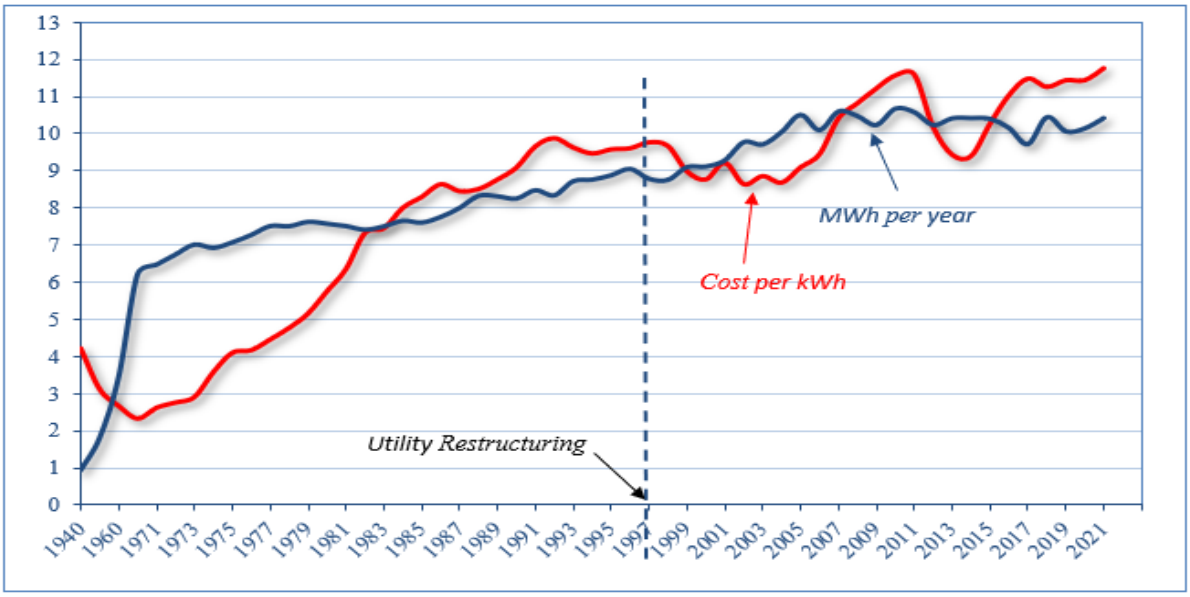


Figure 9 below shows Pennsylvania's aggregate non-coincidental peak load demand from 2012 through 2021 and the associated five-year projections estimated during the last three years.

Figure 9: Pennsylvania Aggregate Non-Coincidental Peak Load (MW)

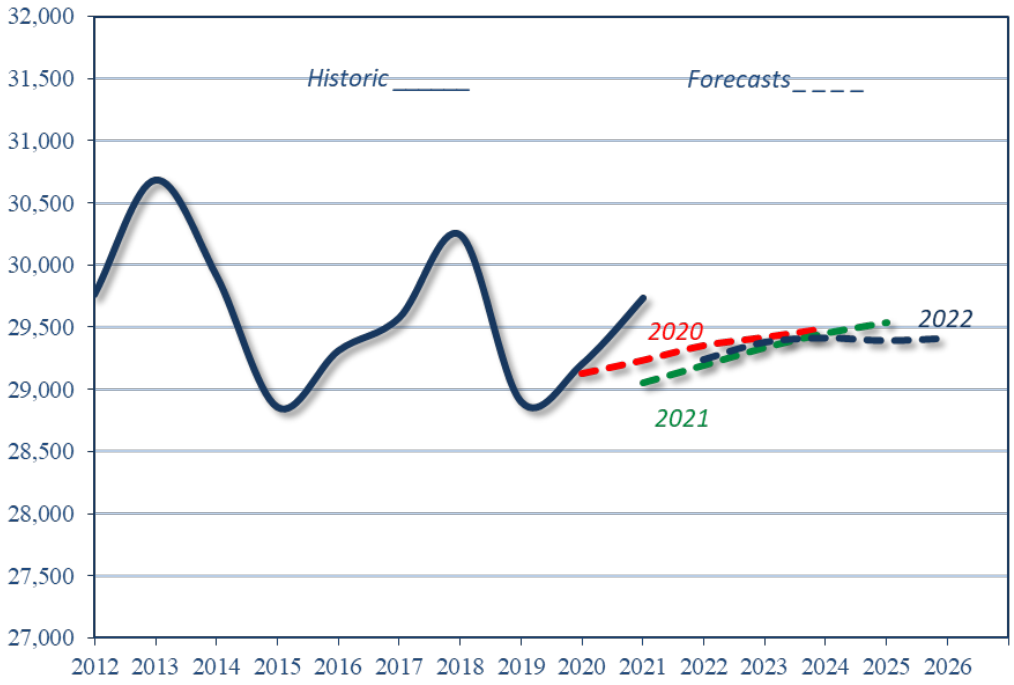
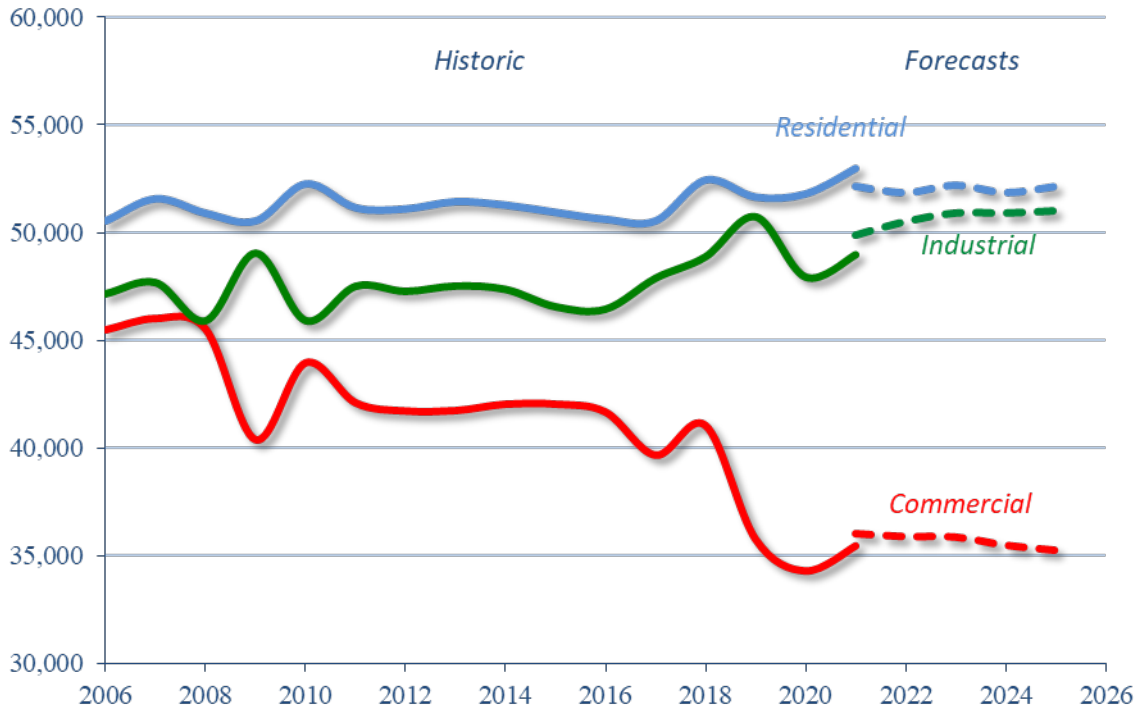


Figure 10 below shows Pennsylvania's aggregate energy demand from 2006 through 2021 and the associated five-year projections.

Figure 10: Pennsylvania Aggregate Energy Demand (GWh)

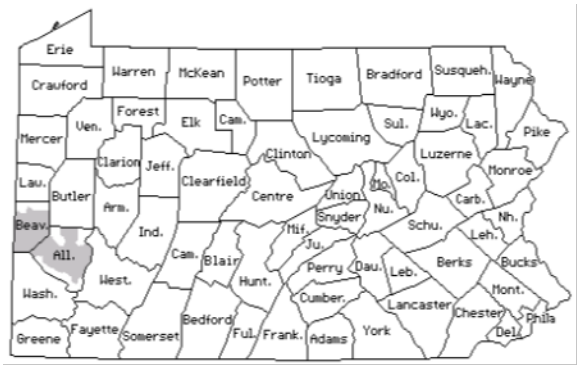


Summary of Data for the Seven Largest EDCs

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 607,349 customers in the City of Pittsburgh and portions of Allegheny and Beaver counties in Southwestern Pennsylvania. Duquesne's 2021 energy usage total was 12,581 as compared to: 12,159 GWh in 2020; 12,654 GWh in 2019; 13,178 GWh in 2018; and 12,673 GWh in 2017. Year-over-year (YOY) energy usage increased 3.5%. Duquesne's total usage mix consisted of residential (33.5%), commercial (45.93%), industrial (19.94%), other (0.44%) and sales for resale (0.19%).
Over the next five years, total energy usage is projected to decrease at an average annual rate of 1.77%. This includes a residential usage average annual decrease of 2.10%, commercial usage decrease of 1.27%, and industrial usage decrease by 2.37% as shown in Figure 11 on the next page.

Duquesne's highest summer peak load in 2021 was 2,760 MW. This represents a YOY increase of 3.49% from the previous year's peak of 2,667 MW. The five-year peak load forecast is projected to increase by an average of 0.31% per year as shown in Figure 12 on the next page.

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 2012 through 2021.

Figure 11: Duquesne energy usage (GWh)

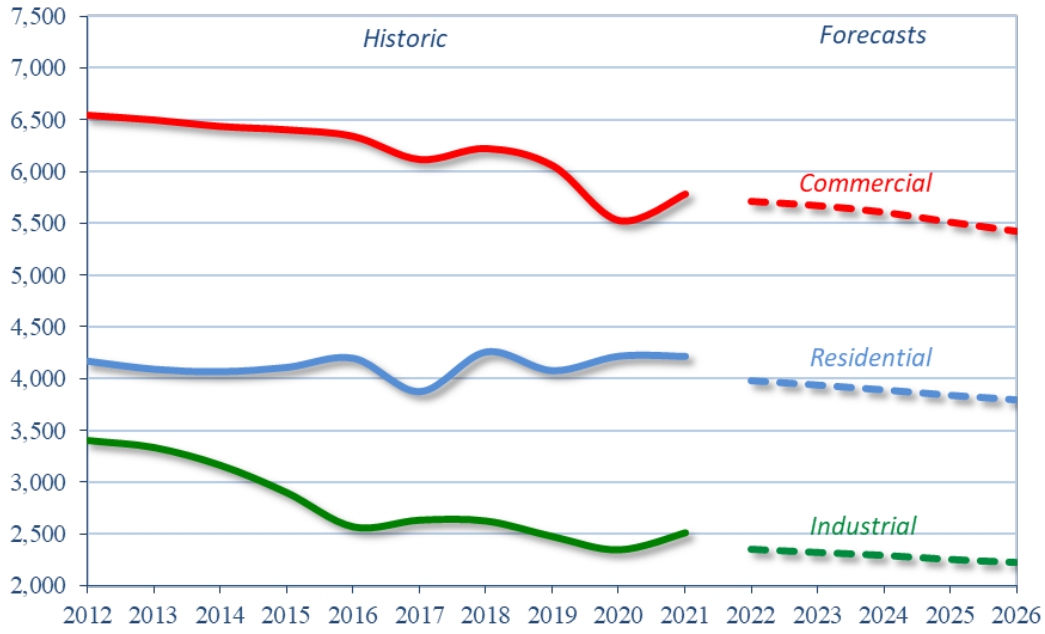
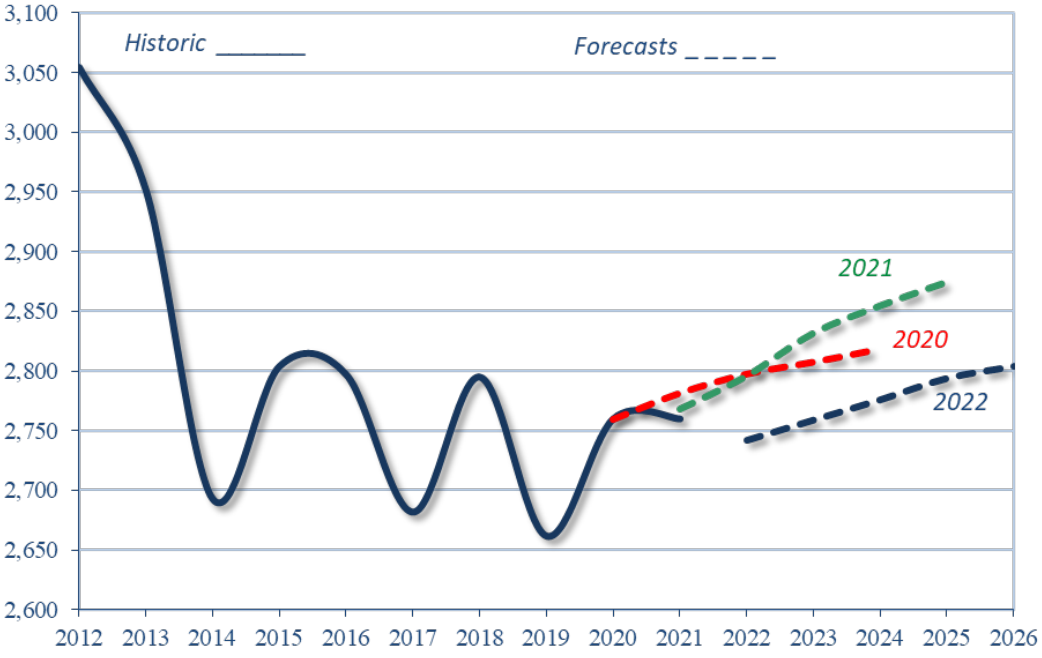
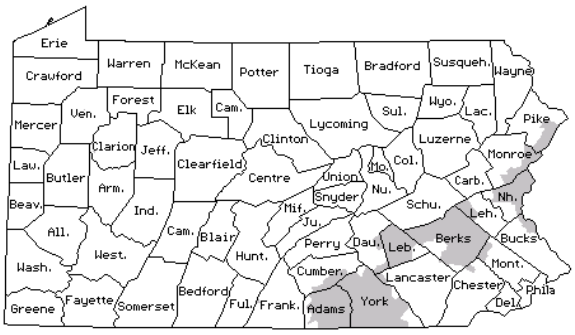


Figure 12: Duquesne peak load (MW)



Metropolitan Edison Company (Met-Ed)



Met-Ed provides electric service to about 583,251 customers in all or portions of 14 counties in Eastern and Southcentral Pennsylvania. Met-Ed's 2021 energy usage total was 14,748 GWh as compared to: 14,291 GWh in 2020: 14,787 GWh in 2019: 14,974 GWh in 2018; and 14,297 GWh in 2017. Year-over-year (YOY) energy usage increased 3.2%. Met-Ed's total usage mix consisted of residential (39.5%), commercial (14.6%), industrial (42.0 %) and sales for resale (3.6%).

Over the next five years, total energy usage is projected to increase at an average annual rate of 0.33%. This includes a residential usage average annual decrease of 0.36%, commercial usage decrease of 1.85%, and industrial usage increase by 1.66% as shown in Figure 13 on the next page.

Met-Ed's highest summer peak load in 2021 was 3,072 MW. This represents a YOY increase of 3.22% the previous year's peak of 2,976. The five-year peak load forecast is projected to slightly decease by 0.17% each year as shown in Figure 14 on the next page.

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 2012 through 2021.

Figure 13: Met-Ed energy usage (GWh)

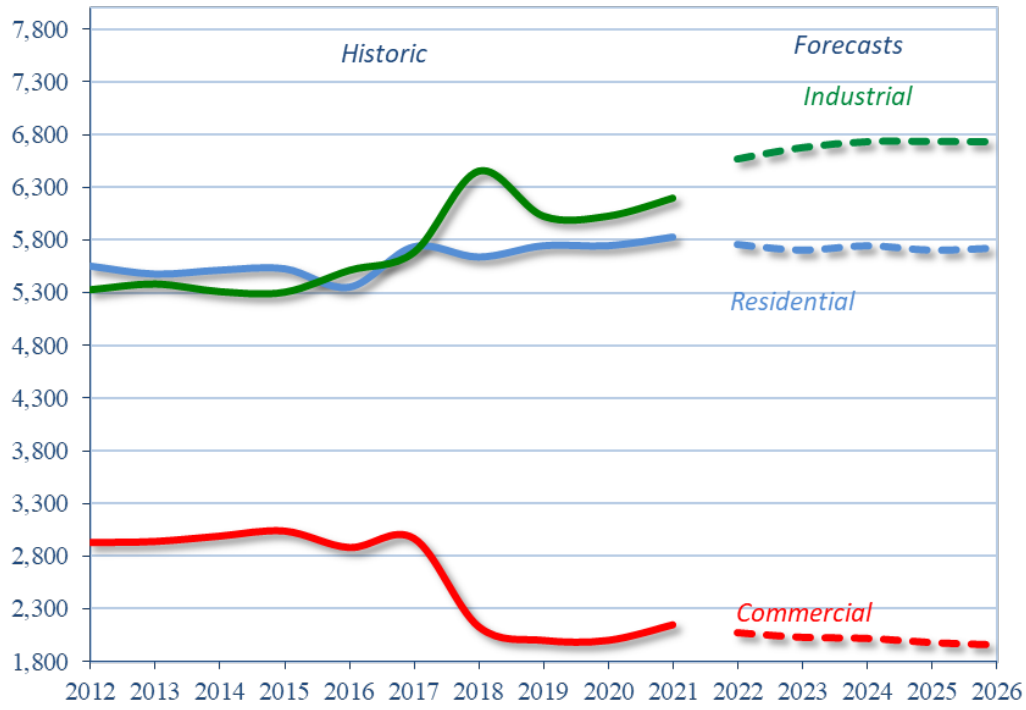
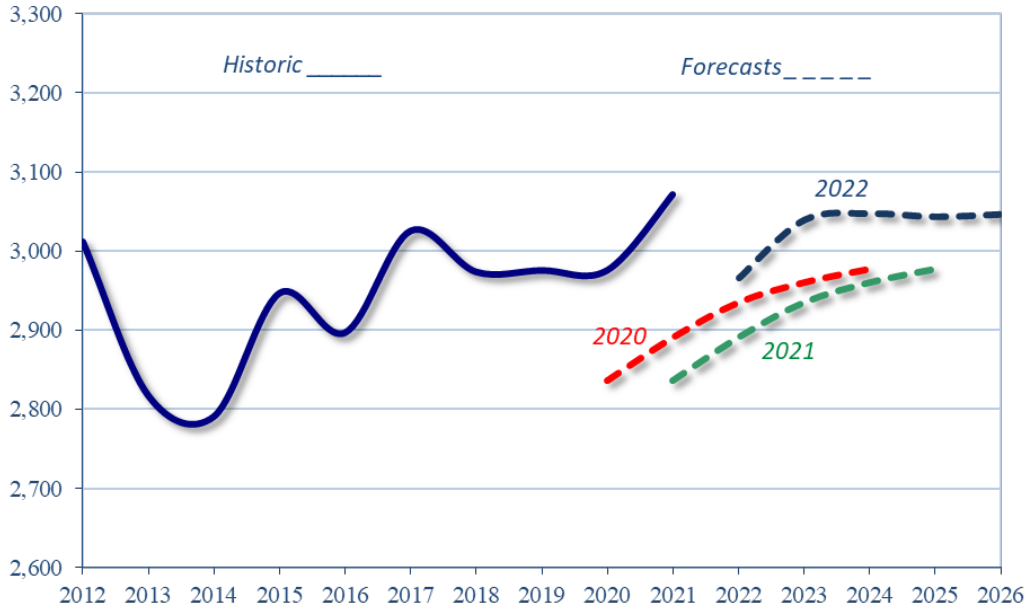
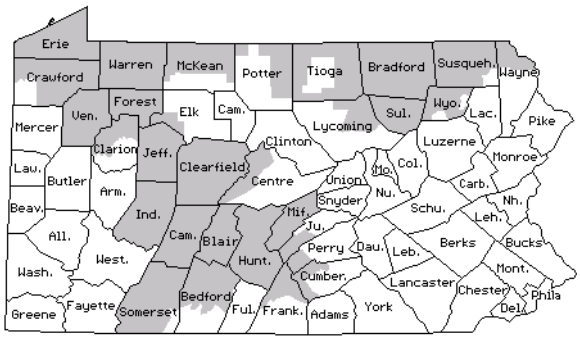


Figure 14: Met-Ed peak load (MW)



Pennsylvania Electric Company (Penelec)



Penelec provides electric service to about 588,548 customers in all or portions of 29 counties in Western and Northern Pennsylvania. Penelec's 2021 energy usage total was 15,972 GWh as compared to: 15,715 GWh in 2020; 16,182 GWh in 2019; 16,600 GWh in 2018; and 16,054 GWh in 2017. Year-over-year (YOY) energy usage increased 1.64%. Penelec's total usage mix consisted of residential (27.3%), commercial (15.0%), industrial (40.2%), and sales for resale (17.3%).

Over the next five years, total energy usage is projected to decrease at an average annual rate of 1.15%. This includes a residential usage average annual decrease of 1.01%, commercial usage decrease of 0.7%, and industrial usage decrease by 1.4% as shown in Figure 15 below.

Penelec's highest summer peak load in 2021 was 2,898 MW. This represents a YOY decrease of 0.34% from the previous year's peak of 2,908 MW. The five-year peak load forecast is projected to decrease by an average of 0.69% per year as shown in Figure 16 on the next page.

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 2012 through 2021.

Figure 15: Penelec energy usage (GWh)

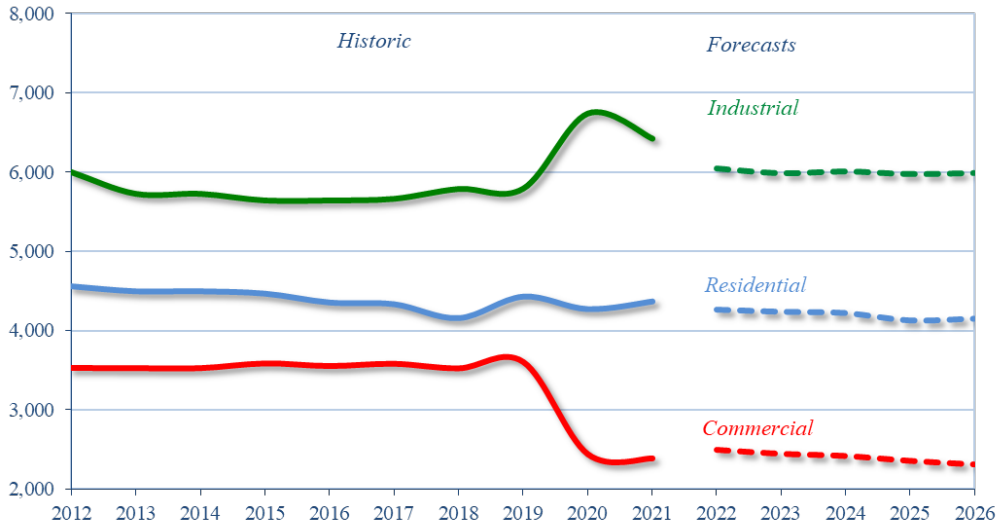
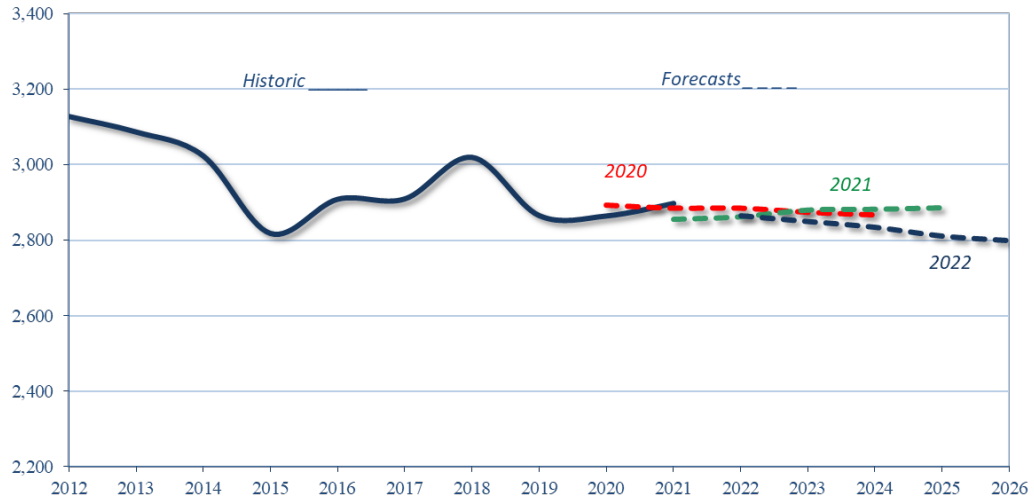
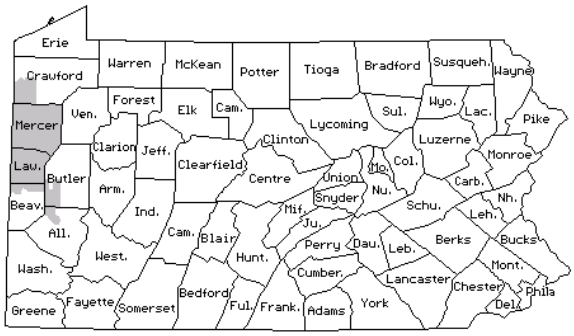


Figure 16: Penelec peak load (MW)



Pennsylvania Power Company (Penn Power)



Penn Power provides electric service to about 169,954 customers in all or portions of six counties in Western Pennsylvania. Penn Power's 2021 energy usage total was 4,600 GWh as compared to: 4,427 GWh in 2020; 4,833 GWh in 2019; 5,074 GWh in 2018; and 4,875 GWh in 2017. Year-over-year (YOY) energy usage increased 3.9%. Penn Power's total usage mix consisted of residential (36.2%), commercial (15.3%), industrial (44.8%), and sales for resale (3.6%).

Over the next five years, total energy usage is projected to increase at an average annual rate of 1.15%. This includes residential usage remaining around the same, a commercial average annual usage decrease of 0.63%, and industrial usage increase by 2.56% as shown in Figure 17 on the next page.

Penn Power's highest summer peak load in 2021 was 971 MW. This represents a YOY increase of 9.22% from the previous year's peak of 889 MW. The five-year peak load forecast is projected to decrease by an average of 0.29% per year as shown in Figure 18 on the next page.

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 2012 through 2021.

6

Figure 17: Penn Power energy usage (GWh)

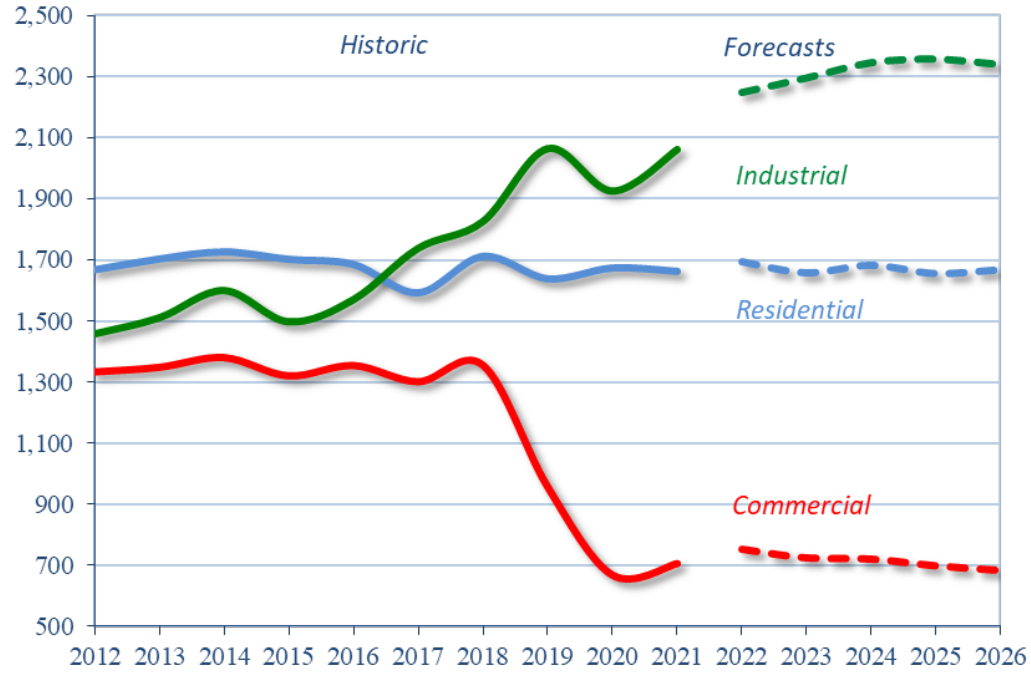
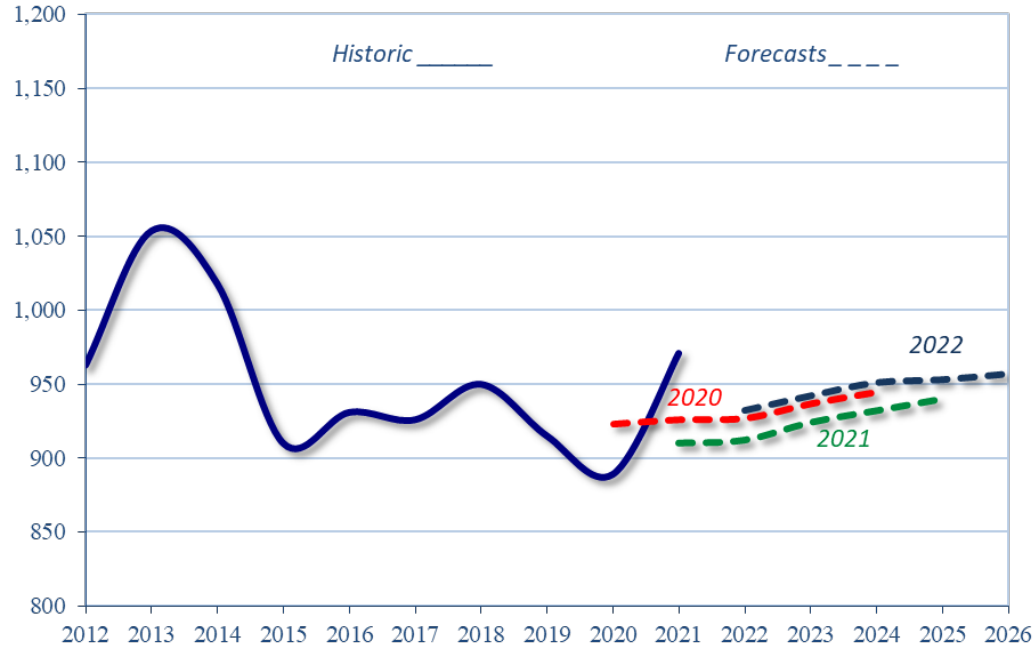
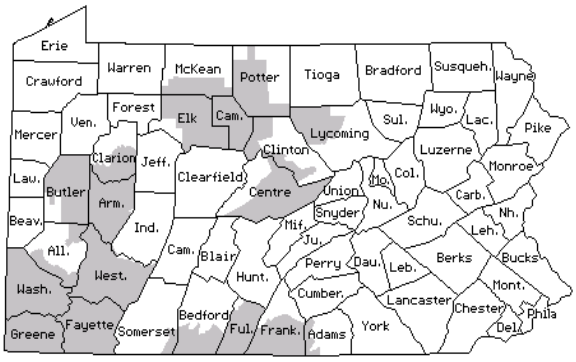


Figure 18: Penn Power peak load (MW)



West Penn Power Company (West Penn)



West Penn provides electric service to 734,971 customers in all or portions of 24 counties in Western, North and South-Central Pennsylvania. West Penn's 2021 energy usage total was 20,050 GWh as compared to: 19,598 in 2020; 20,809 in 2019; 21,298 GWh in 2018; and 20,299 GWh in 2017. Year-over-year (YOY) energy usage increased 2.3%. West Penn's total usage mix consisted of residential (35.9%), commercial (13.5%), industrial (46.6%), and sales for resale (3.9%).

Over the next five years, total energy usage is projected to increase at an average annual rate of 0.7%. This includes a residential usage average annual decrease of 0.36%, commercial usage decrease of 0.97%, and industrial usage increase by 1.95%. See Figure 19 on the next page.

West Penn's highest summer peak load in 2021 was 3,940 MW. This represents a YOY increase of 2.95% from the previous year's peak of 3,827 MW. The five-year peak load forecast is projected to decrease by an average of 0.62% per year as shown in Figure 20 on the next page.

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 2012 through 2021.

Figure 19: West Penn energy usage (GWh)

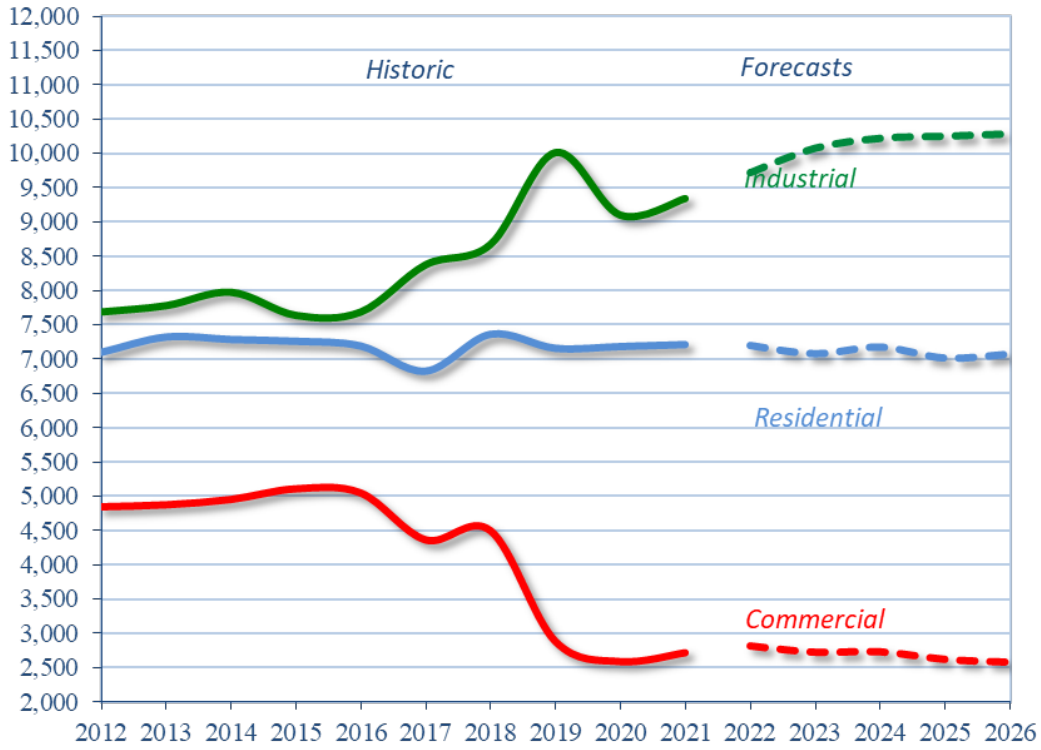
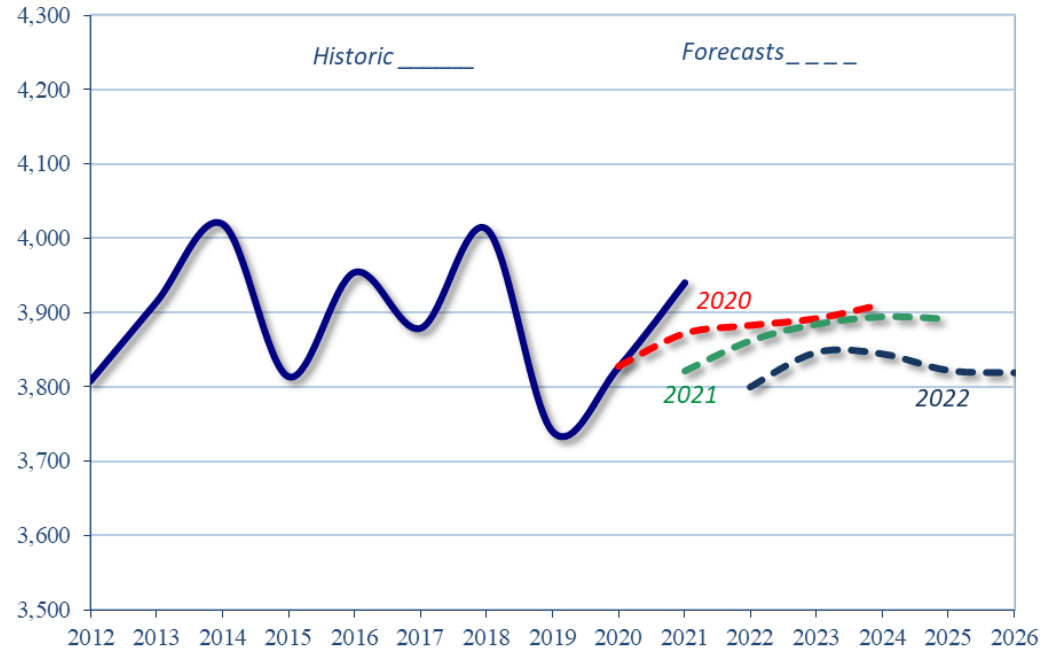
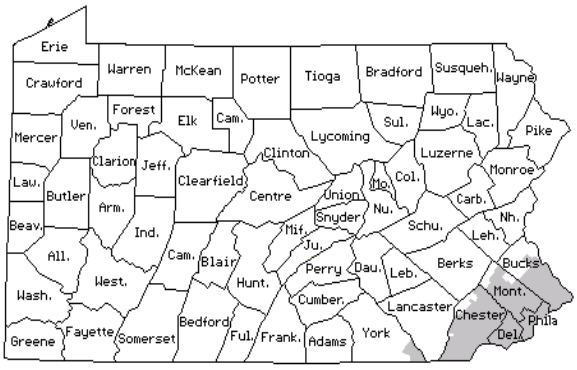


Figure 20: West Penn peak load (MW)



PECO Energy Company (PECO)



PECO is the largest electric utility in Pennsylvania, providing service to about 1,686,527 customers in the City of Philadelphia and all or portions of six counties in Southeastern Pennsylvania. PECO's 2021 energy usage total was 36,431 GWh as compared to: 35,507 GWh in 2020; 37,327 GWh in 2019; 38,468 GWh in 2018; and 37,234 GWh in 2017. Year-over-year (YOY) energy usage increased 2.60%. PECO's total usage mix consisted of residential (39.1%), commercial (20.9%), industrial (38.4%), other (1.6%) 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 0.67%. This includes a residential usage average annual increase of 0.35%, commercial usage average annual increase of 0.38% and industrial usage increase by 0.98% as shown in Figure 21 on the next page.

PECO's highest summer peak load in 2021 was 8,479 MW. This represents a YOY increase of 4.06% from the previous year's peak of 8,148 MW. The five-year peak load forecast is projected to increase by an average of 0.1% per year as shown in Figure 22 on the next page.

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 2012 through 2021.

Figure 21: PECO Energy Company energy usage (GWh)

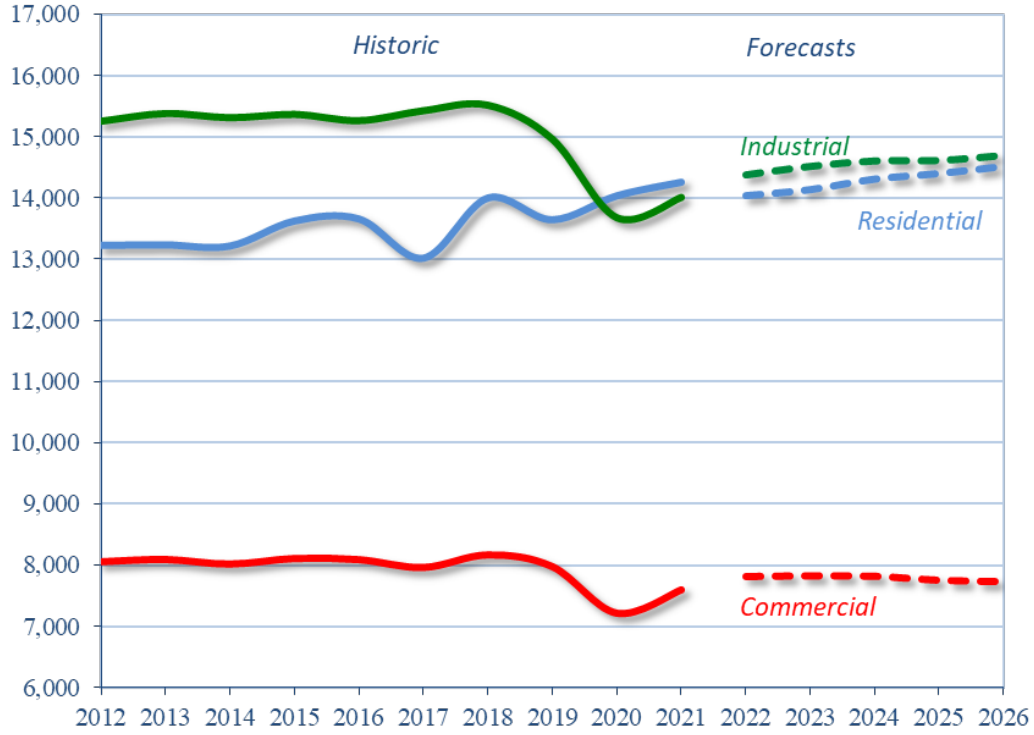
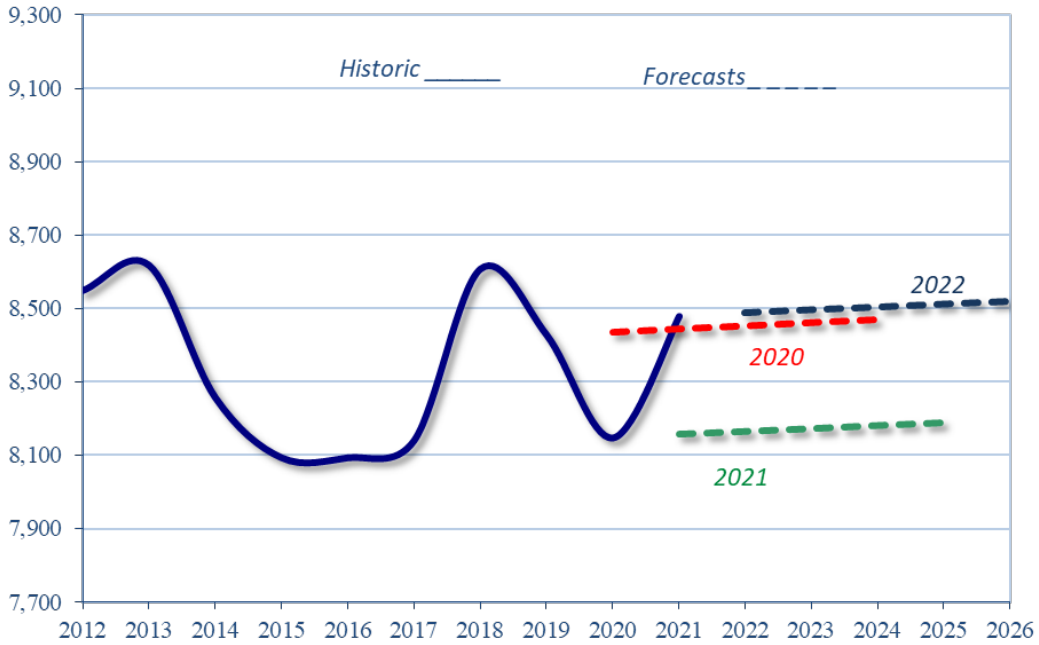
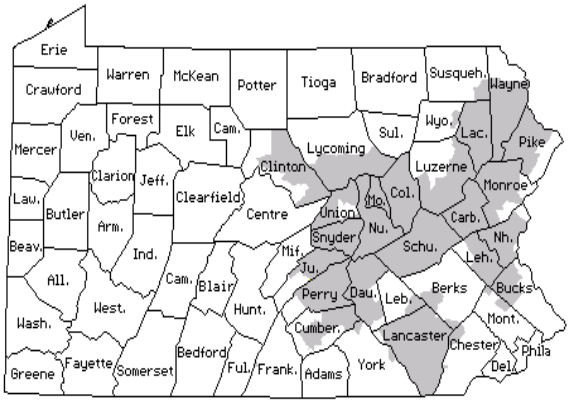


Figure 22: PECO Energy Company peak load (MW)



PPL Electric Utilities Corporation (PPL)



PPL provides service to about 1,466,277 customers over a 10,000-square-mile area in all or portions of 29 counties in Central Eastern Pennsylvania. PPL's 2021 energy usage total was 37,104 GWh as compared to: 36,171 GWh in 2020; 37,196 GWh in 2019; 37,371 GWh in 2018; and 35,996 GWh in 2017. Year-over-year (YOY) energy usage increased 2.58%. PPL's total usage mix consisted of residential (40.1%), commercial (37.2%), industrial (22.5%), and other less than 1%.

Over the next five years, total energy usage is projected to increase at an average annual rate of 0.24%. This includes a residential usage average annual increase of 0.30%, commercial usage increase of 0.55%, and industrial usage increase of 0.67% as shown in Figure 23 on next page.

PPL's highest annual peak load was in summer peak at 7,314 MW. This represents a YOY increase of 3.76% from the previous year's peak of 7,049 MW. The five-year peak load forecast is projected to decrease by an average of 0.12% per year as shown in Figure 24 on the next page.

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 2012 through 2021.

Figure 23: PPL Electric Utilities Corporation energy usage (GWh)

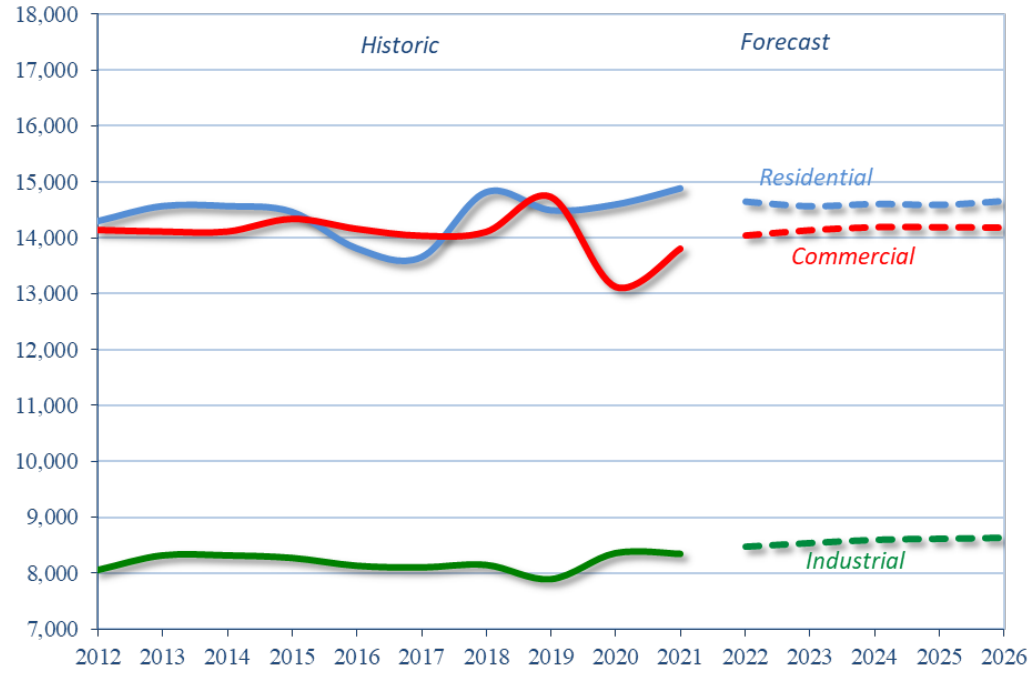
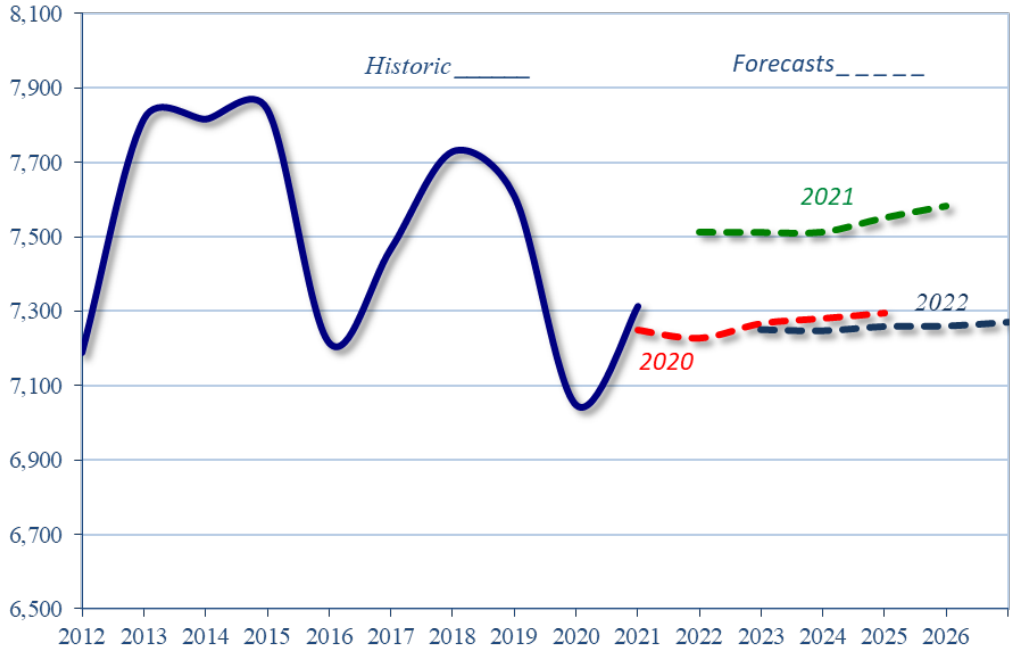
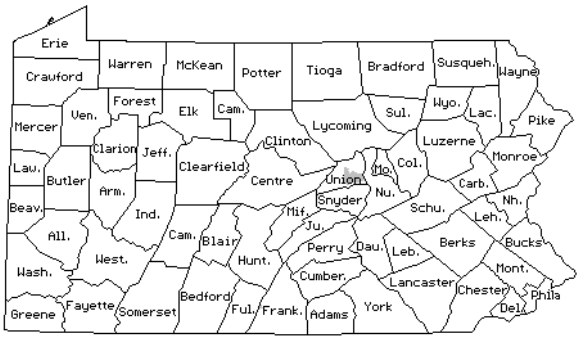


Figure 24: PPL Electric Utilities Corporation peak load (MW)



Summary of Data for the Four Smallest EDCs

Citizens' Electric Company (Citizens')

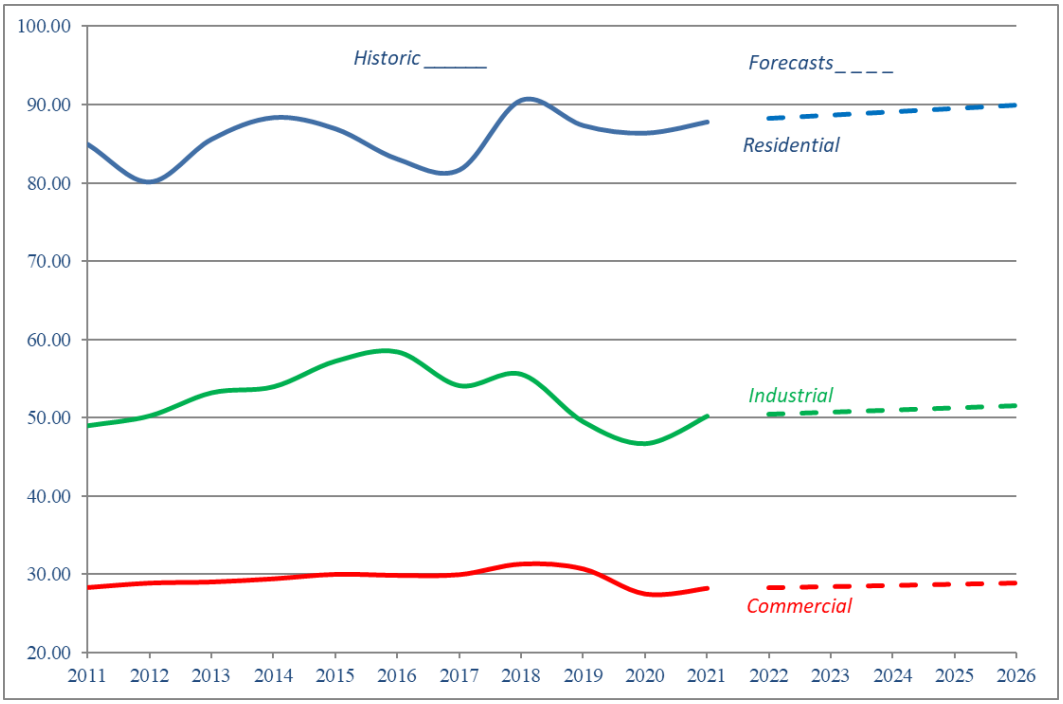


Citizens provides service to about 7,085 customers in Union County, Pennsylvania. Citizens' 2020 energy usage total was 173 GWh as compared to: 161 GWh in 2020; 168 GWh in 2019; 178 GWh in 2018; and 166 GWh in 2017. Year-over-year (YOY) energy usage increased 7.45%. Citizens' total usage mix consisted of residential (52.7%), commercial (16.9%), industrial (30.2%), and other (less than 1%).

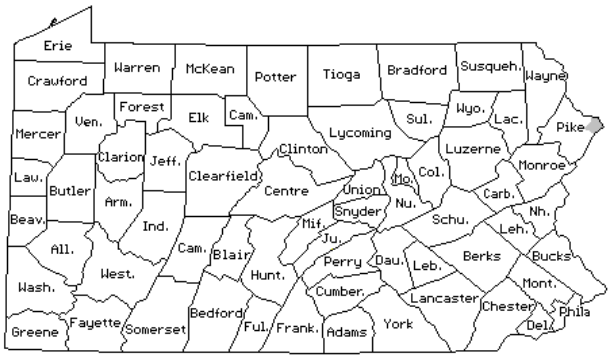
Over the next five years, total energy usage is projected to increase at an average annual rate of 0.5%. This includes a residential usage average annual increase of 0.5 %, commercial usage increase of 0.5%, and industrial usage increase by 0.5% as shown in Figure 25 below.

Citizens' highest winter peak load in 2021 was 45.7 MW. This represents a YOY increase of 8.8% from the previous year's peak of 42.0 MW. The five-year peak load forecast is projected to increase by an average of 0.09% per year.

Figure 25: Citizens' energy usage (GWh)



Pike County Light & Power Company (Pike)

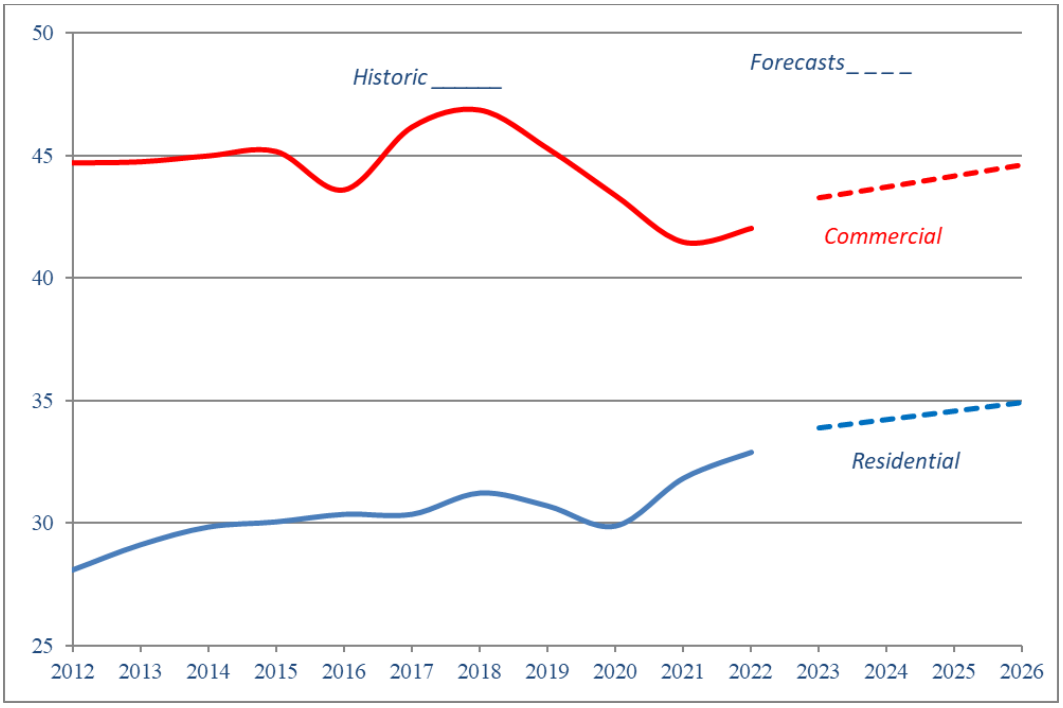


Pike provides service to about 5,047 customers in Eastern Pike County, Northeastern Pennsylvania. Pike's 2021 energy usage total was 75.3 GWh as compared to: 73.7 GWh in 2020; 73 GWh in 2019; 76 GWh in 2018; and 78 GWh in 2017. Year-over-year (YOY) energy usage increased by 2.18%. Pike's total usage mix consisted of residential (43.7%), commercial (55.8%), and other (0.5%). Pike has no industrial customers or sales for resale.

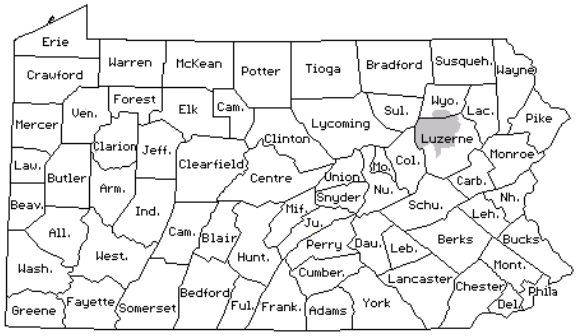
Over the next five years, total energy usage is projected to increase at an average annual rate of 1.43%. This includes a residential usage average annual increase of 1.4%, and a commercial usage increase of 1.4% as shown in Figure 26 below.

Pike's peak load in 2021 occurred in the winter at 16.4 MW. This represents a YOY decrease of 6.29% from the previous year's peak of 17.5 MW. The five-year peak load forecast is projected to increase by an average of 4.35% per year.

Figure 26: Pike County Light & Power energy usage (GWh)



UGI Utilities Inc.—Electric Division (UGI)

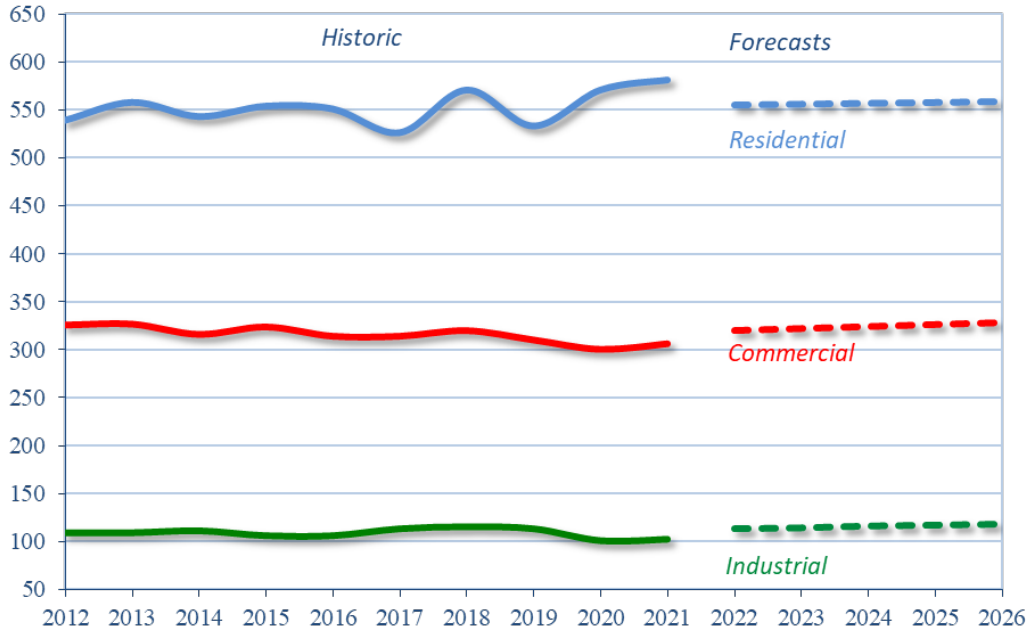


UGI provides electric service to about 62,714 customers in Northwestern Luzerne and Southern Wyoming counties in Pennsylvania. UGI's 2021 energy usage total was 996 GWh as compared to: 977 GWh in 2020; 958 GWh in 2019; 1,009 GWh in 2018; and 957 GWh in 2017. Year-over-year (YOY) energy usage increased 1.94%. UGI's total usage mix consisted of residential (58.4%), commercial (30.7%), industrial (10.3%), and sales for resale (less than 1%).

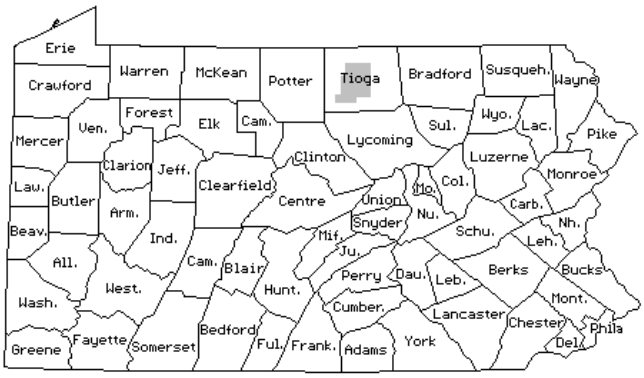
Over the next five years, total energy usage is projected to increase at an average annual rate of 0.75%. This includes a residential usage average annual decrease of 0.46%, commercial usage increase of 2.74%, and industrial usage increase by 1.37% as shown in Figure 27 below.

UGI highest summer peak load in 2021 was 216 MW. This represents a YOY increase of 2.37% from the previous year's peak of 211 MW. The five-year peak load forecast is projected to decrease an average of 1.92% per year.

Figure 27: UGI Utilities Inc. energy usage (GWh)



Wellsboro Electric Company (Wellsboro)



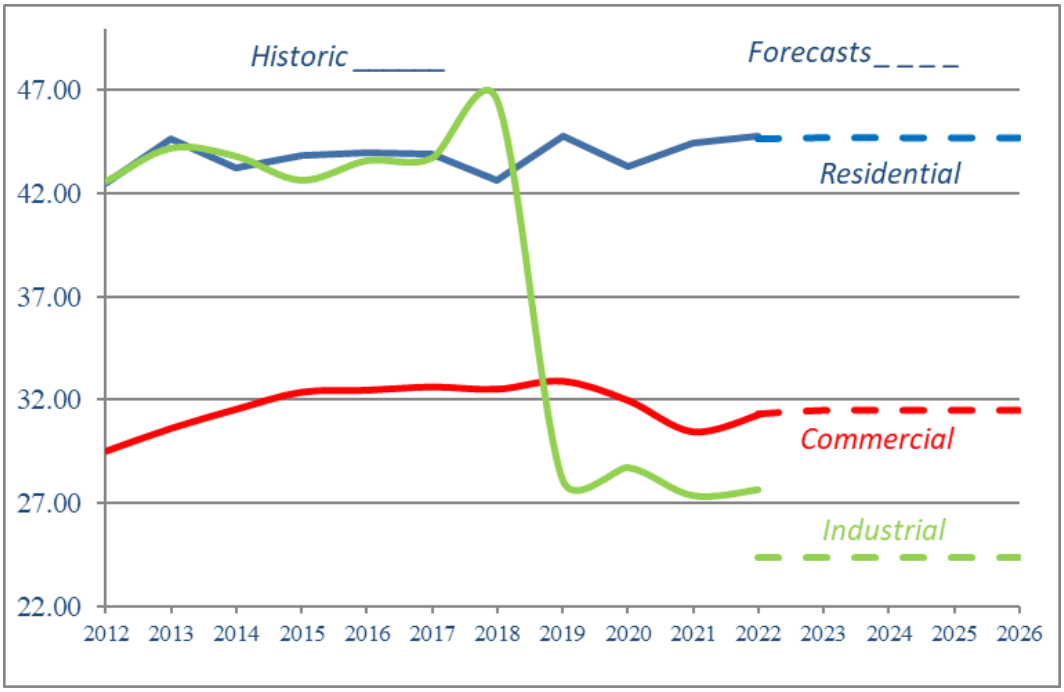
Wellsboro provides electric service to about 6,399 customers in Tioga County, North Central Pennsylvania. Wellsboro's 2021 energy usage total was 104 GWh as compared to: 103 GWh in 2020; 104 GWh in 2019; 106 GWh in 2018; and 105 GWh in 2017. Year-over-year (YOY) energy usage increased by approximately 1%. Wellsboro's total usage mix consisted of residential (43.1%), commercial (30.1%), industrial (26.6%), and other/sales for resale (less than 1%).

Over the next five years, total energy usage is projected to decrease at an average annual rate of 0.61%. This includes a residential usage average annual decrease of 0.05%, commercial usage increase of 0.15%, and industrial usage decrease of 2.36% as shown in Figure 28 below.

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 2021 occurred in the winter at 21.4 MW. This represents a YOY decrease of 1.38% from the previous year's peak of 21.7 MW. The five-year peak load forecast is projected to remain the same at 21.4 MW.

Figure 28: 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 2012 through 2021 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 2022 through 2026.

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

		Projected Peak Load Requirments (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	3054	2935										
2013	2951	2980	2966									
2014	2693	3045	3021	2997								
2015	2804	3102	3083	3056	2969							
2016	2797	3132	3135	3094	3005	2893						
2017	2682		3167	3118	3026	2918	2884					
2018	2795			3143	3042	2938	2895	2872				
2019	2662				3056	2950	2901	2874	2862			
2020	2760					2942	2890	2861	2852	2759		
2021	2760						2882	2862	2853	2781	2768	
2022								2869	2865	2797	2796	2742
2023									2866	2807	2832	2759
2024										2818	2855	2776
2025											2875	2794
2026												2804

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	4169	4350										
2013	4091	4436	4246									
2014	4068	4509	4260	4217								
2015	4109	4579	4265	4230	4176							
2016	4197	4676	4284	4266	4202	4081						
2017	3876		4306	4266	4184	4068	4004					
2018	4258			4272	4172	4067	3987	3949				
2019	4078				4164	4053	3955	3915	4011			
2020	4217					4012	3908	3856	3971	4005		
2021	4215						3863	3797	3913	3951	4021	
2022								3747	3862	3908	3895	3975
2023									3816	3864	3834	3934
2024										3821	3782	3887
2025											3722	3836
2026												3791

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	6539	6682										
2013	6494	6749	6642									
2014	6432	6842	6640	6600								
2015	6399	6929	6640	6621	6494							
2016	6335	7017	6645	6648	6503	6371						
2017	6112		6641	6643	6472	6327	6261					
2018	6218			6654	6455	6299	6232	6072				
2019	6053				6430	6254	6187	6024	6098			
2020	5522					6210	6151	5980	6029	6057		
2021	5778						6082	5905	5973	5986	5645	
2022								5833	5896	5881	5711	5707
2023									5804	5807	5624	5666
2024										5754	5556	5603
2025											5463	5508
2026												5419

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	3406	3185										
2013	3337	3226	3501									
2014	3164	3252	3035	2787								
2015	2898	3272	3032	2778	2909							
2016	2566	3289	3031	2762	2896	2890						
2017	2632		3031	2734	2873	2852	2665					
2018	2623			2711	2851	2837	2658	2675				
2019	2472				2826	2819	2640	2656	2719			
2020	2343					2803	2638	2650	2783	2641		
2021	2509						2618	2627	2733	2553	2405	
2022								2605	2712	2519	2399	2347
2023									2692	2485	2367	2318
2024										2457	2343	2291
2025											2312	2253
2026												2225

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	3012	2881										
2013	2817	2887	2958									
2014	2791	2898	2965	2975								
2015	2947	2910	2974	2979	2987							
2016	2897	2932	2996	2985	2995	2901						
2017	3026		3017	2987	2997	2895	2926					
2018	2974			2986	2996	2872	2907	2921				
2019	2976				2995	2855	2874	2871	2934			
2020	2976					2856	2865	2868	2928	2837		
2021	3072						2875	2876	2940	2891	2837	
2022								2883	2949	2935	2891	2966
2023									2971	2960	2935	3039
2024										2977	2960	3047
2025											2977	3043
2026												3046

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	5553	5297										
2013	5477	5159	5354									
2014	5515	5042	5421	5533								
2015	5528	4979	5438	5378	5190							
2016	5351	4993	5457	5392	5042	5316						
2017	5740		5476	5382	4925	5242	5347					
2018	5641			5351	4840	5154	5265	5318				
2019	5750				4760	5083	5201	5239	5460			
2020	5750					5044	5166	5201	5422	5577		
2021	5832						5172	5198	5418	5539	5577	
2022								5203	5428	5573	5539	5763
2023									5553	5628	5573	5702
2024										5666	5628	5749
2025											5666	5701
2026												5726

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	2933	2900										
2013	2944	2930	2914									
2014	2995	2937	2931	2983								
2015	3043	2940	2964	2929	2919							
2016	2886	2956	2984	2938	2923	2953						
2017	2972		2989	2938	2927	2948	2952					
2018	2133			2923	2925	2941	2948	2940				
2019	2003				2921	2935	2924	2899	2101			
2020	2003					2925	2904	2873	2081	1906		
2021	2151						2912	2875	2083	1393	1906	
2022								2880	2089	1956	1933	2074
2023									2146	1969	1956	2031
2024										1965	1969	2021
2025											1965	1982
2026												1960

* The 2010 actual and 2011 forecast are based on a reclassification of the commercial and industrial classes.

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	5328	5411										
2013	5382	5521	5322									
2014	5309	5561	5381	5413								
2015	5304	5587	5456	5472	5350							
2016	5512	5612	5508	5507	5372	5360						
2017	5685		5524	5523	5467	5428	5449					
2018	6459			5532	5474	5408	5443	5451				
2019	6029				5467	5397	5396	5372	6396			
2020	6029					5458	5388	5409	6422	6302		
2021	6201						5419	5450	6466	6471	6302	
2022								5472	6507	6577	6471	6570
2023									6876	6625	6577	6677
2024										6611	6625	6733
2025											6611	6735
2026												6732

* The 2010 actual and 2011 forecast are based on a reclassification of the commercial and industrial classes.

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	3128	2515										
2013	3087	2544	2938									
2014	3024	2579	2942	2927								
2015	2819	2625	2987	2935	2888							
2016	2909	2662	3039	2946	2896	2890						
2017	2910		3081	2962	2904	2898	2797					
2018	3020			2968	2904	2906	2794	2823				
2019	2866				2902	2907	2775	2809	2849			
2020	2865					2907	2751	2779	2811	2892		
2021	2898						2739	2775	2811	2884	2855	
2022								2779	2813	2884	2862	2865
2023									2817	2873	2880	2850
2024										2866	2882	2835
2025											2886	2812
2026												2800

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	4554	4460										
2013	4491	4304	4257									
2014	4491	4387	4164	4469								
2015	4462	4539	4145	4513	4491							
2016	4350	4653	4157	4525	4373	4145						
2017	4328		4156	4554	4393	4011	4248					
2018	4153			4583	4394	3923	4229	4238				
2019	4424				4377	3856	4181	4157	4187			
2020	4266					3791	4133	4090	4134	4141		
2021	4363						4112	4056	4104	4111	4279	
2022								4057	4104	4109	4247	4269
2023									4112	4104	4244	4240
2024										4112	4256	4223
2025											4259	4125
2026												4147

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	3534	3562										
2013	3531	3526	3512									
2014	3531	3593	3535	3553								
2015	3591	3650	3510	3552	3649							
2016	3558	3698	3503	3582	3582	3539						
2017	3587		3503	3604	3614	3545	3483					
2018	3529			3608	3619	3551	3454	3525				
2019	3610				3607	3553	3426	3516	3506			
2020	2443					3552	3392	3499	3459	2485		
2021	2390						3352	3473	3424	2459	2485	
2022								3472	3406	2446	2459	2497
2023									3397	2440	2446	2446
2024										2449	2440	2418
2025											2449	2354
2026												2307

* The 2010 actual and 2011 forecast are based on a reclassification of the commercial and industrial classes.

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	6005	6026										
2013	5731	6175	5883									
2014	5731	6266	5993	5696								
2015	5647	6304	6062	5808	5747							
2016	5647	6325	6133	5867	5822	5723						
2017	5668		6130	5894	5931	5746	5602					
2018	5792			5896	6017	5721	5617	5822				
2019	5797				5998	5675	5602	5832	5807			
2020	6743					5623	5569	5757	5720	6520		
2021	6427						5548	5751	5770	6587	6473	
2022								5790	5819	6474	6522	6049
2023									5854	6394	6513	5988
2024										6327	6481	6011
2025											6463	5977
2026												5990

* The 2010 actual and 2011 forecast are based on a reclassification of the commercial and industrial classes.

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

Year	Actual	Projected Peak Load Requirements (Year Forecast Was Filed)										
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	963	1010										
2013	1054	1001	929									
2014	1018	1003	930	867								
2015	910	1006	953	873	931							
2016	931	1010	969	880	940	992						
2017	926		980	885	947	999	973					
2018	950			889	949	1003	965	983				
2019	915				949	1004	956	979	976			
2020	889					1006	951	975	965	923		
2021	971						945	977	968	926	910	
2022								985	973	927	912	932
2023									976	937	924	942
2024										945	932	951
2025											940	953
2026												957

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

Year	Actual	Projected Residential Energy Demand (Year Forecast Was Filed)										
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	1668	1590										
2013	1704	1588	1645									
2014	1728	1582	1627	1677								
2015	1703	1589	1619	1685	1752							
2016	1686	1588	1625	1691	1689	1597						
2017	1591		1649	1699	1703	1563	1651					
2018	1713			1705	1713	1545	1632	1640				
2019	1638				1714	1532	1609	1617	1630			
2020	1674					1520	1593	1604	1612	1613		
2021	1663						1584	1595	1604	1604	1647	
2022								1598	1606	1608	1636	1692
2023									1614	1616	1647	1659
2024										1657	1662	1682
2025											1672	1657
2026												1668

Table A15 Pe
Actual and Pr

Year	Actual	Projected Commercial Energy Demand (Year Forecast Was Filed)										
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	1334	1291										
2013	1349	1297	1337									
2014	1381	1314	1347	1345								
2015	1321	1335	1358	1322	1180							
2016	1355	1334	1365	1326	1048	1311						
2017	1302		1374	1332	1049	1315	1345					
2018	1356			1332	1047	1319	1330	1317				
2019	957				1040	1321	1314	1312	1307			
2020	668					1321	1302	1303	1287	1016		
2021	706						1289	1295	1262	996	787	
2022								1293	1237	977	850	751
2023									1221	967	908	724
2024										1023	940	720
2025											931	699
2026												684

Table A16 Pe
Actual and Pr

Year	Actual	Projected Industrial Energy Demand (Year Forecast Was Filed)										
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	1456	1513										
2013	1509	1483	1473									
2014	1599	1486	1518	1596								
2015	1496	1490	1519	1743	1847							
2016	1569	1490	1488	1739	2079	1637						
2017	1738		1485	1729	2202	1696	1513					
2018	1826			1731	2256	1742	1476	1702				
2019	2066				2278	1775	1465	1713	1727			
2020	1926					1790	1467	1726	1728	2088		
2021	2063						1460	1757	1781	2121	1970	
2022								1794	1833	2153	2075	2250
2023									1866	2220	2141	2297
2024										2298	2182	2346
2025											2200	2357
2026												2340

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	7190	7271										
2013	7816	7403	7334									
2014	7816	7556	7477	7220								
2015	7842	7691	7568	7314	7209							
2016	7216	7785	7635	7408	7298	7209						
2017	7468		7686	7467	7385	7298	7248					
2018	7729			7511	7435	7385	7215	7250				
2019	7609				7427	7435	7194	7229	7248			
2020	7049					7427	7208	7267	7215	7250		
2021	7314						7243	7280	7194	7229	7513	
2022								7294	7208	7267	7512	7252
2023									7243	7280	7513	7249
2024										7294	7552	7260
2025											7584	7261
2026												7271

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	14295	14142										
2013	14563	14120	13848									
2014	14563	14005	13658	13607								
2015	14462	14161	13667	13575	13588							
2016	13810	14335	13738	13602	13644	13647						
2017	13650		13896	13695	13769	13720	13721					
2018	14811			13678	13814	13732	13750	13856				
2019	14490				13908	13781	13825	13940	13588			
2020	14592					13790	13826	13982	13499	14050		
2021	14879						13679	13853	13448	13960	14399	
2022								13750	13253	13901	14383	14643
2023									13045	13845	14383	14565
2024										13827	14382	14604
2025											14382	14588
2026												14653

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	14140	14354										
2013	14111	14524	14414									
2014	14111	14740	14570	14235								
2015	14336	14998	14741	14234	14214							
2016	14160	15137	14859	14376	14257	14394						
2017	14037		14985	14440	14326	14517	14353					
2018	14105			14484	14357	14578	14372	13986				
2019	14728				14357	14560	14336	13880	14353			
2020	13129					14493	14307	13818	14372	13986		
2021	13807						14260	13810	14336	13880	14721	
2022								13802	14307	13818	14776	14046
2023									14260	13810	14799	14140
2024										13802	14803	14196
2025											14827	14195
2026												14187

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	8052	12151										
2013	8313	12116	8475									
2014	8313	12269	8468	8133								
2015	8269	12450	8501	8182	8092							
2016	8128	12686	8550	8281	8171	7966						
2017	8098		8603	8407	8260	8066	8283					
2018	8144			8459	8324	8129	8354	8370				
2019	7889				8365	8168	8420	8467	8421			
2020	8354					8189	8450	8521	8486	8109		
2021	8340						8450	8520	8440	8058	7814	
2022								8520	8406	8025	7836	8470
2023									8345	7997	7855	8533
2024										7965	7872	8589
2025											7891	8607
2026												8624

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	8549	8926										
2013	8618	8956	8529									
2014	8258	8987	8580	8627								
2015	8094	9018	8631	8635	8259							
2016	8094	9049	8683	8644	8267	8102						
2017	8141		8735	8653	8275	8110	8102					
2018	8608			8661	8284	8118	8110	8149				
2019	8428				8292	8126	8118	8157	8617			
2020	8148					8135	8126	8165	8625	8436		
2021	8479						8135	8174	8634	8445	8156	
2022								8182	8642	8453	8164	8487
2023									8651	8462	8172	8496
2024										8470	8181	8504
2025											8189	8513
2026												8521

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	13233	13669										
2013	13241	13806	13392									
2014	13222	13944	14463	13343								
2015	13630	14083	14608	13346	13288							
2016	13664	14224	14754	13349	13355	13366						
2017	13024		14902	13351	13422	13341	13436					
2018	14005			13354	13489	13352	13423	13266				
2019	13650				13556	13354	13404	13240	13581			
2020	14041					13360	13428	13182	13661	13600		
2021	14262						13346	13104	13718	13570	13809	
2022								13009	13741	13580	13602	14037
2023									13762	13599	13672	14135
2024										13671	13804	14304
2025											13848	14393
2026												14508

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	8063	8360										
2013	8101	8443	7821									
2014	8025	8528	7790	7858								
2015	8118	8613	7868	7936	8021							
2016	8099	8699	7947	8015	8017	8044						
2017	7968		8026	8096	8013	8020	8132					
2018	8177			8177	8009	8016	8073	7992				
2019	7983				8005	8018	8063	8043	8143			
2020	7210					8019	8046	8049	8156	7976		
2021	7597						7995	8038	8163	7936	7638	
2022								8042	8163	7917	7873	7809
2023									8163	7892	7866	7818
2024										7882	7857	7813
2025											7809	7757
2026												7739

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	15253	15755										
2013	15379	15912	15481									
2014	15310	16071	15714	15609								
2015	15365	16232	15949	15844	15302							
2016	15263	16394	16188	16081	15294	15547						
2017	15425		16431	16322	15287	15515	15016					
2018	15516			16567	15279	15513	15364	15421				
2019	14958				15271	15517	15320	15293	15385			
2020	13669					15529	15356	15306	15415	14430		
2021	14003						15355	15247	15431	14444	14173	
2022								15217	15431	14598	14647	14367
2023									15431	14715	14692	14511
2024										14687	14623	14604
2025											14587	14611
2026												14698

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	3808	3758										
2013	3914	3771	3784									
2014	4019	3840	3846	4075								
2015	3814	3903	3908	3945	3793							
2016	3954	3964	3980	4012	3842	3793						
2017	3879		4015	4065	3927	3840	3776					
2018	4012			4077	4020	3886	3789	3806				
2019	3740				4031	3916	3775	3801	3764			
2020	3827					3917	3767	3796	3704	3828		
2021	3940						3762	3798	3690	3872	3821	
2022								3804	3695	3883	3862	3800
2023									3704	3892	3884	3846
2024										3911	3894	3844
2025											3891	3822
2026												3819

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	7092	7121										
2013	7318	7149	7146									
2014	7281	7188	7282	7311								
2015	7255	7231	7369	7302	7383							
2016	7186	7281	7431	7303	7157	6775						
2017	6817		7493	7319	7244	6634	6892					
2018	7358			7335	7298	6548	6834	6931				
2019	7152				7303	6473	6752	6906	6988			
2020	7178					6407	6660	6819	6901	6931		
2021	7206						6614	6756	6851	6844	6925	
2022								6756	6858	6849	6877	7202
2023									6864	6846	6897	7081
2024										6862	6926	7179
2025											6916	7016
2026												7076

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	4849	4819										
2013	4878	4930	4845									
2014	4956	5083	4909	4860								
2015	5112	5229	4946	4897	4996							
2016	5051	5343	4979	4932	4957	4900						
2017	4364		5047	4962	5015	4915	4995					
2018	4500			4962	5029	4941	4953	4285				
2019	2880				5006	4952	4918	4246	4261			
2020	2584					4954	4884	4208	4260	2879		
2021	2714						4857	4184	4266	2882	2686	
2022								4184	4273	2880	2738	2818
2023									4279	2868	2786	2729
2024										2862	2819	2734
2025											2805	2626
2026												2585

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012	7685	8029										
2013	7777	8172	8087									
2014	7972	8334	8303	7947								
2015	7635	8487	8542	8161	8053							
2016	7684	8608	8786	8331	8492	8287						
2017	8371		8878	8466	8903	8641	7947					
2018	8667			8495	9321	8798	8072	8785				
2019	10003				9700	8847	8114	8873	8617			
2020	9094					8852	8179	8865	8540	10074		
2021	9334						8199	8920	8651	10209	9889	
2022								8920	8760	10306	10161	9726
2023									8813	10375	10258	10077
2024										10857	10273	10219
2025											10237	10249
2026												10282

Appendix B – Plant Additions and Upgrades

Table B-1 below provides detail of PJM interconnection requests for new generating resources located in Pennsylvania.[64] Currently Pennsylvania has 1,563 MW under construction as compared to: 2,503 MW in 2020: 2,831 MW in 2019, 6,600 MW in 2018; 9,636 MW in 2017; 7,142 MW in 2016; 8,202 MW in 2015; and 4,629 MW in 2014.

Table B-2 below details the generation deactivations for Pennsylvania from Jan. 1, 2021, through Dec. 31, 2021. In 2021, there were 24 deactivation notices for generation units in Pennsylvania comprising approximately 920.8 MW[65] as compared to: 78.3 MW in 2020; 931.1 MW in 2019; 76.1 MW in 2018; 14 MW in 2017; and 177 MW in 2016.

Table B-1: New Generation Queue for Pennsylvania – Interconnection Requests (Dec. 31, 2021)

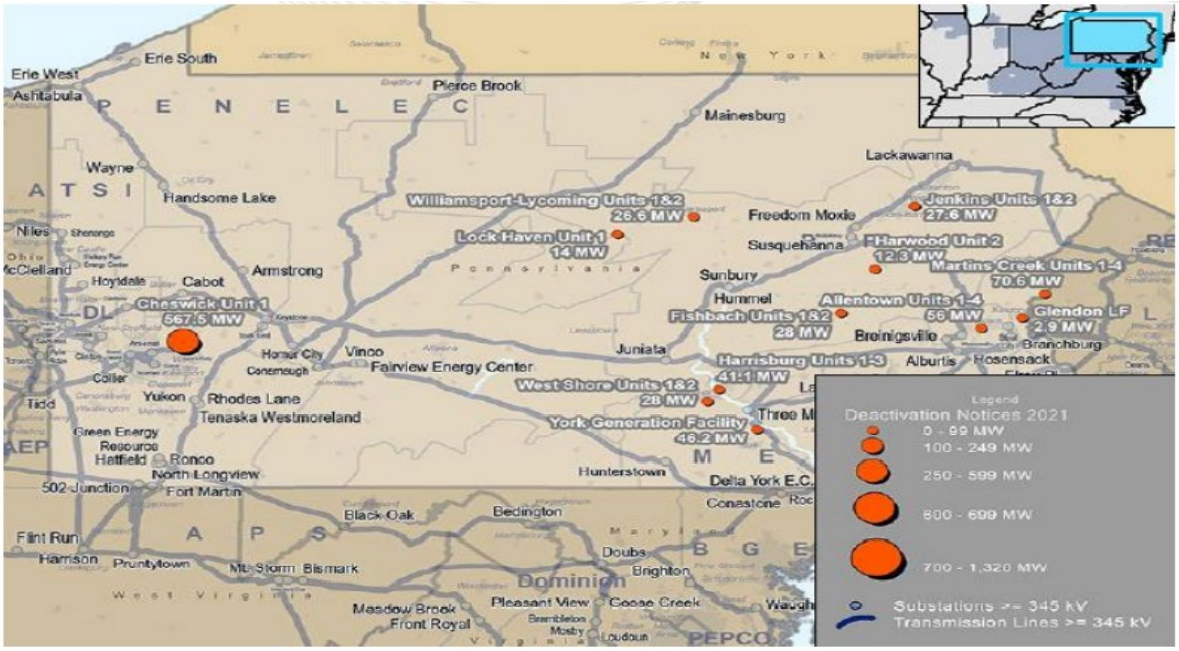
		In Queue						Complete					
		Active		Suspended		Under Construction		In Service		Withdrawn		Grand Total	
		Projects	Capacity (MW)	Projects	Capacity (MW)	Projects	Capacity (MW)	Projects	Capacity (MW)	Projects	Capacity (MW)	Projects	Capacity (MW)
Non-Renewable	Coal	0	0.0	0	0.0	0	0.0	17	229.0	28	14,354.6	45	14,583.6
	Diesel	0	0.0	0	0.0	0	0.0	4	37.4	12	51.5	16	88.9
	Natural Gas	6	295.5	4	1,028.0	19	848.4	107	21,209.9	249	90,886.0	385	114,267.8
	Nuclear	2	0.0	0	0.0	1	44.0	14	2,565.0	12	1,731.0	29	4,340.0
	Oil	0	0.0	0	0.0	6	7.5	3	9.4	9	1,307.0	18	1,323.9
	Other	5	2.9	0	0.0	0	0.0	2	306.5	8	344.0	15	653.4
	Storage	61	3,095.0	3	11.8	0	0.0	5	0.0	48	804.0	117	3,910.8
Renewable	Biomass	0	0.0	0	0.0	0	0.0	2	15.4	4	36.5	6	51.9
	Hydro	6	487.8	0	0.0	2	21.5	12	480.8	18	465.4	38	1,455.4
	Methane	0	0.0	0	0.0	0	0.0	24	130.7	37	201.3	61	332.0
	Solar	433	8,853.9	29	280.1	72	609.6	14	56.9	252	4,560.4	800	14,360.9
	Wind	5	91.1	1	8.7	2	32.0	42	295.9	137	1,757.5	187	2,185.2
	Wood	0	0.0	0	0.0	0	0.0	0	0.0	1	16.0	1	16.0
	Grand Total	**518**	**12,826.1**	**37**	**1,328.7**	**102**	**1,563.0**	**246**	**25,336.9**	**815**	**116,515.1**	**1,718**	**157,569.7**

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

[65] *Id.*

Table B-2, 2021 Pennsylvania Actual Generation Deactivations and Deactivation Notifications Received in 2021

Unit	TO Zone	Fuel Type	Request Received to Deactivate	Actual or Projected Deactivation Date	Age (Years)	Capacity (MW)
Martins Creek CT 2	PPL	Oil	9/30/2021	5/31/2023	50	17.3
Martins Creek CT 1					50	18
Lock Haven CT 1				4/1/2022	52	14
Jenkins CT 2					52	13.8
Jenkins CT 1					52	13.8
Harrisburg CT 3				6/1/2022	54	13.8
Harrisburg CT 2					54	13.9
Harrisburg CT 1					54	13.4
Fishbach CT 2				4/1/2022	52	14
Fishbach CT 1					52	14
Allentown CT 4				6/1/2022	54	14
Allentown CT 3					54	14
Allentown CT 2					54	14
Allentown CT 1					54	14
Glendon LF	METED	Methane	9/1/2021	6/1/2022	10	2.9
Cheswick 1	DLCO	Coal	6/9/2021	4/1/2022	51	567.5
Martins Creek CT 4	PPL	Natural Gas	2/25/2021	5/31/2023	50	17.3
York Generation Facility	METED		6/22/2021	9/20/2021	31	46.2
Harwood 2	PPL	Oil	4/27/2021	5/31/2022	53	12.3
Williamsport-Lycoming CT 2	PPL	Oil	9/30/2021	4/1/2022	54	13.4
Williamsport-Lycoming CT 1					54	13.2
West Shore CT 2					52	14
West Shore CT 1					52	14
Martins Creek CT 3				5/31/2023	50	18



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 2016 through 2021.[66] Chart C below represents the 2021 and 2020 Pennsylvania installed capacity percentage by energy source.[67] Table C-2 below represents existing generating facilities by located in Pennsylvania.[68]

Table C-1 PJM Region Electrical Power Supply Mix

PJM Region Electrical Power Supply Mix 2021/2022/2020/2019/2018/2017/2016

Energy Source	Capacity						Generation					
	2021	2020	2019	2018	2017	2016	2021	2020	2019	2018	2017	2016
Coal	26.1	27	30.5	32.7	35.4	36.5	48.5	19.3	23.8	28.6	31.8	33.9
Nuclear	17.4	17.5	17.5	17.6	18	18.1	32.3	34.2	33.6	34.2	35.6	34.4
Natural Gas	46.1	45.6	42.3	40.2	36.8	35.7	85.8	39.8	36.2	30.9	27.1	26.7
Hydro, Wind, Solar & Other	7.9	7	6.3	6.1	6	6	13.7	6.4	5.9	5.9	5.7	4.7
Oil	3	3	3.4	3.4	3.6	3.7	5.5	0.2	0.2	0.4	0.3	0.3

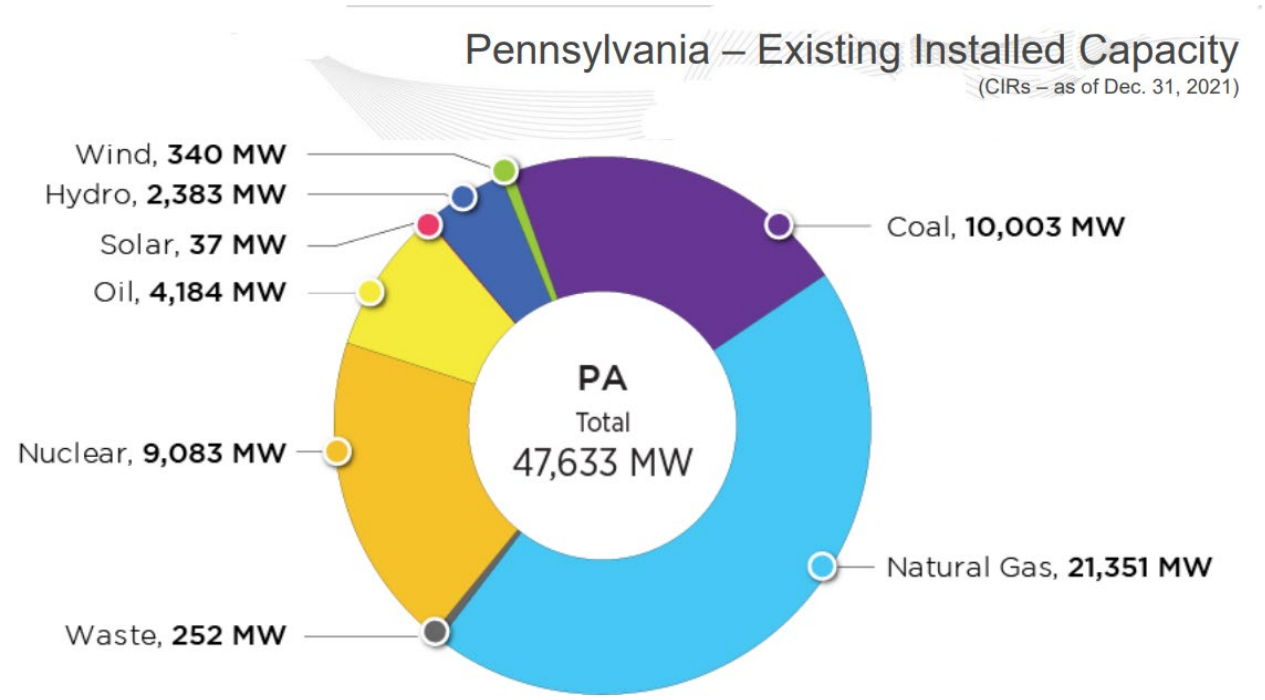
[66] *State of the Market Report for PJM*, Volume II, Sections 3 & 5 reporting years 2021, 2020, 2019, 2018, 2017, and 2016. Available at: www.monitoringanalytics.com.

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

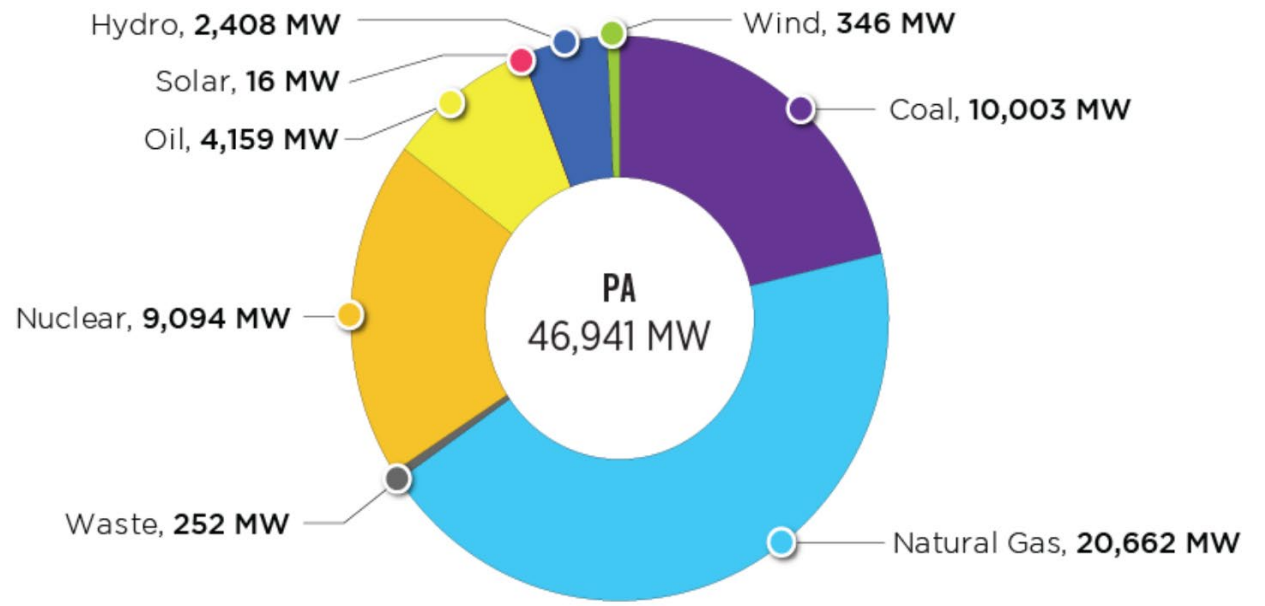
[68] Data accessed through S&P Global Market Intelligence as of Jul. 1, 2022. Note: S&P Global Market Intelligence uses the best available data to estimate the power market region for each power plant unit and electric utility. Estimates are based on ownership, purchase power agreements, interconnected 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

2021 Pennsylvania Installed Capacity



2020 Pennsylvania Installed Capacity



69

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

Table C-2 Electric Generating Facilities in Pennsylvania

Power Plant	*Owner Name*	*Ultimate Parent*	*Fuel Type*	*Operating Capacity (MW)*	*First Unit Online*	*Last Unit Online*
Delaware County Resource Recovery Facility	Covanta Delaware Valley	EQT AB (publ)	Biomass	75.0	4/1991	4/1991
Johnsonburg Mill	Domtar Paper Co. LLC	First Mgmt Ltd.	Biomass	49.0	2/1993	2/1993
Wheelabrator Falls	Wheelabrator Falls Inc.	Macquarie Group	Biomass	43.9	5/1994	5/1994
York County Resource Recovery Center	Covanta York Renewable Energy	EQT AB (publ)	Biomass	36.5	11/1989	11/1989
Lancaster County Resource Recovery	Covanta Lancaster Inc.	EQT AB (publ)	Biomass	32.4	5/1991	5/1991
Covanta Plymouth (Montenay Montgomery)	Covanta Plymouth Renewable	EQT AB (publ)	Biomass	28.0	12/1991	12/1991
Archbald Cogeneration	PEI Power Corporation	Energy Transfer LP	Biomass	20.0	9/1988	9/1988
Susquehanna Resource Management Complex (Harrisburg Facility Coge	Covanta Harrisburg, Inc.	EQT AB (publ)	Biomass	16.7	10/1986	4/2006
Mountain View Landfill	CCI Power Holdings	Energy Trading Innovations	Biomass	14.4	3/2003	3/2003
Dart Container Corp Cogen	Dart Container Corp.	Dart Container Corp.	Biomass	10.4	12/2012	12/2012
Broad Mountain Landfill Facility	UGI Development Company	UGI Corp.	Biomass	9.8	1/2009	1/2009
Green Knight Energy Center	Waste Management Inc.	Waste Management Inc.	Biomass	8.7	2/2001	2/2001
Pioneer Crossing Landfill	Fortistar LLC	Fortistar LLC	Biomass	8.0	10/2008	11/2013
IESI Blue Ridge Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	6.4	1/2013	1/2013
Shippensburg (Cumberland County) Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	6.4	1/2009	1/2009
Lakeview Gas Recovery	WM Renewable Energy LLC	Waste Management Inc.	Biomass	6.0	5/1997	6/1997
PWD Northeast WPCP Biogas Cogen	Philadelphia Water Department	Philadelphia Water Department	Biomass	5.6	12/2013	12/2013
Arden Landfill	WM Renewable Energy LLC	Waste Management Inc.	Biomass	4.8	2/2009	2/2009
Andromeda One A Biomass Plant	Andromeda Green Energy	Andromeda Green Energy	Biomass	4.0	2/2016	2/2016
Allenwood (PPLRE Lycoming County Landfill Project)	Talen Renewable Energy	Energy Power Partners LLC	Biomass	3.2	10/2012	10/2012
Glades Pike Cogeneration Plant IC	State Correctional Inst (Laure	State Correctional Inst (Laure	Biomass	3.2	10/2011	10/2011
Greater Lebanon Refuse Authority Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	3.2	9/2007	9/2007
Honey Brook Generating Station (Granger)	Granger Electric Co	Granger Electric Co	Biomass	3.2	12/2006	8/2010
Zook Generating Station (L&S Sweetners)	Granger Electric Co	Granger Electric Co	Biomass	3.2	10/2013	10/2013
Lycoming County Landfill Project (PPL Renewable)	Talen Renewable Energy	Energy Power Partners LLC	Biomass	3.0	10/2012	10/2012
SECCRA Community Landfill	Southeastern Chester County Re	Southeastern Chester County Re	Biomass	2.5	1/2007	11/2010
Frey Farm Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	1.6	1/2006	1/2006
Morgantown Generating Station	Granger Electric Co	Granger Electric Co	Biomass	1.6	5/2016	5/2016
Northern Tier Landfill	Talen Renewable Energy	Energy Power Partners LLC	Biomass	1.6	1/2009	1/2009
Tullytown Landfill Gas Facility	WM Renewable Energy LLC	Waste Management Inc.	Biomass	1.6	3/2013	3/2013
Homer City	Homer City Generation, L.P.	Homer City Generation, L.P.	Coal	1,915.1	6/1969	11/1977
Conemaugh	ArcLight Capital Partners LLC	ACHP L.P.	Coal	1,700.0	5/1970	5/1971
Keystone	ArcLight Capital Partners LLC	ACHP L.P.	Coal	1,700.0	8/1967	7/1968
Montour	Talen Generation LLC	Riverstone Holdings-D, L.P.	Coal	1,504.0	3/1972	4/1973
Seward Waste Coal	Robindale Energy Services Inc	Robindale Energy Services Inc	Coal	521.0	11/2004	11/2004
Colver Power Project	Colver Green Energy LLC	Generation Holdings LP	Coal	110.0	2/1995	2/1995
St. Nicholas Cogeneration	Schuylkill Energy Resources In	Schuylkill Energy Resources In	Coal	86.0	9/1990	9/1990
P.H. Glatfelter Company - Pennsylvania	Glatfelter Corp.	Glatfelter Corp.	Coal	85.0	5/1948	1/1994

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

Power Plant	Owner Name	Ultimate Parent	Fuel Type	Operating Capacity (MW)	First Unit Online	Last Unit Online
John B Rich Memorial Power Station	RI-CORP Development	RI-CORP Development	Coal	80.0	2/1988	2/1988
Ebensburg Power Company	Ebensburg Power Co	Babcock & Wilcox Enterprises	Coal	50.0	5/1991	5/1991
Mount Carmel Cogeneration	Mt Carmel Co-Gen	Kenneth Pollock & Connie Rado	Coal	43.0	1/1990	1/1990
Westwood Generating Station	WPS Westwood Generation LLC	RCL Holdings Ltd	Coal	30.0	6/1987	6/1987
Martins Creek 3 and 4	Talen Generation LLC	Riverstone Holdings-D, L.P.	Natural Gas	1,700.0	10/1975	3/1977
Lackawanna Energy Center	Invenergy LLC	Invenergy LLC	Natural Gas	1,479.0	3/2018	1/2019
Brunner Island	Talen Generation LLC	Riverstone Holdings-D, L.P.	Natural Gas	1,411.0	5/1961	6/1969
Fairless Works Energy Center	Starwood Energy Group Glbl LLC	Starwood Energy Group Glbl LLC	Natural Gas	1,355.4	5/2004	6/2004
Bethlehem CC	Conectiv Bethlehem LLC	ACE REIT Inc	Natural Gas	1,134.0	1/2003	1/2003
CPV Fairview Energy Center	NAES Corp	ITOCHU Corp.	Natural Gas	1,106.4	12/2019	12/2019
Moxie Freedom Generating Plant	EthosEnergy	EthosEnergy	Natural Gas	1,050.0	8/2018	8/2018
Hickory Run Energy Station	NAES Corp	ITOCHU Corp.	Natural Gas	1,033.7	5/2020	5/2020
Tenaska Westmoreland Generating Station	Tenaska Operations	Tenaska Energy Inc.	Natural Gas	1,032.0	12/2018	12/2018
Marcus Hook	Marcus Hook Energy	Starwood Energy Group Glbl LLC	Natural Gas	898.0	12/2004	12/2004
York 2 Energy Center	Calpine Corp.	CPN Mgmt LP	Natural Gas	858.9	3/2019	3/2019
Hunterstown CC	NAES Corp	ITOCHU Corp.	Natural Gas	855.0	7/2003	7/2003
Panda Liberty Generating Station (Moxie Liberty)	The Carlyle Group	The Carlyle Group	Natural Gas	850.0	10/2016	10/2016
Patriot Power Generation Plant (Moxie Patriot)	The Carlyle Group	The Carlyle Group	Natural Gas	850.0	7/2016	7/2016
Armstrong County	Ihi Power Services Corp.	Ihi Power Services Corp.	Natural Gas	829.7	5/2002	5/2002
PPL Ironwood	Helix Generation LLC	LS Power Group	Natural Gas	777.9	12/2001	12/2001
Eddystone 3-4	Exelon Power	Constellation Energy Corp.	Natural Gas	760.0	9/1974	6/1976
Fayette Energy Facility	Vistra Corp.	Vistra Corp.	Natural Gas	716.0	6/2003	6/2003
Ontelaunee Energy Center	Dynegy Power	Vistra Corp.	Natural Gas	624.7	5/2002	5/2002
Hill Top Energy Center	Hill Top Energy Center LLC	Hill Top Energy Center LLC	Natural Gas	620.0	7/2021	7/2021
Lower Mount Bethel	Talen Energy Corporation	Riverstone Holdings-D, L.P.	Natural Gas	601.6	2/2004	3/2004
Shawville	NRG REMA , LLC	GenOn Holdings Inc.	Natural Gas	589.7	3/1954	4/1960
Liberty Electric Power	Liberty Electric Power LLC	Vistra Corp.	Natural Gas	562.0	5/2002	5/2002
Allegheny Energy 3, 4 and 5 (Springdale)	Aspen Generating LLC	LS Power Group	Natural Gas	550.0	7/2003	7/2003
York Energy Center (Delta Power Project)	Conectiv Mid Merit LLC	CPN Mgmt LP	Natural Gas	545.0	3/2011	3/2011
Birdsboro Combined Cycle Plant	NAES Corp	ITOCHU Corp.	Natural Gas	485.0	5/2019	5/2019
New Castle	NRG Power Midwest	GenOn Holdings Inc.	Natural Gas	320.0	11/1939	6/1964
Brunot Island CC	NRG Power Midwest	GenOn Holdings Inc.	Natural Gas	269.4	6/1973	7/1974
Handsome Lake Energy	Handsome Lake Energy LLC	Handsome Lake Energy LLC	Natural Gas	267.5	7/2001	8/2001
Shell Chemical Appalachia Cogen	Shell Chemical Appalachia LLC	Shell Chemical Appalachia LLC	Natural Gas	250.4	7/2021	10/2021
Grays Ferry Cogeneration	Grays Ferry Cogeneration Ptnsh	Antin Infrastructure Ptnrs US	Natural Gas	183.6	10/1997	10/1997
Hazleton Cogeneration	NAES Corp	ITOCHU Corp.	Natural Gas	150.9	1/1989	6/2002
Hunlock Repowering	UGI Development Company	UGI Corp.	Natural Gas	129.6	7/2011	7/2011
Mehoopany CT	Procter & Gamble Paper Product	Procter & Gamble Paper Product	Natural Gas	123.0	6/1985	4/2013
Allegheny Energy Units 1 and 2 (Springdale)	Aspen Generating LLC	LS Power Group	Natural Gas	88.0	12/1999	12/1999
Allegheny Energy Units 12 & 13 (Chambersburg)	Aspen Generating LLC	LS Power Group	Natural Gas	88.0	11/2001	11/2001

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

Power Plant	*Owner Name*	*Ultimate Parent*	*Fuel Type*	*Operating Capacity (MW)*	*First Unit Online*	*Last Unit Online*
Allegheny Energy Units 8 and 9 (Gans Plant)	Aspen Generating LLC	LS Power Group	Natural Gas	88.0	11/2000	11/2000
Chester Operations CC	Kimberly-Clark Corp.	Kimberly-Clark Corp.	Natural Gas	69.2	8/2020	8/2020
West Point Facility	Merck & Co.	Merck & Co.	Natural Gas	66.0	1/1989	4/2001
Hunterstown	NRG REMA , LLC	GenOn Holdings Inc.	Natural Gas	60.0	5/1971	5/1971
Archbald Power Station	PEI Power Corporation	Energy Transfer LP	Natural Gas	59.2	5/2001	2/2010
Warren CT	NRG REMA , LLC	GenOn Holdings Inc.	Natural Gas	50.1	9/1972	9/1972
AE Hunlock 4	UGI Development Company	UGI Corp.	Natural Gas	47.6	12/2000	12/2000
Indiana University of Pennsylvania	IN University PA	IN University PA	Natural Gas	24.0	3/1988	3/1988
Orchard Park	Chambersburg Borough of	Chambersburg Borough of	Natural Gas	23.2	12/2003	12/2003
Wolf Run Energy Project	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	22.0	6/2019	6/2019
Beaver Dam Gas Project	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	21.0	5/2016	5/2016
Oxbow Creek Energy	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	21.0	12/2019	12/2019
Roundtop	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	21.0	10/2015	10/2015
Alpaca Gas Project	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	20.4	4/2017	4/2017
Milan Gas Project	IMG Midstream LLC	IMG Midstream LLC	Natural Gas	20.4	4/2017	4/2017
Blossburg	NRG REMA , LLC	GenOn Holdings Inc.	Natural Gas	19.0	5/1971	5/1971
Temple SEGF Plant	Temple University	Temple University	Natural Gas	16.0	5/1993	5/1993
Paxton Creek Cogeneration	Clearway Energy Inc.	Glbl Infrastructure GP III LP	Natural Gas	12.0	11/1986	11/1986
West Point Facility IC	Merck & Co.	Merck & Co.	Natural Gas	11.8	1/1972	5/2020
East Campus Plant	The PA State University	The PA State University	Natural Gas	8.9	6/2011	6/2011
Navy Yard Natural Gas Plant	Ameresco Inc.	Ameresco Inc.	Natural Gas	8.0	1/2018	11/2018
West Campus Plant	The PA State University	The PA State University	Natural Gas	7.8	1/1938	12/2021
Falling Spring	Chambersburg Borough of	Chambersburg Borough of	Natural Gas	7.1	12/1967	6/2001
Bucknell University	Bucknell University	Bucknell University	Natural Gas	6.7	10/1991	6/1998
West Campus Steam Plant CHP Expansion	The PA State University	The PA State University	Natural Gas	6.1	12/2021	12/2021
ECP Uptown Campus Cogeneration Facility	ECP Uptown Campus LLC	ECP Uptown Campus LLC	Natural Gas	5.6	11/1997	11/1997
Spring House IC Plant	Janssen Pharmaceuticals Inc.	Johnson & Johnson	Natural Gas	3.8	4/2013	4/2013
Newman & Company Inc.	Newman & Co.	Newman & Co.	Natural Gas	1.8	5/1964	5/1964
Hill at Whitemarsh	Talen Renewable Energy	Energy Power Partners LLC	Natural Gas	1.6	5/2007	5/2007
Mehoopany	Procter & Gamble Paper Product	Procter & Gamble Paper Product	Natural Gas	1.6	10/1984	10/1984
Juniata Locomotive Shop GT Project	Norfolk Southern Corporation	Norfolk Southern Corporation	Natural Gas	1.5	4/2015	4/2015
Jefferson Torresdale Hospital IC Project (Cogen)	Jefferson Torresdale Hospital	Jefferson Torresdale Hospital	Natural Gas	1.1	5/2016	5/2016
Mount Joy Wire	Mount Joy Wire Corp.	Mount Joy Wire Corp.	Natural Gas	1.1	12/2011	12/2011
Phoenix Contact - CCHP Plant	Phoenix Contact USA, Inc.	Phoenix Contact USA, Inc.	Natural Gas	1.0	3/2014	3/2014
Mon Valley Works	U.S. Steel Corp.	U.S. Steel Corp.	Other Fuel	67.9	6/1943	2/2002
Clairton Works	U.S. Steel Corp.	U.S. Steel Corp.	Other Fuel	26.0	1/1955	1/1955
Hazle Township Flywheel Energy Storage	Convergent Energy and Power LP	Energy Capital Partners LLC	Other Fuel	20.0	9/2013	7/2014

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

Power Plant	*Owner Name*	*Ultimate Parent*	*Fuel Type*	*Operating Capacity (MW)*	*First Unit Online*	*Last Unit Online*
Meyersdale Windpower Battery Storage	FPL Energy Meyersdale	FPL Energy Meyersdale	Other Fuel	18.0	12/2015	12/2015
Green Mountain Battery Storage System	NextEra Energy Resources LLC	NextEra Energy Inc.	Other Fuel	10.4	5/2016	5/2016
Erie Coke Corporation	Erie Coke Corp.	Erie Coke Corp.	Other Fuel	1.3	1/1953	1/1953
Altairnano PJM Li-ion Battery Storage Project	AES Energy Storage LLC	The AES Corp.	Other Fuel	1.0	1/2009	1/2009
Croydon	Exelon Power	Constellation Energy Corp.	Petroleum Products	512.0	6/1974	8/1974
Portland CT	NRG REMA , LLC	GenOn Holdings Inc.	Petroleum Products	190.0	12/1967	4/1997
Richmond CT	Exelon Power	Constellation Energy Corp.	Petroleum Products	132.0	6/1973	6/1973
Eddystone CT	Exelon Power	Constellation Energy Corp.	Petroleum Products	76.0	5/1967	6/1970
Delaware CT	Exelon Power	Constellation Energy Corp.	Petroleum Products	74.0	4/1969	7/1970
Southwark	Exelon Power	Constellation Energy Corp.	Petroleum Products	72.0	6/1967	11/1968
Falls	Exelon Power	Constellation Energy Corp.	Petroleum Products	60.0	5/1970	6/1970
Moser	Exelon Power	Constellation Energy Corp.	Petroleum Products	60.0	5/1970	6/1970
Chester	Exelon Power	Constellation Energy Corp.	Petroleum Products	54.0	2/1969	5/1969
Mountain	NRG REMA , LLC	GenOn Holdings Inc.	Petroleum Products	50.0	6/1972	6/1972
Tolna	NRG REMA , LLC	GenOn Holdings Inc.	Petroleum Products	50.0	6/1972	6/1972
Schuylkill CT	Exelon Power	Constellation Energy Corp.	Petroleum Products	38.0	5/1969	6/1971
Sunbury CT	Sunbury Generation LP	Corona Power	Petroleum Products	36.0	11/1971	11/1971
Titus CT	NRG REMA , LLC	GenOn Holdings Inc.	Petroleum Products	35.0	12/1967	8/1970
Orrtanna	NRG REMA , LLC	GenOn Holdings Inc.	Petroleum Products	26.0	5/1971	5/1971
Hamilton	NRG REMA , LLC	GenOn Holdings Inc.	Petroleum Products	24.0	6/1971	6/1971
Shawnee CT	NRG REMA , LLC	GenOn Holdings Inc.	Petroleum Products	24.0	6/1972	6/1972
Brunot Island	NRG Power Midwest	GenOn Holdings Inc.	Petroleum Products	15.0	3/1972	3/1972
Conemaugh IC	ArcLight Capital Partners LLC	ACHP L.P.	Petroleum Products	11.2	2/1970	2/1970
Keystone IC	ArcLight Capital Partners LLC	ACHP L.P.	Petroleum Products	11.2	11/1968	11/1968
Shawville IC	NRG REMA , LLC	GenOn Holdings Inc.	Petroleum Products	6.0	4/1960	4/1966
Pine Grove Landfill	CCI Power Holdings	Energy Trading Innovations	Petroleum Products	5.4	2/2008	2/2008
PPG Industries Works 6 IC Facility	PPG Industries Inc.	PPG Industries Inc.	Petroleum Products	5.0	7/1972	5/1996
Sunbury IC	Sunbury Generation LP	Corona Power	Petroleum Products	5.0	4/1967	4/1967
General Electric Company	General Electric Co.	General Electric Co.	Petroleum Products	4.3	6/1984	6/1984
New Castle IC	NRG Power Midwest	GenOn Holdings Inc.	Petroleum Products	2.5	12/1968	12/1968
PPG Place	PPG Industries Inc.	PPG Industries Inc.	Petroleum Products	2.3	5/1990	6/1998
PPG Monroeville Chemicals Center	PPG Monroeville Chemicals	PPG Industries Inc.	Petroleum Products	1.1	10/1998	9/2000
Whitetail Solar 2	Lightsource bp Renewable Energ	Lightsource bp Renewable Energ	Solar	20.0	9/2020	9/2020
Whitetail Solar 3	Lightsource bp Renewable Energ	Lightsource bp Renewable Energ	Solar	20.0	8/2020	8/2020
Elk Hill Solar 2 Project	Elk Hill Solar 2 LLC	Elk Hill Solar 2 LLC	Solar	15.0	12/2020	12/2020
Whitetail Solar 1	Whitetail Solar 1 LLC	Lightsource bp Renewable Energ	Solar	13.5	12/2019	12/2019
PA Solar Park II Project	Con Edison Development	Consolidated Edison Inc.	Solar	10.0	1/2020	1/2020
PA Solar Park Project	Con Edison Development	Consolidated Edison Inc.	Solar	10.0	10/2012	10/2012
Keystone Solar Project	Keystone Solar	Keystone Solar	Solar	5.0	9/2012	9/2012
PA4 Solar Farm	DEPCOM Power Inc.	DEPCOM Power Inc.	Solar	3.6	5/2019	5/2019

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

Power Plant	*Owner Name*	*Ultimate Parent*	*Fuel Type*	*Operating Capacity (MW)*	*First Unit Online*	*Last Unit Online*
TPE Pennsylvania Solar 1	DEPCOM Power Inc.	DEPCOM Power Inc.	Solar	3.6	8/2019	8/2019
ABE4 Solar Project	Mid-River PA LLC	Mid-River PA LLC	Solar	3.0	9/2020	9/2020
Dickinson Solar Project (Carlisle)	Dickinson Solar LLC	NextEra Energy Inc.	Solar	3.0	12/2016	12/2016
Fort Indiantown Gap Solar Project (FTIG)	Standard Solar Inc.	Caisse de dépôt et placement	Solar	3.0	1/2019	1/2019
Hunker Solar River Project	Hunker Solar River LLC	Hunker Solar River LLC	Solar	3.0	10/2021	10/2021
Knouse Foods Solar Plant	Knouse Foods Cooperative	Knouse Foods Cooperative	Solar	3.0	12/2010	12/2010
Pocono Raceway Solar Project	EDF Renewables Inc.	France	Solar	3.0	8/2010	8/2010
Susquehanna University Solar Project	TerraForm Power Inc	Brookfield Renewable	Solar	3.0	9/2018	9/2018
Lincoln Financial Field Solar Plant	Clearway Renew LLC	Glbl Infrastructure GP III LP	Solar	2.9	1/2013	1/2013
Crayola Solar Park	Talen Renewable Energy	Energy Power Partners LLC	Solar	2.8	5/2010	11/2011
Temple Solar Arrays Project	UGI Energy Services LLC	UGI Corp.	Solar	2.2	5/2011	5/2011
Elizabethtown Solar	Community Energy Solar	The AES Corp.	Solar	2.0	2/2016	2/2016
Air Products Solar (Trexlertown Solar)	Air Products Energy Entrprs	Air Products & Chemicals Inc.	Solar	1.9	6/2011	6/2011
Romark PA Solar	Romark Logistics Of Pa, Inc.	Romark Logistics Of Pa, Inc.	Solar	1.8	11/2011	11/2011
Morgantown Solar Park	Hankin Group	Hankin Group	Solar	1.6	11/2011	11/2011
Turnkey Project - GlaxoSmith	GlaxoSmithKline Cnsmr Hlthcr L	GlaxoSmithKline	Solar	1.6	12/2010	12/2010
Exelon-Conergy Solar Energy Center	MF Mesa Lane	Kawa Capital Partners LLC	Solar	1.5	11/2008	11/2008
Merck-Upper Gwynedd Solar Array	Ray Angelini, Inc.	Ray Angelini, Inc.	Solar	1.5	5/2011	5/2011
University Park Solar Project	SS Pa II PSU LLC	SS Pa II PSU LLC	Solar	1.5	12/2018	12/2018
Pickering Solar	Essential Utilities Inc.	Essential Utilities Inc.	Solar	1.4	1/2012	1/2012
Beaver Solar	Tangent Energy Solutions Inc.	Tangent Energy Solutions Inc.	Solar	1.3	12/2012	12/2012
Carlisle Area School District	Carlisle Area School	Carlisle Area School	Solar	1.3	10/2010	10/2010
Longwood Gardens Solar Plant	Ecogy Pennsylvania Systems Llc	Ecogy Pennsylvania Systems Llc	Solar	1.3	5/2010	5/2010
500 Virginia Solar	500 Virginia Solar Lp	500 Virginia Solar Lp	Solar	1.0	7/2011	7/2011
IKEA Conshohocken Rooftop PV System	IKEA Energy US LLC	Stichting INGKA Foundation	Solar	1.0	7/2012	7/2012
Marlboro Mushrooms Solar Field	Marlborough Mushrooms	Marlborough Mushrooms	Solar	1.0	11/2011	11/2011
Martin Limestone Solar Array Plant	Sunstream Energy Llc	Sunstream Energy Llc	Solar	1.0	12/2012	12/2012
Masser Farms Realty Solar	Masser Farms Realty, Ltd.	Masser Farms Realty, Ltd.	Solar	1.0	5/2011	5/2011
Aqua Ingrams Mill Solar	Essential Utilities Inc.	Essential Utilities Inc.	Solar	0.9	12/2009	12/2009
Conshohocken -Solar	Sun Power Electric	Conservation Services Group	Solar	0.1	4/1999	4/1999
Peach Bottom	Constellation Energy Corp.	Constellation Energy Corp.	Uranium	2,658.0	7/1974	12/1974
Susquehanna Nuclear	Susquehanna Nuclear, LLC	Riverstone Holdings-D, L.P.	Uranium	2,494.0	6/1983	2/1985
Limerick	Exelon Nuclear	Constellation Energy Corp.	Uranium	2,386.0	2/1986	1/1990
Beaver Valley	Energy Harbor Nuclear Corp	Energy Harbor Corp	Uranium	1,872.0	9/1976	11/1987
Muddy Run Pumped Storage Facility	Exelon Power	Constellation Energy Corp.	Water	1,070.0	4/1967	2/1968
Kinzua Pumped Storage Project (Seneca)	PE Hydro Generation LLC	Province of Ontario	Water	482.0	1/1970	1/1970
Safe Harbor	Safe Harbor Water Power Corp.	Brookfield Renewable	Water	417.5	12/1931	4/1986
Holtwood Hydroelectric Plant	Talen Energy Supply LLC	Riverstone Holdings-D, L.P.	Water	249.0	10/1910	11/2013
Wallenpaupack	Brookfield Renewable	Brookfield Renewable	Water	44.0	6/1926	6/1926
Piney	Brookfield Power Piney & Deep	Brookfield Power Piney & Deep	Water	33.2	6/1924	2/1928

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

Power Plant	*Owner Name*	*Ultimate Parent*	*Fuel Type*	*Operating Capacity (MW)*	*First Unit Online*	*Last Unit Online*
Wm F Matson Generating Station	Allegheny Electric Coop	Allegheny Electric Coop	Water	21.7	6/1988	6/1988
York Haven	Ontario Power Generation	Province of Ontario	Water	19.0	12/1905	12/1905
Conemaugh Hydroelectric	Pennsylvania Renewable Resourc	Pennsylvania Renewable Resourc	Water	15.0	2/1989	2/1989
Yough Hydro Power	D/R Hydro Co.	D/R Hydro Co.	Water	12.2	12/1989	12/1989
Allegheny 6	Ontario Power Generation	Province of Ontario	Water	12.0	11/1988	11/1988
Allegheny 5	Ontario Power Generation	Province of Ontario	Water	10.0	10/1988	10/1988
Mahoning Creek	Ontario Power Generation	Province of Ontario	Water	6.7	12/2013	12/2013
Townsend Hydro	Beaver Falls Municipal Authori	Beaver Falls Municipal Authori	Water	4.2	10/1987	10/1987
Warrior Ridge Hydroelectric	American Hydro Power Co.	American Hydro Power Co.	Water	2.8	12/1985	12/1985
Mehoopany Wind	BP Wind Energy North America	BP p.l.c.	Wind	140.8	12/2012	12/2012
Twin Ridges Wind Farm	Senvion SE	Suzlon Energy Ltd.	Wind	139.4	12/2012	12/2012
Locust Ridge II	Avangrid Renewables LLC	Iberdrola SA	Wind	102.0	5/2009	5/2009
Armenia Mountain Wind	ALLETE Clean Energy	ALLETE Inc.	Wind	100.5	12/2009	12/2009
Big Level Wind Project (Cunningham)	TransAlta Renewables Inc.	TransAlta Corp	Wind	90.0	12/2019	12/2019
Allegheny Ridge Wind Farm	Allegheny Ridge Wind Farm LLC	OMERS Administration Corp.	Wind	80.0	6/2007	6/2007
Highland North Wind Farm	BlackRock Inc.	BlackRock Inc.	Wind	75.0	3/2012	3/2012
North Allegheny Wind	Duke Energy Generation Service	Duke Energy Corp	Wind	70.0	9/2009	9/2009
Laurel Hill	Laurel Hill Wind Energy	Duke Energy Corp	Wind	69.0	9/2012	9/2012
Waymart Wind Farm	GlidePath Power Solutions	Quinbrook Infrastructure Ptnrs	Wind	64.5	10/2003	10/2003
Highland Wind Project (Krayn Wind)	Cambria Wind LLC	Corporación Masaveu	Wind	62.5	8/2009	8/2009
Stony Creek Wind Farm	E.ON Climate & Renewables Nort	RWE Aktiengesellschaft	Wind	52.5	11/2009	11/2009
South Chestnut Wind Project	Avangrid Renewables LLC	Iberdrola SA	Wind	50.4	4/2012	4/2012
Sandy Ridge Wind Farm	Gamesa Wind US LLC	Siemens Aktiengesellschaft	Wind	48.2	2/2012	2/2012
Ringer Hill Wind Farm	Skyline Renewables LLC	Skyline Renewables LLC	Wind	38.3	12/2016	12/2016
Chestnut Flats Windfarm	Chestnut Flats Lessee LLC	France	Wind	38.0	12/2011	12/2011
Lookout WindPower LLC	Clearway Energy Inc.	Glbl Infrastructure GP III LP	Wind	37.8	10/2008	10/2008
Casselman Wind	Avangrid Renewables LLC	Iberdrola SA	Wind	34.5	12/2007	12/2007
Meyersdale Wind Project	GlidePath Power Solutions	Quinbrook Infrastructure Ptnrs	Wind	30.0	12/2003	12/2003
Patton Wind Farm	BlackRock Inc.	BlackRock Inc.	Wind	30.0	12/2012	12/2012
Forward WindPower LLC	Clearway Energy Inc.	Glbl Infrastructure GP III LP	Wind	29.4	4/2008	4/2008
Locust Ridge Wind Farm	Avangrid Renewables LLC	Iberdrola SA	Wind	26.0	2/2007	2/2007
Wind Park Bear Creek Project	Wind Park Bear Creek LLC	JPMorgan Chase & Co.	Wind	24.0	3/2006	3/2006
Mill Run Wind Farm	GlidePath Power Solutions	Quinbrook Infrastructure Ptnrs	Wind	15.0	12/2001	12/2001
Somerset Wind Project	GlidePath Power Solutions	Quinbrook Infrastructure Ptnrs	Wind	9.0	12/2001	12/2001
Turkey Point Wind Project (Frey Farm Wind)	Talen Renewable Energy	Energy Power Partners LLC	Wind	3.2	1/2011	1/2011
MATS Wind	Electric City Wind Power Corp.	Electric City Wind Power Corp.	Wind	0.6	2008	2008

PAPUC

Pennsylvania Public Utility Commission
400 North Street
Harrisburg, PA 17120
puc.pa.gov