Electric Power Outlook for Pennsylvania 2017-2022

August 2018

PENNSYLVANIA PUC PUBLIC UTILITY COMMISSION

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ELECTRIC POWER OUTLOOK FOR PENNSYLVANIA 2017–2022

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Executive Summary

Introduction

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

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 2027, 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 2017, the reserve margin requirement was 16.6 percent with an actual available reserve of 29.1 percent. In 2018, the reserve margin requirement is 16.7 percent with an actual available reserve of 32.5 percent. NERC also projects PJM will have enough generation capacity to meet its reserve margin requirements through 2027.

Pennsylvania's aggregate electrical energy usage (residential, commercial, industrial, sales for resale, and other) in 2017 was 142,740 gigawatt hours (GWh) as compared to 145,022 GWh in 2016, which is a 1.57 percent decrease. Over the next 5 years, total Pennsylvania electric energy usage is projected to decrease at an average annual rate of 0.41 percent. This includes a decrease of 0.81 percent average annual residential usage, a decrease of 0.30 percent average annual commercial usage, and a decrease of 0.10 percent average annual industrial usage.

[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.

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Section 1 – Regional Electric Outlook

Purpose

The *Electric Power Outlook for Pennsylvania 2017-2022* 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.[5]

The information contained in this report includes highlights of the past year, as well as EDCs' projections of energy demand and peak load for 2018-2022. The state's seven largest EDCs[6] represent over 95 percent of jurisdictional electricity usage in Pennsylvania. Accordingly, information regarding the 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 5 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.

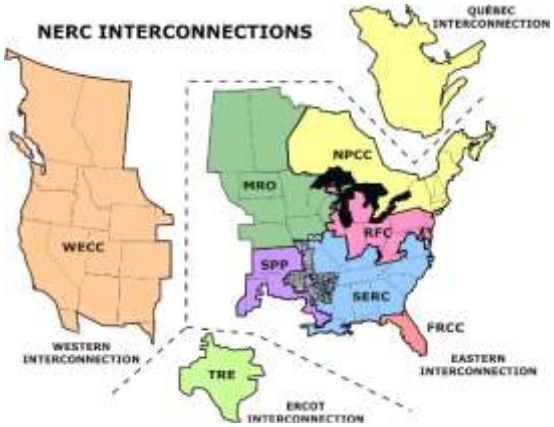
The Commission relies on reports and analyses of regional entities, including the ReliabilityFirst Corporation (RFC) and PJM, to obtain a more complete assessment of the current and future status of the electric power supply within the region. Also, data for the report is submitted annually by EDCs, pursuant to the Commission's regulations.[7] 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).

[5] This report is available at http://www.puc.pa.gov/utility_industry/electricity/electric_reports.aspx.
[6] Those EDCs with at least 100,000 customers.
[7] *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 councils 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 334 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.

NERC's members operate in 8 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).

NERC establishes criteria, standards and requirements for its members and all control areas. All control 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 *2017 Long-Term Reliability Assessment*[8] is NERC's independent review of the 10-year reliability outlook for the North American bulk power system (BPS) while identifying trends, emerging issues, and potential risk. Also reported is insight on resource adequacy and operating reliability, as well as an overview of projected electricity demand growth for individual assessments areas. NERC also provides specific review of the PJM Regional Transmission Organization (RTO).

In the 2017 assessment, NERC highlighted several "key findings" that are emerging and have the potential to increase risks to reliability:

- ***Projected reserve margin shortages in the SERC Reliability Corporation East (SERC-E) and Electric Reliability Council of Texas (ERCOT)***

    - Recent retirement announcements in Texas RE-ERCOT and the canceled nuclear plant expansion in SERC-E result in projected margin shortfalls for both assessment areas.

    - SERC-E Anticipated and Prospective Reserve Margins drop below the Reference Margin Level beginning in Summer 2020.

    - ERCOT Anticipated Reserve Margins drop below the Reference Margin Level beginning in Summer 2018; Prospective Reserve Margins remain adequate.

- ***Conventional generation continues to retire amid slower demand growth***

    - Rapid additions of natural gas, wind, and solar resources continue.

    - NERC-wide electricity peak demand and energy growth are at the lowest rates on record with declining demand projected in three areas.

    - Conventional generation retirements have outpaced conventional generation additions with continued additions of wind and solar.

    - Retirement plans have been announced for 14 nuclear units, totaling 10.5 GW.

    - A total of 37 GW (nameplate) of solar additions are projected by 2022. Of these, 20 GW (nameplate) are distributed, raising visibility concerns for system planners.

[8] *See* NERC, *2017 Long-Term Reliability Assessment*, Dec. 2017, available at https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_12132017_Final.pdf.

- ***More robust planning approaches are needed to ensure adequate essential reliability services and fuel assurance***

    - Changing composition of the North American generation resource mix.

    - Reference Margin Levels vary across North America depending on the resource mix.

    - Methods for determining the on-peak availability of wind and solar are improving with growing performance data.

    - Fuel assurance mechanisms offer important reliability benefits, particularly in areas with high levels of natural gas.

- ***A total of 6,200 miles of transmission additions are planned to maintain reliability and meet policy objectives***

    - Despite low or flat load growth, a total of 6,200 circuit miles of new transmission is planned throughout the NERC assessment period with more than 1,100 circuit miles currently under construction.

    - Actual transmission additions have increased despite lower projected energy growth.

NERC's 2017 assessment outlined the following recommendations for certain stakeholder classes based on the identified key findings above:

- ***Policy Makers and Regulators:***

    - ***Support essential reliability services:*** The Federal Energy Regulatory Commission (FERC) should support new market products and/or changes to market rules that support the provision of essential reliability services, which includes frequency response and increased system flexibility.

    - ***Recognize time needed to maintain reliability:*** State, federal, and provincial regulators should continue to recognize that there are lead times for the planning, approval, and construction of generation, transmission, and natural gas infrastructure needed to maintain reliability as industry strives to meet policy goals and initiatives.

    - ***Consider industry study recommendations when reviewing infrastructure requirements:*** Regulators should consider results and conclusions of industry studies that evaluate the impact of natural gas disruptions to the bulk power system (BPS) when evaluating infrastructure requirements.

- ***Focus on reliability and resilience attributes to limit exposure to risk:*** Regulators should consider the reliability and resilience attributes provided by generation to ensure that the expanding generation resource mix continues evolving in a manner that maintains a reliable and resilient BPS.

- ***Industry:***

  - ***Support technologies that contribute to essential reliability services:*** All new resources should have the capability to support voltage and frequency. Regional transmission organizations, independent system operators, and FERC have taken steps in this direction, and these positive steps must continue.

  - ***Integrate distributed energy resources (DERs) with increased visibility:*** System operators and planners should gather data about the aggregate technical specifications of DERs connected to local distribution grids to ensure accurate system planning models, coordinated system protection, and real-time situation awareness, especially in areas with expected growth in DERs.

  - ***Report on expected reliability concerns:*** In areas impacted by an increasing share of natural-gas-fired generation, transmission planners and operators should identify and report on expected reliability concerns due to a large share of interruptible natural gas transportation and supplies. Where deregulated markets exist, market operators should develop additional rues or incentives to encourage increased fuel security, particularly during winter months.

- ***NERC:***

  - ***Conduct a comprehensive evaluation of Reliability Standards:*** NERC should conduct a comprehensive evaluation of its Reliability Standards to ensure compatibility with nonsynchronous and distributed resources.

  - ***Monitor reserve margin short falls:*** In light of the projected reserve margin shortfalls, identify and assess updated industry plans and proactive measures for maintaining reliability given the reduction in expected capacity resources.

ReliabilityFirst Corporation

ReliabilityFirst Corporation (RFC), headquartered in Fairlawn, Ohio, is one of 8 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)[9], RTOs, suppliers and transmission companies.

[9] 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).

The RFC controls reliability standards and enforcement by entering into delegation agreements with regional entities to ensure adequate generating capacity and transmission. Some performance factors considered in establishing acceptable reliability levels include: load characteristics; load forecast error; scheduled maintenance requirements; and forced outage rates of generating units. The RFC reliability standards require sufficient generating capacity to be installed to ensure the probability of the system load exceeding available capacity is no greater than one day in 10 years. LSEs that are members of RFC have a capacity obligation determined by evaluating individual system load characteristics, unit size and operating characteristics.

Regional Transmission Organizations

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

PJM Interconnection

PJM is a regional transmission organization that ensures the reliability of the largest centrally dispatched control area in North America, covering 243,417 square miles. PJM coordinates the operation of 185,804 megawatts (MW) of generating capacity with more than 84,042 miles of transmission lines.[10] 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 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 facilities. PJM's mission can be described as below:[11]

- Acting 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.

[10] *See* PJM, *Summer 2018 PJM Reliability Assessment*, available at http://www.puc.state.pa.us/Electric/pdf/Reliability/Summer_Reliability_2018-PJM.pdf.
[11] http://www.pjm.com/about-pjm/who-we-are.aspx.

- 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 2017, the PJM market amount billed increased to $41.17 billion as compared to $39 billion in 2016. Membership increased 4.3 percent from 990 members in 2016, to 1,032 members in 2017.[12] PJM's 2017 transmission volumes were 807 terawatt hours (TWhs), as compared to 792.3 TWhs for 2016.

PJM's annual net energy load for growth is expected to average 0.4 percent over the next 10 years and 0.5 percent over the next 15 years.[13] PJM received deactivation notifications throughout 2017, totaling 4,800 MW as compared to 5,605 MW in 2016, 1,626 MW in 2015, 4,291 MW in 2014, 7,745 MW in 2013, and 14,444 MW in 2012. To replace retiring generators, there are over 23,000 MW of new generating resources under construction as of December 31, 2017, with an additional 66,644 MW actively under study.[14]

Coal-fired generators continue to face deactivation often due to: old age of the unit, with many more than 40 years old; the cost of operation; environmental public policy, particularly emissions standards; state mandates for renewable energy; and low natural gas prices. Some generator owners are transitioning their fleets to become cleaner and leaner to meet emission standards and to improve the planet.

PJM Bulk Power System Status – Winter Performance[15]

Temperatures and Peaks

PJM experienced a mild 2017-2018 winter season as compared to the 2014 Polar Vortex season in terms of temperature, wind chill, and peak load. While the 2017-2018 cold snap was one of PJM's top 10 winter peak demand days, PJM always had excess reserves and capacity. However, the cold snap did last longer than the 2014 Polar Vortex, leading to some degrading of generator performance towards the end of the cold snap. December 2017 average temperatures did not reach the extreme low limits of prior seasons. January 2018 average temperatures stayed above 0

[12] *See* PJM, *PJM 2017 Annual Report*, available at http://www.pjm.com/-/media/about-pjm/newsroom/annual-reports/2017-annual-report.ashx?la=en.

[13] *See* PJM, *PJM Load Forecast Report January 2018*, available at http://www.pjm.com/-/media/library/reports-notices/load-forecast/2018-load-forecast-report.ashx?la=en.

[14] *See* PJM, *PJM 2017 Regional Transmission Expansion Plan Report*, Book 2, available at http://www.pjm.com/-/media/library/reports-notices/2017-rtep/2017-rtep-book-2.ashx?la=en/

[15] *See* PJM, *PJM 2018 Cold Weather Event Report*, available at http://www.pjm.com/-/media/library/reports-notices/weather-related/20180226-january-2018-cold-weather-event-report.ashx.

degrees Fahrenheit. The 2014 Polar Vortex had much colder temperatures and wind chills than the 2017-2018 cold snap.

Generator Performance

There were a total of 23,751 MW of forced outages during the winter peak on January 7, 2018, with 5,913 MW, or 25 percent, resulting from natural gas supply outages.[16] By comparison, during the winter peak on January 7, 2014, there was 40,200 MW of forced outages, with approximately 9,300 MW, or 23 percent, resulting from natural gas supply outages. During the winter peak on January 19, 2016, there were 9,992 MW of forced outages, with approximately 3,163 MW, or 25 percent, resulting from natural gas supply outages.

Forced outage rates for January and February 2017 averaged 6.9 percent. Average forced outage rates during this period in 2016, 2015, and 2014 were 4.0 percent, 6.5 percent, and 10.05 percent, respectively. During the winter peak in 2017, the forced outage rate was 12.1 percent, which is higher than the historical norm of about 7 percent, but lower than the 22 percent outage rate of the 2014 Polar Vortex.[17]

Operations

The average error of the day-ahead load forecast was 2.20 percent, meeting PJM's goal of having an error rate under 3 percent. PJM met the January 5, 2018 peak without the need for emergency demand response, shortage pricing, emergency energy purchases or emergency procedures beyond cold weather alerts and System Operations Subcommittee-Transmission (SOS-T) conference calls. PJM maintained its reserve requirements throughout the winter peaks.

Gas/Electric Coordination

Since the 2014 Polar Vortex, PJM has continued to build on gas-electric coordination efforts. PJM's Gas Electric Coordination Team communicated with interstate pipelines and local distribution companies daily during the 2017-2018 cold snap. PJM has data-sharing agreements in place with larger gas local distribution companies (LDCs) to share operation information, which ensured that PJM was aware of any issues, constraints, and impacts with generator owners. PJM implemented a new gas infrastructure analysis during the 2017-2018 cold snap to project transmission and reserve impacts of pipeline contingencies on the PJM system.

Transmission Outage Scheduling

PJM prepared for the winter 2017-18 peak operations by providing cold weather alerts to transmission and generation equipment operators and analyzing winter transmission outage requests to understand impacts to reliability and congestion. PJM held conference calls with the SOS-T to coordinate operating and outage plans. PJM also issued heavy load voltage schedule

[16] When PJM refers to gas supply outages, this relates to a generator outage that was due to lack of natural gas fuel supply, which could be due to a number of varying circumstances. Gas supply outage issues include transportation restrictions and interruptions as well as spot gas commodity availability. Gas supply outage issues primarily affected those generators holding non-firm transportation contracts. However, generators holding firm transportation contracts can also be impacted by ratable take requirements. This can be manifested by generators needing to procure additional supply beyond what is needed to meet their day ahead award or dispatch commitment, which could result in reduced offer flexibility and needing to take a forced outage.

[17] See PJM, *Monthly Equivalent Forced Outage Rates*, available at http://www.pjm.com/markets-and-operations/energy/real-time/historical-bid-data/eford.aspx.

warnings to alert transmission owners of outage schedules to help maximize the power transfer capability of the system.

PJM noted it had few transmission concerns, due to PJM and its members demonstrating strong coordination and reliable operations. PJM addressed congestion by using the lowest-cost energy first, until a transmission constraint required the use of higher-cost generation. PJM noted normal congestion levels on several transmission facilities.

PJM Pennsylvania Regional Transmission Expansion Plan Overview

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 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. A key part of the planning process is to evaluate existing generation deactivation, new generation interconnection, and merchant transmission interconnection requests. Although transmission planning is performed on a regional basis, most upgrades and expansion in Pennsylvania are planned to support the local delivery system and new generating facilities.

LSEs acquire capacity resources by: 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.

As of December 31, 2017, Pennsylvania has 42,257 MW of existing installed generation capacity, as compared to 41,583 MW in 2016, and 42,628 MW in 2015. Natural gas comprises more than 29.9 percent, or 12,663 MW, of this capacity, as compared to 11,991 MW last year. This additional capacity may be used to serve Pennsylvania or out-of-state customers. For the 2021/22 Capacity Market, Pennsylvania cleared 328 MW more Demand Response and Energy Efficient resources than in the prior auction. Current PJM interconnection requests for new generating resources in Pennsylvania total 15,755 MW of requested capacity, with 96.5 percent of that being natural gas requests. [18] Appendices B and C provide more detail on generation plants and capacity for the PJM region and Pennsylvania.

[18] *PJM Pennsylvania State Report 2017*, available at https://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2017/2017-pennsylvania-state-infrastructure-report.ashx?la=en.

Table 1, below, provides a summary of approved PJM Regional Transmission Expansion Plan (RTEP) projects, by status, as of December 31, 2017.[19] The numbers provide a snapshot at one point in time, as with an end-of-year balance sheet. The $35.1 billion total reflects a net $5.8 billion increase over December 31, 2016, as reflected in the year-over-year differentials detailed in Table 2, below.[20] During 2017, the PJM Board approved 198 new baseline projects estimated to cost $3.2 billion and 341 new network transmission projects estimated to cost 2.94 billion. These cost estimates were offset by revised project cost changes and project cancellations for previously approved RTEP elements, including a net $181 million increase for 48 baseline projects and a net $540 million decrease for 336 network project cancellations caused by the withdrawal of 257 generator interconnection requests totaling 13,362 MW.[21]

Table 1 Approved RTEP Projects as of Dec 31, 2017

$ Millions	Active	In Service	Under Construction	Total
Baseline Projects	6,679.22	18,452.57	2,750.80	27,882.59
Network Projects	5,383.65	1,226.55	617.70	7,227.90
Total	12,062.87	19,679.12	3,368.50	35,110.49

Table 2 RTEP Project Cost Differentials – Dec 31, 2016 as compared to Dec 31, 2015

	Baseline Project Differentials ($M)	Network Project Differentials ($M)
Cost of New Projects	3,203.16	2,943.97
Cost of Cancelled Projects	-189.97	-356.04
Cost Changes to Existing Projects (Change)	371.31	-183.69
Net Difference	3,384.5	2,404.24

Transmission Project Highlights [22]

During the 2016/2017 RTEP Long-Term RTEP Proposal Window, PJM evaluated and reviewed market efficiency, congestion, and reliability projects. Based on its evaluation, PJM recommended five market efficiency projects. PJM also reevaluated and approved 13 market

[19] See PJM, *2017 RTEP Key Graphics*, available at https://pjm.com/-/media/library/reports-notices/2017-rtep/2017-rtep-key-graphics-updated.ashx?la=en.

[20] See PJM, *PJM 2017 Regional Transmission Expansion Plan Report*, Book 1, available at http://www.pjm.com/~/media/library/reports-notices/2017-rtep/2017-rtep-book-1.ashx.

[21] See PJM, *PJM 2017 Regional Transmission Expansion Plan Report*, Book 1, available at http://www.pjm.com/~/media/library/reports-notices/2017-rtep/2017-rtep-book-1.ashx.

[22] *Id*.

efficiency projects from the 2014/2015 long-term window. There were five projects identified in 2017 to address energy market and capacity market congestion with an estimated total cost of $7.06 million. The projects are expected to save customers a total of $26.2 million in annual energy and capacity payments by 2021. The 5 projects are described below:

- ***Reconductor Upgrade Dequine-Meadow Lake:*** PJM recommends the acceleration of the previously approved upgrade to the reconductor on the Dequine-Meadow Lake 345 kV line. PJM notes that since the project is an upgrade to existing equipment, AEP, the incumbent transmission owner, is designed to implement the upgrades. PJM estimates this project to cost less than $1 million and will be in service by 2019.

- ***Reconductor Upgrade Eugene-Dequine Lake:*** PJM recommends the acceleration of the previously approved upgrade to the reconductor on the Eugene-Dequine 345 kV line. PJM notes that since the project is an upgrade to existing equipment, AEP, the incumbent transmission owner, is designed to implement the upgrades. PJM estimates this project to cost less than $1 million and will be in service by 2019.

- ***Capacity Upgrade East Frankfort-University Park:*** PJM recommends the energy capacity be upgraded on the East Frankfort-University Park 345 kV line. PJM notes that since the project is an upgrade to existing equipment, ComEd, the incumbent transmission owner, is designed to implement the upgrades. PJM estimates this project to cost approximately $0.84 million and will be in service by 2021.

- ***Substation Equipment Upgrade Pontiac Midpoint:*** PJM recommends the substation equipment be upgraded to increase energy capacity on the Pontiac-Brokaw 345 kV line at the Pontiac Midpoint station. PJM notes that since the project is an upgrade to existing equipment, ComEd, the incumbent transmission owner, is designed to implement the upgrades. PJM estimates this project to cost approximately $5.62 million and will be in service by 2021.

- ***Terminal Equipment Upgrade Tanners Creek:*** PJM recommends the terminal equipment be upgraded on the Tanners Creek-Dearborn 345 kV line at the Tanners Creek station. PJM designated ComEd, the incumbent transmission owner, to implement the upgrades. PJM estimates this project to cost approximately $0.60 million and will be in service by 2021.

Status of PJM Backbone Transmission Lines

The specific status of approved active projects for backbone transmission lines – transmission lines that are 345kV or higher – is summarized below. PJM has indicated that based on flat load growth, energy efficiency, generation shifts and aging infrastructure, among other drivers, transmission need projects continue to shift transmission need away from large-scale, cross-system backbone projects at 345 kV, 500 kV and 765 kV voltage levels. PJM Board-approved projects in 2017 address market

efficiency congestion and solve localized reliability criteria violations. [23] It can be surmised that backbone transmission line projects will decline in terms of investment and more projects will be focused on projects below 345 kV.

- ***Lackawanna 500 kV Line (PPL):*** The expansion and reconfiguration of the Lackawanna 500 kV substation was approved by the PJM Board in February 2017, with a projected in-service date of December 1, 2018. Construction will add a third bay with three breakers to the substation and is estimated to cost $11.3 million.[24]

- ***Juniata-Alburtis 500 kV Line (PPL):*** The PJM board approved the process to tap the Juniata-Alburtis 500 kV Line to create a new DAUP 500 kV station in December 2017. Expected to cost $200 million, the project will also build a 500kV Line from Sunberry 500kV line to the new DAUP 500 kV station. It is predicted to be in-service by September 30, 2019.[25]

- ***Carson-Rodgers 500 kV Line and Chesterfield-Messer Road 230 kV Line (Virginia):*** PJM conducted a window in 2016 to address 2 generator deliverability analysis reliability criteria violations identified in 2015. These are associated with the Chesterfield-Messer Road 230 kV line and the Carson-Rodgers Road 500 kV line. PJM RTEP Proposal Window No. 1 in 2016 yielded 25 proposals from seven entities to solve the identified reliability criteria violations. Once the Window closed, PJM staff conducted analytical, constructability and company evaluations to identify a solution that most effectively solved all reliability criteria violations and did not introduce new ones. Those evaluations revealed that rebuilding the Carson-Rodgers Road 500 kV Line and the Chesterfield-Messer Road 230 kV Line was the most effective solution at a combined estimated cost of $84.7 million. The PJM Board approved the solution in August 2016. The Carson-Rodgers 500 kV Line is projected to be completed by December 12, 2018 and the Chesterfield-Messer Road 230 kV Line is projected to be completed by June 1, 2020.

- ***Surry-Skiffes Creek 500 kV Line (Virginia):*** The PJM Board approved plans to build a new 7.7-mile Surry to Skiffes Creek 500 kV line and a 20.25-mile Skiffes Creek to Whealton 230 kV line in April 2012. June 1, 2015 was identified as the required in-service date for the 500-kV portion of the project and June 1, 2016, was identified as the required in-service date for the 230-kV portion of the project. The VSCC approved Dominion's request to build the project on Nov. 26, 2013. Construction activities were delayed due to transmission permitting issues. This line was in service by December 31, 2017.

- ***Loudoun-Brambleton Area (Maryland):*** PJM's RTEP includes two 500 kV projects in this area. First, a project that encompasses a rebuild of the Mosby-Brambleton-Pleasant View-Goose Creek portion of the Loudoun-Doubs 500 kV line was approved by the PJM Board in October 2011. The rebuild was completed by Dominion in May 2016. PJM's RTEP also

[23] *See* PJM, *PJM 2016 RTEP*, Book 1, available at http://www.pjm.com/library/reports-notices/rtep-documents/2016-rtep.aspx.

[24] See *PJM Pennsylvania State Report 2017*, provided to PUC Staff in May 2018, available at http://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2017/2017-pennsylvania-state-infrastructure-report.ashx?la=en.

[25] *Id.*

includes a new, second 500 kV line from Loudoun to Brambleton, as approved by the PJM Board in December 2013. This new line is expected to be in service by September 1, 2018.

- ***Northern New Jersey 345 kV Upgrades (New Jersey):*** The Bergen to Linden Corridor project was approved by the PJM Board in December 2013, with a required in-service date of June 2015. The project is comprised of a series of transmission facility line upgrades from 138 kV to 345 kV in northern New Jersey. Phase 1 of the project will focus on work to be performed within the Hudson-Bergen/Marion-Bergen 230 kV and 138 kV overhead transmission corridor, and at the Bergen, North Bergen, Homestead, Penhorn and Marion stations. Construction of Phase 1 began during the third quarter of 2015, with an in-service date of April 2016. Phase 2 will focus upon work to be performed within the PSE&G Linden-Bayway 138 kV overhead transmission corridor, and the Linden and Bayway stations. Phase 3 will focus on work to be performed on facilities interconnected by underground cable, looping together the Marion stations. The underground system will serve to loop together the facilities upgraded in Phase 1 and Phase 2 of the project. The remainder of facilities under construction were completed by May 6, 2017.

- ***Byron-Wayne 345 kV Line (Illinois):*** The Byron-Wayne 345 kV line (Grand Prairie Gateway) was approved by the PJM Board in October 2012, with a requested June 1, 2017 in-service date. Construction began in the second quarter of 2015 and was completed on April 7, 2017.

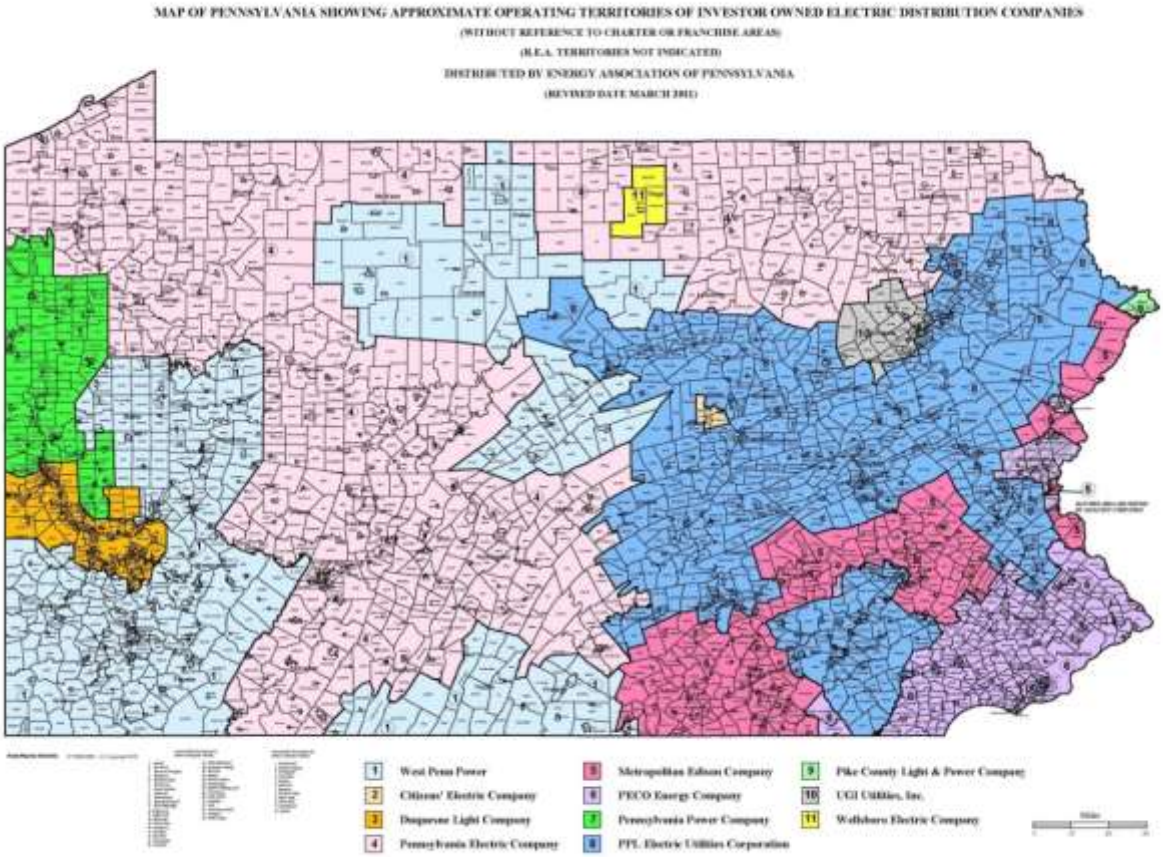
Section 2 – Pennsylvania Electric Outlook

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 11 jurisdictional EDCs 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 1 Map of EDC Service Territories



Each LSE is responsible to make provisions for adequate generating resources to serve its customers. The local EDC or a Commission approved alternative default service provider (DSP)[26] must acquire electricity, pursuant to a Commission approved competitive procurement process, for customers who:

1. Contract with a DSP. Contracting with a DSP allows customers to choose an electric provider in the competitive retail market. The Commission provides a website that provides a one source comparison of DSP electric offers and allows electric customer to directly link into a DSP website to switch electric services. [27]

   or,

2. Stay with the local EDC. 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.[28]

[26] 66 Pa. C.S. § 2803
[27] http://www.papowerswitch.com.
[28] *See id.* § 2807(e)(3).

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).[29] 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 increases to a total of 18 percent by 2021. In 2008, the Commission adopted regulations pertaining to the AEPS obligations of EDCs and EGSs.[30] AEPS resources must be located in PJM.

Alternative energy resources are categorized as Tier I and Tier II resources. 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 lignins in spent pulping liquors)[31] 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 percent of the electricity sold in each EDC service territory will be derived from Tier I resources, including solar. Energy derived from Tier II resources is to increase to 10 percent. Act 213 sets forth a 15-year schedule for complying with its mandates, as shown in Table 3, below. Since Jan. 1, 2011, all EDCs and EGSs have been required to comply.

Table 3 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 that is sold to customers. An AEC represents one megawatt hour (MWh) of qualified alternative electric generation or conservation, whether self-generated,

[29] Alternative Energy Portfolio Standards Act, effective Feb. 28, 2005; 73 P.S. §§ 1648.1—1648.8.
[30] *See* Docket No. L-00060180; 52 Pa. Code §§ 75.61-75.70.
[31] *See* 66 Pa.C.S. § 2814(b).

purchased along with the electric commodity, or purchased separately through a tradable instrument.[32]

AECs are earned when a qualified facility generates 1,000 kilowatt-hours (kWh) of electricity through either estimated or actual metered production. An AEC is a tradable certificate that represents all the renewable energy benefits 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. 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 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.[33] The regulations also provide for required metering capabilities and a compensation mechanism that reimburses customer-generators for surplus energy supplied to the electric grid.[34] 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.[35]

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.[36]

On October 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.[37] On April 19, 2018, the Commission adopted a Final Implementation Order to provide the Commission's interpretation and implementation of Section 11.1 of Act 40 of 2017.[38] Effective October 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.

[32] *See* 52 Pa. Code §§ 75.61—75.70.
[33] 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.
[34] *See* Docket No. L-00050174; 52 Pa. Code §§ 75.11-75.15.
[35] *Id.*
[36] *See* Docket No. L-00050175; 52 Pa. Code §§ 75.21-75.40.
[37] *See* Docket No. L-2014-2404361; 52 Pa. Code §§ 75.1-75.72.
[38] *See* Docket No. M-2017-2631527

As of May 31, 2018, Pennsylvania had certified 24,526[39] alternate energy facilities, of which 18,082 are located within the state. The statewide cost for AEPS compliance for the 2017 reporting year (June 1, 2016 – May 31, 2017) was $122,717,631.[40]

For additional information on Alternative Energy in Pennsylvania, please visit the Commission's website (http://www.puc.pa.gov/consumer_info/electricity/alternative_energy.aspx).

Energy Efficiency and Conservation (Act 129)

Act 129 of 2008[41] required the seven Pennsylvania EDCs[42] with at least 100,000 customers[43] to establish an energy efficiency and conservation (EE&C) plan. The Act is being implemented in phases; Phases I and II are now complete. Phase III of Act 129, the current five-year phase, began on June 1, 2016 and will end on May 31, 2021.

The Commission directed the Act 129 State Wide Evaluator (SWE) to perform a Demand Response (DR) Potential Study using residential direct load control and commercial and industrial load curtailment models provided by the Commission.[44] This study was to provide the Commission with the information necessary to determine whether Act 129 Phase III peak demand reduction programs would be cost-effective. The SWE submitted its final version of the DR Potential Study to the Commission on February 25, 2015.[45]

The SWE also performed an Energy Efficiency (EE) Potential Study to determine the cost-effective consumption reduction potential in Pennsylvania.[46] The SWE submitted its final EE Potential Study to the Commission on February 25, 2015.[47] Following a review of the SWE's EE and DR Potential Studies, the Commission found that additional consumption and peak demand reduction targets were cost-effective.[48] On June 11, 2015, the Commission adopted a Final Implementation Order prescribing targets for a Phase III of the Act 129 EE&C Program.[49]

[39] See http://pennaeps.com/app7/publiccontroller
[40] See http://www.puc.pa.gov/Electric/pdf/AEPS/AEPS_Ann_Rpt_2017.pdf
[41] Act 129 of 2008, effective November 14, 2008; 66 Pa. C.S. §§2806.1-2806.2.
[42] 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.
[43] *See* 66 Pa. C.S. § 2806.1.
[44] *See* Energy Efficiency and Conservation Program Final Order, Docket No. M-2012-2289411, entered February 20, 2014.
[45] *See* Demand Response Potential for Pennsylvania – Final Report, submitted by GDS Associates, Inc., et al., February 25, 2015 (hereinafter DR Potential Study).
[46] *See* Proposal to Pennsylvania Public Utility Commission – Statewide Evaluator RFP, submitted by GDS Associates, Inc., et. al., January 11, 2013.
[47] *See* Energy Efficiency Potential for Pennsylvania – Final Report, submitted by GDS Associates, Inc., et. al., February 2015 (hereinafter EE Potential Study).
[48] *See* Energy Efficiency and Conservation Program Implementation Order, Docket No. M-2014-2424864, entered June 19, 2015, at 10-12.
[49] *Id.* at 14-15.

Phase III began on June 1, 2016 and will end on May 31, 2021. The EDCs' consumption[50] and peak demand reduction[51] requirements are provided in Table 4, below. While the EDCs must implement energy efficiency programs all 5 years of Phase III, the Commission required demand response programs only during the last 4 years of the Phase, recognizing the time necessary to develop and implement such programs.[52]

Additionally, using the design and budgetary allocation information provided by the Commission, the SWE 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 4 - 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

The Commission requires that all EDCs file semiannual, preliminary annual and final annual reports, which provide the reported savings for that program year. The EDCs just recently filed their preliminary annual reports for the second year of Phase III (Program Year 9).[53]

The SWE monitors and verifies data collection, quality assurance and the results of each EDCs EE&C Plan. Table 5, below, summarizes unverified and SWE verified electric consumption and peak demand savings data since Phase III began on June 1, 2016.

[50] *Id.* at 57.
[51] *Id.* at 35.
[52] *Id.* at 35.
[53] *See* EDCs Preliminary Annual Reports for Program Year 9 available at: http://www.puc.pa.gov/filing_resources/issues_laws_regulations/act_129_information/electric_distribution_company_act_129_reporting_requirements.aspx.

Table 5 - Phase III Electric Consumption and Peak Demand Savings since June 1, 2016

EDC	Phase III – PY8 SWE Verified Electric Consumption Savings (MWh)	Phase III to date Unverified Electric Consumption Savings (MWh)	Phase III – PY 9 SWE Verified Peak Demand Savings (MW)
Duquesne	170,060	260,218	59.1
Met-Ed	170,357	332,430	45.9
PECO	210,689	609,445	149.4
Penelec	182,144	335,825	0 *
Penn Power	50,996	104,239	33.5
PPL	331,344	731,683	126.7
West Penn	151,870	333,465	81.9

* The Commission did not prescribe a peak demand reduction requirement for Penelec.
PY8: June 1, 2016 – May 31, 2017
PY9: June 1, 2017 – May 31, 2018

It appears that all EDCs are well on their way to meet their 5-year electric consumption and peak demand reduction requirements. Final annual reports for Program Year 9 are due to the Commission by November 15, 2018.

In its planning for a potential Phase IV, the Commission directed the SWE to perform electric baseline studies to establish baseline energy characteristics for residential, commercial and industrial sectors. These baseline studies are currently underway and will be completed shortly.

By the end of 2018, the SWE will perform an energy efficiency potential study to inform the Commission of the energy savings potential remaining in the EDCs service territories. This data will be used to assist the Commission to determine energy efficiency and conservation consumption reduction targets for a potential Phase IV. In addition, the Commission will task the SWE to perform a demand response potential study to determine if cost-effective peak demand reduction potential remains in the EDCs service territories for the next phase of Act 129.

Phase IV, if implemented by the Commission, would begin June1, 2021 and end on May 31, 2026.

Statewide Review of Electrical Energy Usage

As shown on Table 6 and Table 7 below, the Pennsylvania's aggregate electrical energy usage (residential, commercial, industrial, other, sales for resale, system losses, and company use) in 2017, was 151,483 gigawatt hours (GWh) as compared to 154,032 GWh in 2016, which is a year-over-year decrease of 1.65 percent in electric usage.

The total number of electrical customers is 2017 was 5,782,124 as compared to 5,751,791 in 2016, which is a year-over-year increase of 30,333 customers, or 0.53 percent. In 2016, the year-over-year customer increase was 26,143, or 0.46 percent.

Table 6 PA EDC customers served, energy usage, and peak load (2017)

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	594,785	3,876,119	6,111,717	2,632,037	53,063	0	12,672,936	0	0	12,672,936	2,682
Met-Ed	568,797	5,350,518	2,885,830	5,511,678	28,567	520,101	15,417,207	1,120,513	0	14,296,695	2,897
Penelec	587,361	4,152,733	3,529,397	5,791,727	37,280	2,542,574	17,414,594	1,360,883	0	16,053,711	2,910
Penn Power	165,705	1,590,587	1,302,207	1,737,658	3,471	240,764	5,073,364	198,678	0	4,874,686	926
PPL	1,432,366	13,649,551	14,037,007	8,097,915	211,470	0	38,651,816	2,596,017	59,855	35,995,944	7,468
PECO	1,626,898	13,023,608	7,968,328	15,424,996	811,758	4,967	39,301,774	2,032,029	36,088	37,233,657	8,141
West Penn	725,891	6,816,601	4,364,001	8,371,394	33,832	712,697	21,553,529	1,255,004	0	20,298,525	3,879
UGI	62,197	525,732	313,812	112,762	4,239	110	1,030,522	72,466	1,402	956,654	215
Citizens'	7,035	81,630	29,979	54,097	576	0	176,265	9,820	163	166,282	47
Pike County	4,768	30,965	46,899	0	379	0	78,359	0	116	78,243	16
Wellsboro	6,321	42,426	32,221	30,050	232	107	112,982	7,726	220	105,036	23
Total	**5,782,124**	**49,140,470**	**40,621,398**	**47,764,314**	**1,184,867**	**4,021,320**	**151,483,348**	**8,653,136**	**97,844**	**142,732,369**	**29,204**
% of Total		32.44%	26.82%	31.53%	0.78%	2.65%	100.00%				
2017 VS 2016	0.53%	-3.85%	-3.40%	2.95%	-7.86%	-3.86%	-1.65%	-11.12%	-29.71%	-1.57%	-0.68%

Table 7 PA EDC customers served, energy usage, and peak load (2016)

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	591,620	4,197,290	6,334,654	2,565,611	55,986	19,053	13,172,594			13,172,594	2,797
Met-Ed	564,764	5,527,901	3,042,610	5,304,243	29,215	537,014	15,620,216	1,179,233	0	14,440,983	2,947
Penelec	587,624	4,328,262	3,586,987	5,668,449	37,738	2,623,343	17,459,488	1,214,710	0	16,244,778	2,909
Penn Power	164,787	1,685,833	1,355,032	1,569,262	4,954	245,466	5,079,853	219,306	0	4,860,547	931
PPL	1,425,508	13,810,148	14,159,912	8,128,143	212,987	0	38,990,890	2,618,791	60,910	36,311,189	7,216
PECO	1,613,041	13,664,168	8,098,558	15,262,974	893,202	21,718	40,268,284	2,288,175	39,489	37,940,620	8,364
West Penn	724,422	7,185,771	5,050,570	7,684,390	45,225	735,741	21,992,198	1,290,500	0	20,701,698	3,954
UGI	62,045	551,190	314,300	106,003	5,504	121	1,056,816	77,925	1,773	977,118	200
Citizens'	6,981	83,010	29,877	58,390	587	0	180,384	8,346	174	171,864	43
Pike County	4,699	31,228	46,841	0	391	0	78,857	0	100	78,757	19
Wellsboro	6,300	42,662	32,525	46,534	213	115	132,033	9,764	220	112,049	23
Total	**5,751,791**	**51,107,463**	**42,051,866**	**46,393,999**	**1,286,002**	**4,182,571**	**154,031,613**	**9,735,321**	**139,194**	**145,012,197**	**29,403**

As shown on Table 8, below, the total average annual aggregate 5-year energy usage growth projection for the residential, commercial, and industrial classes is projected to decrease 0.41 percent per year. This includes an average residential growth rate decrease of 0.81 percent, a commercial growth rate decrease of 0.30 percent, and an industrial growth rate decrease of 0.10 percent for the entire 5-year period.

Table 8 Average Aggregate 5-year Electrical Energy Projection

Energy Usage Projection (GWh)				
Year	Residential	Commercial	Industrial	Total
2018	49,495	40,834	48,389	138,718
2019	49,135	40,802	48,410	138,347
2020	48,736	40,643	48,254	137,633
2021	48,263	40,454	48,210	136,927
2022	47,920	40,346	48,204	136,470
average annual growth (%)	-0.81	-0.30	-0.10	-0.41

Figure 2, below, shows in Gigawatt-hours the Pennsylvania historic usage for residential, commercial, and industrial retail from 1972 through 2017, and forecasted Gigawatt-hours usage from 2018 through 2022.

Figure 2 Pennsylvania retail energy usage and 5-year forecast (GWh)

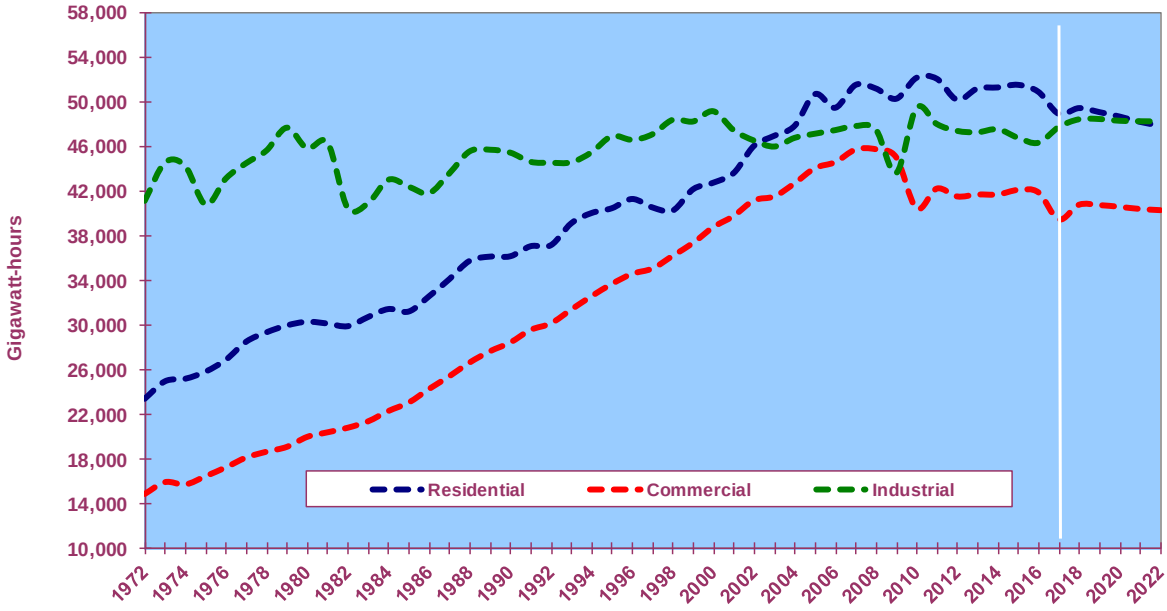


Figure 3, below, shows average residential cost and average usage from 1940 to 2017. Between 1970 and 2010, average residential yearly usage in Pennsylvania increased 1.4 percent each year, while average yearly cost increased 4.1 percent each year during this period. During the last 10 years, average residential yearly usage increased 0.12 percent each year, while average yearly cost increased 3.2 percent a year. In 2017 the average Pennsylvania resident paid 11.5 cents per kWh and used 10.87 MWh of electric.

Figure 3 Average residential cost (cents/kWh) and usage (MWh/year)

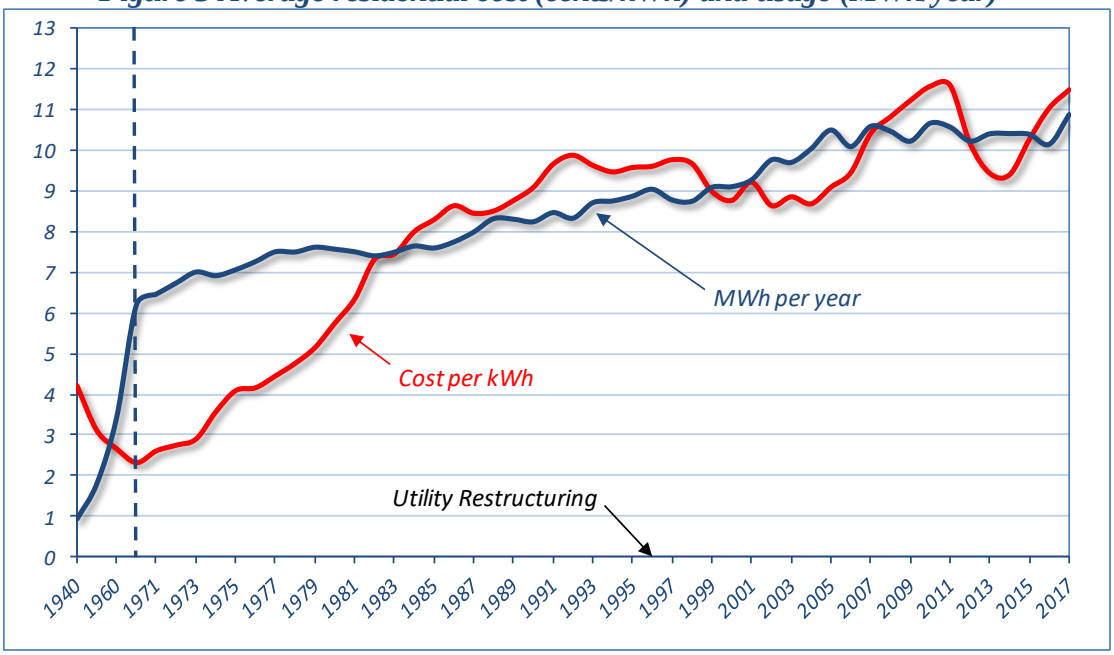
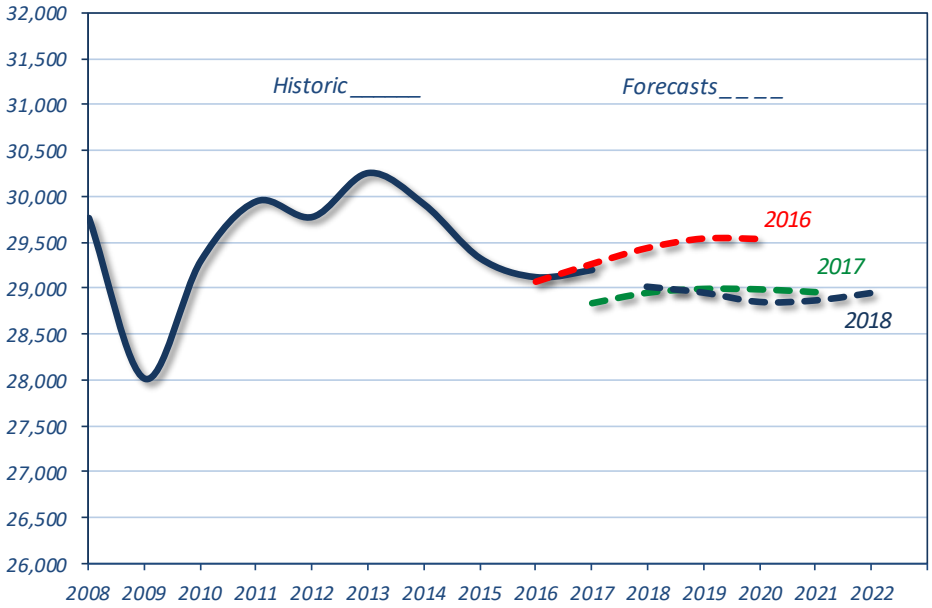


Figure 4, below, shows Pennsylvania's aggregate non-coincidental peak load demand from 2008 to 2017 and the associated 5-year projections estimated during the last 3 years.

Figure 4 Pennsylvania aggregate non-coincidental peak load (MW)

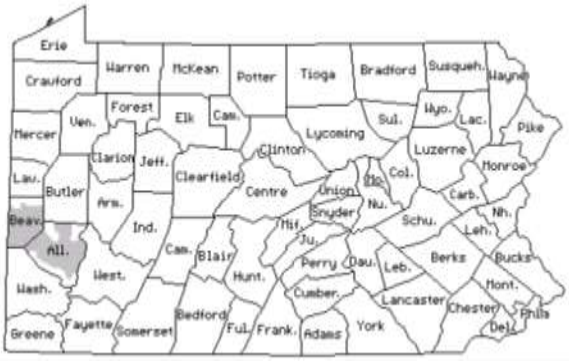


Summary of Data for the Seven Largest EDCs

Individual EDC forecasts are more specific to customers and geographical areas. Each EDC bases its forecasts on financial forecasts of its choosing. The EDC's forecasts are more specific for each territory than the PJM forecast, which is a broader forecast that includes 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 591,500 customers in the City of Pittsburgh and portions of Allegheny and Beaver counties in Southwestern Pennsylvania. Duquesne's 2017 energy usage total was 12,673 GWh as compared to 13,173 GWh in 2016. Year-over-year (YOY) energy usage decreased 3.8 percent. Duquesne's total usage mix consisted of residential (30.6 percent), commercial (48.2 percent), industrial (20.8 percent), and other (less than 1 percent).

Over the next 5 years, total energy usage is projected to decrease at an average annual rate of 0.7 percent. This includes a residential usage average annual decrease of 0.7 percent, commercial usage decrease of 0.9 percent, and industrial usage decrease by 0.2 percent. See Figure 5.

Duquesne's highest peak load of 2,682 MW occurred on July 19, 2017. This represents a YOY decrease of 4.4 percent from the previous year's peak of 2,804 MW. Summer peak load is projected to increase from 2,682 MW in summer 2017 to 2,869 MW by summer 2022, or by an average annual growth rate increase of 1.4 percent. See Figure 6.

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 years 2008 through 2018.

Figure 5 Duquesne energy usage (GWh)

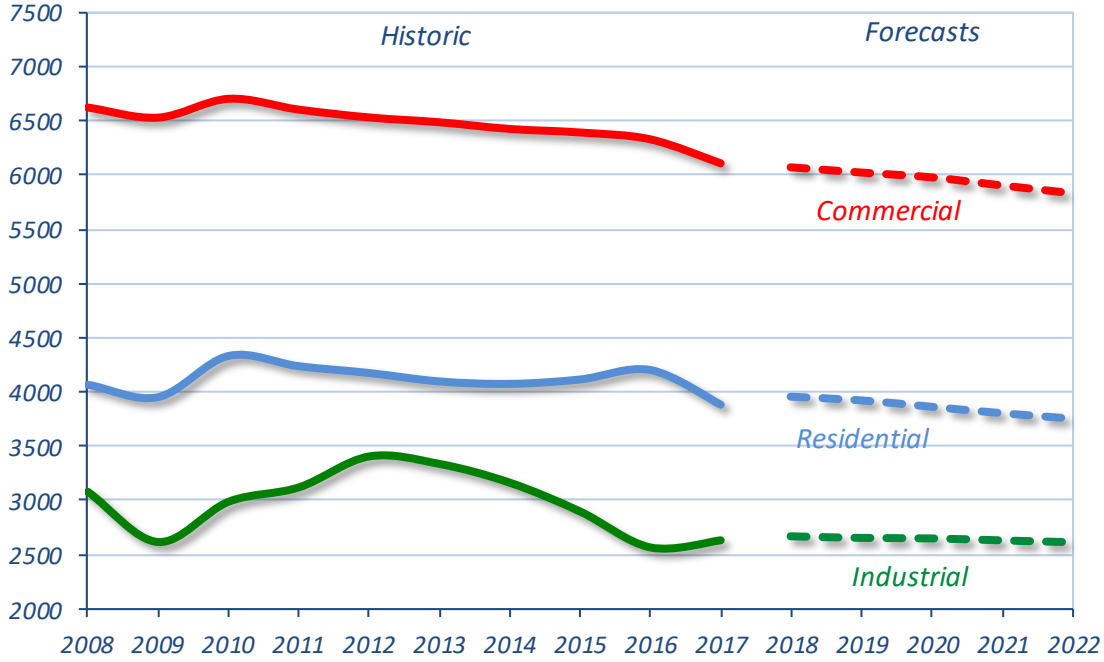
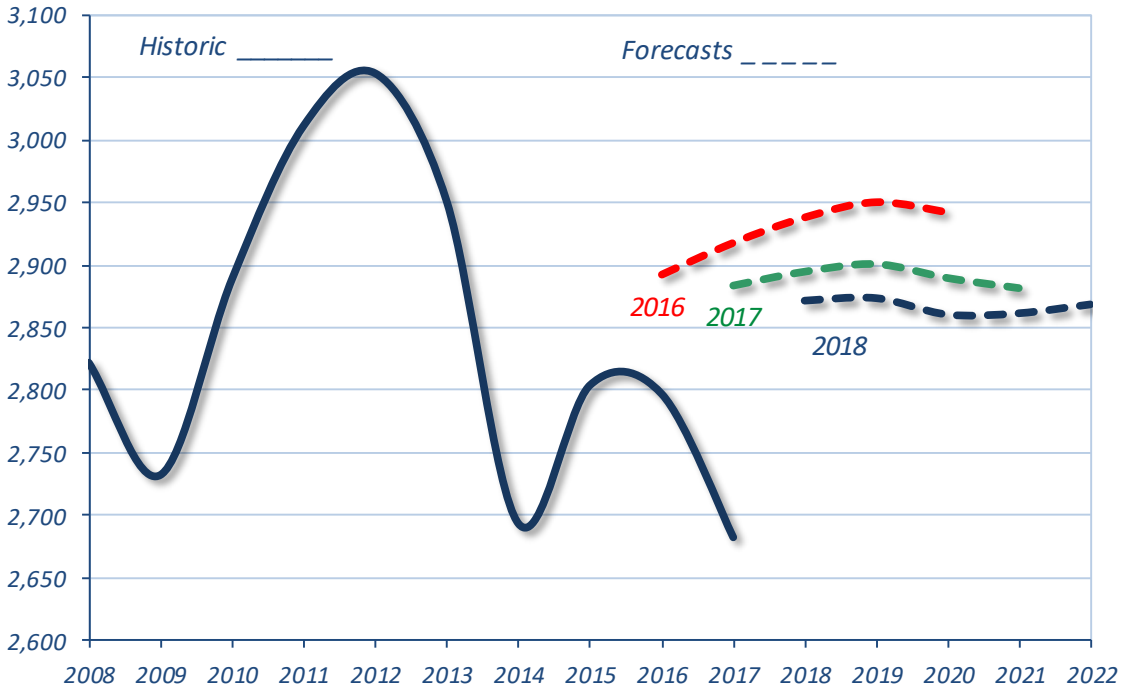


Figure 6 Duquesne peak load (MW)



Metropolitan Edison Company (Met-Ed)

Met-Ed provides electric service to about 564,800 customers in all or portions of 14 counties in Eastern and Southcentral Pennsylvania. Met-Ed's 2017 energy usage total was 15,417 GWh as compared to 15,620 GWh in 2016. YOY energy usage decreased 1.3 percent. Met-Ed's total usage mix consisted of residential (37.4 percent), commercial (20.4 percent), industrial (38.6 percent), and sales for resale (3.6 percent).

Over the next 5 years, total energy usage is projected to decrease at an average annual rate of 0.4 percent. This includes a residential usage average annual decrease of 0.7 percent, commercial usage increase of 0.2 percent, and industrial usage decrease by 0.3 percent. See Figure 7.

Met-Ed's highest peak load of 2,897 MW occurred on July 20, 2017. This represents a YOY decrease of 1.7 percent from the previous year's peak of 2,947 MW. Summer peak load is projected to decrease from 2,897 MW in summer 2017, to 2,875 MW by summer 2022, or by an average annual growth rate decrease of 0.2 percent. See Figure 8.

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 years 2008 through 2018.

Figure 7 Met-Ed energy usage (GWh)

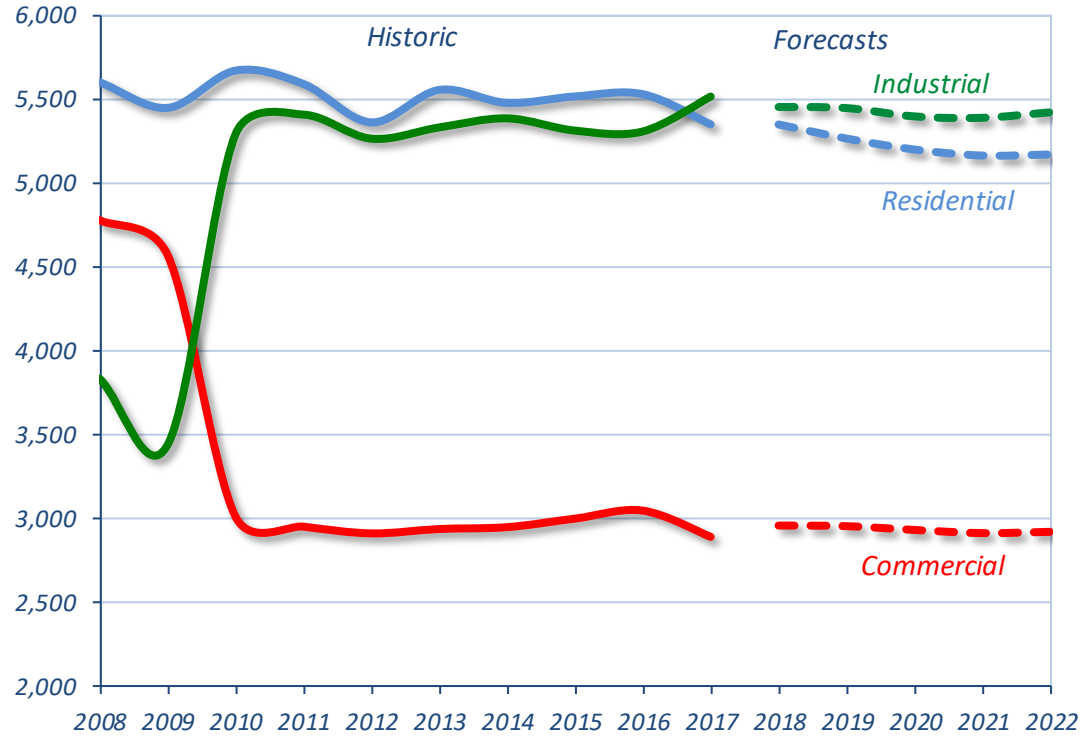
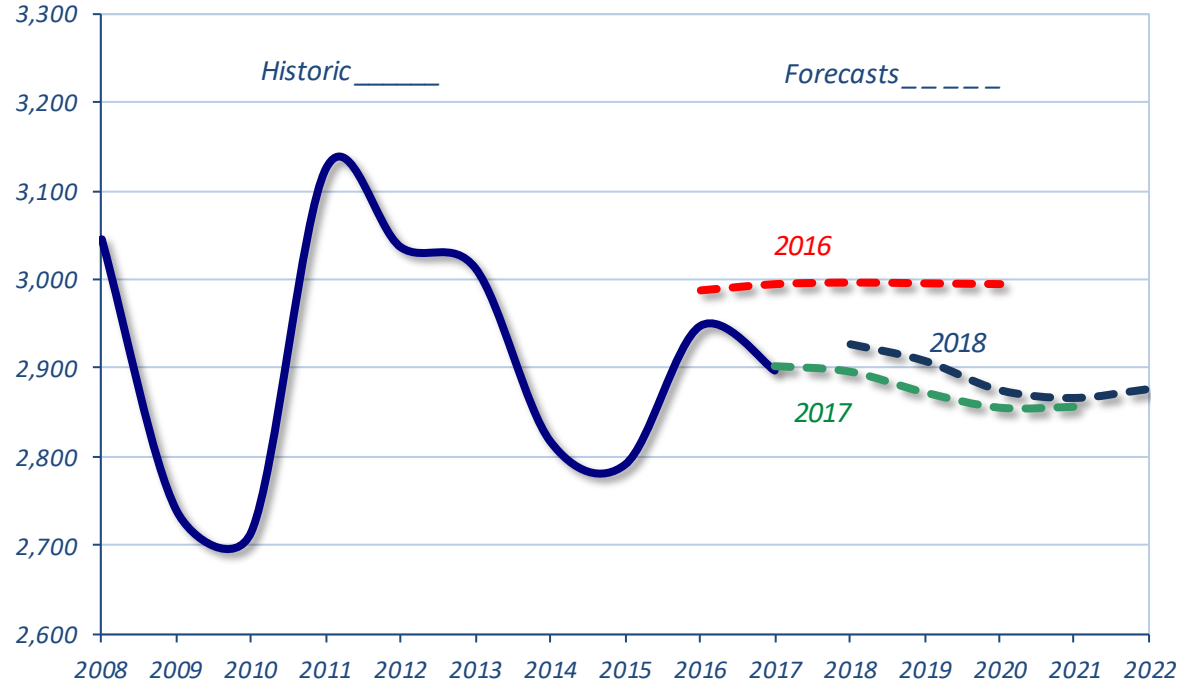
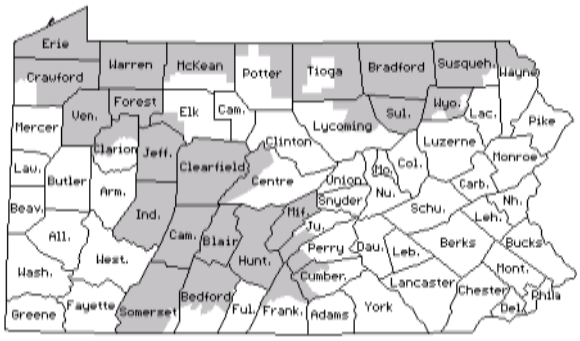


Figure 8 Met-Ed peak load (MW)



Pennsylvania Electric Company (Penelec)

Penelec provides electric service to about 587,600 customers in all or portions of 29 counties in Western and Northern Pennsylvania. Penelec's 2017 energy usage total was 17,415 GWh as compared to 17,459 GWh in 2016. YOY energy usage decreased 0.3 percent. Penelec's total usage mix consisted of residential (25.9 percent), commercial (22.0 percent), industrial (36.1 percent), and sales for resale (15.84 percent).



Over the next 5 years, total energy usage is projected to decrease at an average annual rate of 0.2 percent. This includes a residential usage average annual decrease of 0.5 percent, commercial usage decrease of 0.3 percent, and industrial usage decrease by 0.01 percent. See Figure 9.

Penelec's highest peak load of 2,910 MW occurred on January 5, 2018. This represents a YOY increase of 0.04 percent from the previous year's peak of 2,909 MW. Winter peak load is projected to decrease from 2,910 MW in summer 2017 to 2,779 MW by summer 2022, or by an average annual growth rate decrease of 0.92 percent. See Figure 10.

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 years 2008 through 2018.

Figure 9 Penelec energy usage (GWh)

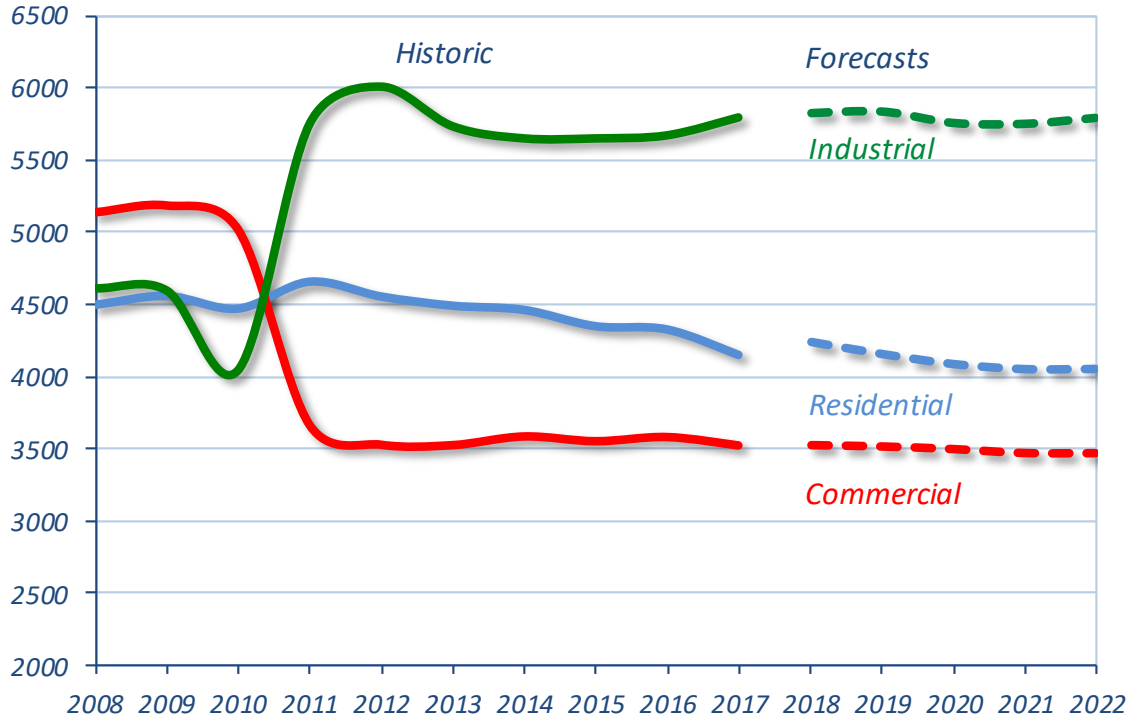
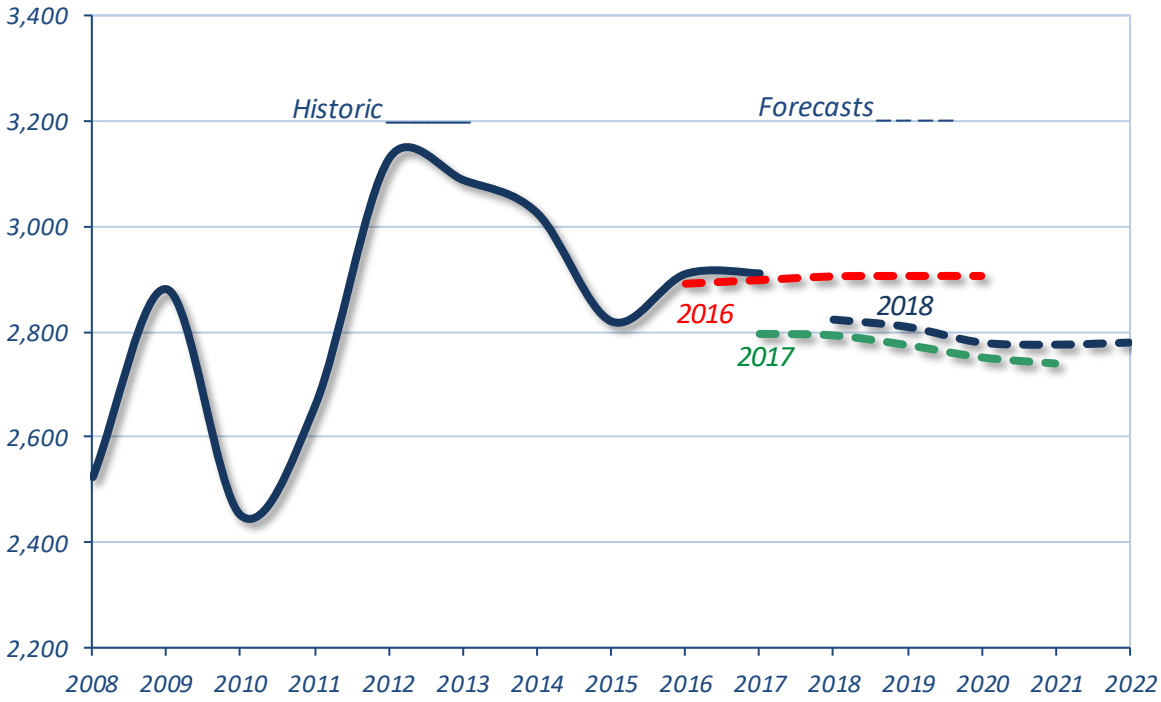
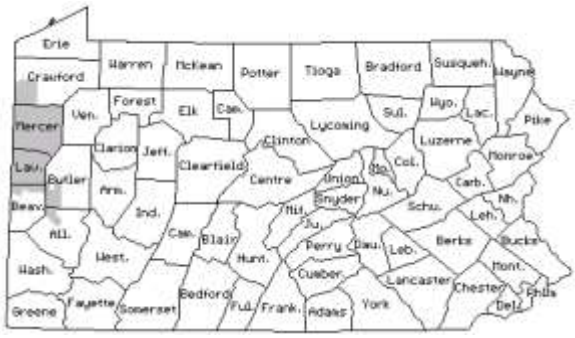


Figure 10 Penelec peak load (MW)



Pennsylvania Power Company (Penn Power)



Penn Power provides electric service to about 164,500 customers in all or portions of six counties in Western Pennsylvania. Penn Power's 2017 energy usage total was 5,073 GWh as compared to 5,080 GWh in 2016. YOY energy usage decreased 0.13 percent. Penn Power's total usage mix consisted of residential (32.6 percent), commercial (26.7 percent), industrial (35.7 percent), and sales for resale (5.0 percent).

Over the next 5 years, total energy usage is projected to increase at an average annual rate of 0.2 percent. This includes a residential usage average annual decrease of 0.1 percent, commercial usage decrease of 0.1 percent, and industrial usage increase by 0.6 percent. See Figure 11.

Penn Power's highest peak load of 926 MW occurred on July 20, 2017. This represents a YOY decrease of 0.5 percent from the previous year's peak of 931 MW. Summer peak load is projected to increase from 926 MW in summer 2017 to 985 MW by summer 2022, or by an average annual growth rate increase of 1.2 percent. See Figure 12.

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 2008 through 2018.

Figure 11 Penn Power energy usage (GWh)

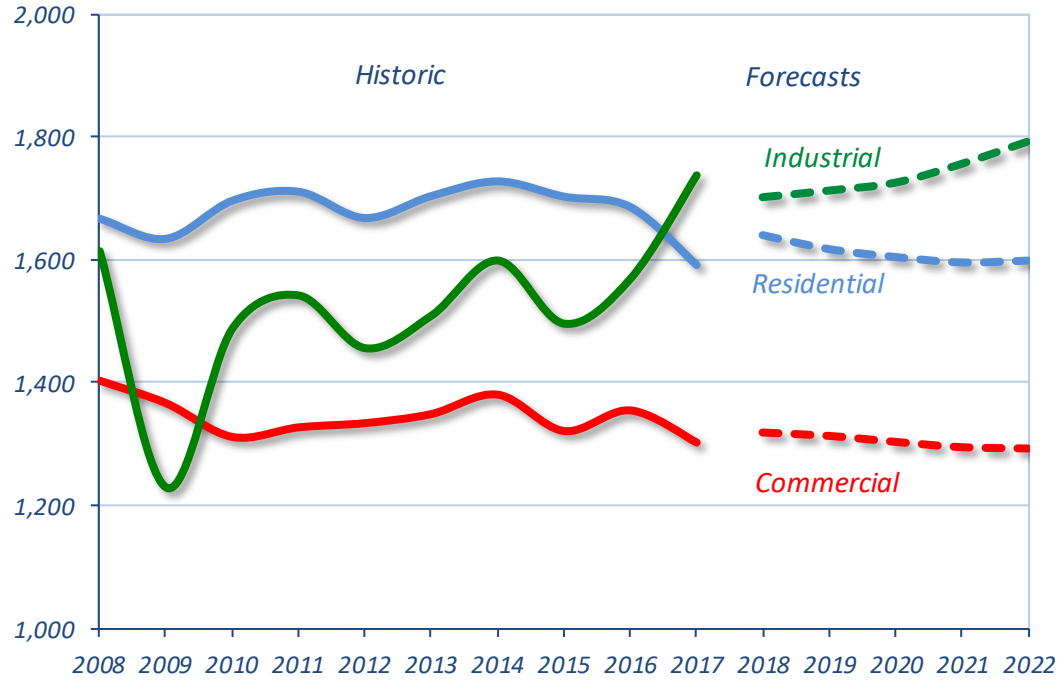
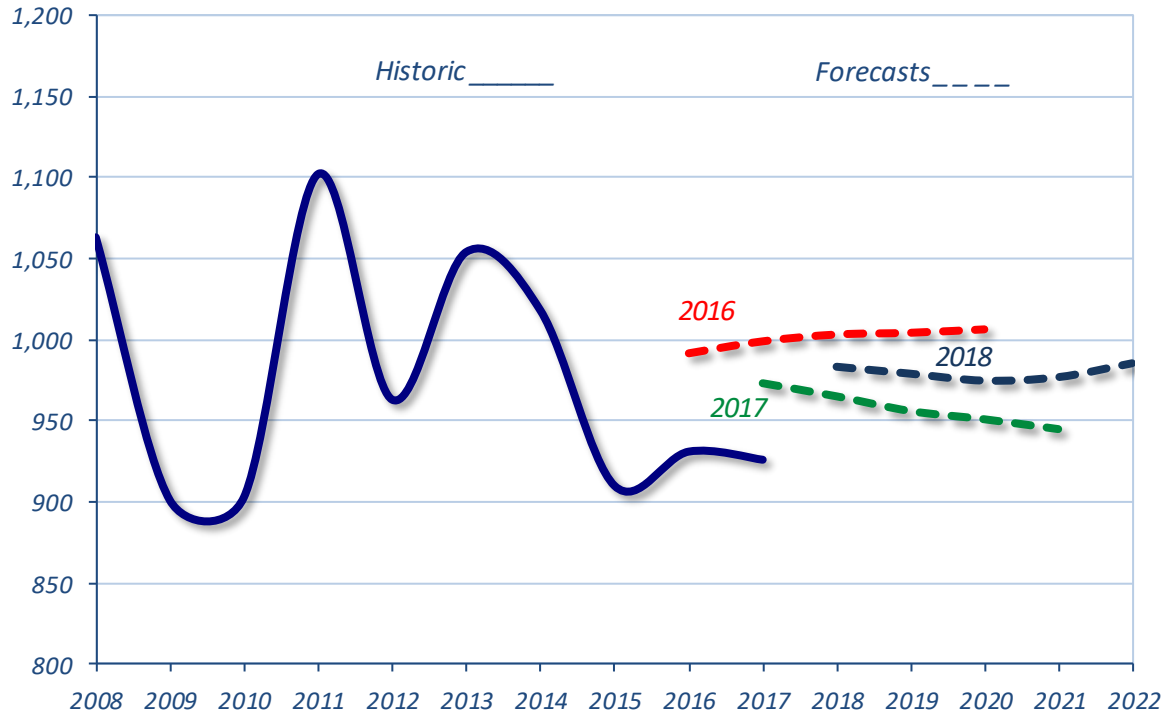
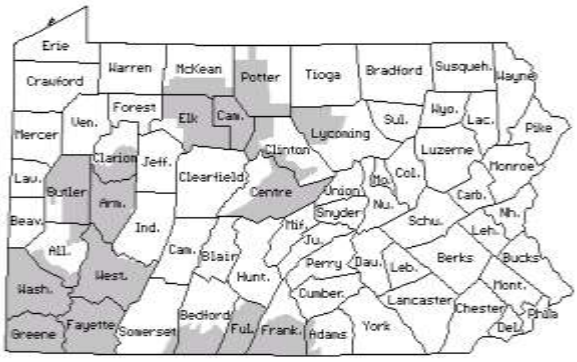


Figure 12 Penn Power peak load (MW)



West Penn Power Company (West Penn)



West Penn provides electric service to 724,500 customers in all or portions of 24 counties in Western, North and South-Central Pennsylvania. West Penn's 2017 energy usage total was 21,554 GWh as compared to 21,992 GWh in 2016. YOY energy usage decreased 2.0 percent. West Penn's total usage mix consisted of residential (33.6 percent), commercial (21.5 percent), industrial (41.2 percent), and sales for resale (3.7 percent).

Over the next 5 years, total energy usage is projected to increase at an average annual rate of 0.3 percent. This includes a residential usage average annual decrease of 0.2 percent, commercial usage decrease of 0.8 percent, and industrial usage increase by 1.3 percent. See Figure 13.

West Penn's highest peak load of 3,879 MW occurred on January 5, 2018. This represents a YOY decrease of 1.9 percent from the previous year's peak of 3,954 MW. Winter peak load is projected to decrease from 3,879 MW in winter 2017 to 3,804 MW by winter 2022, or by an average annual growth rate decrease of 0.4 percent. See Figure 14.

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 years 2008 through 2018.

Figure 13 West Penn energy usage (GWh)

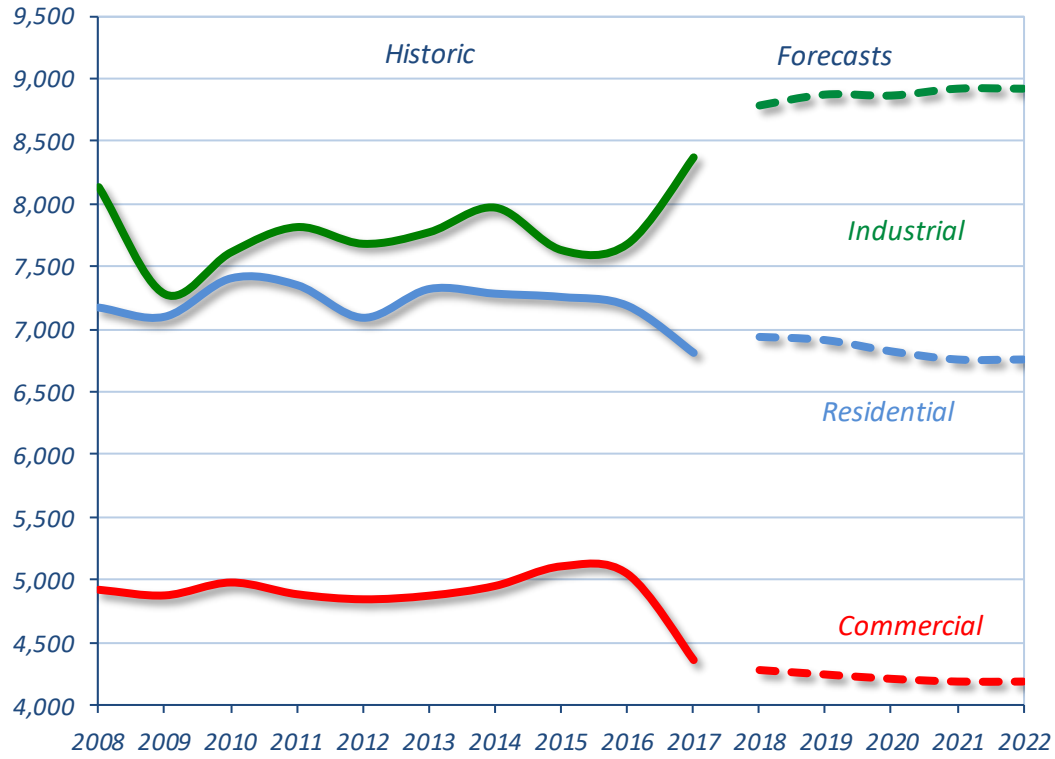
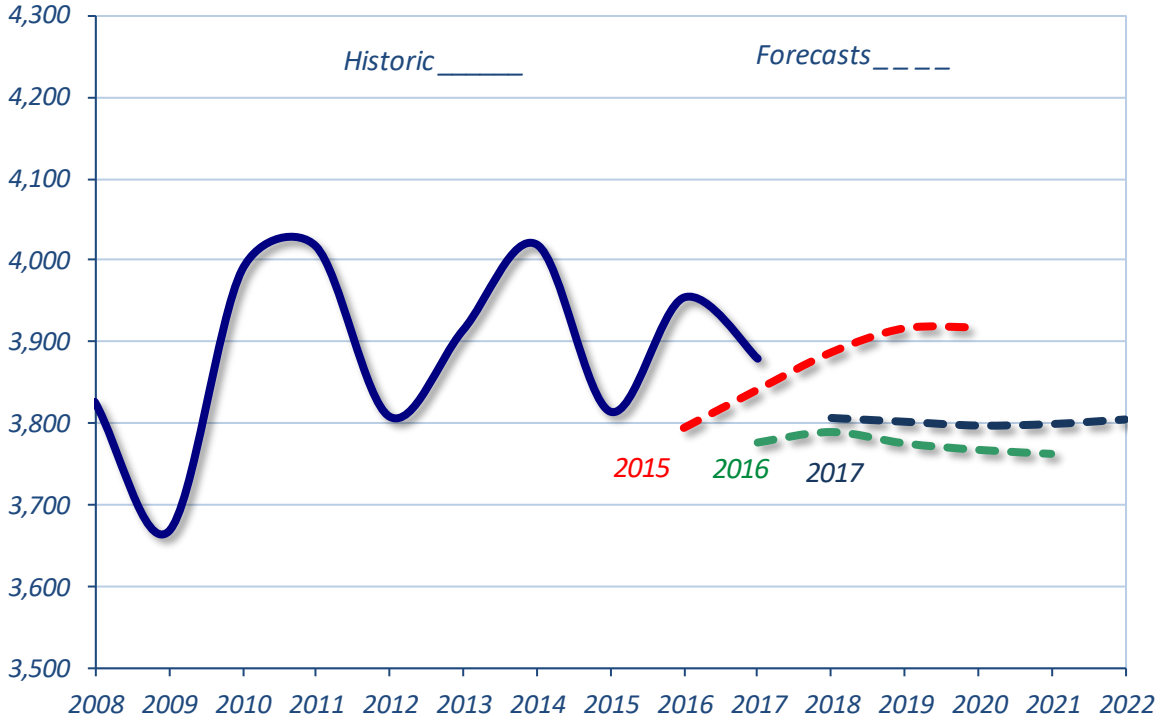
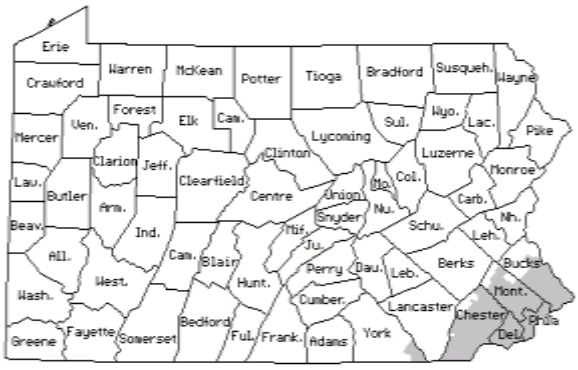


Figure 14 West Penn peak load (MW)



PECO Energy Company (PECO)

PECO is the largest electric utility in Pennsylvania, providing service to about 1,600,000 customers in the City of Philadelphia and all or portions of six counties in Southeastern Pennsylvania. PECO's 2017 energy usage total was 39,302 GWh as compared to 40,268 GWh in 2016. YOY energy usage decreased 2.4 percent. PECO's total usage mix consisted of residential (35.0 percent), commercial (21.4 percent), industrial (41.4 percent), and other (2.2 percent).



Over the next 5 years, total energy usage is projected to decrease at an average annual rate of 0.1 percent. This includes a residential usage average annual change of 0 percent, commercial usage increase of 0.2 percent, and industrial usage decrease by 0.3 percent. See Figure 15.

PECO's highest peak load of 8,141 MW occurred on July 20, 2017. This represents a YOY decrease of 2.7 percent from the previous year's peak of 8,364 MW. Summer peak load is projected to increase from 8,141 MW in summer 2017 to 8,182 MW by summer 2022, or by an average annual growth rate increase of 0.1 percent. See Figure 16.

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 2008 through 2018.

Figure 15 PECO energy usage (GWh)

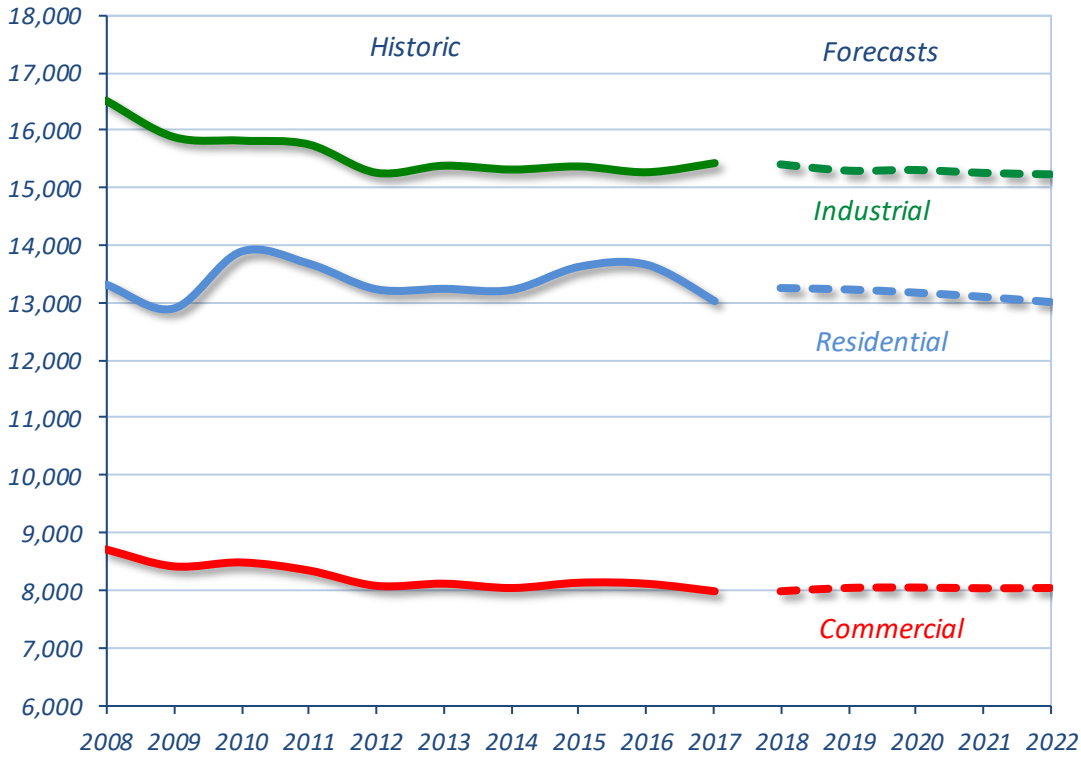
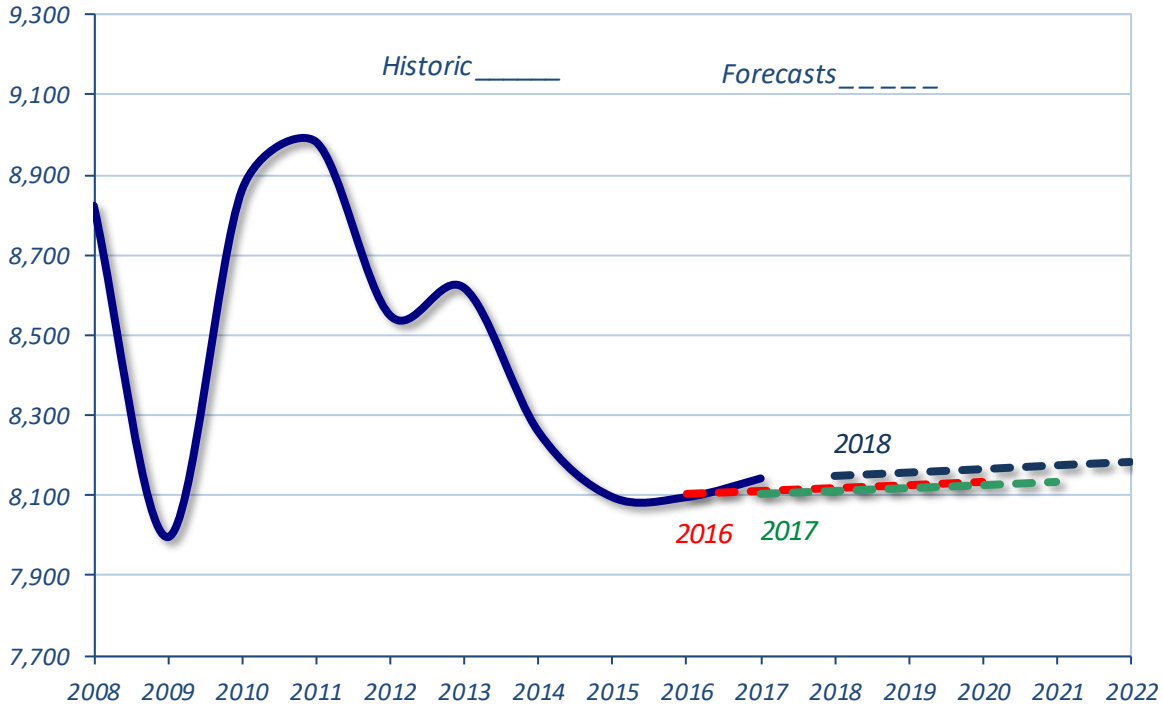
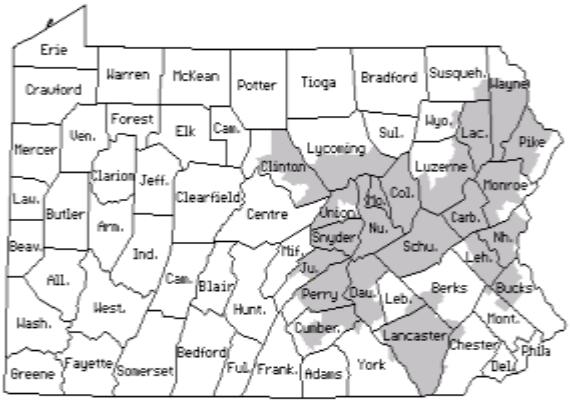


Figure 16 PECO Energy Company peak load (MW)



PPL Electric Utilities Corporation (PPL)



PPL provides service to about 1,425,500 customers over a 10,000-square-mile area in all or portions of 29 counties in Central Eastern Pennsylvania. PPL's 2017 energy usage total was 38,652 GWh as compared to 38,991 GWh in 2016. YOY energy usage decreased 0.9 percent. PPL's total usage mix consisted of residential (37.9 percent), commercial (39.0 percent), industrial (22.5 percent), and other (0.6 percent).

Over the next 5 years, total energy usage is projected to decrease at an average annual rate of 0.1 percent. This includes a residential usage average annual decrease of 0.9 percent, commercial usage increase of 0.3 percent, and industrial usage increase by 0.6 percent. See Figure 17.

PPL's highest peak load of 7,468 MW occurred on January 5, 2018. This represents a YOY increase of 3.5 percent from the previous year's peak of 7,216 MW. Winter peak load is projected to decrease from 7,468 MW in winter 2017 to 7,243 MW by winter 2022, or by an average annual growth rate decrease of 0.6 percent. See Figure 18.

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 years 2008 through 2018.

Figure 17 PPL Electric Utilities Corporation energy usage (GWh)

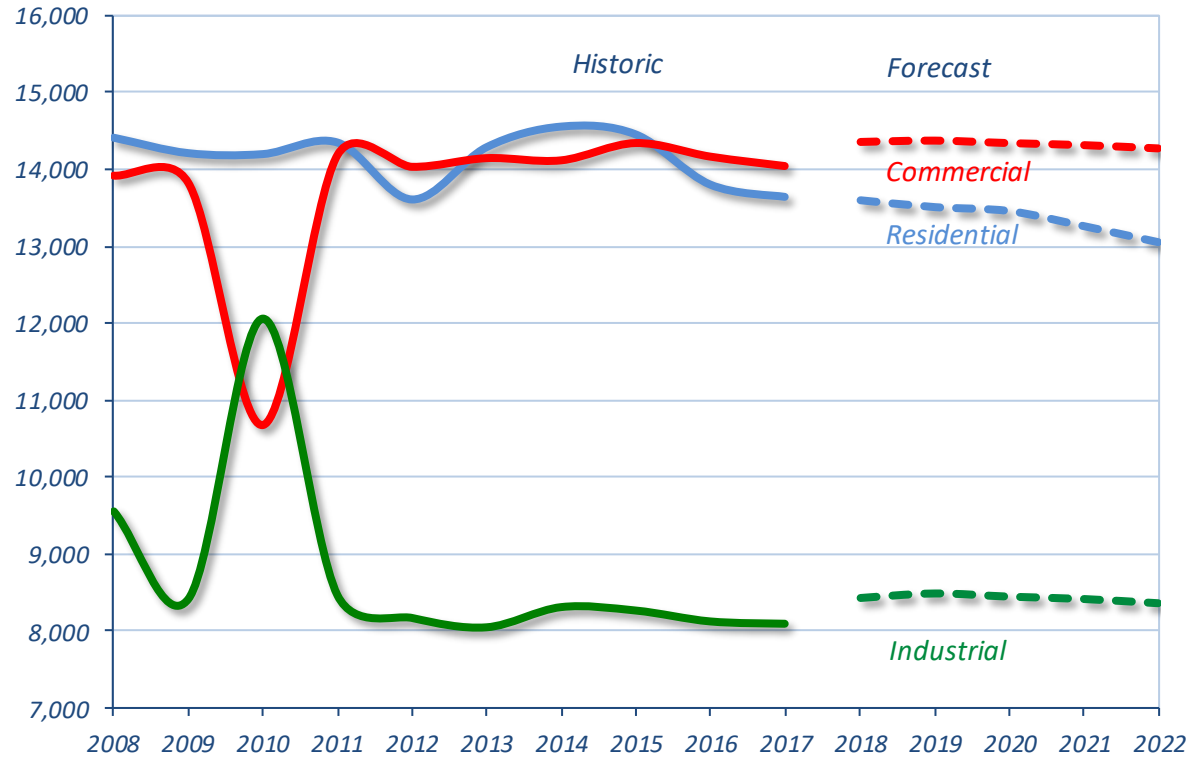
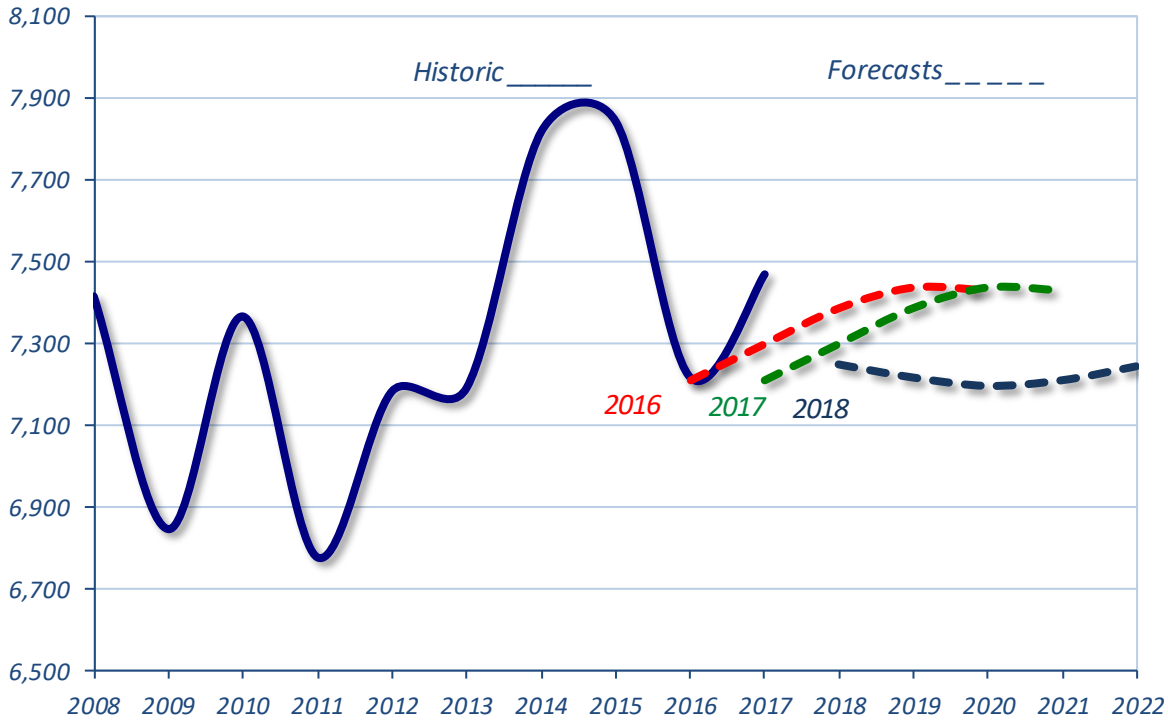
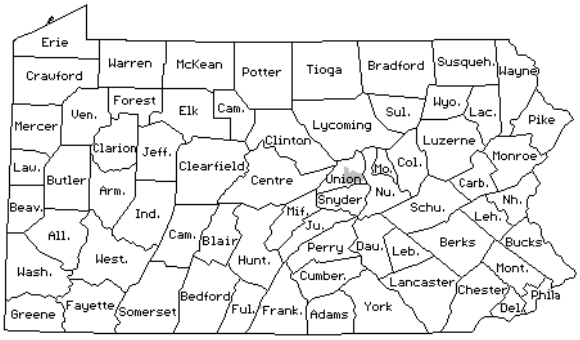


Figure 18 PPL Electric Utilities Corporation peak load (MW)



Summary of Data for the Four Smallest EDCs

Citizens' Electric Company (Citizens')

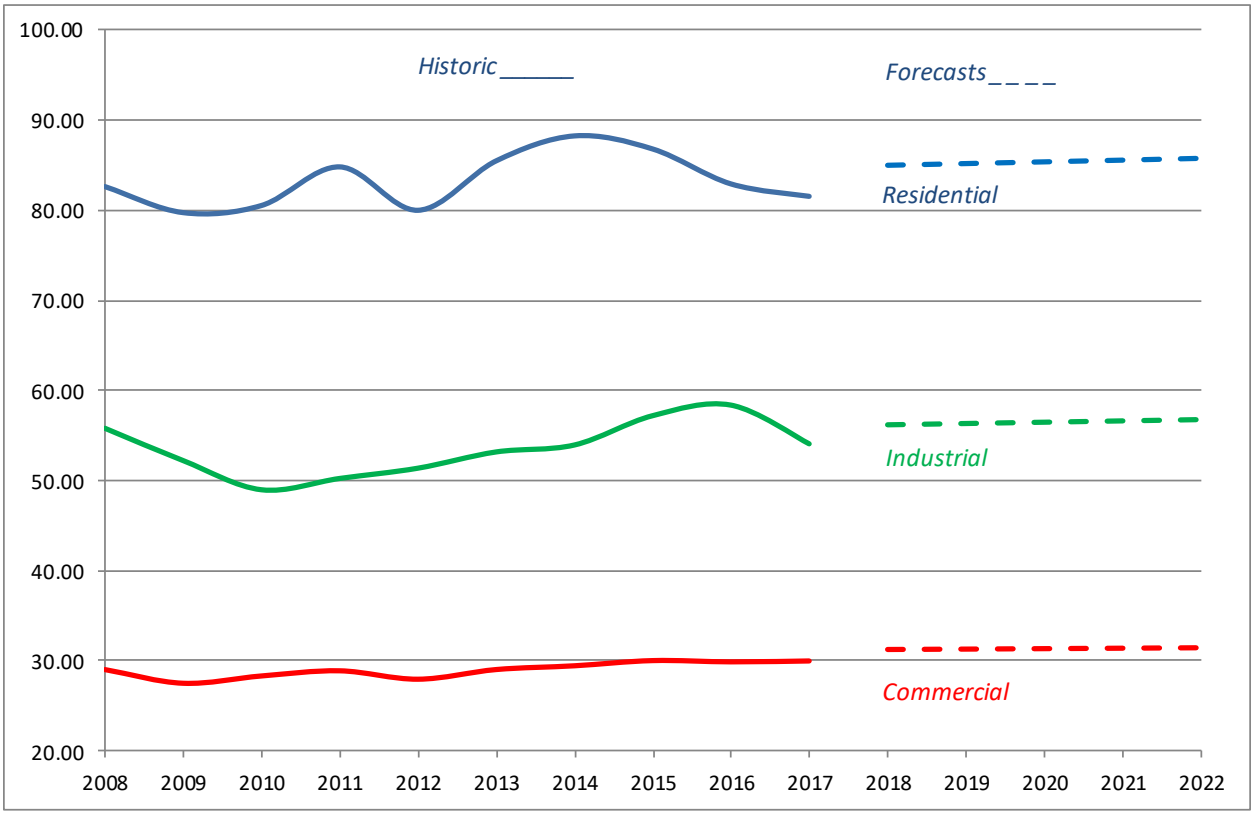


Citizens' provides service to about 6,980 customers in Union County, Pennsylvania. Citizens' 2017 energy usage total was 176 GWh as compared to 180 GWh in 2016. YOY energy usage decreased 2.3 percent. Citizens' total usage mix consisted of residential (49.1 percent), commercial (18.0 percent), industrial (32.5 percent), and other (<1 percent).

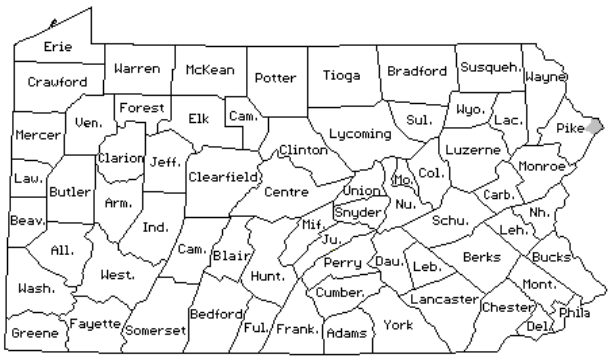
Over the next 5 years, total energy usage is projected to increase at an average annual rate of 1.0 percent. This includes a residential usage average annual increase of 1.0 percent, commercial usage increase of 1.0 percent, and industrial usage increase by 1.0 percent. See Figure 19.

Citizens' highest peak load of 47.1 MW occurred on January 3, 2018. This represents a YOY increase of 8.3 percent from the previous year's peak of 43.2 MW. Winter peak load is projected to increase from 47.1 MW in winter 2017 to 49.8 MW by winter 2022, or by an average annual growth rate increase of 1.1 percent.

Figure 19 Citizens' energy usage (GWh)



Pike County Light & Power Company (Pike)

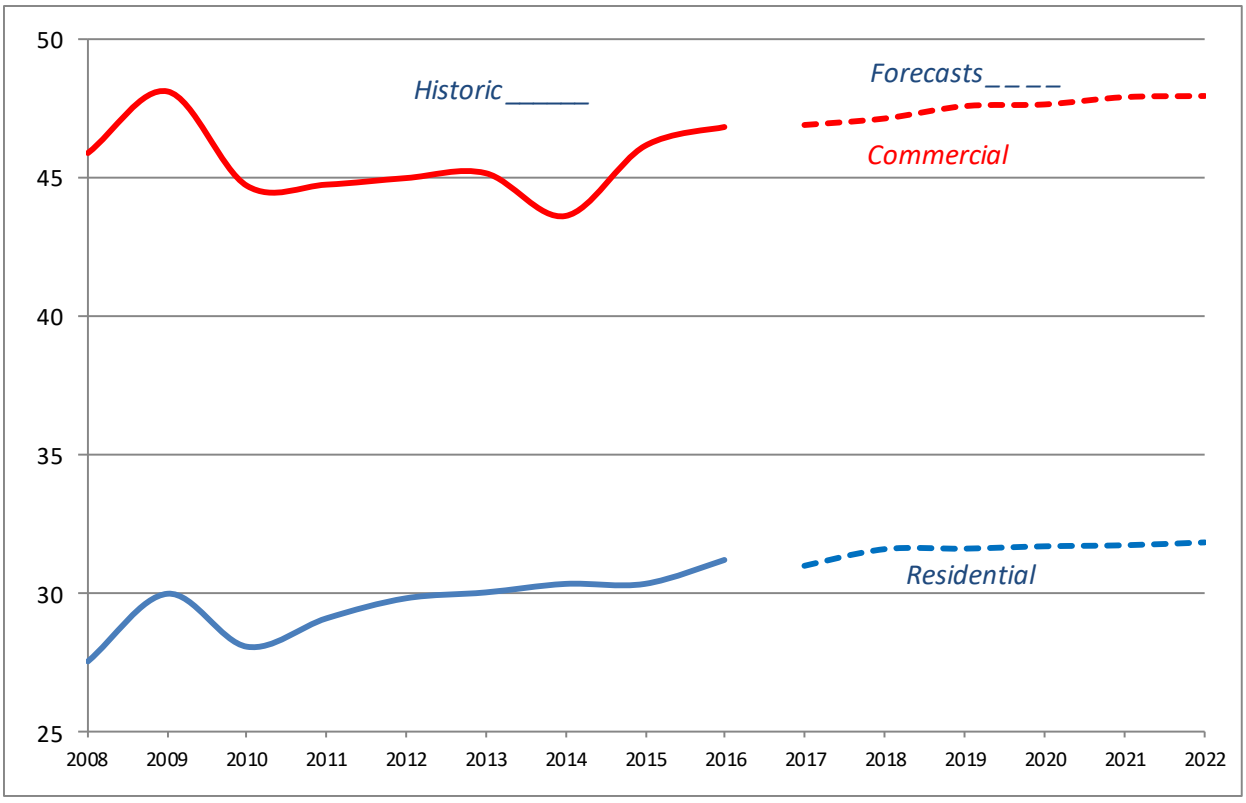


Pike provides service to about 4,700 customers in Eastern Pike County, Northeastern Pennsylvania. Pike 2017 energy usage total was 78.4 GWh as compared to 78.9 GWh in 2016. YOY energy usage decreased 0.6 percent. Pike total usage mix consisted of residential (39.6 percent), commercial (59.9 percent), and other (0.5 percent). Pike has no industrial customers or sales for resale.

Over the next 5 years, total energy usage is projected to increase at an average annual rate of 0.5 percent. This includes a residential usage average annual increase of 0.6 percent, commercial usage increase of 0.4 percent. See Figure 20.

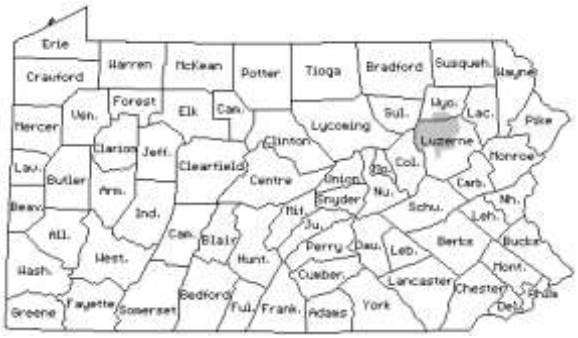
Pike's highest peak load of 16.12 MW occurred on June 13, 2017. This represents a YOY decrease of 13.7 percent from the previous year's peak of 18.67 MW. Summer peak load is projected to increase from 16.12 MW in summer 2017 to 18.85 MW by summer 2022, or by an average annual growth rate increase of 3.2 percent.

Figure 20 Pike County Light & Power energy usage (GWh)



UGI Utilities Inc.—Electric Division (UGI)

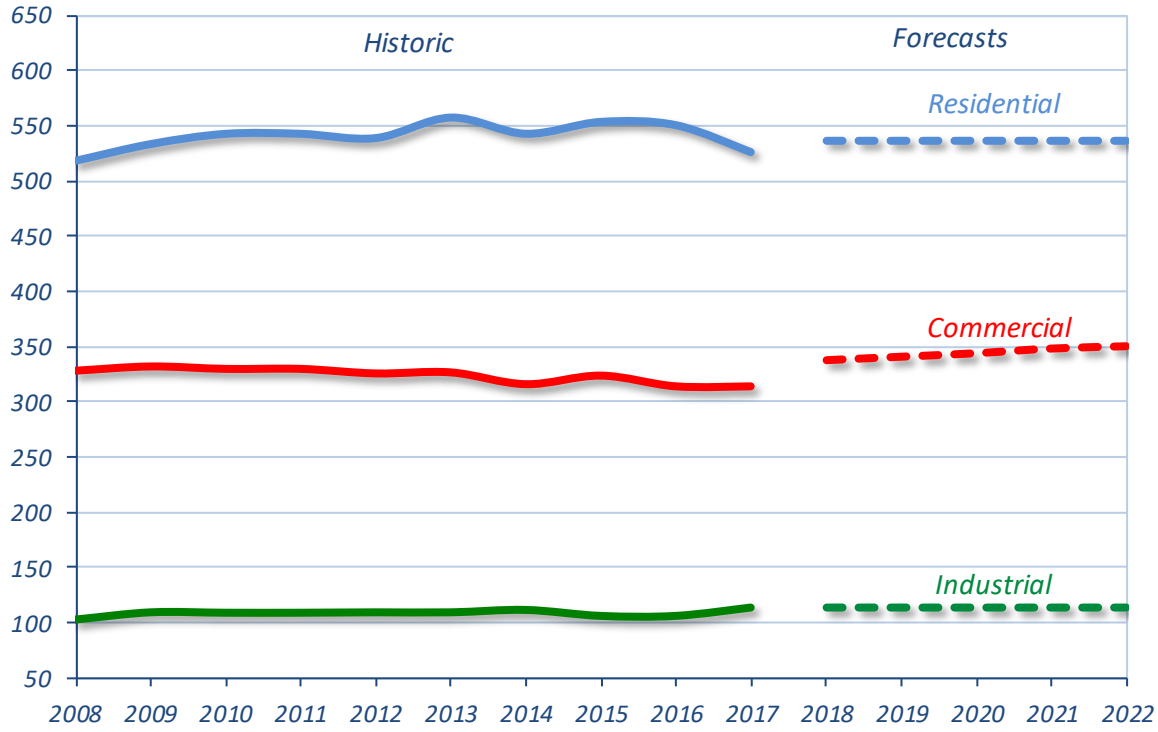
UGI provides electric service to about 62,100 customers in Northwestern Luzerne and Southern Wyoming counties in Pennsylvania. UGI 2017 energy usage total was 1,030 GWh as compared to 1,057 GWh in 2016. YOY energy usage decreased 2.5 percent. UGI total usage mix consisted of residential (55 percent), commercial (33 percent), industrial (11.8 percent), and other (0.4 percent).



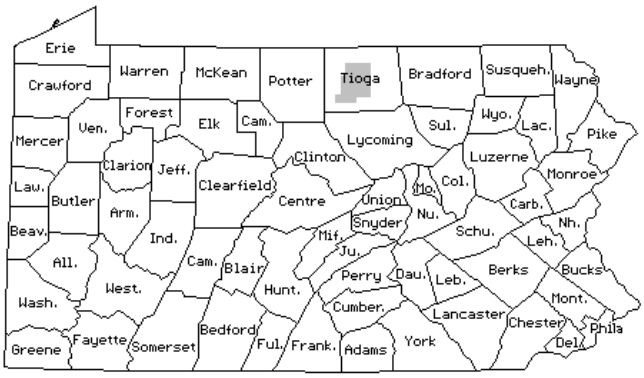
Over the next 5 years, total energy usage is projected to increase at an average annual rate of 1.0 percent. This includes a residential usage average annual increase of 0.4 percent, commercial usage increase of 2.2 percent, and industrial usage increase by 0.2 percent. See Figure 21.

UGI's highest peak load of 215 MW occurred on January 5, 2018. This represents a YOY increase of 7.5 percent from the previous year's peak of 200 MW. Winter peak load is projected to decrease from 215 MW in winter 2017 to 189 MW by winter 2022, or by an average annual growth rate decrease of 2.5 percent.

Figure 21 UGI Utilities Inc. energy usage (GWh)



Wellsboro Electric Company (Wellsboro)



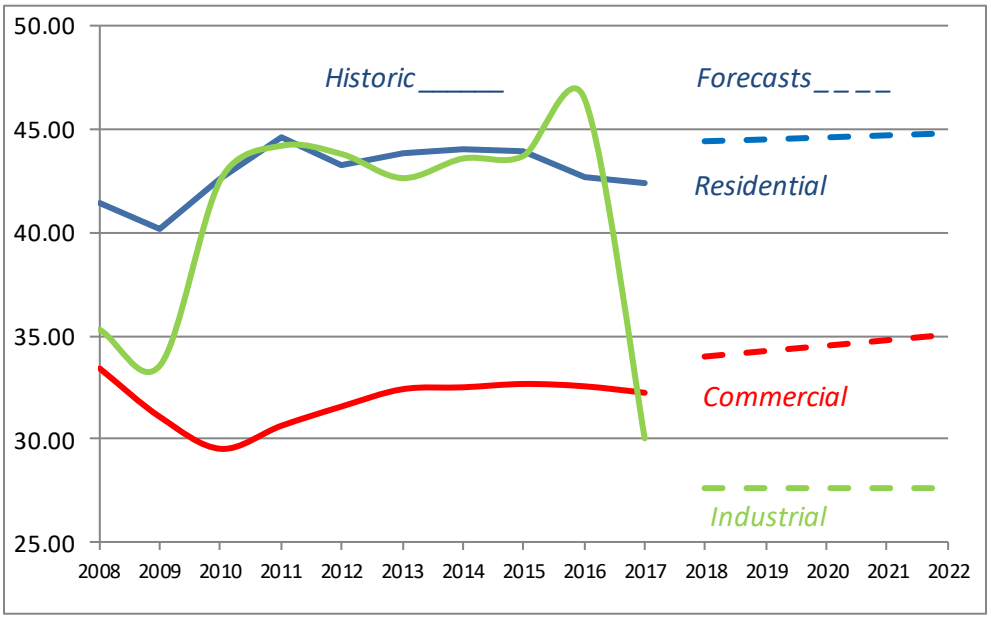
Wellsboro provides electric service to about 6,300 customers in Tioga County, North Central Pennsylvania. Wellsboro 2017 energy usage total was 113 GWh as compared to 132 GWh in 2016. YOY energy usage decreased 14.4 percent. Wellsboro total usage mix consisted of residential (40.4 percent), commercial (30.7 percent), industrial (28.7 percent).

Over the next 5 years, total energy usage is projected to increase at an average annual rate of 0.6 percent. This includes a residential usage average annual increase of 1.1 percent, commercial usage increase of 1.7 percent, and industrial usage decrease by 1.6 percent. See Figure 22.

Note: the dramatic drop in Industrial usage is due to 2 large industrial customers leaving the region in 2017.

Wellsboro highest peak load of 23 MW occurred on August 10, 2017. This represents a YOY change of 0 percent from the previous year's peak of 23 MW. Winter peak load is projected to decrease from 23 MW in winter 2017 to 21 MW by winter 2022, or by an average annual growth rate decrease of 1.8 percent.

Figure 22 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 5-year projections are filed each year by the large EDCs. Actual values are provided for years 2008 through 2017 and values are listed in the second column labeled "Actual". The lower-right-most-column in the body of the table is the latest 5-year projection for years 2018 through 2022.

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

		Projected Peak Load Requirments (Year Forecast Was Filed)										
Year	**Actual**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
2008	2822	2948										
2009	2732	3007	2862									
2010	2889	3067	2836	2854								
2011	3012	3128	2857	2863	2944							
2012	3054	3191	2850	2860	3000	2935						
2013	2951		2890	2917	3053	2980	2966					
2014	2693			2960	3088	3045	3021	2997				
2015	2804				3125	3102	3083	3056	2969			
2016	2797					3132	3135	3094	3005	2893		
2017	2682						3167	3118	3026	2918	2884	
2018								3143	3042	2938	2895	2872
2019									3056	2950	2901	2874
2020										2942	2890	2861
2021											2882	2862
2022												2869

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	**Actual**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
2008	4060	4216										
2009	3946	4293	4177									
2010	4327	4371	4188	4117								
2011	4232	4444	4181	4184	4213							
2012	4169	4527	4171	4267	4275	4350						
2013	4091		4197	4352	4332	4436	4246					
2014	4068			4448	4402	4509	4260	4217				
2015	4109				4474	4579	4265	4230	4176			
2016	4197					4676	4284	4266	4202	4081		
2017	3876						4306	4266	4184	4068	4004	
2018								4272	4172	4067	3987	3949
2019									4164	4053	3955	3915
2020										4012	3908	3856
2021											3863	3797
2022												3747

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	**Actual**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
2008	6631	6731										
2009	6537	6768	6648									
2010	6712	6815	6627	6428								
2011	6612	6878	6583	6501	6681							
2012	6539	6952	6533	6585	6782	6682						
2013	6494		6527	6666	6854	6749	6642					
2014	6432			6742	6957	6842	6640	6600				
2015	6399				7056	6929	6640	6621	6494			
2016	6335					7017	6645	6648	6503	6371		
2017	6112						6641	6643	6472	6327	6261	
2018								6654	6455	6299	6232	6072
2019									6430	6254	6187	6024
2020										6210	6151	5980
2021											6082	5905
2022												5833

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	**Actual**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
2008	3079	3098										
2009	2616	3102	3002									
2010	2987	3084	2933	2440								
2011	3120	3140	2851	2407	2865							
2012	3406	3141	2777	2395	2846	3185						
2013	3337		2726	2385	2815	3226	3501					
2014	3164			2359	2770	3252	3035	2787				
2015	2898				2724	3272	3032	2778	2909			
2016	2566					3289	3031	2762	2896	2890		
2017	2632						3031	2734	2873	2852	2665	
2018								2711	2851	2837	2658	2675
2019									2826	2819	2640	2656
2020										2803	2638	2650
2021											2618	2627
2022												2605

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	3045	2801										
2009	2739	2857	2829									
2010	2715	2915	2932	2687								
2011	3125	2972	3017	2640	2869							
2012	3036	3032	3085	2630	2775	2911						
2013	3012		3158	2668	2815	2928	2881					
2014	2817			2731	2872	2962	2887	2958				
2015	2791				2952	2995	2898	2965	2975			
2016	2947					3028	2910	2974	2979	2987		
2017	2897						2932	2996	2985	2995	2901	
2018								3017	2987	2997	2895	2926
2019									2986	2996	2872	2907
2020										2995	2855	2874
2021											2856	2865
2022												2875

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	5598	5699										
2009	5448	5872	5771									
2010	5666	6037	5836	5587								
2011	5588	6187	5969	5552	5424							
2012	5363	6341	6109	5577	5226	5201						
2013	5553		6232	5682	5386	5184	5297					
2014	5477			5799	5547	5183	5159	5354				
2015	5515				5650	5212	5042	5421	5533			
2016	5528					5210	4979	5438	5378	5190		
2017	5351						4993	5457	5392	5042	5316	
2018								5476	5382	4925	5242	5347
2019									5351	4840	5154	5265
2020										4760	5083	5201
2021											5044	5166
2022												5172

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	4777	4818										
2009	4568	4969	4853									
2010	3006	5108	5020	4671								
2011	2947	5244	5152	4706	2955							
2012	2907	5375	5291	4783	2959	2871						
2013	2933		5421	4887	3019	2909	2900					
2014	2944			4963	3090	2948	2930	2914				
2015	2995				3158	2997	2937	2931	2983			
2016	3043					2995	2940	2964	2929	2919		
2017	2886						2956	2984	2938	2923	2953	
2018								2989	2938	2927	2948	2952
2019									2923	2925	2941	2948
2020										2921	2935	2924
2021											2925	2904
2022												2912

* 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	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	3831	4156										
2009	3439	4181	3620									
2010	5288	4193	3842	3538								
2011	5404	4201	4035	3497	5443							
2012	5261	4209	4047	3528	5545	5434						
2013	5328		4048	3731	5589	5652	5411					
2014	5382			4021	5610	5765	5521	5322				
2015	5309				5625	5851	5561	5381	5413			
2016	5304					5847	5587	5456	5472	5350		
2017	5512						5612	5508	5507	5372	5360	
2018								5524	5523	5467	5428	5449
2019									5532	5474	5408	5443
2020										5467	5397	5396
2021											5458	5388
2022												5419

* 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	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	2524	2598										
2009	2880	2637	2637									
2010	2451	2674	2674	2603								
2011	2659	2711	2711	2630	2465							
2012	3128	2750	2750	2661	2452	2515						
2013	3087		2789	2688	2458	2544	2938					
2014	3024			2715	2496	2579	2942	2927				
2015	2819				2531	2625	2987	2935	2888			
2016	2909					2662	3039	2946	2896	2890		
2017	2910						3081	2962	2904	2898	2797	
2018								2968	2904	2906	2794	2823
2019									2902	2907	2775	2809
2020										2907	2751	2779
2021											2739	2775
2022												2779

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	4497	4469										
2009	4558	4533	4533									
2010	4471	4598	4598	4611								
2011	4656	4662	4662	4614	4569							
2012	4554	4727	4727	4662	4489	4460						
2013	4491		4793	4721	4443	4304	4257					
2014	4462			4776	4442	4387	4164	4469				
2015	4350				4486	4539	4145	4513	4491			
2016	4328					4653	4157	4525	4373	4145		
2017	4153						4156	4554	4393	4011	4248	
2018								4583	4394	3923	4229	4238
2019									4377	3856	4181	4157
2020										3791	4133	4090
2021											4112	4056
2022												4057

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	5139	5045										
2009	5186	5122	5122									
2010	5019	5199	5199	5159								
2011	3671	5277	5277	5213	5196							
2012	3534	5356	5356	5265	5215	3562						
2013	3531		5436	5320	5257	3526	3512					
2014	3591			5364	5343	3593	3535	3553				
2015	3558				5424	3650	3510	3552	3649			
2016	3587					3698	3503	3582	3582	3539		
2017	2529						3503	3604	3614	3545	3483	
2018								3608	3619	3551	3454	3525
2019									3607	3553	3426	3516
2020										3552	3392	3499
2021											3352	3473
2022												3472

* 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	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	4610	4809										
2009	4594	4881	4881									
2010	4044	4954	4954	4203								
2011	5748	4983	4983	4538	4126							
2012	6005	5013	5013	4859	4222	6026						
2013	5731		5043	4889	4370	6175	5883					
2014	5647			4922	4607	6266	5993	5696				
2015	5647				4674	6304	6062	5808	5747			
2016	5668					6325	6133	5867	5822	5723		
2017	5792						6130	5894	5931	5746	5602	
2018								5896	6017	5721	5617	5822
2019									5998	5675	5602	5832
2020										5623	5569	5757
2021											5548	5751
2022												5790

* 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)

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	1063	936										
2009	901	951	984									
2010	903	965	941	896								
2011	1102	980	963	890	944							
2012	963	994	981	899	947	1010						
2013	1054		995	930	983	1001	929					
2014	1018			977	1002	1003	930	867				
2015	910				1010	1006	953	873	931			
2016	931					1010	969	880	940	992		
2017	926						980	885	947	999	973	
2018								889	949	1003	965	983
2019									949	1004	956	979
2020										1006	951	975
2021											945	977
2022												985

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	1667	1693										
2009	1634	1724	1780									
2010	1696	1758	1761	1701								
2011	1711	1789	1806	1708	1664							
2012	1668	1821	1860	1721	1624	1590						
2013	1704		1904	1714	1638	1588	1645					
2014	1728			1739	1664	1582	1627	1677				
2015	1703				1684	1589	1619	1685	1752			
2016	1686					1588	1625	1691	1689	1597		
2017	1591						1649	1699	1703	1563	1651	
2018								1705	1713	1545	1632	1640
2019									1714	1532	1609	1617
2020										1520	1593	1604
2021											1584	1595
2022												1598

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	1404	1427										
2009	1367	1461	1401									
2010	1311	1496	1394	1428								
2011	1327	1532	1424	1408	1300							
2012	1334	1569	1491	1449	1267	1291						
2013	1349		1535	1500	1272	1297	1337					
2014	1381			1535	1277	1314	1347	1345				
2015	1321				1278	1335	1358	1322	1180			
2016	1355					1334	1365	1326	1048	1311		
2017	1302						1374	1332	1049	1315	1345	
2018								1332	1047	1319	1330	1317
2019									1040	1321	1314	1312
2020										1321	1302	1303
2021											1289	1295
2022												1293

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	1614	1727										
2009	1229	1734	1347									
2010	1488	1741	1517	1226								
2011	1542	1748	1687	1214	1527							
2012	1456	1755	1694	1238	1652	1513						
2013	1509		1700	1370	1705	1483	1473					
2014	1599			1596	1725	1486	1518	1596				
2015	1496				1738	1490	1519	1743	1847			
2016	1569					1490	1488	1739	2079	1637		
2017	1738						1485	1729	2202	1696	1513	
2018								1731	2256	1742	1476	1702
2019									2278	1775	1465	1713
2020										1790	1467	1726
2021											1460	1757
2022												1794

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	7414	7410										
2009	6845	7450	7180									
2010	7365	7500	7250	7207								
2011	6776	7580	7320	7227	7101							
2012	7182	7680	7360	7283	7138	7331						
2013	7190		7450	7366	7142	7400	7271					
2014	7816			7487	7216	7484	7403	7334				
2015	7842				7282	7622	7556	7477	7220			
2016	7216					7731	7691	7568	7314	7209		
2017	7468						7785	7635	7408	7298	7209	
2018								7686	7467	7385	7298	7248
2019									7511	7435	7385	7215
2020										7427	7435	7194
2021											7427	7208
2022												7243

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	14419	14469										
2009	14218	14584	14341									
2010	14206	14562	14340	14384								
2011	14356	14608	14246	14390	14142							
2012	13616	14770	14350	14226	14120	13848						
2013	14295		14443	14164	14005	13658	13607					
2014	14563			14325	14161	13667	13575	13588				
2015	14462				14335	13738	13602	13644	13647			
2016	13810					13896	13695	13769	13720	13721		
2017	13650						13678	13814	13732	13750	13856	
2018								13908	13781	13825	13940	13588
2019									13790	13826	13982	13499
2020										13679	13853	13448
2021											13750	13253
2022												13045

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	13913	13676										
2009	13818	14028	14258									
2010	10667	14253	14486	14098								
2011	14179	14596	14631	14642	10756							
2012	14027	14907	14926	14907	10860	14217						
2013	14140		15228	15295	11022	14270	14354					
2014	14111			15827	11251	14411	14524	14414				
2015	14336				11499	14580	14740	14570	14235			
2016	14160					14754	14998	14741	14234	14214		
2017	14037						15137	14859	14376	14257	14394	
2018								14985	14440	14326	14517	14353
2019									14484	14357	14578	14372
2020										14357	14560	14336
2021											14493	14307
2022												14260

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	9551	9625										
2009	8418	9570	9401									
2010	12045	9228	9141	8506								
2011	8467	9005	8879	8365	12151							
2012	8173	9009	8866	8211	12116	8475						
2013	8052		8864	8110	12269	8468	8133					
2014	8313			8054	12450	8501	8182	8092				
2015	8269				12686	8550	8281	8171	7966			
2016	8128					8603	8407	8260	8066	8283		
2017	8098						8459	8324	8129	8354	8370	
2018								8365	8168	8420	8467	8421
2019									8189	8450	8521	8486
2020										8450	8520	8440
2021											8520	8406
2022												8345

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	8824	8677										
2009	7994	8807	8956									
2010	8864	8940	9091	8114								
2011	8984	9074	9227	8236	8786							
2012	8549	9210	9365	8359	8770	8926						
2013	8618		9506	8485	8842	8956	8529					
2014	8258			8612	8916	8987	8580	8627				
2015	8094				8991	9018	8631	8635	8259			
2016	8094					9049	8683	8644	8267	8102		
2017	8141						8735	8653	8275	8110	8102	
2018								8661	8284	8118	8110	8149
2019									8292	8126	8118	8157
2020										8135	8126	8165
2021											8135	8174
2022												8182

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	13317	13757										
2009	12893	14032	13583									
2010	13896	14313	13855	13151								
2011	13686	14599	14132	13414	13912							
2012	13233	14891	14415	13683	14037	13669						
2013	13241		14703	13956	14317	13806	13392					
2014	13222			14235	14604	13944	14463	13343				
2015	13630				14896	14083	14608	13346	13288			
2016	13664					14224	14754	13349	13355	13366		
2017	13024						14902	13351	13422	13341	13436	
2018								13354	13489	13352	13423	13266
2019									13556	13354	13404	13240
2020										13360	13428	13182
2021											13346	13104
2022												13009

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	8700	9069										
2009	8404	9251	8874									
2010	8472	9436	9052	8572								
2011	8332	9625	9233	8744	8589							
2012	8063	9817	9417	8918	8705	8360						
2013	8101		9606	9097	8879	8443	7821					
2014	8025			9279	9057	8528	7790	7858				
2015	8118				9238	8613	7868	7936	8021			
2016	8099					8699	7947	8015	8017	8044		
2017	7968						8026	8096	8013	8020	8132	
2018								8177	8009	8016	8073	7992
2019									8005	8018	8063	8043
2020										8019	8046	8049
2021											7995	8038
2022												8042

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	16534	16914										
2009	15889	17252	16864									
2010	15824	17597	17202	16207								
2011	15755	17949	17546	16531	15991							
2012	15253	18308	17897	16861	16153	15755						
2013	15379		18254	17199	16476	15912	15481					
2014	15310			17543	16806	16071	15714	15609				
2015	15365				17142	16232	15949	15844	15302			
2016	15263					16394	16188	16081	15294	15547		
2017	15425						16431	16322	15287	15515	15016	
2018								16567	15279	15513	15364	15421
2019									15271	15517	15320	15293
2020										15529	15356	15306
2021											15355	15247
2022												15217

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

		Projected Peak Load Requirements (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	3826	3871										
2009	3667	3958	3910									
2010	3988	4036	3990	3788								
2011	4017	4083	4032	3755	3757							
2012	3808	4123	4084	3771	3754	3758						
2013	3914		4120	3809	3786	3771	3784					
2014	4019			3951	3879	3840	3846	4075				
2015	3814				3928	3903	3908	3945	3793			
2016	3954					3964	3980	4012	3842	3793		
2017	3879						4015	4065	3927	3840	3776	
2018								4077	4020	3886	3789	3806
2019									4031	3916	3775	3801
2020										3917	3767	3796
2021											3762	3798
2022												3804

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

		Projected Residential Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	7172	7481										
2009	7101	7654	7206									
2010	7401	7774	7264	7147								
2011	7349	7892	7233	7104	7139							
2012	7092	7965	7248	7085	7122	7121						
2013	7318		7102	6952	7047	7149	7146					
2014	7281			7008	7073	7188	7282	7311				
2015	7255				7148	7231	7369	7302	7383			
2016	7186					7281	7431	7303	7157	6775		
2017	6817						7493	7319	7244	6634	6892	
2018								7335	7298	6548	6834	6931
2019									7303	6473	6752	6906
2020										6407	6660	6819
2021											6614	6756
2022												6756

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

		Projected Commercial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	4925	5115										
2009	4880	5235	5048									
2010	4983	5327	5160	4966								
2011	4889	5387	5275	4987	4909							
2012	4849	5462	5353	5059	4931	4819						
2013	4878		5450	5169	4979	4930	4845					
2014	4956			5307	5091	5083	4909	4860				
2015	5112				5229	5229	4946	4897	4996			
2016	5051					5343	4979	4932	4957	4900		
2017	4364						5047	4962	5015	4915	4995	
2018								4962	5029	4941	4953	4285
2019									5006	4952	4918	4246
2020										4954	4884	4208
2021											4857	4184
2022												4184

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

		Projected Industrial Energy Demand (Year Forecast Was Filed)										
Year	Actual	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
2008	8135	8311										
2009	7286	8476	8440									
2010	7617	8699	8711	7612								
2011	7818	8799	8906	7740	7833							
2012	7685	8844	9093	7936	8025	8029						
2013	7777		9246	8105	8146	8172	8087					
2014	7972			8214	8264	8334	8303	7947				
2015	7635				8346	8487	8542	8161	8053			
2016	7684					8608	8786	8331	8492	8287		
2017	8371						8878	8466	8903	8641	7947	
2018								8495	9321	8798	8072	8785
2019									9700	8847	8114	8873
2020										8852	8179	8865
2021											8199	8920
2022												8920

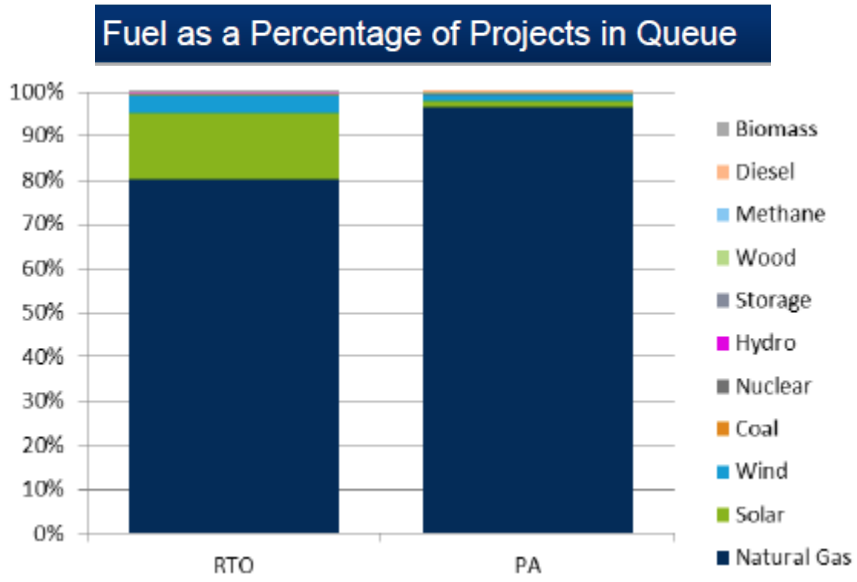
Appendix B – Plant Additions and Upgrades

Table B-1, Chart B-1, and Chart B-2 detail PJM interconnection requests for new generating resources located in Pennsylvania.[54] Currently Pennsylvania has 9,636 MW under construction, as compared to 7,142 MW in 2016, 8,202 MW in 2015, 4,629 MW in 2014, and 2,134 MW in 2013. Table B-2 details the generation deactivations for Pennsylvania from January 1, through December 31, 2017.

Table B-1, New Generation Queue for Pennsylvania – Interconnection Requests (as of Dec 31, 2017)

	Complete				In Queue						Grand Total	
	In Service		Withdrawn*		Active		Suspended**		Under Construction**			
	MW	# of Projects	MW	# of Projects	MW	# of Projects	MW	# of Projects	MW	# of Projects	MW	# of Projects
Non-Renewable	14,924	108	103,233	295	5,001	37	743	13	9,565	31	133,466	484
Coal	229	17	14,355	28							14,584	45
Diesel	33	3	52	12					4	1	89	16
Natural Gas	11,744	61	85,495	217	4,895	29	743	13	9,561	28	112,438	348
Nuclear	2,582	15	1,681	8	94	5					4,357	28
Oil	9	3	1,307	9							1,316	12
Other	327	3	344	6							671	9
Storage	0	6	0	15	12	3			-	2	12	26
Renewable	895	82	2,706	266	277	20	98	10	71	7	4,048	385
Biomass	31	3	37	4							68	7
Hydro	481	12	189	15							669	27
Methane	136	27	197	36	4	1					337	64
Solar	7	3	716	89	183	12	21	4	4	1	931	109
Wind	240	37	1,568	122	90	7	61	5	67	6	2,026	177
Wood							16	1			16	1
Grand Total	**15,819**	**190**	**105,940**	**561**	**5,277**	**57**	**842**	**23**	**9,636**	**38**	**137,514**	**869**

Chart B-1, Pennsylvania/PJM New Generation – Fuel as % of Projects in Queue (Dec 31, 2017)



[54] http://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2017/2017-pennsylvania-state-infrastructure-report.ashx?la=en.

Chart B-2, Pennsylvania New Generation Queue –Total MW Capacity by Fuel (Dec 31, 2017)

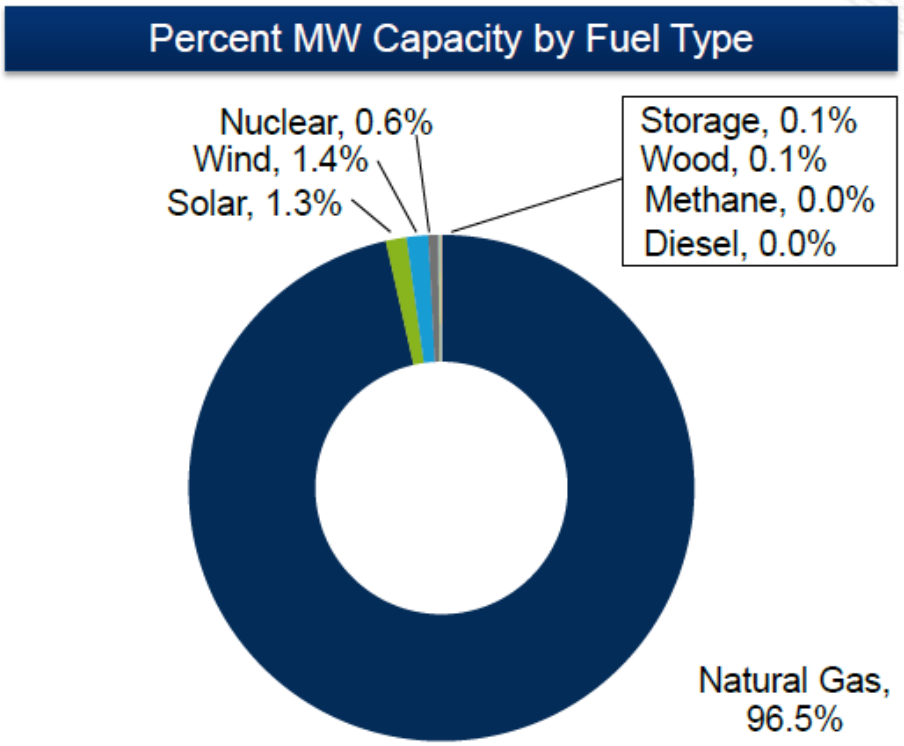


Table B-2, 2017 Pennsylvania Generation Deactivations

Unit	TO Zone	Fuel Type	Request Received to Deactivate	Projected Deactivation Date	Age	Capacity
Three Mile Island Unit 1	ME	Nuclear	5/30/2017	9/30/2019	43	802.8
Colver NUG	PENELEC	Coal	11/22/2017	9/1/2020	22	110.0

In 2017, there were no deactivations in Pennsylvania compared as to 14 MW in 2016. However, PJM received two notifications with projected deactivation dates as shown in Table B-2. In 2016, 14 MW of capacity retired in Pennsylvania as compared to 177 MW in 2015. In 2017, 2,084 MW of capacity deactivated in PJM territory as compared to 392 MW in 2016, and 10,800 MW in 2015.

Appendix C – Existing Generating Facilities

Table C-1, represents the PJM region installed electrical capacity percentage and actual generation percentage by energy source from 2014 through 2017.[55]

Chart C-1, represents the 2017 Pennsylvania installed capacity percentage by energy source.[56]

Chart C-2, represents the Pennsylvania actual generation percentage by energy source from June 1, 2015 through December 31, 2017.

Table C-2 represents existing generating facilities by County located in Pennsylvania and provides.[57]

Table C-1 Electrical Power Supply Mix

PJM Region Electricity Supply Mix 2017/2016/2015/2014
(percent)

Energy Source	Capacity				Generation			
	2017	2016	2015	2014	2017	2016	2015	2014
Coal	35.4	36.5	37.5	39.7	31.8	33.9	36.6	43.3
Nuclear	18	18.1	18.6	17.9	35.6	34.4	35.5	34.4
Natural Gas	36.8	35.7	34	30.7	27.1	26.7	23.4	17.8
Hydro, Wind, & Other	6	6	6	5.7	5.7	4.7	4.4	4.4
Oil	3.6	3.7	3.9	6	0.3	0.3	0.1	0.1

[55] *State of the Market Report for PJM*, reporting years 2017, 2016, 2015, and 2014, available at www.monitoringanalytics.com.
[56] http://www.pjm.com/-/media/library/reports-notices/state-specific-reports/2017/2017-pennsylvania-state-infrastructure-report.ashx?la=en.
[57] Data reported to SNL and received by PUC staff.

Chart C-1 Electrical Power Capacity Mix

2017 Pennsylvania Installed Capacity

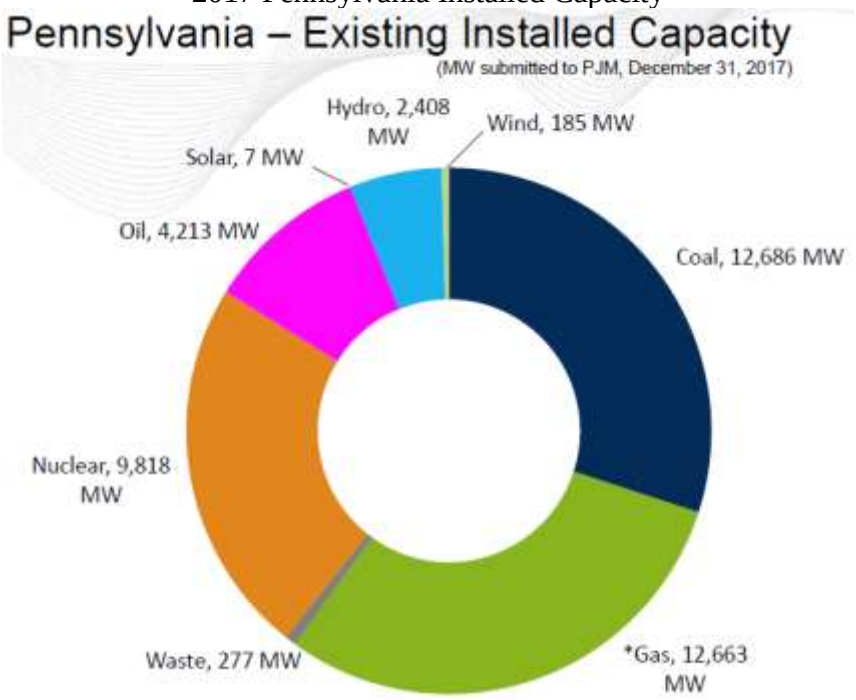


Chart C-2 Pennsylvania Electrical Power Generation Mix

Actual Generation Production

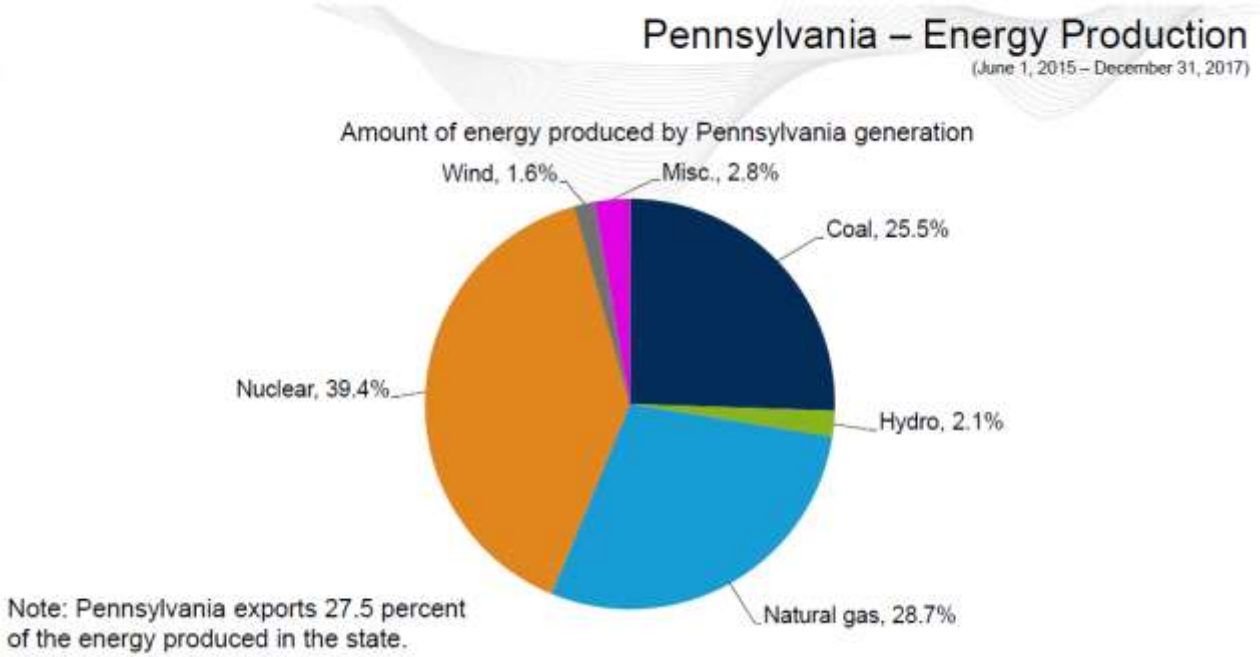


Table C-2 Electric Generating Facilities in Pennsylvania

County	Plant	Owner	Ultimate Parent	Ownership (%)	Operating Capacity (MW)	Year First Unit in Service	Age	Fuel Type
Adams	Gettysburg Energy & Nutrient Recovery Facility (C	EnergyWorks BioPower, Inc	EnergyWorks BioPower, Inc	100	2.7	2013	4	Biomass
	Hamilton	NRG REMA LLC	NRG Energy, Inc.	100	24	1971	46	Oil
	Hunterstown	NRG REMA LLC	NRG Energy, Inc.	100	75	1971	46	Oil
	Hunterstown CC	Platinum Equity Advisors, LLC	Platinum Equity, LLC	100	810	2003	14	Gas
	Orrtanna	NRG REMA LLC	NRG Energy, Inc.	100	26	1971	46	Oil
Allegheny	Allegheny Energy 3, 4 and 5 (Springdale)	Aspen Generating, LLC	LS Power Group	100	550	2003	14	Gas
	Allegheny Energy Units 1 and 2 (Springdale)	Aspen Generating, LLC	LS Power Group	100	88	1999	18	Gas
	Brunot Island	Orion Power Holdings, Inc.	NRG Energy, Inc.	100	15	1972	45	Oil
	Brunot Island CC	NRG Power Midwest LP.	NRG Energy, Inc.	100	269.4	1973	44	Gas
	Cheswick	NRG Power Midwest LP.	NRG Energy, Inc.	100	565	1970	47	Coal
	Clairton Works	United States Steel Corporation	United States Steel Corporation	100	26	1955	62	Other
	Mon Valley Works	United States Steel Corporation	United States Steel Corporation	100	31.9	1943	74	Other
	PPG Monroeville Chemicals Center	PPG Monroeville Chemicals Center	PPG Industries, Incorporated	100	1.1	1998	19	Oil
	PPG Place	PPG Industries, Incorporated	PPG Industries, Incorporated	100	2.3	1990	27	Oil
Armstrong	Allegheny 5	Enduring Hydro LLC	Enduring Hydro LLC	1	10	1988	29	Water
		I Squared Capital	I Squared Capital	99		1988	29	Water
	Allegheny 6	Enduring Hydro LLC	Enduring Hydro LLC	1	12	1988	29	Water
		I Squared Capital	I Squared Capital	99		1988	29	Water
	Allegheny 8 (Torrent Hydro)	BluEarth Renewables Inc.	BluEarth Renewables Inc.	49	13.6	1990	27	Water
		Public Sector Pension Investment Board	Public Sector Pension Investment Board	51		1990	27	Water
	Allegheny 9 (Torrent Hydro)	BluEarth Renewables Inc.	BluEarth Renewables Inc.	49	17.8	1990	27	Water
		Public Sector Pension Investment Board	Public Sector Pension Investment Board	51		1990	27	Water
	Armstrong County	LS Power Development, LLC	LS Power Group	100	676	2002	15	Gas
	Keystone	ArcLight Capital Partners, LLC	ArcLight Capital Holdings, LLC	44.45	1700	1967	50	Coal
		NRG Northeast Generating LLC	NRG Energy, Inc.	3.7		1967	50	Coal
		NRG REMA LLC	NRG Energy, Inc.	16.67		1967	50	Coal
		PSEG Fossil LLC	Public Service Enterprise Group Incorporated	22.84		1967	50	Coal
		Talen Generation LLC	Talen Energy Corporation	12.34		1967	50	Coal
	Keystone IC	ArcLight Capital Partners, LLC	ArcLight Capital Holdings, LLC	44.45	11.2	1968	49	Oil
		NRG Northeast Generating LLC	NRG Energy, Inc.	3.7		1968	49	Oil
		NRG REMA LLC	NRG Energy, Inc.	16.67		1968	49	Oil
		PSEG Fossil LLC	Public Service Enterprise Group Incorporated	22.84		1968	49	Oil
		Talen Generation LLC	Talen Energy Corporation	12.34		1968	49	Oil
	Mahoning Creek	Enduring Hydro LLC	Enduring Hydro LLC	51	6.7	2013	4	Water
		I Squared Capital	I Squared Capital	49		2013	4	Water
Beaver	Beaver Solar	Eaton Corp.	Eaton Corp.	100	1.3	2012	5	Solar
	Beaver Valley	FirstEnergy Nuclear Generation, LLC	FirstEnergy Corp.	100	1872	1976	41	Nuclear
	Beaver Valley Patterson Dam	Enel Green Power North America, Inc.	Enel Green Power S.p.A	31.7	1.2	1982	35	Water
			Enel S.p.A.	68.3		1982	35	Water
	Bruce Mansfield	FirstEnergy Generation, LLC	FirstEnergy Corp.	100	2510	1976	41	Coal
	Townsend Hydro	Beaver Falls Municipal Authority	Beaver Falls Municipal Authority	100	4.2	1987	30	Water

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

County	Plant	Owner	Ultimate Parent	Ownership (%)	Operating Capacity (MW)	Year First Unit in Service	Age	Fuel Type
Berks	Altairnano PJM Li-ion Battery Storage Project	AES Energy Storage, LLC	AES Corporation	100	1	2009	8	Other
	Morgantown Generating Station	Granger Electric Co	Granger Electric Co	100	1.6	2016	1	Biomass
	Morgantown Solar Park	Hankin Group	Hankin Group	100	1.6	2011	6	Solar
	Ontelaunee Energy Center	Dynegy Power, LLC	Vistra Energy Corp.	100	624	2002	15	Gas
	Pioneer Crossing Landfill	Fortistar LLC	Fortistar LLC	100	8	2008	9	Biomass
		Green Gas Americas, Inc.	Green Gas International B.V.	0		2008	9	Biomass
	Temple Solar Arrays Project	UGI Energy Services, Inc.	UGI Corporation	100	2.2	2011	6	Solar
	Titus CT	NRG REMA LLC	NRG Energy, Inc.	100	35	1967	50	Oil
Blair	Allegheny Ridge Wind Farm	ArcLight Capital Partners, LLC	ArcLight Capital Holdings, LLC	100	80	2007	10	Wind
	Chestnut Flats Windfarm	EDF Renewables	EDF Group	100	38	2011	6	Wind
	Juniata Locomotive Shop GT Project	Norfolk Southern Corporation	Norfolk Southern Corporation	100	1.5	2015	2	Gas
	North Allegheny Wind	Duke Energy Renewables, Inc.	Duke Energy Corporation	100	70	2009	8	Wind
	Sandy Ridge Wind Farm	Algonquin Power Fund (America) Inc.	Algonquin Power & Utilities Corp.	100	48.2	2012	5	Wind
Bradford	Alpaca Gas Project	IMG Midstream LLC	COFRA Holding AG	100	21.18	2017	0	Gas
	Beaver Dam Gas Project	IMG Midstream LLC	COFRA Holding AG	100	22	2016	1	Gas
	Milan Gas Project	IMG Midstream LLC	COFRA Holding AG	100	21.18	2017	0	Gas
	Northern Tier Landfill	Talen Renewable Energy	Energy Power Partners	100	1.6	2009	8	Biomass
	Panda Liberty Generating Station (Moxie Liberty)	Panda Power Funds, LP	Panda Power Funds, LP	100	936	2016	1	Gas
Bucks	Croydon	Exelon Generation Company, LLC	Exelon Corporation	100	512	1974	43	Oil
	Exelon-Conergy Solar Energy Center	Conergy AG	Kawa Capital Management, Inc.	100	1.5	2008	9	Solar
	Fairless Hills Steam Generating Station	Exelon Generation Company, LLC	Exelon Corporation	100	60	1996	21	Biomass
	Fairless Works Energy Center	Dominion Generation, Inc.	Dominion Energy, Inc.	100	1320.4	2004	13	Gas
	Falls	Exelon Generation Company, LLC	Exelon Corporation	100	60	1970	47	Oil
	Pennsbury Generating Station	Exelon Generation Company, LLC	Exelon Corporation	100	5.4	1996	21	Biomass
	Tullytown Landfill Gas Facility	WM Renewable Energy, LLC	Waste Management, Inc.	100	1.6	2013	4	Biomass
	Wheelabrator Falls Inc.	Wheelabrator Technologies, Inc.	Energy Capital Partners LLC	100	45.1	1994	23	Biomass
Cambria	Cambria Cogeneration	Gulf Pacific Power LLC	Harbert Management Corporation	37.5	88	1991	26	Coal
		Harbert Power Fund V, LLC	Harbert Management Corporation	12.5		1991	26	Coal
		UBS Global Asset Management	UBS Group AG	50		1991	26	Coal
	Colver Power Project	Gulf Pacific Power LLC	Harbert Management Corporation	37.5	110	1995	22	Coal
		Harbert Power Fund V, LLC	Harbert Management Corporation	12.5		1995	22	Coal
		UBS Global Asset Management	UBS Group AG	50		1995	22	Coal
	Ebensburg Power Company	Revloc Reclamation Service, Inc.	Generation Holdings, LP	100	50	1991	26	Coal
	Highland North Wind Farm	BlackRock, Inc.	BlackRock, Inc.	100	75	2012	5	Wind
	Highland Wind Project	BlackRock, Inc.	BlackRock, Inc.	100	62.5	2009	8	Wind
	Patton Wind Farm	BlackRock, Inc.	BlackRock, Inc.	100	30	2012	5	Wind
Carbon	PA Solar Park Project	Consolidated Edison Development, Inc.	Consolidated Edison, Inc.	100	10	2012	5	Solar
	Panther Creek	ArcLight Energy Partners Fund IV, L. P.	ArcLight Capital Holdings, LLC	75	83	1992	25	Coal
		Olympus Power, LLC	Olympus Holdings, LLC	25		1992	25	Coal
Centre	East Campus Plant	Pennsylvania State University	Pennsylvania State University	100	8.4	2011	6	Gas
	West Campus Plant	Pennsylvania State University	Pennsylvania State University	100	5.2	1938	79	Gas
Chester	Andromeda One A Biomass Plant	Behrens Energy Agriculture & Robotics	Behrens Energy Agriculture & Robotics	100	4	2016	1	Biomass
	Aqua Ingrams Mill Solar	Aqua Pennsylvania, Inc.	Aqua America Inc.	100	0.9	2009	8	Solar
	Longwood Gardens Solar Plant	Ecogy Pennsylvania Systems, Llc	Ecogy Pennsylvania Systems, Llc	100	1.3	2010	7	Solar
	Marlboro Mushrooms Solar Field	Marlborough Mushrooms	Marlborough Mushrooms	100	1	2011	6	Solar
	Pickering Solar	Aqua America Inc.	Aqua America Inc.	100	1.4	2012	5	Solar
	SECCRA Community Landfill	Southeastern Chester County Refuse Authority	Southeastern Chester County Refuse Authority	100	2.5	2007	10	Biomass

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

County	Plant	Owner	Ultimate Parent	Ownership (%)	Operating Capacity (MW)	Year First Unit in Service	Age	Fuel Type
Clarion	Piney	Brookfield Renewable Partners L.P.	Brookfield Asset Management Inc.	60	33.2	1924	93	Water
			Brookfield Renewable Partners L.P.	40		1924	93	Water
Clearfield	Shawville	NRG REMA LLC	NRG Energy, Inc.	100	588	1954	63	Gas
	Shawville IC	NRG REMA LLC	NRG Energy, Inc.	100	6	1960	57	Oil
Clinton	Lock Haven	Talen Energy Supply, LLC	Riverstone Holdings LLC	100	15	1969	48	Oil
Cumberland	Carlisle Area School District	Carlisle Area School District	Carlisle Area School District	100	1.3	2010	7	Solar
	Knouse Foods Solar Plant	Knouse Foods Cooperative Inc	Knouse Foods Cooperative Inc	100	3	2010	7	Solar
	Mountain	NRG REMA LLC	NRG Energy, Inc.	100	50	1972	45	Oil
	PPG Industries Works 6 IC Facility	PPG Industries, Incorporated	PPG Industries, Incorporated	100	5	1972	45	Oil
	Shippensburg (Cumberland County) Landfill	Talen Renewable Energy	Energy Power Partners	100	6.4	2009	8	Biomass
	West Shore	Talen Energy Supply, LLC	Riverstone Holdings LLC	100	31	1969	48	Oil
Dauphin	Harrisburg	Talen Energy Supply, LLC	Riverstone Holdings LLC	100	43.5	1967	50	Oil
	Paxton Creek Cogeneration	NRG Yield, Inc.	NRG Energy, Inc.	55.1	12	1986	31	Gas
			NRG Yield, Inc.	44.9		1986	31	Gas
	Susquehanna Resource Management Complex (	Lancaster County Solid Waste Management Authority	Lancaster County Solid Waste Management Authority	100	21.8	1986	31	Biomass
	Three Mile Island	Exelon Generation Company, LLC	Exelon Corporation	100	829	1974	43	Nuclear
Delaware	Chester	Exelon Generation Company, LLC	Exelon Corporation	100	54	1969	48	Oil
	Chester Operations	Kimberly-Clark Corp.	Kimberly-Clark Corp.	100	67	1986	31	Coal
	Delaware County Resource Recovery Facility	Covanta Energy Corporation	Covanta Holding Corporation	100	80	1991	26	Biomass
	Eddystone 3-4	Exelon Generation Company, LLC	Exelon Corporation	100	760	1974	43	Gas
	Eddystone CT	Exelon Generation Company, LLC	Exelon Corporation	100	76	1967	50	Oil
	Liberty Electric Power	Equipower Resources Corp.	Vistra Energy Corp.	100	551.5	2002	15	Gas
	Marcus Hook	Starwood Energy Group Global, LLC	Starwood Energy Group Global, LLC	100	847	2004	13	Gas
	Marcus Hook Cogeneration	Starwood Energy Group Global, LLC	Starwood Energy Group Global, LLC	100	50	1987	30	Gas
Elk	Johnsonburg Mill	Domtar Paper Company, LLC	Domtar Corp.	100	49	1993	24	Biomass
Erie	Erie Coke Corporation	Erie Coke Corporation	Erie Coke Corporation	100	1.3	1953	64	Other
	Lakeview Gas Recovery	WM Renewable Energy, LLC	Waste Management, Inc.	100	6	1997	20	Biomass
Fayette	Allegheny Energy Units 8 and 9 (Gans Plant)	Aspen Generating, LLC	LS Power Group	100	88	2000	17	Gas
	Fayette Energy Facility	Vistra Energy Corp.	Vistra Energy Corp.	100	729	2003	14	Gas
	Mill Run Wind Farm	Quinbrook Infrastructure Partners Ltd	Quinbrook Infrastructure Partners Ltd	100	15	2001	16	Wind
	South Chestnut Wind Project	Avangrid Renewables, LLC	Avangrid, Inc.	18.5	50.4	2012	5	Wind
			Iberdrola, S.A.	81.5		2012	5	Wind
Franklin	Allegheny Energy Units 12 & 13 (Chambersburg	Aspen Generating, LLC	LS Power Group	100	88	2001	16	Gas
	Falling Spring	Chambersburg Borough of	Chambersburg Borough of	100	7.1	1967	50	Gas
	IESI Blue Ridge Landfill	Talen Renewable Energy	Energy Power Partners	100	6.4	2013	4	Biomass
	Mountain View Landfill	CCI Power Holdings LLC	Castleton Commodities International, LLC	12.31	14.4	2003	14	Biomass
			Energy Trading Innovations LLC	87.69		2003	14	Biomass
	Orchard Park	Chambersburg Borough of	Chambersburg Borough of	100	23.2	2003	14	Gas
Huntingdon	Warrior Ridge Hydroelectric	American Hydro Power Co.	American Hydro Power Co.	100	2.8	1985	32	Water
	Wm F Matson Generating Station	Allegheny Electric Cooperative Inc.	Allegheny Electric Cooperative Inc.	100	21.7	1988	29	Water

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

County	Plant	Owner	Ultimate Parent	Ownership (%)	Operating Capacity (MW)	Year First Unit in Service	Age	Fuel Type
Indiana	Conemaugh	ArcLight Capital Partners, LLC	ArcLight Capital Holdings, LLC	35.11	1700	1970	47	Coal
		NRG Northeast Generating LLC	NRG Energy, Inc.	3.72		1970	47	Coal
		NRG REMA LLC	NRG Energy, Inc.	16.45		1970	47	Coal
		PSEG Fossil LLC	Public Service Enterprise Group Incorporated	22.5		1970	47	Coal
		Talen Generation LLC	Talen Energy Corporation	16.25		1970	47	Coal
		UGI Development Company	UGI Corporation	5.97		1970	47	Coal
	Conemaugh IC	ArcLight Capital Partners, LLC	ArcLight Capital Holdings, LLC	35.11	11.2	1970	47	Oil
		NRG Northeast Generating LLC	NRG Energy, Inc.	3.72		1970	47	Oil
		NRG REMA LLC	NRG Energy, Inc.	16.45		1970	47	Oil
		PSEG Fossil LLC	Public Service Enterprise Group Incorporated	22.5		1970	47	Oil
		Talen Generation LLC	Talen Energy Corporation	16.25		1970	47	Oil
		UGI Development Company	UGI Corporation	5.97		1970	47	Oil
	Homer City	Elliott Associates, L.P.	Elliot Group	2.99	########	1969	48	Coal
		GE Capital US Holdings, Inc.	General Electric Company	10.65		1969	48	Coal
		Homer City Generation, L.P.	Homer City Generation, L.P.	80		1969	48	Coal
		Preston Securities LLC	Preston Securities LLC	6.36		1969	48	Coal
	Indiana University of Pennsylvania	Indiana University Of Pennsylvania	Indiana University Of Pennsylvania	100	24	1988	29	Gas
	Seward Waste Coal	Seward Generation, LLC	Robindale Energy Services, Inc.	100	521	2004	13	Coal
Lackawanna	Archbald Cogeneration	PEI Power Corporation	Energy Transfer Equity, L.P.	100	20	1988	29	Biomass
	Archbald Power Station	PEI Power Corporation	Energy Transfer Equity, L.P.	100	59.2	2001	16	Gas
	Keystone Landfill	Keystone Recovery Inc.	Keystone Recovery Inc.	100	5.6	1995	22	Biomass
	Lackawanna Energy Center	First Reserve Management, L.P.	First Reserve Corporation	50	337	2018	-1	Gas
		Invenergy LLC	Invenergy LLC	50		2018	-1	Gas
Lancaster	Dart Container Corp Cogen	Dart Container Corp.	Dart Container Corp.	100	10.4	2012	5	Biomass
	Elizabethtown Solar	Community Energy Solar LLC	Community Energy, Inc.	100	2	2016	1	Solar
	Frey Farm Landfill	Talen Renewable Energy	Energy Power Partners	100	1.6	2006	11	Biomass
	Holtwood Hydroelectric Plant	Brookfield Renewable Partners L.P.	Brookfield Asset Management Inc.	60	249	1910	107	Water
			Brookfield Renewable Partners L.P.	40		1910	107	Water
		Talen Generation, LLC	Talen Energy Corporation	0		1910	107	Water
	Honey Brook Generating Station (Granger)	Granger Energy of Honey Brook, L.L.C.	Granger Electric Co	100	3.2	2006	11	Biomass
	Keystone Solar Project	Bright Plain Renewable Energy, LLC	Bright Plain Renewable Energy, LLC	50	5	2012	5	Solar
		D. E. Shaw Renewable Investments, LLC	D. E. Shaw & Co., L.P.	50		2012	5	Solar
	Lancaster County Resource Recovery	Lancaster County Solid Waste Management Authority	Lancaster County Solid Waste Management Authority	100	32.4	1991	26	Biomass
	Martin Limestone Solar Array Plant	Sunstream Energy LLC	Sunstream Energy LLC	100	1	2012	5	Solar
	Muddy Run Pumped Storage Facility	Exelon Generation Company, LLC	Exelon Corporation	100	1070	1967	50	Water
	Safe Harbor	Brookfield Renewable Partners L.P.	Brookfield Asset Management Inc.	60	417.5	1931	86	Water
			Brookfield Renewable Partners L.P.	40		1931	86	Water
	Turkey Point Wind Project (Frey Farm Wind)	Talen Renewable Energy	Energy Power Partners	100	3.2	2011	6	Wind
	Zook Generating Station (L&S Sweetners)	Granger Electric Co	Granger Electric Co	100	3.2	2013	4	Biomass
Lawrence	New Castle	NRG Power Midwest LP.	NRG Energy, Inc.	100	320	1939	78	Gas
	New Castle IC	Orion Power Holdings, Inc.	NRG Energy, Inc.	100	2.5	1968	49	Oil
Lebanon	Greater Lebanon Refuse Authority Landfill	Talen Renewable Energy	Energy Power Partners	100	3.2	2007	10	Biomass
	PPL Ironwood	Helix Generation, LLC	LS Power Group	100	735.4	2001	16	Gas
Lehigh	Air Products Solar (Trexlertown Solar)	Air Products Energy Enterprises, L.P.	Air Products and Chemicals, Inc.	100	1.9	2011	6	Solar
	Allentown	Talen Energy Supply, LLC	Riverstone Holdings LLC	100	62	1967	50	Oil

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

County	Plant	Owner	Ultimate Parent	Ownership (%)	Operating Capacity (MW)	Year First Unit in Service	Age	Fuel Type
Luzerne	AE Hunlock 4	Aspen Generating, LLC	LS Power Group	100	45	2000	17	Gas
	Bear Creek Wind Project	ArcLight Capital Partners, LLC	ArcLight Capital Holdings, LLC	26.3	24	2006	11	Wind
		Central Hudson Enterprises Corporation	Fortis Inc.	8.85		2006	11	Wind
		Community Energy, Inc.	Community Energy, Inc.	8.85		2006	11	Wind
		JPMorgan Chase & Co.	JPMorgan Chase & Co.	56		2006	11	Wind
	Harwood	Talen Energy Supply, LLC	Riverstone Holdings LLC	100	30	1967	50	Oil
	Hazle Township Flywheel Energy Storage	Convergent Energy and Power LP	Convergent Energy and Power LP	100	20	2013	4	Other
	Hazleton Cogeneration	Starwood Energy Group Global, LLC	Starwood Energy Group Global, LLC	100	150.9	1989	28	Gas
	Hunlock Repowering	UGI Development Company	UGI Corporation	100	129.6	2011	6	Gas
	Jenkins	Talen Energy Supply, LLC	Riverstone Holdings LLC	100	31	1969	48	Oil
	MATS Wind	Electric City Wind Power Corp.	Electric City Wind Power Corp.	100	0.55	2008	9	Wind
	Romark PA Solar	Romark Logistics Of Pa, Inc.	Romark Logistics Of Pa, Inc.	100	1.8	2011	6	Solar
	Susquehanna Nuclear	Allegheny Electric Cooperative Inc.	Allegheny Electric Cooperative Inc.	10	2620	1983	34	Nuclear
		Talen Generation LLC	Talen Energy Corporation	90		1983	34	Nuclear
Lycoming	Allenwood (PPLRE Lycoming County Landfil	Talen Renewable Energy	Energy Power Partners	100	3.2	2012	5	Biomass
	Laurel Hill	Duke Energy Renewables, Inc.	Duke Energy Corporation	100	69	2012	5	Wind
	Lycoming County Landfill Project (PPL Renev	Talen Renewable Energy	Energy Power Partners	100	3	2012	5	Biomass
	Patriot Power Generation Plant (Moxie Patriot	Panda Power Funds, LP	Panda Power Funds, LP	100	829	2016	1	Gas
	Williamsport	Talen Energy Supply, LLC	Riverstone Holdings LLC	100	28.8	1967	50	Oil
Mercer	General Electric Company	General Electric Company	General Electric Company	100	4.3	1984	33	Oil
Monroe	Pocono Raceway Solar Project	Pocono International Raceway Inc.	Pocono International Raceway Inc.	100	3	2010	7	Solar
	Shawnee CT	NRG REMA LLC	NRG Energy, Inc.	100	24	1972	45	Oil
Montgomery	500 Virginia Solar	500 Virginia Solar, LP	500 Virginia Solar, LP	100	1	2011	6	Solar
	Barbadoes Energy Storage Unit	AES Energy Storage, LLC	AES Corporation	100	2	2013	4	Other
	Conshohocken -Solar	Sun Power Electric	Conservation Services Group	100	0.06	1999	18	Solar
	Covanta Plymouth (Montenay Montgomery)	Covanta Plymouth Renewable Energy L.P.	Covanta Holding Corporation	100	28	1991	26	Biomass
	Hill at Whitemarsh	Talen Renewable Energy	Energy Power Partners	100	1.6	2007	10	Gas
	Limerick	Exelon Generation Company, LLC	Exelon Corporation	100	2386	1986	31	Nuclear
	Merck-Upper Gwynedd Solar Array	Merck & Company, Inc.	Merck & Company, Inc.	100	1.5	2011	6	Solar
	Moser	Exelon Generation Company, LLC	Exelon Corporation	100	60	1970	47	Oil
	Spring House IC Plant	Janssen Pharmaceuticals, Inc.	Johnson & Johnson	100	3.8	2013	4	Gas
	West Point Facility	Merck & Company, Inc.	Merck & Company, Inc.	100	66	1989	28	Gas
	West Point Facility IC	Merck & Company, Inc.	Merck & Company, Inc.	100	12.1	1972	45	Oil
Montour	Montour	Talen Generation LLC	Talen Energy Corporation	100	1548.5	1971	46	Coal
Northampton	Bethlehem CC	Conectiv Bethlehem LLC	Calpine Corporation	4.9	1134	2003	14	Gas
			Energy Capital Partners LLC	95.1		2003	14	Gas
	Bethlehem Landfill	Commonwealth Landfill Gas	Commonwealth Landfill Gas	20	5.4	2008	9	Biomass
		Pepco Energy Services, Inc.	Exelon Corporation	79.92		2008	9	Biomass
			Pepco Holdings LLC	0.08		2008	9	Biomass
	Crayola Solar Park	Talen Renewable Energy	Energy Power Partners	50	2.8	2010	7	Solar
		UGI Development Company	UGI Corporation	50		2010	7	Solar
	Glendon Plant	Talen Renewable Energy	Energy Power Partners	100	3.2	2011	6	Biomass
	Green Knight Energy Center	Waste Management, Inc.	Waste Management, Inc.	100	8.7	2001	16	Biomass
	Lower Mount Bethel	Talen Energy Corporation	Riverstone Holdings LLC	100	627.5	2004	13	Gas
	Martins Creek 3 and 4	Talen Generation LLC	Talen Energy Corporation	100	1729.7	1975	42	Gas
	Martins Creek CT	Talen Generation LLC	Talen Energy Corporation	100	78.8	1971	46	Gas
	Northampton	EIF Northampton LLC	Ares Owners Holdings, L.P.	91.18	112	1995	22	Coal
			EIF Northampton LLC	8.82		1995	22	Coal
	Portland CT	NRG REMA LLC	NRG Energy, Inc.	100	191	1967	50	Oil

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

County	Plant	Owner	Ultimate Parent	Ownership (%)	Operating Capacity (MW)	Year First Unit in Service	Age	Fuel Type
Northumberland	Mount Carmel Cogeneration	Mt Carmel Co-Gen, Inc.	Private investors-Kenneth M. Pollock & Connie J. Pollock Rado	100	43	1990	27	Coal
Philadelphia	Delaware CT	Exelon Generation Company, LLC	Exelon Corporation	100	74	1969	48	Oil
	Grays Ferry Cogeneration	Grays Ferry Cogeneration Partnership	Veolia Environnement SA	100	170.6	1997	20	Gas
	Lincoln Financial Field Solar Plant	NRG Renew LLC	NRG Energy, Inc.	100	2.9	2013	4	Solar
	Navy Yard Natural Gas Plant	PIDC Local Development Corp.	PIDC Local Development Corp.	100	6	2018	-1	Gas
	Newman & Company Inc.	Newman & Co Inc	Newman & Co Inc	100	1.8	1964	53	Gas
	Philadelphia Refinery	Carlyle Group L.P.	Carlyle Group L.P.	67	20.7	1952	65	Other
		Sunoco, Inc.	Energy Transfer Equity, L.P.	33		1952	65	Other
	PWD Northeast WPCP Biogas Cogen	Philadelphia Water Department	Philadelphia Water Department	100	5.6	2013	4	Biomass
	Richmond CT	Exelon Generation Company, LLC	Exelon Corporation	100	132	1973	44	Oil
	Schuylkill CT	Exelon Generation Company, LLC	Exelon Corporation	100	38	1969	48	Oil
	Southwark	Exelon Generation Company, LLC	Exelon Corporation	100	72	1967	50	Oil
	Temple SEGF Cogen Plant	Temple University	Temple University	100	16	1993	24	Gas
Pike	Wallenpaupack	Brookfield Renewable Partners L.P.	Brookfield Asset Management Inc.	60	44	1926	91	Water
			Brookfield Renewable Partners L.P.	40		1926	91	Water
Schuylkill	Broad Mountain Landfill Facility	UGI Development Company	UGI Corporation	100	9.2	2009	8	Biomass
	Fishbach	Talen Energy Supply, LLC	Riverstone Holdings LLC	100	36	1969	48	Oil
	John B Rich Memorial Power Station	Cogentrix Energy Power Management LLC	Carlyle Group L.P.	19.55	80	1988	29	Coal
		NextEra Energy Resources LLC	NextEra Energy, Inc.	5.45		1988	29	Coal
		Ontario Teachers' Pension Plan Board	Ontario Teachers' Pension Plan Board	12.5		1988	29	Coal
		RI-CORP Development Inc.	RI-CORP Development Inc.	50		1988	29	Coal
		UBS Global Asset Management	UBS Group AG	12.5		1988	29	Coal
	Locust Ridge II	Avangrid Renewables, LLC	Avangrid, Inc.	18.5	102	2009	8	Wind
			Iberdrola, S.A.	81.5		2009	8	Wind
	Locust Ridge Wind Farm	Avangrid Renewables, LLC	Avangrid, Inc.	18.5	26	2007	10	Wind
			Iberdrola, S.A.	81.5		2007	10	Wind
	Masser Farms Realty Solar	Masser Farms Realty, Ltd.	Masser Farms Realty, Ltd.	100	1	2011	6	Solar
	Northeastern Power Cogeneration Facility	Dynegy Generation NA, Inc.	Vistra Energy Corp.	100	52	1989	28	Coal
	Pine Grove Landfill	CCI Power Holdings LLC	Castleton Commodities International, LLC	12.31	5.4	2008	9	Biomass
			Energy Trading Innovations LLC	87.69		2008	9	Biomass
	St. Nicholas Cogeneration	Schuylkill Energy Resources Inc	Schuylkill Energy Resources Inc	100	86	1990	27	Coal
	Westwood Generating Station	Rausch Creek Development LLC	Rausch Creek Development LLC	12.75	30	1987	30	Coal
		RCL Holdings Ltd	RCL Holdings Ltd	62.25		1987	30	Coal
		Treemont Funding, LLC	ArcLight Capital Holdings, LLC	25		1987	30	Coal
	Wheelabrator Frackville Energy Company	Wheelabrator Technologies, Inc.	Energy Capital Partners LLC	100	42.5	1988	29	Coal
Snyder	Sunbury CT	Corona Power, LLC	Corona Power, LLC	100	36	1971	46	Oil
	Sunbury IC	Corona Power, LLC	Corona Power, LLC	100	5	1967	50	Oil
Somerset	Casselman Wind	Avangrid Renewables, LLC	Avangrid, Inc.	18.5	34.5	2007	10	Wind
			Iberdrola, S.A.	81.5		2007	10	Wind
	Forward WindPower LLC	NRG Yield, Inc.	NRG Energy, Inc.	55.1	29.4	2008	9	Wind
			NRG Yield, Inc.	44.9		2008	9	Wind
	Glades Pike Cogeneration Plant (CT)	State Correctional Institution – Laurel Highlan	State Correctional Institution – Laurel Highlands	100	2.5	2011	6	Biomass
	Glades Pike Cogeneration Plant IC	State Correctional Institution – Laurel Highlan	State Correctional Institution – Laurel Highlands	100	2.8	2011	6	Biomass

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

County	Plant	Owner	Ultimate Parent	Ownership (%)	Operating Capacity (MW)	Year First Unit in Service	Age	Fuel Type
Somerset	Lookout WindPower LLC	NRG Yield, Inc.	NRG Energy, Inc.	55.1	37.8	2008	9	Wind
(continued)			NRG Yield, Inc.	44.9		2008	9	Wind
	Meyersdale Wind Project	Quinbrook Infrastructure Partners Ltd	Quinbrook Infrastructure Partners Ltd	100	30	2003	14	Wind
	Ringer Hill Wind Farm	NJR Clean Energy Ventures Corporation	New Jersey Resources Corporation	100	38.3	2016	1	Wind
	Somerset Wind Project	Quinbrook Infrastructure Partners Ltd	Quinbrook Infrastructure Partners Ltd	100	9	2001	16	Wind
	Stony Creek Wind Farm	EC&R Investco Mgmt, LLC	E.ON SE	50	52.5	2009	8	Wind
		PD Alternative Investments US Inc	PensionDanmark Holding AS	50		2009	8	Wind
	Twin Ridges Wind Farm	BlackRock, Inc.	BlackRock, Inc.	100	139.4	2012	5	Wind
	Yough Hydro Power	D/R Hydro Co	D/R Hydro Co	100	12.2	1989	28	Water
Susquehanna	Roundtop	IMG Midstream LLC	COFRA Holding AG	100	21	2015	2	Gas
Tioga	Armenia Mountain Wind	ALLETE Clean Energy	ALLETE, Inc.	100	100.5	2009	8	Wind
	Blossburg	NRG REMA LLC	NRG Energy, Inc.	100	24	1971	46	Gas
Union	Bucknell University	Bucknell University	Bucknell University	100	6.7	1991	26	Gas
Venango	Handsome Lake Energy	Constellation Power, Inc.	Exelon Corporation	100	267.5	2001	16	Gas
	Scrubgrass	EIF United States Power Fund IV, L.P.	Ares Owners Holdings, L.P.	20	86.1	1993	24	Coal
		Olympus Power, LLC	Olympus Holdings, LLC	30		1993	24	Coal
		United States Power Fund III, L.P.	Ares Owners Holdings, L.P.	50		1993	24	Coal
Warren	Kinzua Pumped Storage Project (Seneca)	Harbor Hydro Holdings, LLC	LS Power Group	100	513	1970	47	Water
	Warren CT	NRG REMA LLC	NRG Energy, Inc.	100	57	1972	45	Oil
Washington	Arden Landfill	WM Renewable Energy, LLC	Waste Management, Inc.	100	4.8	2009	8	Biomass
Wayne	Waymart Wind Farm	Quinbrook Infrastructure Partners Ltd	Quinbrook Infrastructure Partners Ltd	100	64.5	2003	14	Wind
Westmoreland	Conemaugh Hydroelectric	Pennsylvania Renewable Resources	Pennsylvania Renewable Resources	50	15	1989	28	Water
		PSEG Global L.L.C.	Public Service Enterprise Group Incorporated	50		1989	28	Water
Wyoming	Mehoopany	Procter & Gamble Co.	Procter & Gamble Co.	100	1.6	1984	33	Gas
	Mehoopany CT	Procter & Gamble Co.	Procter & Gamble Co.	100	123	1985	32	Gas
	Mehoopany Wind	BP Wind Energy North America Inc.	BP Plc	50	142.6	2012	5	Wind
		Sempra U.S. Gas & Power, LLC	Sempra Energy	50		2012	5	Wind
York	Brunner Island	Talen Generation LLC	Talen Energy Corporation	100	1459.6	1961	56	Gas
	Brunner Island IC	Talen Generation LLC	Talen Energy Corporation	100	7.4	1967	50	Oil
	P.H. Glatfelter Company - Pennsylvania	P H Glatfelter Co	P H Glatfelter Co	100	89.3	1948	69	Coal
	Peach Bottom	Exelon Generation Company, LLC	Exelon Corporation	50	2626.9	1974	43	Nuclear
		PSEG Nuclear LLC	Public Service Enterprise Group Incorporated	50		1974	43	Nuclear
	Tolna	NRG REMA LLC	NRG Energy, Inc.	100	50	1972	45	Oil
	Turnkey Project - GlaxoSmith	GlaxoSmithKline	GlaxoSmithKline	100	1.6	2010	7	Solar
	York Cogeneration	Sapphire Power Generation Holdings LLC	Riverstone Holdings LLC	100	46.92	1989	28	Gas
	York County Resource Recovery Center	York County Solid W & R Authority	York County Solid W & R Authority	100	29.5	1989	28	Biomass
	York Energy Center (Delta Power Project)	Conectiv Mid Merit, LLC	Calpine Corporation	4.9	545	2011	6	Gas
			Energy Capital Partners LLC	95.1		2011	6	Gas
	York Haven	Enduring Hydro LLC	Enduring Hydro LLC	1	19	1905	####	Water
		I Squared Capital	I Squared Capital	99		1905	####	Water

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