

Utility Usage Report for Fiscal Year 2017–2018



Pennsylvania's
STATE SYSTEM
of Higher Education

Utility Usage Report
for
Fiscal Year 2017–2018

prepared for

Pennsylvania's State System
of Higher Education

Penn State Facilities Engineering Institute

Our Mission

To merit the public trust by meeting customer facility needs through engineering, information management, education, and applied research while exploring new and innovative ways to exceed customer expectations.

Our Vision

Penn State Facilities Engineering Institute will impart significant value to the services provided to their customers, thereby earning their respect and enhancing Penn State's tradition of excellence.

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A Message from the Director

We are proud to assist Pennsylvania's State System of Higher Education universities with facilities engineering and management needs. The services provided by the Penn State Facilities Engineering Institute help make your facilities safer, more reliable, more energy efficient, and more cost effective. Over the past year, we have continued to address your ever-changing and challenging needs presented by the built environment at each of the universities.

Please take time to review our collective services summary, summary of services rendered to individual universities, and the summary of utility usage information with analysis for each university. The data gathered from you and organized by our personnel provides an accounting of your utility and energy usage for planning and budgeting purposes.

We encourage you to take advantage of the education offerings provided by our institute. We continuously monitor and modify our educational programs as your personnel's skill sets change, as regulatory issues require specific personnel training, and as new technology becomes integrated into your facilities infrastructure.

We value our working relationship with each university and the Office of the Chancellor and thank all the individuals who provided support in collecting the data that is the basis for this report.

Please feel free to contact us at any time to request services or simply to discuss new ideas.

Sincerely,

A handwritten signature in blue ink, appearing to read "John Hajduk".

John Hajduk, MBA
Director

INTRODUCTION

The Penn State Facilities Engineering Institute (PSFEI) is pleased to present the *Utility Usage Report for Fiscal Year 2017–2018* for Pennsylvania's State System of Higher Education (PASSHE). This report includes two major components, a summary of services and utility usage data. The Summary of Services is a brief description of services that are provided both collectively and for individual universities. The utility usage data tables and graphs identify fuel consumption and energy costs for the past five years. The Energy Utilization Index (EUI), defined as British thermal units per square foot (Btu/sq-ft), remains the primary index of a university's use of all forms of energy relative to the conditioned space. Identification of the EUI and other parameters in this report establish baseline data for past and future measurement and comparison. Additionally, the data reflects a five-year history for student population and a variety of energy, space, water, and sewage information.

The 2003–2004 EUI baseline has been maintained for fiscal year 2017–2018. The EUI baseline allows a comparison of the current year with the EUI for year one of the PASSHE Energy Plan. It is shown for all PASSHE universities in Table 1 and in the five-year tables for each university.

PSFEI meets periodically with the Office of the Chancellor to review the progress of our existing work and plan for future work. During the meetings, PSFEI provides valuable information on the current state of electricity and natural gas procurement for PASSHE, energy-related issues including market updates, changing environmental regulations, and a variety of other topics of interest to the attendees. These meetings increase productivity by facilitating communication, thus allowing PSFEI to provide the most needed services to PASSHE.

During the fiscal year, professional and technical services for boiler plant; electrical; energy; heating, ventilating, and air conditioning (HVAC); and water treatment were provided by PSFEI. These services covered a broad array of completed and continuing projects that resulted in avoided costs, improved equipment reliability, and increased operating efficiency.

In addition, PSFEI developed greenhouse gas (GHG) and fuel-combustion emissions data for all PASSHE universities. The GHG data represents general emissions data for various direct-fuel usage as well as that consumed by electric utility suppliers. The data was developed from the United States Environmental Protection Agency's (EPA) eGRID data for electricity and 40 Code of Federal Regulations (CFR) emission information for other fuels. An updated report is provided to the PASSHE Assistant Vice Chancellor for Facilities every year.

COLLECTIVE SERVICES

Following is a listing of services PSFEI offers to its clients. PASSHE has contracted for a specific group of services that meet their needs. Additional services from the listing are available upon request.

BOILER PLANT

PSFEI provides central heating plant services for all aspects of boiler plant operations and maintenance supporting a broad range of issues including:

- System troubleshooting
- Specification document review for capital projects
- Assistance with air quality permitting and reporting
- Evaluation of new and proposed air quality regulations for impact on boiler plants
- Boiler plant control system assessments
- Annual training classes and onsite training by request

ELECTRICAL

PSFEI provides a variety of electrical services that cover:

- Engineering, operation, maintenance, and project advisory services
- Electrical equipment testing and field services
- Power system inspections, surveys, and analyses
- Power system studies
- Emergency response assistance
- Electrical codes and standards reviews
- Medium voltage electrical distribution system testing and maintenance
- Capital project reviews
- Coordination studies
- Recommendations for operations, maintenance, and replacement of low and medium voltage electrical equipment
- Arc flash studies
- Annual training classes and onsite training by request

HEATING, VENTILATING, AND AIR CONDITIONING

PSFEI provides a variety of HVAC advisory services that include:

- Review of conventional and new technologies in HVAC designs that involve steam and hot water heating systems, chillers, and chilled water systems
- Review and troubleshooting of building air-distribution systems
- Assistance with automatic temperature controls (ATC) and building automation systems (BAS)

- Troubleshooting cooling and heating systems, airflow, refrigeration, and steam-related issues
- Reviewing plans for renovations and new building installations
- Evaluation of various pieces of HVAC equipment such as pumps, variable frequency drives, air handlers, chillers, terminal units and valves, and distribution equipment
- Participation in HVAC facility assessments and energy audits
- Annual training classes and onsite training by request

STRUCTURAL/ARCHITECTURAL

PSFEI provides the following structural/architectural engineering advisory services:

- Repair recommendations related to building structure and enclosure concerns
- Logistical support for relocation of equipment
- Assessment and replacement recommendations for deteriorated concrete slabs, utility tunnels, below-grade waterproofing, roofing assemblies, masonry facade displacement, and masonry boiler stack cracking and deterioration
- Advice on implementing repair programs

WATER/WASTEWATER TREATMENT

PSFEI provides water/wastewater treatment and related advisory services that include:

- Technical evaluation and advice relative to boiler water, cooling towers, potable (drinking) water, and wastewater
- Engineering evaluations of wastewater treatment facilities, wastewater collection systems, water treatment facilities, and water distribution systems
- Feasibility studies
- Preparation of operation and maintenance manuals for water and wastewater facilities
- Rate studies
- Development and negotiation of inter-municipal service agreements
- Review of facility boiler water chemistry logs
- Advice regarding environmental regulations
- Onsite, site-specific training upon request

DEPARTMENT OF GENERAL SERVICES COAL COMMITTEE

PSFEI is a standing member of the Department of General Services (DGS) Coal Committee. The committee met in March 2018 to review performance from the previous contract year and determine any changes to contract requirements for the 2018–2019 year.

During the March 2018 meeting, personnel from the Pennsylvania Department of Environmental Protection (PADEP) were briefed on committee activities and issues that the committee deals with on a continuous basis. Support provided by PSFEI included coal specification reviews, development of actions to maintain desired coal quality, vendor meetings, assistance with the development of contract language

to reflect changes to the program, and updates to the lab reporting spreadsheet to reflect changes in the Pennsylvania Commercial Item Description (PCID) 1069 coal specifications.

PASSHE DIRECTORS MEETINGS

In addition to the university-specific services listed within this report, PSFEI participated in the PASSHE Directors Meetings at Indiana University of Pennsylvania in September 2017 and Lock Haven University in March 2018. Updates were provided at both meetings on the electricity and natural gas markets. At the September 2017 meeting, PSFEI presented an example of a security design and operation for large events using Penn State's Beaver Stadium as an example.

ENERGY

The PSFEI Energy Team serves the energy needs of PASSHE universities. The Energy Team furnishes essential services in energy procurement, energy database development and management, energy education, strategic energy planning, and energy market-place research and tracking.

During the fiscal year, the PSFEI Energy Team helped save the PASSHE universities over \$5.1 million in contract avoided costs versus utility rates for electricity and natural gas procurement and \$478,831 in payments from participation in the PJM Demand Response Program.

ENERGY RISK MANAGEMENT APPLICATION

PSFEI continued development efforts to improve the Energy Risk Management Application (ERMA), its proprietary, advanced, multifunction, web-based application that provides online access to detailed procurement and utility billing information allowing facility management personnel to make informed utility and commodity decisions. Development efforts during the fiscal year focused on expanding administrative import functions, adding a new fixed-with-pass-through electricity bid type, general bug fixes, system optimization, and enhanced reporting.

ACT 129

Act 129 amends the Public Utility Code and includes an Energy Efficiency and Conservation (EE&C) Program that requires each of the seven major Commonwealth of Pennsylvania (Commonwealth) electrical distribution companies (EDCs) to adopt plans that reduce energy demand and consumption within their service territory. It includes incentives for energy-efficient equipment upgrades, smart-meter technology, time-of-use rates, real-time pricing plans with conservation components, and alternative energy sources. Since consumers fund the cost of this program, it is advantageous to participate in the program.

Act 129 Phase III will operate from June 2016 through May 2021 and provide cash rebates for electricity saving initiatives. The program includes an EDC-based demand response program that started in June 2017, which provides a financial benefit to users who can reduce their electric demand during periods of peak grid electric demand. Program specifics are available through each EDC.

The DGS Energy and Resource Management group plays an active role in assisting the Commonwealth with taking advantage of the Act 129 program. PSFEI provides support to DGS and any agency who requests program information.

PJM DEMAND RESPONSE PROGRAM SERVICES

PSFEI supported PASSHE universities with the PJM Emergency Demand Response program. This support included solicitation of curtailment service providers (CSP) and review and dissemination of information on various PJM programs, proposed fees, procedures, and associated revenues for program participation. Six universities participated in the PJM program. Results from the 2017–2018 program are detailed in the following PJM Demand Response Program Results table.

PJM Demand Response Program Results

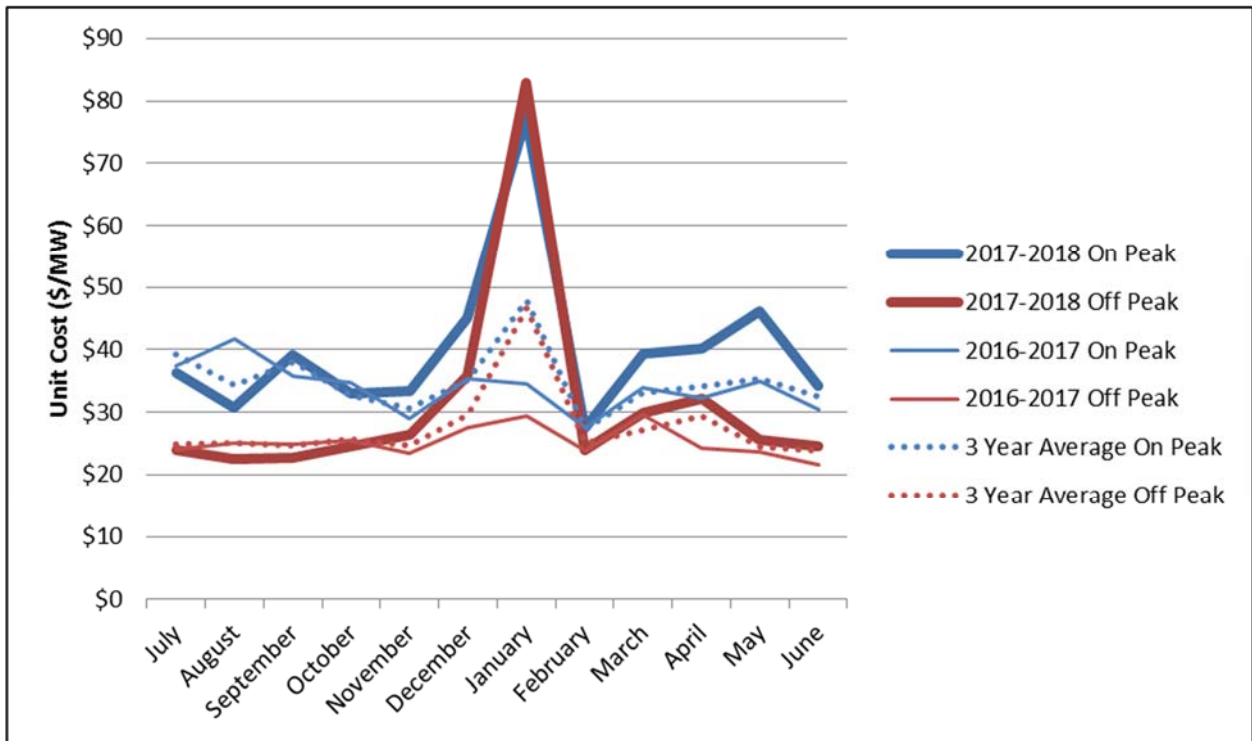
University	CSP	EDC	KW Commitment	KW Achieved	Total Payment
Clarion University	NRG	West Penn	1,306	1,470	\$69,361
East Stroudsburg University	NRG	PPL	591	919	\$15,694
Kutztown University	NRG	MetEd	2,504	2,805	\$132,982
Millersville University	NRG	PPL	1,114	1,771	\$29,573
Slippery Rock University	NRG	West Penn	2,903	2,762	\$138,337
West Chester University	NRG	PECO	1,246	2,437	\$92,883
Total Customer Payments					\$478,831

ELECTRICITY MARKET

Throughout fiscal year 2017–2018, the energy markets continued to exhibit a strong correlation between natural gas and regional electricity pricing. With a slowly shifting regional electricity generation fleet that sees legacy generation fuels, such as coal, undercut by newer natural gas generators, the electricity markets are increasingly reliant on natural gas as a baseload fuel. While strong local gas production within the footprint of the Commonwealth assures that fuel is readily available, high-demand periods show that electricity pricing can still be extremely volatile.

To gain a more granular view of electricity market changes, PSFEI analyzed the PJM Western Hub Real Time Locational Marginal Price (LMP) hourly energy market data to compare and contrast fiscal years 2017–2018 and 2016–2017 with a three-year average. The average monthly on-peak and off-peak prices are shown in the PJM Western Hub Real-Time LMP Prices by Month graph on page 7.

PJM Western Hub Real-Time LMP Prices by Month



In fiscal year 2017–2018, the hourly LMP market shifted back toward a winter-peaking pricing pattern. This contrasts with the summer-peaking pattern seen in fiscal year 2016–2017 and is reminiscent of the winter-peaking pattern observed in fiscal year 2014–2015. In January 2018, an extended period of extreme cold temperatures across the region stressed natural gas pipeline capacity, forcing generators to switch to backup fuels while more expensive peaking generation plants were called on to meet the increased electricity demand. Accordingly, January 2018 represented the highest average on-peak LMP price of \$77.43 per megawatt (MW); however, the highest average LMP price overall was observed in the January 2018 off-peak period at \$82.86 per MW.

Over the course of the fiscal year, on-peak pricing was approximately 19 percent higher while off-peak pricing was approximately 26 percent higher, leading to an around-the-clock average of a 21 percent increase in hourly LMP pricing for fiscal year 2017–2018 in comparison to 2016–2017. In addition to higher pricing, volatility in the hourly LMP market increased a staggering 155 percent on a year-over-year basis and was 109 percent higher than the three-year average.

By all accounts, the hourly LMP market was much more active than the last fiscal year. Elevations in overall pricing and volatility allude to an hourly market that is attempting to balance a shifting generation fleet and reliability with slowing load growth.

The cost of generation capacity, set by PJM’s Reliability Pricing Model and effective on a June through May cycle, increased in the western portion of the Commonwealth and decreased slightly in the eastern portion of the Commonwealth during 2017–2018, as compared to fiscal year 2016–2017. In general, capacity prices across the entire Commonwealth ranged tightly between \$170 and \$177 per MW-day. Capacity charges represent approximately 15–20 percent of total electric bill charges for larger

Commonwealth facilities. It is important to note the capacity prices quoted in the graph include final zonal scaling factors and forecast pool requirements.

Significant increases in 2017–2018 capacity pricing in West Penn Power, Penn Power, and Duquesne were experienced in comparison to fiscal year 2016–2017 with 48, 15, and 52 percent cost increases, respectively. MetEd, PECO, Penelec, and PPL experienced decreases of 8, 7, 3, and 7 percent, respectively. Looking ahead, in general, capacity costs will rise in 2018–2019 before sharply decreasing in 2019–2020. The sharp decrease in pricing in 2019–2020 will be followed by another moderate decrease in 2020–2021 across all zones except PECO. In 2021–2022, capacity prices will bounce back to 2017–2018 levels.

Transmission rates in fiscal year 2017–2018 increased in the PPL, MetEd, Penelec, and Penn Power territories. PPL’s transmission rate experienced an approximate increase of 40 percent, MetEd and Penelec increased by 50 percent, and Penn Power increased by approximately 13 percent. PECO and Duquesne experienced slight decreases while transmission rates in West Penn Power remained the same. Transmission charges account for approximately 15 percent of the total cost of electricity for larger Commonwealth facilities.

All transmission territories in the Commonwealth, except for West Penn Power, now utilize a formula rate structure for recovering transmission costs. Consequently, transmission rates for these territories will be updated on an annual basis. Aging infrastructure, introduction of more renewable generation resources, and the ever-growing threat of cyber and terrorist attacks will require significant investment in the electrical grid. It is expected that transmission rates will continue to rise to cover costs associated with replacement of aging assets and fortification of transmission lines and equipment.

During the fiscal year, several developments occurred at the regulatory level with regards to electric distribution. UGI Electric, Duquesne Light, and PECO requested rate increases before the Public Utility Commission (PUC). The impact on customer distribution rates will vary by rate class and individual account usage characteristics. In addition to these base rate case proceedings, two other significant regulatory developments occurred.

On April 19, 2018, the PUC implemented Act 40 that requires solar projects under the Alternative Energy Portfolio Standard (AEPS) to be built in Pennsylvania. Previously, the Commonwealth allowed solar from anywhere within PJM to be used for compliance with the AEPS. The consensus is that Act 40 will increase the price of Solar Alternative Energy Credits; however, the impact may not be felt for a few years.

On June 28, 2018, House Bill (HB) 1782 was signed into law. HB 1782 allows utilities to propose new ratemaking approaches, including decoupling, performance-based rates, formula rates, and multiyear rates. The bill is designed to allow utilities to encourage energy efficiency and conservation as well as distributed and renewable generation projects. HB 1782 only impacts the distribution portion of the electricity bill and will not impact the generation portion. Any alternative rate structures proposed by utilities will still require PUC review and approval.

ELECTRICITY PROCUREMENT

PSFEI worked with the PASSHE Collaborative Contract Manager to conduct an electricity commodity procurement event for large PASSHE accounts during fiscal year 2017–2018. To provide the most

relevant projections of future avoided cost, PSFEI staff assembled recent utility billing data, hourly interval usage data, and generation and transmission Peak Load Contributions (PLCs) where applicable for larger accounts.

Larger accounts were solicited for each university with decisions regarding contract awards being made by university personnel. PSFEI provided advisory services regarding market observations and expectations. In some cases, the bids submitted by suppliers indicated a negative avoided cost, wherein default service from the utility company was projected to be less costly. Since default service for these large accounts is based on the real-time energy market plus an additional fee or credit from the utility company for management, fixed-price contracts were awarded by the universities to remove the risk of unpredictable and volatile pricing and to ensure budget certainty.

Smaller accounts for each university were aggregated with Commonwealth accounts by customer class and service territory to provide the most diverse portfolio possible, driving competition and lowering overall pricing. Authority to award contracts for the smaller accounts was delegated to Commonwealth personnel.

During fiscal year 2017–2018, contracts were awarded for twenty-one electric accounts. Total contract avoided cost in comparison to the utility rate for these accounts was projected to be \$3,381,594. When comparing the newly awarded contracts to the existing pricing in place for these accounts, where available, a decrease in electricity commodity cost was projected to be \$1,229,183 over the term of the new contracts.

Electricity Procurement Summary

University	No. of Accounts	Annual Avoided Cost vs Previous Contract	Contract Avoided Cost vs Previous Contract	Annual Avoided Cost vs Utility Rates	Contract Avoided Cost vs Utility Rates
California	2	\$115,645	\$346,991	\$1,066,611	\$3,200,597
Lock Haven	1	\$909	\$2,726	\$1,546	\$4,639
Millersville (1)	12	\$170,210	\$510,631	(\$101,497)	(\$304,491)
Shippensburg	4	\$184,418	\$368,836	\$236,502	\$480,222
Slippery Rock	2	---	---	\$157	\$627
Totals	21	\$471,182	\$1,229,183	\$1,203,319	\$3,381,594

(1) To eliminate price risk from hourly default pricing, fixed-price contracts were awarded resulting in a projected negative contract avoided cost versus the retail tariff hourly pricing.

NATURAL GAS MARKET

The natural gas market continues to be very dynamic, with many factors affecting supply, demand, and pricing. Over the last ten years, natural gas monthly settlement prices trended generally downward at a rate of approximately 16 percent per year as shown in the New York Mercantile Exchange (NYMEX) Natural Gas Monthly Settlement Price 2009–2018 graph on page 10. With U.S. natural gas production at an all-time high of approximately 93 billion cubic feet (BCF) per day over the past three fiscal years, the rate of price decrease began to level out as global demand began to catch up to production. According to Bloomberg New Energy Finance, at current conditions, demand could catch up to production within two years. However, new global production set to come on line in the coming years will put more gas back into the markets, keeping prices relatively stable.

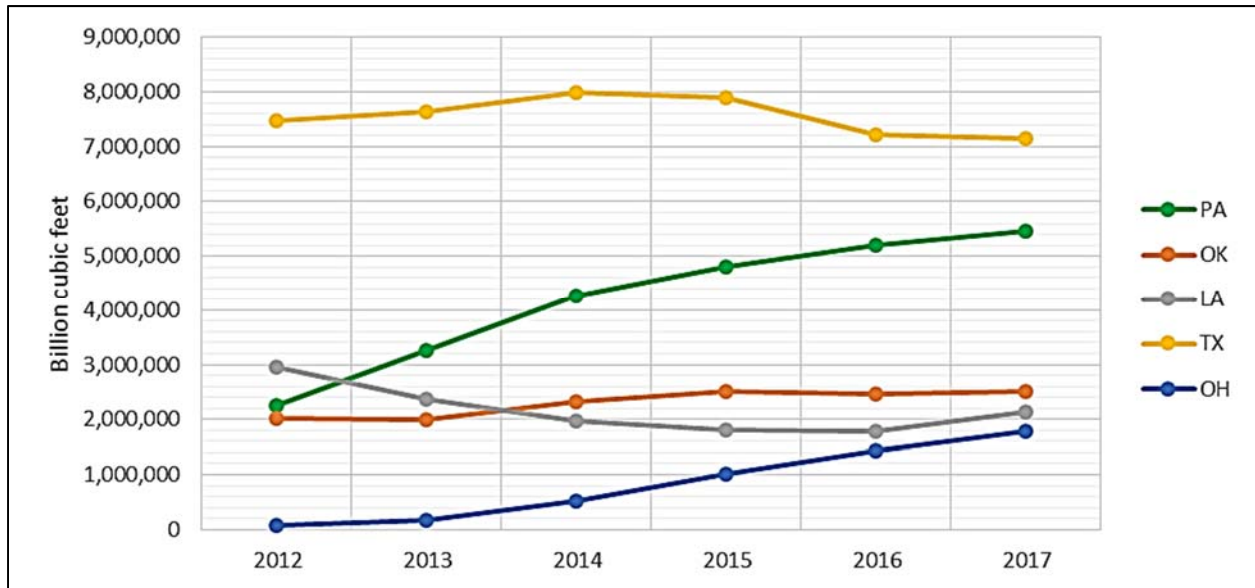
NYMEX Natural Gas Monthly Settlement Price 2009–2018



As of June 2018, natural gas storage inventory was 2,152 BCF, a decrease of 717 BCF (25 percent) from a year ago and 493 BCF (19 percent) below the five-year average of gas in storage. Lower volumes of gas in storage typically result in higher natural gas prices. Likewise, increased demand from gas-fired power generation and increased liquefied natural gas (LNG) exports would normally lead to rising natural gas prices. However, the average monthly NYMEX natural gas settlement price decreased 4.6 percent from \$3.07 per million British thermal units (mmBtu) in fiscal year 2016–2017 to \$2.93 per mmBtu in fiscal year 2017–2018. Even during occasional cold snaps during the 2017–2018 winter months, market price reaction has been minimal and short-term. The consensus in the marketplace is that the reason for low prices is due to the expectation that production will keep up with or outpace demand, keeping prices less reactive and more stable.

Pennsylvania’s contribution to U.S. natural gas production is significant, second only to Texas and far outpacing the next three largest producing states, as shown in the Annual Natural Gas Production graph on page 11. As in the past several years, Pennsylvania and the mid-Atlantic region continued to experience discounted gas prices in reaction to weak demand in the local marketplace coupled with pipeline capacity limitations; however, this is changing. According to the U.S. Energy Information Administration, over 23 BCF per day of takeaway capacity from Pennsylvania will be online by the end of 2018, an increase of 38 percent over 2017. Local natural gas prices could potentially rise as the mid-Atlantic region market becomes coordinated with higher-priced national and global markets.

Annual Natural Gas Production

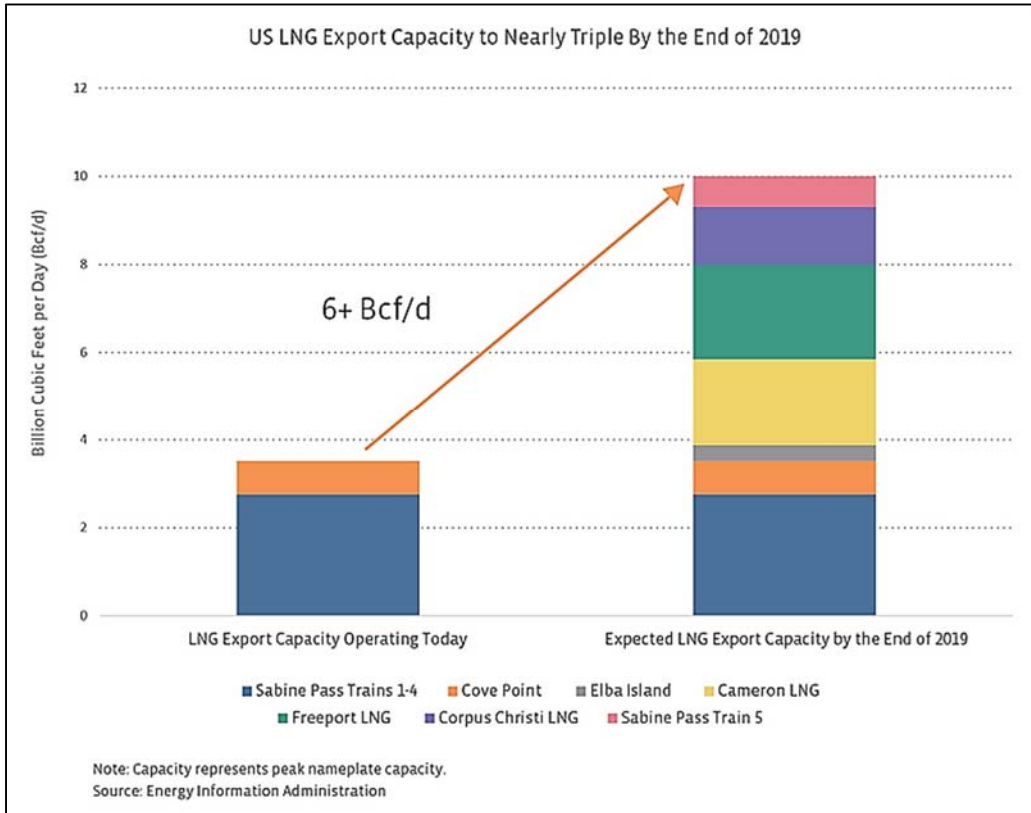


Source: U.S. Energy Information Administration

The U.S. exported more natural gas than it imported beginning in early 2017. LNG is accounting for a large and growing portion of gas exports. Many new LNG export terminals are under construction or in planning. In 2017, U.S. LNG exports were approximately 2 BCF per day. By the end of 2019, LNG exports could increase to 10 BCF per day with five additional LNG export terminals coming online, as shown in the U.S. LNG Export Capacity chart on page 12. The impact on northeast regional pricing due to LNG exports remains to be seen. Currently, all eastern U.S. terminals, except for Cove Point in Maryland, are located in the Gulf of Mexico or southeast U.S. With takeaway capacity expected to increase, the effect of increased LNG exports on Pennsylvania natural gas pricing may be delayed or minimal.

As in past years, the major factors affecting natural gas price are gas in storage, demand, supply, and weather, with the latter being the most unpredictable. Given the recent trend of warmer than normal winters coupled with the ability of supply to exceed demand and the decreasing relevance of storage volumes on price, natural gas will likely continue to be a cost-efficient fuel for Commonwealth of Pennsylvania facilities for the next several years.

U.S. LNG Export Capacity



NATURAL GAS PROCUREMENT

Two natural gas commodity procurement events were held during the fiscal year. For each of the accounts shopped, PSFEI collected billing data, charted historical gas consumption, and estimated monthly gas nominations for bidding based on usage trends, weather data, and future facility operations. Verbal or written correspondence with each university was conducted to determine nominations. Subsequent approval by the university was then obtained via PSFEI’s web-based procurement software.

The Natural Gas Procurement Summary table on page 13 shows four universities (California, Indiana, Lock Haven, and Shippensburg) with negative avoided cost when compared to previous gas supply contracts. This is due to rising natural gas market prices. However, all universities realized savings as compared to obtaining natural gas from their gas utilities. For more details on natural gas market conditions, refer to the Natural Gas Market section.

During a period of low natural gas market prices in May 2018, PSFEI contacted all PASSHE universities with basis-price natural gas contracts to provide recommendations on locking in gas commodity prices for future months. Universities participating in price-locking included Bloomsburg, Edinboro, and Slippery Rock.

Natural Gas Procurement Summary

University	No. of Accounts	Annual Avoided Cost vs Previous Contract	Contract Avoided Cost vs Previous Contract	Annual Avoided Cost vs Utility Rates	Contract Avoided Cost vs Utility Rates
Bloomsburg	6	\$46,047	\$12,133	\$280,741	\$349,562
California (1)	14	(\$15,865)	(\$31,730)	\$45,398	\$90,796
Dixon Center	1	\$944	\$2,831	\$10,227	\$30,682
Edinboro	17	\$2,931	\$4,640	\$109,118	\$172,770
Indiana (1)	3	(\$14,500)	(\$14,999)	\$7,906	\$7,799
Lock Haven (1)	3	(\$60,921)	(\$121,842)	\$214,023	\$428,046
Millersville	4	\$12,889	\$12,889	\$77,113	\$77,113
Shippensburg (1)	1	(\$49,886)	(\$99,773)	\$212,187	\$424,373
Slippery Rock	1	\$149,014	\$186,268	\$124,882	\$156,102
Totals	50	\$70,652	(\$49,583)	\$1,081,594	\$1,737,243

(1) Negative annual and contract avoided cost vs previous contract reflects rising natural gas market pricing.

EDUCATION

Various educational opportunities were provided to PASSHE personnel during the fiscal year. Half-day workshops were held at various locations throughout the Commonwealth, and four short courses consisting of two and one-half days were held in State College. Other specialized trainings were available to PASSHE universities when requested. PSFEI periodically reviews and updates courses to remain current with PASSHE needs and new developments in technology. During the fiscal year, seventy-three PASSHE personnel improved their engineering, maintenance, and operational skills at the PSFEI short courses and workshops. Attendance by university is shown on page 16.

The following PSFEI short course opportunities were provided in fiscal year 2017–2018:

- HVAC Technical Conference, July 26–28, 2017. Topics of instruction focused on basic HVAC thermodynamics and heat transfer, chiller fundamentals and the central plant, Legionella and water treatment, and predictive monitoring for uptime and reliability. Course attendees toured Penn State's West Campus Chiller Plant.
- Boiler Plant Operations and Maintenance Training, May 7–9, 2018. This course provided instruction on boiler properties of water and steam; boiler processes, controls, operations, safety, pumps and fans, and water treatment; and the impact of environmental regulations. Course attendees toured Penn State's East Campus Combined Heat and Power Plant.
- Electrical Theory, May 23–25, 2018. Sessions taught during this course included confined space; lockout/tagout; Occupational Safety and Health Administration (OSHA) discussion (private versus public sector); effective safety training; mold awareness; asbestos in schools; medium voltage vacuum breaker life extension; transformer leak solutions; arc flash training and equipment maintenance; relay testing demonstration; lighting demonstration; electrical system deficiencies; and a review and discussion of Commonwealth projects. Course attendees toured Penn State's Pegula Ice Arena's electrical switchgear.
- HVAC Technical Conference, June 11–13, 2018. Topics of instruction focused on basic HVAC thermodynamics, steam condensate, steam trap design and operating principals, safety with steam, water treatment, coil training, and heating plant essentials. Course attendees toured Penn State's East Campus Combined Heat and Power Plant.

The following half-day workshops were provided and hosted at various Commonwealth facilities across the state.

- Boiler Workshop—boiler plant and heating system operations, maintenance, and performance improvement.
- Electrical Workshop—electrical principles and basics of lighting.
- HVAC Workshop—reading and interpreting HVAC prints.

Monthly Utilities Usage Report training was provided to facilities upon request throughout the fiscal year.

Education Table

University	2017-2018 Short Courses				2017-2018 Workshops				Total Attendees	
	Boiler	EFM (1)	Electrical	HVAC (2)	Boiler	Electrical	HVAC	Arc Flash	Short Courses	Workshops
Bloomsburg	1									
California					4					4
Chancellor's Office										
Cheyney										
Clarion			2	4		2	6		6	8
Clarion - Venango										
Dixon Center										
East Stroudsburg										
Edinboro										
Indiana								8		8
Kutztown										
Lock Haven	2		2						4	
Mansfield			1							
Millersville				2	2				2	2
Shippensburg			3						3	
Slippery Rock			2	4		3	4	15	6	22
West Chester				6					6	
Total	3		10	16	6	5	10	23	29	44

- (1) The Effective Facility Management short course was not held in fiscal year 2017–2018.
 (2) Two HVAC short courses were held in fiscal year 2017–2018.

SERVICES TO INDIVIDUAL UNIVERSITIES

BLOOMSBURG UNIVERSITY

Verified the accuracy of natural gas provider NJR Retail Services' nomination volumes as awarded in Request for Quote (RFQ) 2018-GAS-LAV-04.

Met with the Assistant Director of Facilities Mechanical Maintenance in May 2018 to discuss PSFEI's services and capabilities.

Assisted university staff with evaluating existing boiler controls and reviewing proposals for replacement. This project is ongoing; PSFEI will assist campus staff with generating a scope of work for the replacement project.

CALIFORNIA UNIVERSITY

Conducted a power quality study of the Steel Hall Auditorium at the request of the Interim Electrical Foreman. There had been concerns in the past that power fluctuations caused problems and failures to the sensitive auditorium lighting and sound equipment. Based on the testing data, the electrical power supply at the Steele Hall Auditorium is a stable source of electrical power with no notable surges, sags, voltage imbalances, or harmonics. Testing results and recommendations were provided in PSFEI Report ER 17/18–9 issued November 10, 2017.

Conducted an electric bill audit that identified an incorrect FirstEnergy Solutions supply rate, which resulted in a refund of over \$500.

Assisted university staff with evaluating existing boiler controls and reviewing proposals for replacement. This project is ongoing.

Discussed the need for PSFEI to conduct a preliminary evaluation of the University's central steam plant and distribution system with the Assistant Director for Building Trades.

Visited the campus in January 2018 at the request of the Assistant Director for Utilities and Energy to assist with determining the cause of the water source heat pump condenser pipe leak in Dixon Hall. Findings and recommendations were documented in PSFEI Report HR 17/18–8 issued April 9, 2018.

Provided input to the Assistant Director Utilities and Energy on the condition of the geothermal condenser water piping in the pit located outside the student dorm complexes. Recommended replacement of the piping and provided information on PESTAN Polypropylene Random Copolymer (PP-R) and Polypropylene Random Crystalline Temperature (PP-RCT) piping systems, which are piping systems that would be more suitable in a harsh environment such as the pit. This project is ongoing.

CHEYNEY UNIVERSITY

Responded to a request from the Associate Vice President for Facilities in February 2018 to review the electrical distribution system and discuss the results of a report from an electrical contractor regarding a

fault that occurred in November 2017. Findings and recommendations were provided in PSFEI Report ER 17/18–15 issued February 21, 2018.

Toured the campus to gather information on the electrical service entrance, main switchgear, and distribution system in preparation for the development of an electrical maintenance and testing scope of work.

CLARION UNIVERSITY

Completed a capital project assessment for the Marwick-Boyd Fine Arts Center during fiscal year 2016–2017. The report documenting this effort, PSFEI Report GR 17/18–1, was issued July 26, 2017, and identified electrical and HVAC requirements and budgetary cost estimates for 0–5 Year and 5–10 Year capital project needs.

Provided on-site Monthly Utilities Usage Report training to campus staff to help ensure accurate reporting and timely submission of reports.

Participated in numerous project meetings at the request of the Director of Facilities Planning and Management regarding the University’s electrical upgrade project.

Consulted with the Director of Procurement regarding natural gas supply contract issues.

Responded to a request from the Associate Director of Computing Services in March 2018 to evaluate a humidity issue in the Main Distribution Frame and Server Room (Room 201–202) in Becht Hall. Findings and recommendations were provided in PSFEI Report HR 17/18–7 issued April 27, 2018.

CLARION UNIVERSITY–VENANGO CAMPUS

No site-specific services requested.

DIXON UNIVERSITY CENTER

Reviewed an HVAC systems replacement proposal from Barton Associates, Inc. at the request of the Director of Facility Operations and Maintenance. This project has been put on hold.

Completed an infrared inspection of the buildings at Dixon Center in July 2017 and found no issues.

EAST STROUDSBURG UNIVERSITY

No site-specific services requested.

EDINBORO UNIVERSITY

No site-specific services requested.

INDIANA UNIVERSITY OF PENNSYLVANIA

Met with the Director of Facilities Operations in September 2017 to discuss structural/architectural services offered by PSFEI and assess site-specific needs.

Reviewed the HVAC equipment and configuration proposal from the design firm for the new Science Building at the request of the University's Senior Project Manager. This project is ongoing.

Provided ongoing technical support for the University's electrical project.

Continued to provide technical support for the auxiliary boiler burner upgrade project, which included numerous site visits and discussions with facility staff and vendors regarding flue gas recirculation (FGR) takeoffs, oil flow measurement, nitrogen oxide (NOx) limits, readings on breeching and FGR duct pressure, and observation of the start-up and tuning of the new burner on Boiler No. 2. PSFEI support will continue in fiscal year 2018–2019 regarding evaluation of steam and gas flow meters, chart recorders, and piping changes for fuel oil delivery to the auxiliary boilers.

Provided on-site arc flash training in January 2018 for campus maintenance staff.

KUTZTOWN UNIVERSITY

Conducted electrical maintenance and testing of the Kemp Switchgear in May 2018 at the request of the Facilities Energy Services and Campus Utilities Director. Provided testing reports and a comment and deficiency summary in PSFEI Report TR 17/18–9 issued May 15, 2018.

LOCK HAVEN UNIVERSITY

Assisted the Director of Facilities with locating a temporary chiller to replace the failed chiller in Rob Hall. Provided information for a structural engineer who can provide design services for the roof loading project prior to the new chiller installation.

Inspected, reviewed, and monitored the power consumption of the new chiller plant installation at the Stevenson Library; the metered data indicated proper chiller operation.

Provided continual technical support for DGS Project 409-63, *Renovate and Upgrade Campus Electrical Infrastructure, East Campus Science Center, Lock Haven University*.

Consulted with the Director of Facilities regarding natural gas utility tariff rate options.

Met with the Director of Facilities and Energy Management Specialist in May and June 2018 to discuss PSFEI structural/architectural services and assess site-specific needs.

Investigated the potential use of an EUI normalized by weather conditions at the request of the Director of Facilities. The investigation revealed that attempting to normalize using degree days did not have any significant impact at an annual level of data granularity.

LOCK HAVEN–CLEARFIELD CAMPUS

No site-specific services requested.

MANSFIELD UNIVERSITY

Assisted a specialty masonry-restoration contractor with an investigation of the masonry façade on the west elevation of the Alumni Building in July 2017; followed up with a visit in October 2017 to observe the demolition and progress of the repair project and discussed specific structural/architectural needs with the Director of Facilities. PSFEI Reports SR 17/18–1 issued August 1, 2017, and SR 17/18–6 issued December 8, 2017, detailed this effort.

Reviewed the University’s Demand Response agreement with EnerNOC to determine eligibility for participation in the Commonwealth’s Demand Response RFQ; based on the review, the University was not eligible to participate.

Witnessed the inspection, testing, and cleaning of the main campus electrical switchgear and other various medium voltage equipment in November 2017 at the request of the Electrical Foreman. During the process, an issue was discovered with a breaker that would not energize. Findings and recommendations were provided in PSFEI Report ER 17/18–14 issued February 14, 2018.

Provided significant support regarding combustion problems with Boiler No. 2, which included numerous site visits for evaluations, being present during attempts at combustion tuning, phone discussions with a combustion engineer at Webster Burners (manufacturer), and inspection of a different boiler that was not having combustion problems for comparison of burner refractory rings.

Reviewed a proposed steam piping re-route and provided comments and recommendations for changes via email to campus staff in May 2018. Revisions to the proposal were reviewed with no additional comments.

Reviewed an engineering study to convert the campus to a decentralized heating system and provided comments to the Director of Facilities. Provided natural gas pricing to the consulting engineer and the Director of Facilities for use in the study.

Reviewed a heating system study that evaluated continued use of the central plant versus distributed heating. Provided findings and comments in PSFEI Report MR 17/18–5 issued May 31, 2018.

MILLERSVILLE UNIVERSITY

Met with the Director of Maintenance and Operations in January 2018 to discuss PSFEI structural/architectural services and assess site-specific needs.

SHIPPENSBURG UNIVERSITY

Met with the University’s new Director of Facilities Management and Planning to discuss PSFEI services and capabilities.

Implemented a peak load management strategy that provided alerts on potential five coincident peak (5CP) days. As a result of their participation in the peak load management strategy during summer 2017, Shippensburg University will realize avoided costs of approximately \$80,000 during the 2018–2019 delivery year.

Provided continual technical support for DGS Project 412-55, *Renovation of Electrical Distribution System, Shippensburg University*, which included a site visit in November 2017 to review the InterNational Electrical Testing Association *Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems* (NETA ATS) acceptance testing specifications. Testing recommendations provided in PSFEI Report ER 17/18–10 issued December 18, 2017.

Inspected and tested the chiller plant B-side transformer in March 2018 at the request of the campus Electrical Foreman. Test results and recommendations were provided in PSFEI Report ER 17/18–19 issued April 16, 2018.

Performed an infrared scan of the Performing Arts Building roof in February 2018 at the request of the Associate Director of Operations. Observations and recommendations were documented in PSFEI Report ER 17/18–20 issued April 26, 2018.

Reviewed the University's natural gas utility tariff status to ensure that they are on a cost-effective rate.

SLIPPERY ROCK UNIVERSITY

Assisted campus staff with management of two Penn State student interns conducting space surveys and other tasks directed by campus staff during summer 2017. These students were interviewed and hired by PSFEI during fiscal year 2016–2017.

Provided on-site arc flash training in November 2017 for campus maintenance staff.

Reviewed price-lock confirmation forms to verify the accuracy of Constellation NewEnergy, Inc.'s and Dominion Energy Solutions' nomination volumes and market prices.

Verified accuracy of Constellation NewEnergy, Inc.'s nomination volumes as awarded in RFQ 2018-GAS-LAV-04.

Corresponded with university staff to resolve a natural gas billing discrepancy with utility bills not matching up with gas supplier bills. Contacted the gas supplier and determined that the mid-month utility billing cycle did not match up with supplier billing cycle due to the mid-month cycle cut-off date. PSFEI reconciled the differences and informed university staff of the situation and results.

Provided technical assistance for the new gas boiler being installed under a Guaranteed Energy Savings Act (GESA) project, which included review and comment regarding the PADEP GP-1 (Small Gas and No. 2 Oil-Fired Combustion Units) permit application package for the new boilers and associated equipment (economizer, instrumentation and wiring drawing, three-way valve setup, surge tank level control, etc.). In addition, investigated requirements for stack testing analyzers and methods for the new boiler per the GP-1 permit and visited the campus in March 2018 to view the installation and discuss controls with the controls contractor.

Provided technical support regarding refractory issues and wall pushout on Boiler No. 3, and gas co-firing control valve wiring on Boiler No. 1. The control valve wiring issues identified control system problems; PSFEI will work with university staff and the controls contractor to resolve these issues in fiscal year 2018–2019.

WEST CHESTER UNIVERSITY

Met with the Associate Director of Facilities Planning and the Architect & Project Manager, Facilities Design and Construction in June 2018 to discuss PSFEI structural/architectural services.

UTILITY DATA TABLES AND CHARTS

Fuel and Energy Consumption and Costs

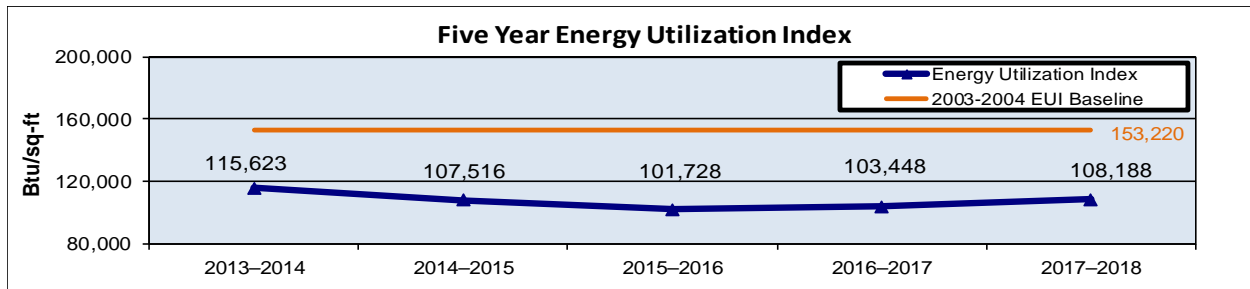
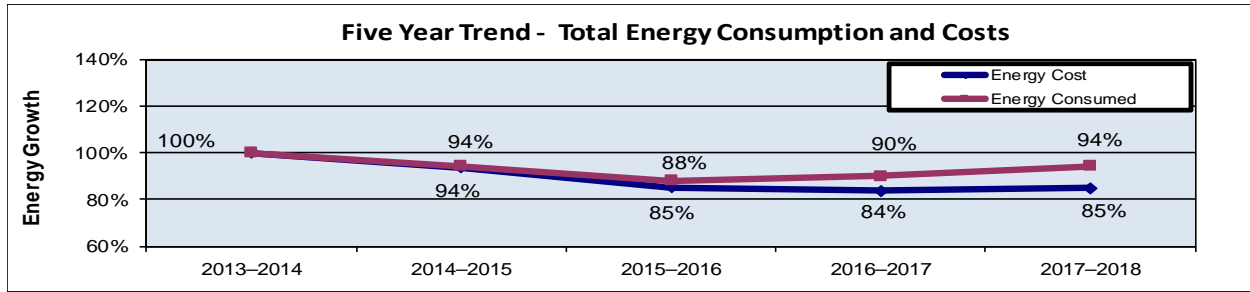
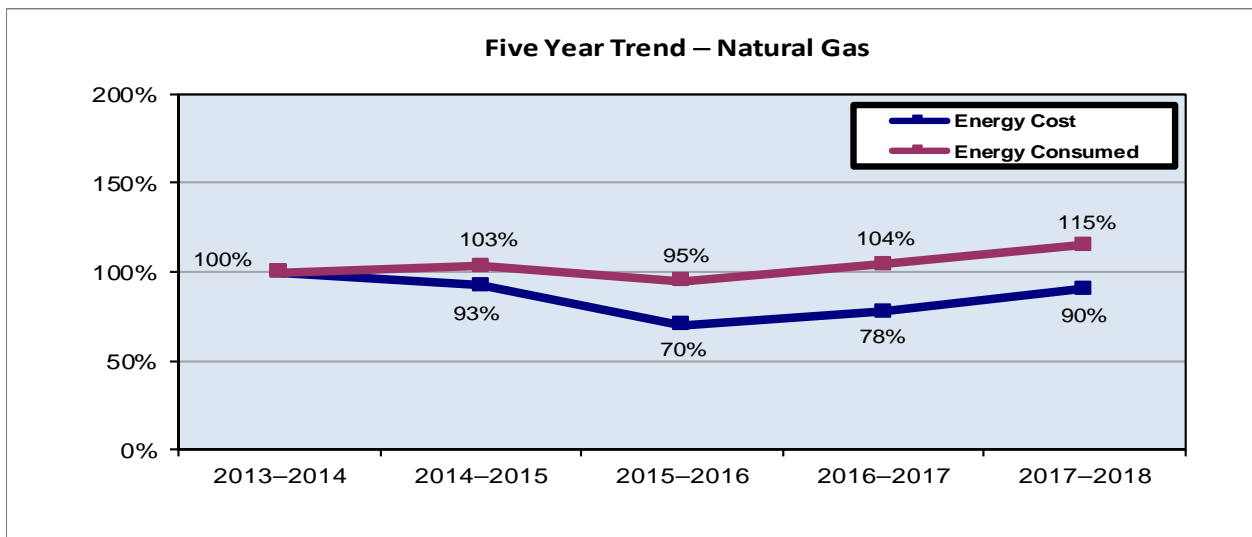
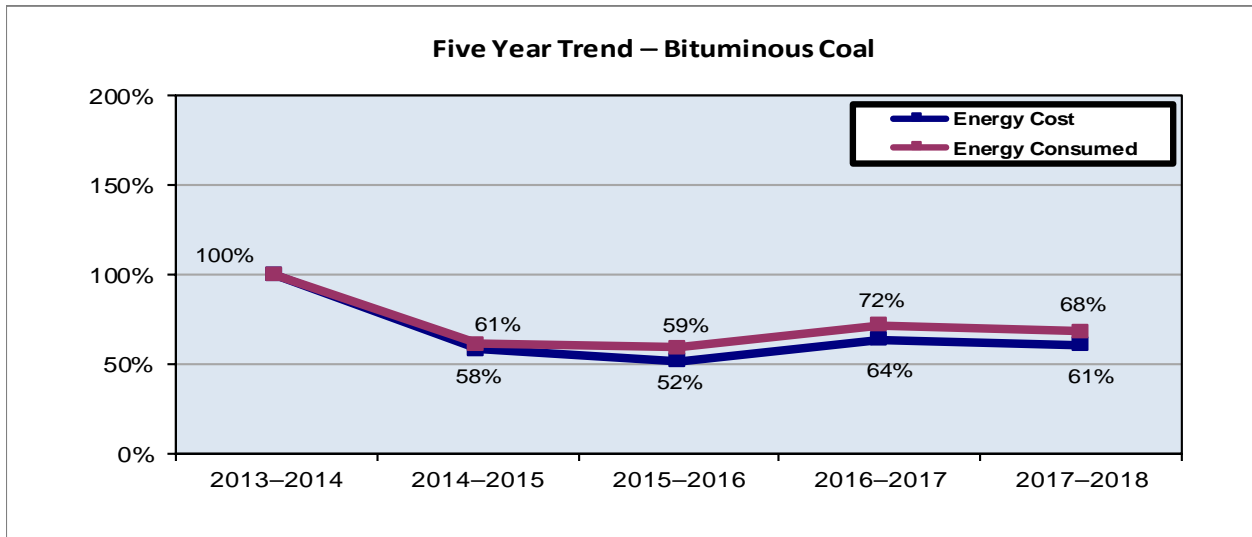
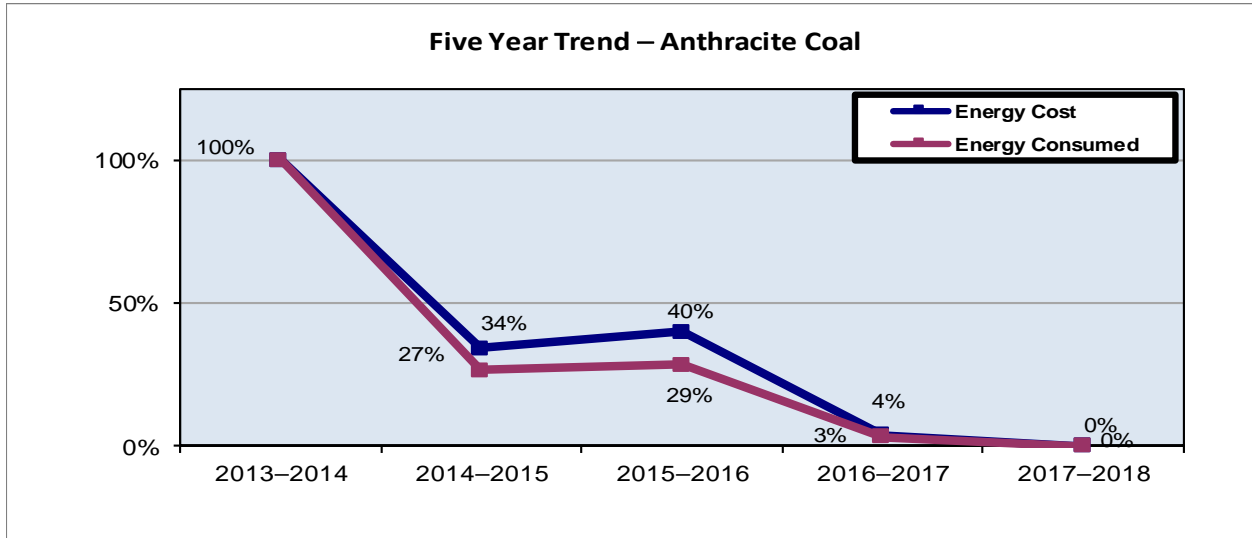


Table 1. Five-Year Comparison: 2013-2014 to 2017-2018

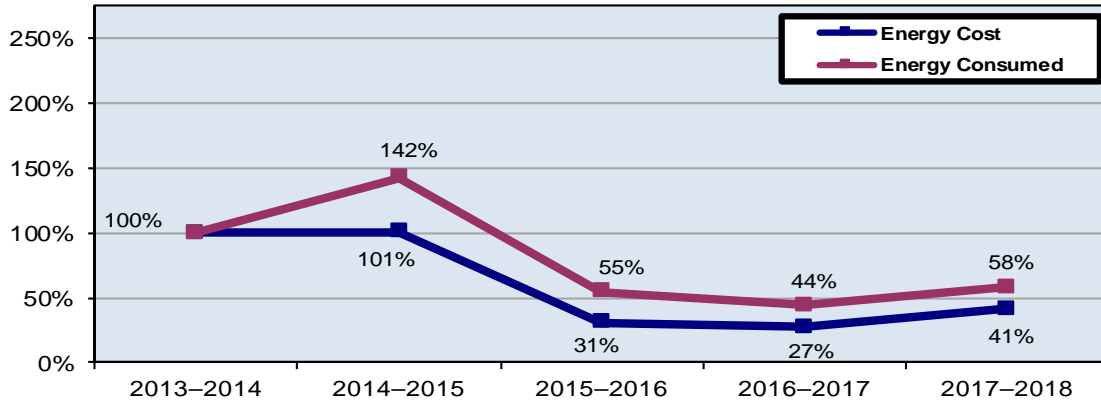
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	14,150	3,783	4,041	456	---
Bituminous Coal	tons	3,761	2,303	2,226	2,698	2,574
Gas	mcf	1,724,955	1,787,192	1,638,610	1,796,746	1,988,732
Oil	gal	195,442	277,674	106,728	86,121	113,244
Wood	tons	10,595	12,450	9,464	6,809	4,842
Electric	kWh	394,287,584	392,487,595	380,306,590	387,247,229	383,522,455
Energy Costs						
Anthracite Coal	\$	\$1,540,391	\$528,482	\$618,678	\$61,560	---
Bituminous Coal	\$	\$407,110	\$237,333	\$210,478	\$259,366	\$247,887
Gas	\$	\$12,100,120	\$11,196,199	\$8,480,300	\$9,384,821	\$10,933,931
Oil	\$	\$651,135	\$655,355	\$199,900	\$177,751	\$266,791
Wood	\$	\$397,237	\$493,500	\$376,136	\$270,668	\$197,505
Electric (1)	\$	\$27,245,769	\$26,519,345	\$26,103,240	\$25,290,899	\$24,294,128
Total	\$	\$42,341,762	\$39,630,215	\$35,988,733	\$35,445,065	\$35,940,242
Energy Consumption						
Anthracite Coal	mmBtu	357,676	95,710	102,237	11,537	---
Bituminous Coal	mmBtu	100,043	61,260	59,212	71,767	68,468
Gas	mmBtu	1,776,704	1,835,917	1,687,768	1,850,648	2,048,394
Oil	mmBtu	27,362	38,874	14,942	12,057	15,854
Wood	mmBtu	90,058	105,825	80,444	57,877	41,157
Electric	mmBtu	1,390,086	1,383,308	1,341,421	1,364,172	1,353,853
Total	mmBtu	3,741,928	3,520,894	3,286,024	3,368,058	3,527,727
Energy Utilization Index	Btu/sq-ft	115,623	107,516	101,728	103,448	108,188
Unit Fuel Costs						
Anthracite Coal	\$/ton	\$108.86	\$139.70	\$153.10	\$135.00	---
Bituminous Coal	\$/ton	\$108.25	\$103.05	\$94.55	\$96.13	\$96.30
Gas	\$/mcf	\$7.01	\$6.26	\$5.18	\$5.22	\$5.50
Oil	\$/gal	\$3.33	\$2.36	\$1.87	\$2.06	\$2.36
Wood	\$/ton	\$37.49	\$39.64	\$39.74	\$39.75	\$40.79
Electric	¢/kWh	6.91 ¢	6.76 ¢	6.86 ¢	6.53 ¢	6.33 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	\$4.31	\$5.52	\$6.05	\$5.34	---
Bituminous Coal	\$/mmBtu	\$4.07	\$3.87	\$3.55	\$3.61	\$3.62
Gas	\$/mmBtu	\$6.81	\$6.10	\$5.02	\$5.07	\$5.34
Oil	\$/mmBtu	\$23.80	\$16.86	\$13.38	\$14.74	\$16.83
Wood	\$/mmBtu	\$4.41	\$4.66	\$4.68	\$4.68	\$4.80
Electric	\$/mmBtu	\$19.60	\$19.17	\$19.46	\$18.54	\$17.94
Weighted Average	\$/mmBtu	\$11.32	\$11.26	\$10.95	\$10.52	\$10.19

(1) Excludes total cost of operation and maintenance for electric generation with the cogeneration plant for Indiana University.

Five-Year Trend – Energy Consumption and Costs



Five Year Trend – Fuel Oil



Five Year Trend – Electricity

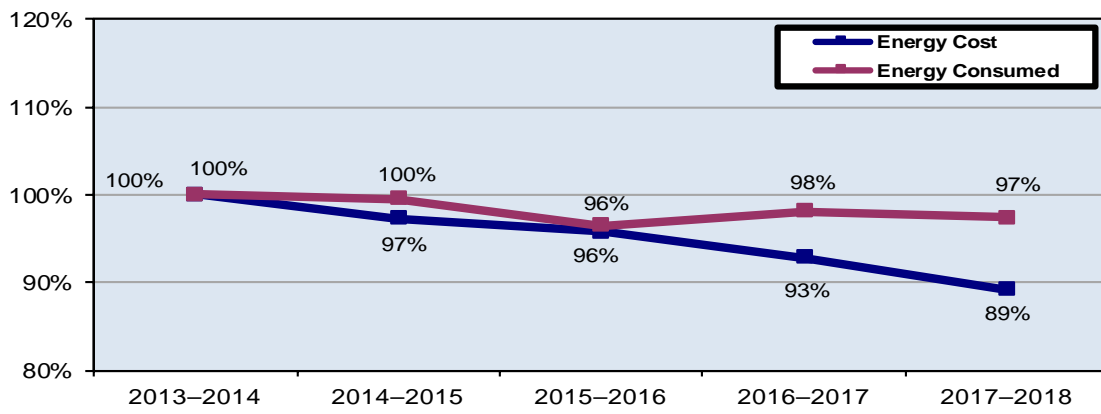


Table 2. Energy Consumption and Costs 2017–2018

University	Energy Sources Utilized						Total Energy (mmBtu)	Total Energy Cost (\$)	Unit Energy Cost (\$/mmBtu)	Total Building Area (sq-ft)	Unit Energy Cost (\$/sq-ft)	Energy Utilization Index (Btu/sq-ft)
	Anthracite Coal	Bituminous Coal	Gas	Oil	Wood	Electric						
Bloomsburg Lower			x		x	x	450,934	\$3,737,496	\$8.29	1,973,756	\$1.89	228,465
Bloomsburg Upper						x	21,345	\$442,164	\$20.72	552,821	\$0.80	38,611
California			x			x	150,009	\$2,010,314	\$13.40	2,158,832	\$0.93	69,486
Cheyney			x			x	85,093	\$1,036,459	\$12.18	1,069,390	\$0.97	79,572
Clarion			x			x	213,050	\$1,672,100	\$7.85	1,423,379	\$1.17	149,679
Clarion-Venango			x			x	7,105	\$110,721	\$15.58	82,036	\$1.35	86,605
Dixon Center			x			x	9,958	\$147,591	\$14.82	145,734	\$1.01	68,330
East Stroudsburg			x	x		x	204,984	\$2,390,554	\$11.66	1,873,318	\$1.28	109,423
Edinboro			x			x	198,509	\$2,621,676	\$13.21	2,404,741	\$1.09	82,549
Indiana (1)			x	x		x	690,894	\$4,117,807	\$5.96	4,020,722	\$1.02	171,833
Kutztown			x	x		x	274,060	\$2,957,032	\$10.79	2,470,753	\$1.20	110,922
Lock Haven			x			x	130,164	\$1,487,819	\$11.43	1,621,044	\$0.92	80,296
Lock Haven-Clearfield			x			x	9,487	\$126,499	\$13.33	92,373	\$1.37	102,704
Mansfield			x			x	142,185	\$1,444,238	\$10.16	1,530,411	\$0.94	92,907
Millersville			x	x		x	193,768	\$2,849,493	\$14.71	2,225,354	\$1.28	87,073
Shippensburg			x			x	174,415	\$2,035,087	\$11.67	2,390,502	\$0.85	72,961
Slippery Rock		x	x			x	295,447	\$2,812,585	\$9.52	2,567,609	\$1.10	115,067
West Chester			x	x		x	276,319	\$3,940,608	\$14.26	4,004,701	\$0.98	68,999
	Anthracite Coal	Bituminous Coal	Gas	Oil	Wood	Electric						
Total							3,527,727	\$35,940,242		32,607,476		
Average									\$10.19		\$1.10	108,188

(1) Electric data represents all purchased and produced electricity, including electricity that flows through the cogeneration plant, to be redistributed throughout campus and includes the Foundation of Indiana University of Pennsylvania (FIUP) usage for Residential Revival. Excludes total cost of operation and maintenance for electric generation with the cogeneration plant.

Table 3. Central Boiler Plant 2017–2018

University	Makeup %	Heating Degree Days	Peak Steam Demand (lbs/hr)	Fuel Cost	Operation and Maintenance Cost	Total Operation Cost	Unit Cost Total Operation (\$/mlb)	Unit Cost Total Operation (\$/mmBtu)	Average Plant Efficiency
Bloomsburg Lower (1)	13%	5,827	22,500	\$881,939	\$925,069	\$1,807,008	\$10.83	\$9.96	---
California	17%	5,537	6,450	\$131,436	\$310,385	\$441,821	\$20.94	\$16.65	80%
Clarion (1)	36%	8,404	40,375	\$578,095	\$630,336	\$1,208,431	\$10.18	\$8.85	---
Dixon Center (2)	---	5,045	---	\$47,621	---	\$47,621	---	\$8.65	---
East Stroudsburg (1)	26%	5,370	35,000	\$591,609	\$339,001	\$930,610	\$9.89	\$8.58	---
Indiana (3)	40%	5,570	49,258	\$1,229,047	\$2,336,745	\$3,565,792	\$16.97	\$11.88	70%
Kutztown	24%	5,186	44,170	\$695,903	\$534,000	\$1,229,903	\$12.51	\$10.07	80%
Lock Haven (2) (4)	---	5,594	---	---	\$174,779	\$174,779	---	---	---
Lock Haven-Clearfield (2) (4)	---	6,541	---	---	\$87,390	\$87,390	---	---	---
Mansfield	23%	6,385	23,850	\$303,567	\$499,886	\$803,453	\$12.54	\$10.17	81%
Slippery Rock	46%	6,221	40,000	\$982,335	\$929,412	\$1,911,747	\$15.40	\$11.35	74%
Total				\$5,441,552	\$6,767,002	\$12,208,554			

(1) Excessive average plant efficiency not shown.

(2) No steam produced.

(3) Excludes FIUP usage and cost of steam.

(4) Operations and maintenance costs for Lock Haven represent decentralized boilers.

Table 3A. Boiler Performance 2017–2018

University	Fuel Type	Number of Boilers	Steam Capacity (lbs/hr)	Steam Generated (mlbs)	Fuel Consumed	Fuel Consumed (mmBtu)	Central Plant Fuel Cost	Central Plant Fuel Cost (\$/mlb)	Boiler Efficiency
Bloomsburg Lower (1)(4)	Gas	2	22,000	130,500	136,107 mcf	140,190	\$684,434	\$5.24	---
	Wood	1	15,000	36,403	4,842 tons	41,157	\$197,505	\$5.43	---
California	Gas	3	45,000	21,098	25,755 mcf	26,528	\$131,436	\$6.23	80%
Clarion (1)	Gas	3	70,000	118,716	132,636 mcf	136,615	\$578,095	\$4.87	---
Dixon Center (2)	Gas	3	---	---	5,345 mcf	5,505	\$47,621	---	---
East Stroudsburg (1)	Gas	4	95,000	90,186	101,332 mcf	104,372	\$505,853	\$5.61	---
Indiana (3)	Gas	3	92,000	219,456	281,489 mcf	289,934	\$1,147,245	\$3.96	76%
	Cogen-Gas	4	44,000	40,679	78,892 mcf	81,259	\$332,729	\$4.09	50%
	Cogen-Oil			1,180	16,911 gal	2,367	\$35,398	\$14.95	50%
Kutztown	Gas	3	90,000	98,317	118,628 mcf	122,187	\$695,903	\$7.08	80%
Mansfield	Gas	3	64,000	64,062	76,721 mcf	79,023	\$303,567	\$4.74	81%
Slippery Rock	Bituminous Coal	3	120,000	50,524	2,574 tons	68,468	\$247,887	\$4.91	74%
	Gas	1		73,576	97,126 mcf	100,040	\$734,448	\$9.98	74%

(1) Excessive boiler efficiency not shown.

(2) No steam produced.

(3) Includes FIUP.

(4) Bloomsburg Lower ceased use of their Anthracite coal boilers in 2016–2017.

Table 4. Electric Consumption and Costs 2017–2018

University	Total Building Area (sq-ft)	Heating Degree Days	Cooling Degree Days	Electric Consumed (kWh)	Electric Consumed (kWh/sq-ft)	Peak Demand (kW)	Peak Demand (W/sq-ft)	Load Factor	Electric Cost (¢/kWh)	Total Electric Cost	Electric Cost (\$/sq-ft)
Bloomsburg Lower	1,973,756	5,827	740	27,402,973	13.9	6,158	3.1	0.65	7.07	\$1,936,652	\$0.98
Bloomsburg Upper	552,821			6,253,993	11.3	1,506	2.7	0.58	7.07	\$442,164	\$0.80
California	2,158,832	5,537	981	26,837,147	12.4	5,219	2.4	0.64	6.39	\$1,715,864	\$0.79
Cheyney	1,069,390	4,584	1,496	11,661,113	10.9	2,112	2.0	0.78	5.98	\$696,869	\$0.65
Clarion	1,423,379	8,404	608	18,794,042	13.2	3,798	2.7	0.71	5.55	\$1,042,139	\$0.73
Clarion-Venango	82,036	6,846	644	1,185,668	14.5	369	4.5	0.48	8.01	\$94,937	\$1.16
Dixon Center	145,734	5,045	1,363	1,304,600	9.0	437	3.0	0.41	7.66	\$99,970	\$0.69
East Stroudsburg	1,873,318	5,370	739	22,856,987	12.2	4,670	2.5	0.69	7.11	\$1,626,034	\$0.87
Edinboro	2,404,741	6,128	843	35,391,683	14.7	6,988	2.9	0.73	6.51	\$2,302,284	\$0.96
Indiana - Gross (1)	4,020,722	5,570	723	51,541,018	12.8	9,681	---	---	6.80	\$3,506,536	\$0.87
Indiana - Net (2)	2,781,346			38,388,103	13.8	---	---	---	2.93	\$1,125,380	\$0.40
Kutztown	2,470,753	5,186	1,097	30,809,041	12.5	7,082	2.9	0.65	6.19	\$1,905,837	\$0.77
Lock Haven	1,621,044	5,594	934	15,569,480	9.6	3,311	2.0	0.61	6.67	\$1,039,224	\$0.64
Lock Haven-Clearfield	92,373	6,541	462	968,360	10.5	299	3.2	0.48	7.86	\$76,097	\$0.82
Mansfield	1,530,411	6,385	512	13,833,365	9.0	2,836	1.9	0.67	7.55	\$1,043,883	\$0.68
Millersville	2,225,354	5,450	834	35,470,390	15.9	7,003	3.1	0.66	6.23	\$2,210,262	\$0.99
Shippensburg	2,390,502	3,960	1,768	22,484,225	9.4	4,338	1.8	0.67	6.28	\$1,410,962	\$0.59
Slippery Rock	2,567,609	6,221	500	27,793,971	10.8	6,300	2.5	0.64	6.18	\$1,717,551	\$0.67
West Chester	4,004,701	5,634	988	46,517,314	11.6	9,383	2.3	0.81	6.60	\$3,068,609	\$0.77
Total	32,607,476			383,522,455						\$25,935,874	
Weighted Average					11.8			0.64	6.76		\$0.80

(1) Includes total electricity produced by cogeneration plant, purchased from Penelec, redistributed to campus and FIUP through cogeneration plant. Includes total cost of operation and maintenance for electric generation with the cogeneration plant.

(2) Includes electricity produced by cogeneration plant that was consumed by campus and electricity purchased from Penelec and redistributed to campus, excluding Residential Revival (FIUP) through the cogeneration plant, once the cogeneration engines were shut down on December 10, 2007.

Table 5. Water, Sewage, Miscellaneous Utilities, and Costs 2017–2018

University	Water (mgal)	Water Cost	Water Cost (\$/mgal)	Sewage (mgal)	Sewage Cost	Sewage Cost (\$/mgal)	Misc Gas (mcf)	Misc Gas Cost	Misc Gas (\$/mcf)	Misc Oil (gal)	Misc Oil Cost	Misc Oil (\$/gal)
Bloomsburg (1)	53,076	\$326,823	\$6.16	---	\$361,162	---	170,932	\$918,905	\$5.38	---	---	---
California	35,788	\$339,471	\$9.49	---	\$893,345	---	30,958	\$163,014	\$5.27	---	---	---
Cheyney	33,204	\$120,943	\$3.64	19,874	\$141,241	\$7.11	43,975	\$339,590	\$7.72	---	---	---
Clarion	46,152	\$419,838	\$9.10	41,710	\$419,107	\$10.05	11,933	\$51,866	\$4.35	---	---	---
Clarion-Venango	450	\$3,393	\$7.54	450	\$2,739	\$6.09	2,969	\$15,784	\$5.32	---	---	---
Dixon Center	674	\$18,473	\$27.41	---	\$560	---	---	---	---	---	---	---
East Stroudsburg	157,058	\$270,104	\$1.72	---	\$125,643	---	17,352	\$162,072	\$9.34	4,131	\$10,838	\$2.62
Edinboro	60,062	\$359,318	\$5.98	---	\$422,785	---	75,453	\$319,392	\$4.23	---	---	---
Indiana	28,004	\$462,258	\$16.51	28,004	\$291,166	\$10.40	44,733	\$327,121	\$7.31	---	---	---
Kutztow n	55,782	\$589,597	\$10.57	51,776	\$672,416	\$12.99	44,609	\$343,152	\$7.69	5,535	\$12,140	\$2.19
Lock Haven	20,035	\$54,213	\$2.71	19,677	\$127,409	\$6.48	74,782	\$448,595	\$6.00	---	---	---
Lock Haven-Clearfield	127	\$4,118	\$32.43	127	\$5,316	\$41.86	6,002	\$50,402	\$8.40	---	---	---
Mansfield	30,452	\$89,361	\$2.93	---	\$198,972	---	15,485	\$96,788	\$6.25	---	---	---
Millersville	91,974	\$141,033	\$1.53	84,853	\$433,450	\$5.11	66,972	\$581,309	\$8.68	26,614	\$57,922	\$2.18
Shippensburg	33,892	\$160,684	\$4.74	24,023	\$182,989	\$7.62	94,831	\$624,125	\$6.58	---	---	---
Slippery Rock	56,081	\$395,519	\$7.05	50,621	\$439,963	\$8.69	31,144	\$112,699	\$3.62	---	---	---
West Chester (2)	87,718	\$930,124	\$10.60	62,411	\$553,179	\$8.86	112,751	\$848,985	\$7.53	10,157	\$23,014	\$2.27
Total	790,530	\$4,685,270		383,526	\$5,271,442		844,880	\$5,403,799		46,437	\$103,914	
Weighted Average			\$5.93			\$8.50			\$6.40			\$2.24

(1) Bloomsburg Lower and Upper campuses are combined.

(2) Water and sewer data includes University Student Housing.

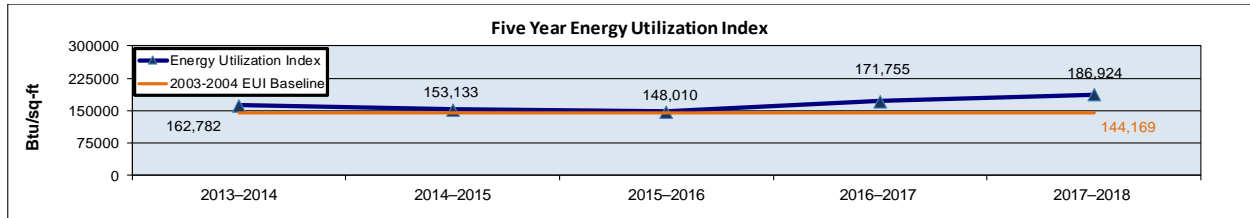
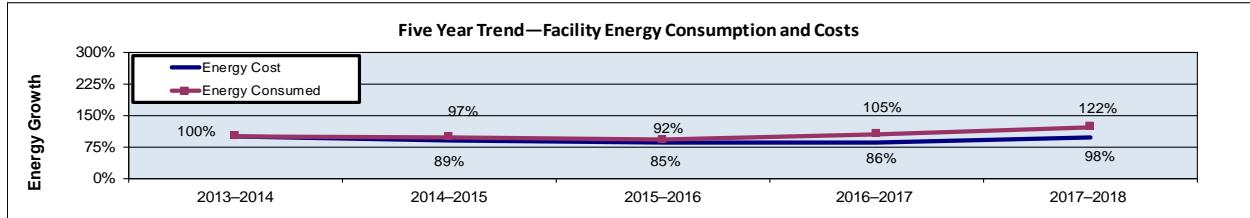
Table 6. Indiana University Cogeneration Summary 2017–2018
Production of Electricity and Steam
(Excludes Auxiliary Boilers and Cost of Purchased Electricity)

Input / Fuel Cost	Units	mmBtu	Cost
Natural Gas Contract (mcf)	238,385	245,536	\$1,004,075
Natural Gas IUP (mcf)	0	0	\$0
Diesel Fuel (gal)	51,451	7,203	\$106,821
Total Input/Fuel Cost		252,739	\$1,110,896
Operating Expenses			
Personnel Cost			\$455,913
Repairs and Parts			\$876,400
Gas Royalty			\$0
Lube Oil			\$12,210
Water			\$18,995
Sewage			\$364
Chemicals			\$0
Total Operating Expenses			\$1,363,883
Total Fuel and Operating Costs			\$2,474,779
Output			
Electricity	kWh	mmBtu	
Sold to Penelec	10,824,970	36,946	
Sold to FIUP	0	0	
Sold to Massaro	0	0	
Supplied to Campus	13,921,610	47,514	
Consumed by Cogen	0	0	
Lost in Transmission	0	0	
Total Electricity	24,746,580	84,460	
Steam	lbs	mmBtu	
Sold to FIUP from Cogen	8,230,644	8,231	
Supplied to Campus	33,628,979	33,629	
Total Steam	41,859,623	41,860	
Total Output (mmBtu)			126,320
Revenue: Electricity and Steam Sold to FIUP and Exported			\$1,922,987
Net Cost (1) (2)			\$551,792
Summary of Data			
Total Thermal Efficiency (mmBtu Output/mmBtu Input)			49.98%
% of Output as Electricity			66.86%
% of Output as Steam			33.14%
	Total Dollars	\$/kWh	
Cost of Electricity—Before Revenue	\$1,654,690	\$0.0669	
Cost of Electricity—Net of Revenue	\$368,940	\$0.0149	
	Total Dollars	\$/mlbs	
Cost of Steam—Before Revenue	\$820,088	\$19.59	
Cost of Steam—Net of Revenue	\$182,852	\$4.37	
	Electricity (KW)	Steam (lbs/hr)	
Peak Capacity	24,320	72,000	
Average Production Level	11.62%	6.64%	
Effective Unit Energy cost—Before Revenue (\$/mmbtu)			\$19.59
Effective Unit Energy cost—Net of Revenue (\$/mmbtu)			\$4.37

(1) Costs do not include bond cost or amortized capital cost of the co-generation plant.

(2) Net cost does not include avoided cost of utilities assuming traditional systems.

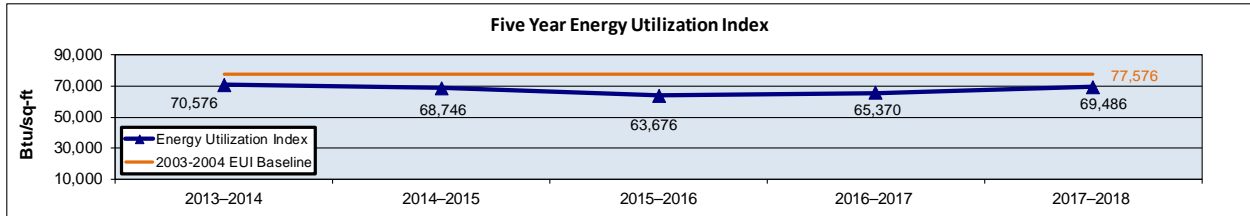
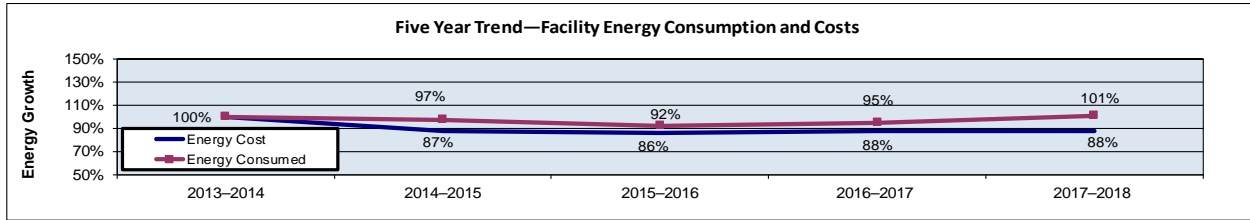
Bloomsburg University



	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	3,793	3,783	4,041	456	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	88,058	62,540	57,376	218,002	307,039
Oil	gal	---	---	---	---	---
Wood	tons	10,595	12,450	9,464	6,809	4,842
Electric	kWh	33,156,182	32,662,388	33,697,313	32,893,391	33,656,966
Energy Costs						
Anthracite Coal	\$	\$ 405,836	\$ 528,482	\$ 618,678	\$ 61,560	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 764,341	\$ 331,048	\$ 212,899	\$ 1,048,554	\$ 1,603,339
Oil	\$	---	---	---	---	---
Wood	\$	\$ 397,237	\$ 493,500	\$ 376,136	\$ 270,668	\$ 197,505
Electric	\$	\$ 2,671,855	\$ 2,444,866	\$ 2,382,674	\$ 2,289,045	\$ 2,378,816
Total	\$	\$ 4,239,269	\$ 3,797,896	\$ 3,590,387	\$ 3,669,827	\$ 4,179,660
Energy Consumption						
Anthracite Coal	mmBtu	95,963	95,710	102,237	11,537	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	90,700	64,416	59,097	224,542	316,250
Oil	mmBtu	---	---	---	---	---
Wood	mmBtu	90,058	105,825	80,444	57,877	41,157
Electric	mmBtu	113,162	111,477	115,009	112,265	114,871
Total	mmBtu	389,882	377,428	356,788	406,221	472,278
Energy Utilization Index	Btu/sq-ft	163,623	153,133	148,010	171,755	186,924
Unit Fuel Costs						
Anthracite Coal	\$/ton	\$ 107.00	\$ 139.70	\$ 153.10	\$ 135.00	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 8.68	\$ 5.29	\$ 3.71	\$ 4.81	\$ 5.22
Oil	\$/gal	---	---	---	---	---
Wood	\$/ton	\$ 37.49	\$ 39.64	\$ 39.74	\$ 39.75	\$ 40.79
Electric	¢/kWh	8.06 ¢	7.49 ¢	7.07 ¢	6.96 ¢	7.07 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	\$ 4.23	\$ 5.52	\$ 6.05	\$ 5.34	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 8.43	\$ 5.14	\$ 3.60	\$ 4.67	\$ 5.07
Oil	\$/mmBtu	---	---	---	---	---
Wood	\$/mmBtu	\$ 4.41	\$ 4.66	\$ 4.68	\$ 4.68	\$ 4.80
Electric	\$/mmBtu	\$ 23.61	\$ 21.93	\$ 20.72	\$ 20.39	\$ 20.71
Weighted Average	\$/mmBtu	\$ 10.87	\$ 10.06	\$ 10.06	\$ 9.03	\$ 8.85
Misc Facility Costs						
Water Cost	\$	\$ 477,003	\$ 453,787	\$ 341,772	\$ 393,768	\$ 326,823
Sewage Cost	\$	\$ 246,855	\$ 279,788	\$ 277,972	\$ 295,628	\$ 361,162
Reported Information						
Gross Area	sq-ft	2,382,801	2,464,713	2,410,556	2,365,115	2,526,577
Reported Student Population		9,169	8,982	8,613	8,480	8,055
Reported Heating Degree Days	degree days	6,349	5,994	4,889	5,425	5,827
Reported Cooling Degree Days	degree days	812	740	774	946	740

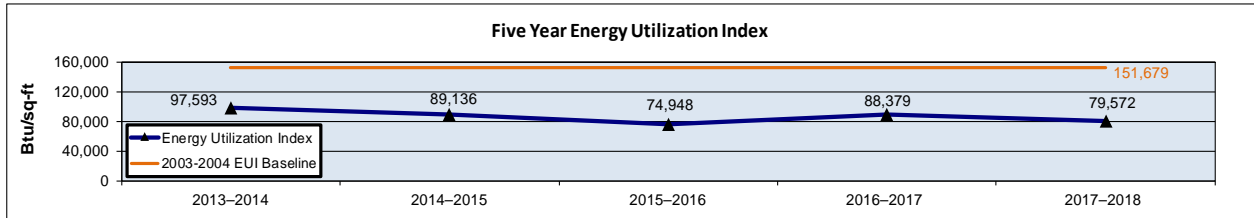
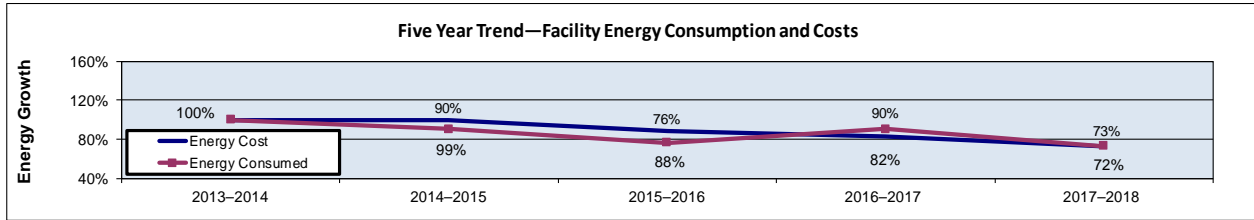
Note: Data reflects both upper and lower campuses.

California University



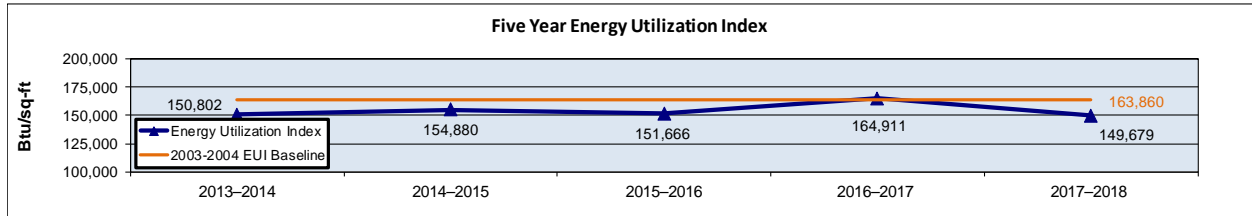
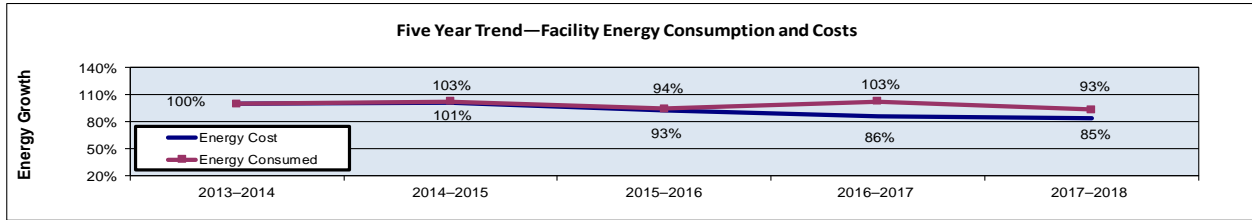
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	47,073	44,577	43,213	43,562	56,713
Oil	gal	---	---	---	---	---
Electric	kWh	29,449,105	29,069,924	27,235,948	28,201,970	26,837,147
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 401,111	\$ 281,491	\$ 242,138	\$ 248,175	\$ 294,450
Oil	\$	---	---	---	---	---
Electric	\$	\$ 1,885,873	\$ 1,714,231	\$ 1,715,360	\$ 1,756,278	\$ 1,715,864
Total	\$	\$ 2,286,984	\$ 1,995,722	\$ 1,957,498	\$ 2,004,453	\$ 2,010,314
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	48,485	45,914	44,510	44,869	58,414
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	100,510	99,216	92,956	96,253	91,595
Total	mmBtu	148,995	145,130	137,466	141,122	150,009
Energy Utilization Index	Btu/sq-ft	70,576	68,746	63,676	65,370	69,486
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 8.52	\$ 6.31	\$ 5.60	\$ 5.70	\$ 5.19
Oil	\$/gal	---	---	---	---	---
Electric	c/kWh	6.40 ¢	5.90 ¢	6.30 ¢	6.23 ¢	6.39 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 8.27	\$ 6.13	\$ 5.44	\$ 5.53	\$ 5.04
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 18.76	\$ 17.28	\$ 18.45	\$ 18.25	\$ 18.73
Weighted Average	\$/mmBtu	\$ 15.35	\$ 13.75	\$ 14.24	\$ 14.20	\$ 13.40
Misc Facility Costs						
Water Cost	\$	\$ 356,532	\$ 337,368	\$ 448,023	\$ 408,583	\$ 339,471
Sewage Cost	\$	\$ 892,000	\$ 892,000	\$ 892,000	\$ 893,620	\$ 893,345
Reported Information						
Gross Area	sq-ft	2,111,111	2,111,111	2,158,832	2,158,832	2,158,832
Reported Student Population		5,086	4,716	4,300	3,893	3,628
Reported Heating Degree Days	degree days	6,017	5,968	4,696	4,648	5,537
Reported Cooling Degree Days	degree days	832	768	929	1,116	981

Cheyney University



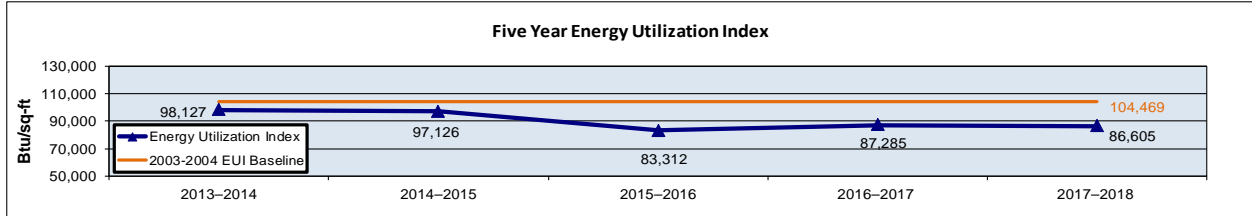
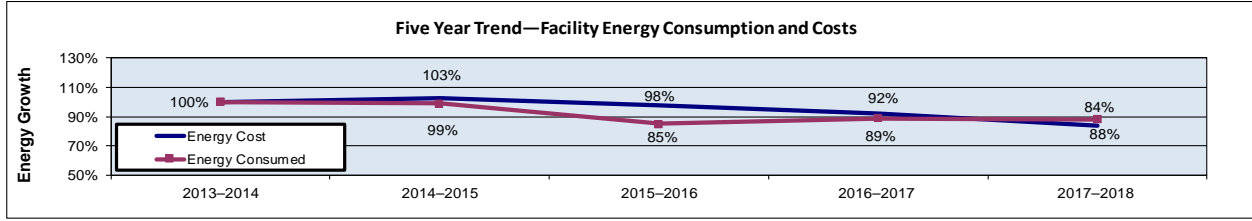
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	69,827	58,514	45,088	45,854	43,975
Oil	gal	---	---	---	---	---
Electric	kWh	13,107,465	13,084,514	12,464,319	12,243,940	11,661,113
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 609,997	\$ 516,540	\$ 315,943	\$ 329,991	\$ 339,590
Oil	\$	---	---	---	---	---
Electric	\$	\$ 821,247	\$ 902,615	\$ 947,557	\$ 845,093	\$ 696,869
Total	\$	\$ 1,431,244	\$ 1,419,155	\$ 1,263,500	\$ 1,175,084	\$ 1,036,459
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	71,922	60,269	46,441	47,230	45,294
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	44,736	44,657	42,541	41,789	39,799
Total	mmBtu	116,658	104,927	88,981	89,018	85,093
Energy Utilization Index	Btu/sq-ft	97,593	89,136	74,948	74,979	79,572
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 8.74	\$ 8.83	\$ 7.01	\$ 7.20	\$ 7.72
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	6.27 ¢	6.90 ¢	7.60 ¢	6.90 ¢	5.98 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 8.48	\$ 8.57	\$ 6.80	\$ 6.99	\$ 7.50
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 18.36	\$ 20.21	\$ 22.27	\$ 20.22	\$ 17.51
Weighted Average	\$/mmBtu	\$ 12.27	\$ 13.53	\$ 14.20	\$ 13.20	\$ 12.18
Misc Facility Costs						
Water Cost	\$	\$ 120,816	\$ 106,266	\$ 103,516	\$ 95,335	\$ 120,943
Sewage Cost	\$	\$ 140,638	\$ 174,509	\$ 128,127	\$ 143,028	\$ 141,241
Reported Information						
Gross Area	sq-ft	1,195,348	1,177,154	1,187,234	1,187,234	1,069,390
Reported Student Population		1,164	993	630	740	656
Reported Heating Degree Days	degree days	4,993	5,963	3,764	4,023	4,584
Reported Cooling Degree Days	degree days	1,291	987	1,622	1,762	1,496

Clarion University



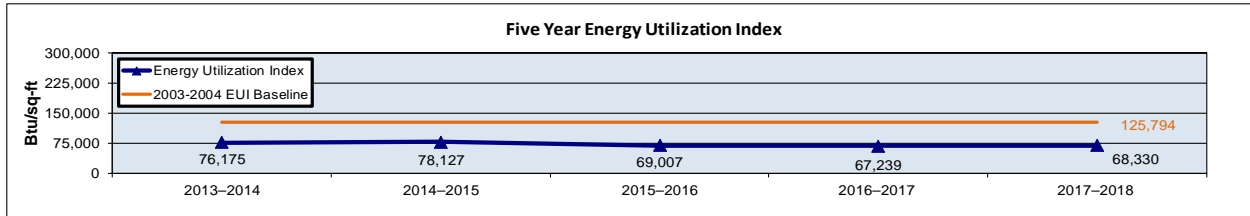
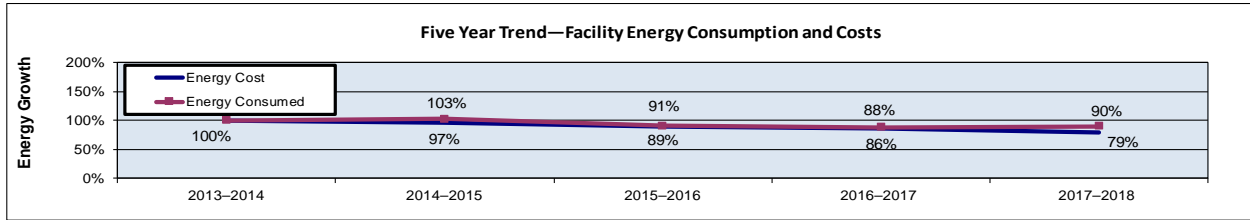
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	162,730	169,654	148,599	151,937	144,569
Oil	gal	---	---	---	---	---
Electric	kWh	17,854,687	17,576,012	18,406,323	19,386,520	18,794,042
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 1,013,830	\$ 939,543	\$ 643,727	\$ 493,744	\$ 629,961
Oil	\$	---	---	---	---	---
Electric	\$	\$ 964,683	\$ 1,054,063	\$ 1,198,168	\$ 1,207,627	\$ 1,042,139
Total	\$	\$ 1,978,513	\$ 1,993,607	\$ 1,841,895	\$ 1,701,371	\$ 1,672,100
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	167,612	174,744	153,057	156,495	148,906
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	60,938	59,987	62,821	66,166	64,144
Total	mmBtu	228,550	234,731	215,878	222,662	213,050
Energy Utilization Index	Btu/sq-ft	150,802	154,880	151,666	156,432	149,679
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 6.23	\$ 5.54	\$ 4.33	\$ 3.25	\$ 4.36
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	5.40 ¢	6.00 ¢	6.51 ¢	6.23 ¢	5.55 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 6.05	\$ 5.38	\$ 4.21	\$ 3.16	\$ 4.23
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 15.83	\$ 17.57	\$ 19.07	\$ 18.25	\$ 16.25
Weighted Average	\$/mmBtu	\$ 8.66	\$ 8.49	\$ 8.53	\$ 7.64	\$ 7.85
Misc Facility Costs						
Water Cost	\$	\$ 257,166	\$ 238,778	\$ 345,621	\$ 419,060	\$ 419,838
Sewage Cost	\$	\$ 239,137	\$ 244,495	\$ 267,167	\$ 372,125	\$ 419,107
Reported Information						
Gross Area	sq-ft	1,515,568	1,515,568	1,423,379	1,423,379	1,423,379
Reported Student Population		4,483	3,599	3,212	3,048	2,963
Reported Heating Degree Days	degree days	7,442	7,191	5,957	5,951	8,404
Reported Cooling Degree Days	degree days	586	574	706	774	608

Clarion University – Venango Campus



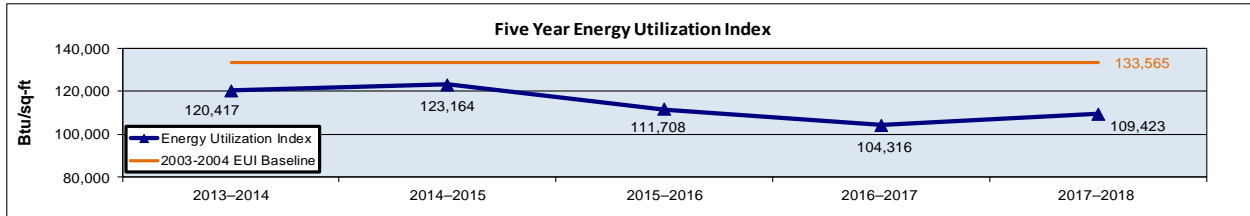
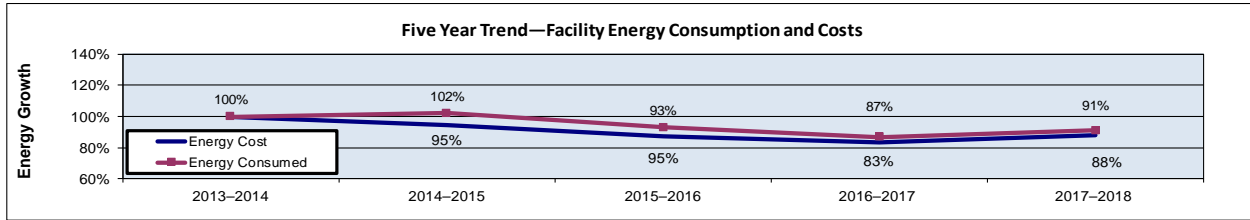
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	3,716	3,546	2,833	2,788	2,969
Oil	gal	---	---	---	---	---
Electric	kWh	1,237,200	1,264,440	1,147,554	1,256,640	1,185,668
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 25,157	\$ 21,141	\$ 15,192	\$ 16,458	\$ 15,784
Oil	\$	---	---	---	---	---
Electric	\$	\$ 106,626	\$ 114,479	\$ 113,343	\$ 104,836	\$ 94,937
Total	\$	\$ 131,783	\$ 135,620	\$ 128,535	\$ 121,294	\$ 110,721
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	3,827	3,652	2,918	2,872	3,058
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	4,223	4,316	3,917	4,289	4,047
Total	mmBtu	8,050	7,968	6,835	7,161	7,105
Energy Utilization Index	Btu/sq-ft	98,127	97,126	83,312	87,285	86,605
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 6.77	\$ 5.96	\$ 5.36	\$ 5.90	\$ 5.32
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	8.62 ¢	9.05 ¢	9.88 ¢	8.34 ¢	8.01 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 6.57	\$ 5.79	\$ 5.21	\$ 5.73	\$ 5.16
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 25.25	\$ 26.53	\$ 28.94	\$ 24.44	\$ 23.46
Weighted Average	\$/mmBtu	\$ 16.37	\$ 17.02	\$ 18.81	\$ 16.94	\$ 15.58
Misc Facility Costs						
Water Cost	\$	\$ 2,649.35	\$ 2,697.65	\$ 2,955.25	\$ 3,477.60	\$ 3,393.00
Sewage Cost	\$	\$ 2,063.25	\$ 2,140.80	\$ 2,529.30	\$ 2,952.91	\$ 2,739.00
Reported Information						
Gross Area	sq-ft	82,037	82,037	82,036	82,036	82,036
Reported Student Population		515	486	307	283	282
Reported Heating Degree Days	degree days	6,892	7,413	6,079	6,041	6,846
Reported Cooling Degree Days	degree days	786	499	640	747	644

Dixon University Center



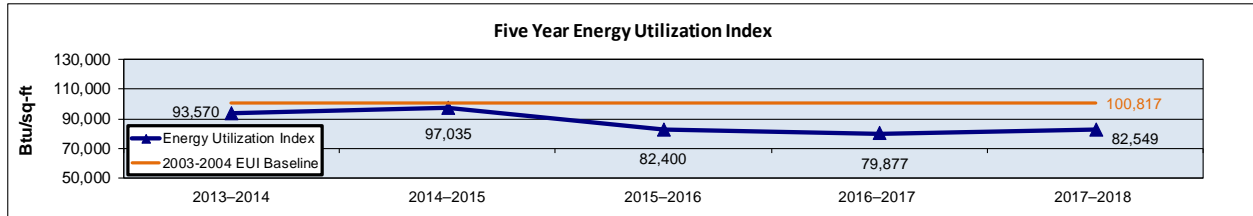
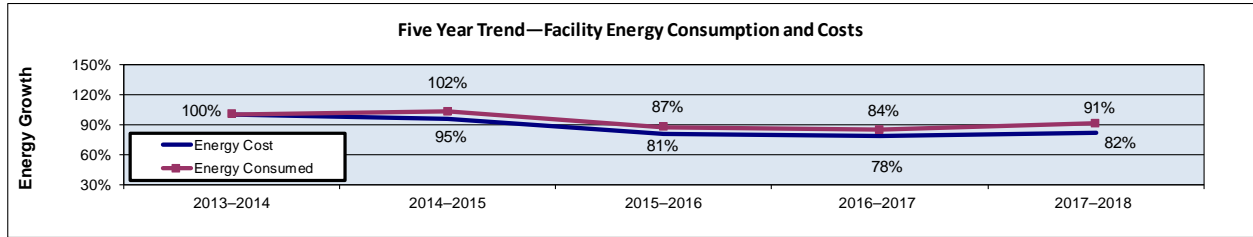
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	5,910	6,275	5,029	4,870	5,345
Oil	gal	---	---	---	---	---
Electric	kWh	1,469,100	1,442,300	1,428,900	1,401,400	1,304,600
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$60,653	\$56,153	\$41,234	\$42,784	\$47,621
Oil	\$	---	---	---	---	---
Electric	\$	\$126,296	\$124,921	\$125,515	\$117,747	\$99,970
Total	\$	\$186,949	\$181,074	\$166,749	\$160,531	\$147,591
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	6,087	6,463	5,180	5,016	5,505
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	5,014	4,923	4,877	4,783	4,453
Total	mmBtu	11,101	11,386	10,057	9,799	9,958
Energy Utilization Index	Btu/sq-ft	76,175	78,127	69,007	67,239	68,330
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 10.26	\$ 8.95	\$ 8.20	\$ 8.79	\$ 8.91
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	8.60 ¢	8.66 ¢	8.78 ¢	8.40 ¢	7.66 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 9.96	\$ 8.69	\$ 7.96	\$ 8.53	\$ 8.65
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 25.19	\$ 25.38	\$ 25.74	\$ 24.62	\$ 22.45
Weighted Average	\$/mmBtu	\$ 16.84	\$ 15.90	\$ 16.58	\$ 16.38	\$ 14.82
Misc Facility Costs						
Water Cost	\$	\$11,166	\$13,901	\$16,028	\$17,581	\$18,473
Sewage Cost	\$	\$1,882	\$3,147	\$3,192	\$2,879	\$560
Reported Information						
Gross Area	sq-ft	145,734	145,734	145,734	145,734	145,734
Reported Student Population		---	---	---	---	---
Reported Heating Degree Days	degree days	5,788	5,684	4,539	4,369	5,045
Reported Cooling Degree Days	degree days	1,154	1,080	1,299	1,594	1,363

East Stroudsburg University



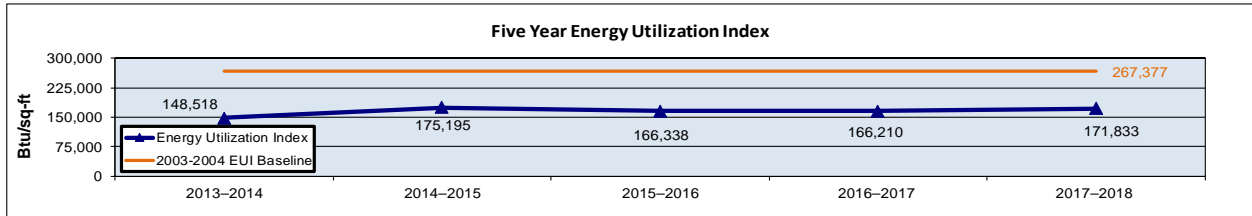
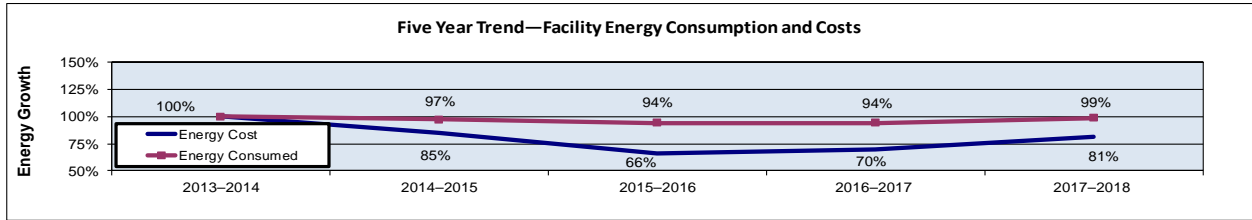
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	144,093	149,038	126,545	114,259	118,684
Oil	gal	4,228	4,968	20,448	3,375	33,781
Electric	kWh	22,341,600	22,276,800	22,395,600	22,739,364	22,856,987
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$919,864	\$841,395	\$694,626	\$700,479	\$667,926
Oil	\$	\$15,149	\$9,733	\$24,027	\$7,040	\$96,594
Electric	\$	\$1,793,470	\$1,727,536	\$1,662,972	\$1,557,421	\$1,626,034
Total	\$	\$2,728,483	\$2,578,664	\$2,381,625	\$2,264,939	\$2,390,554
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	148,416	153,509	130,342	117,687	122,244
Oil	mmBtu	592	696	2,863	473	4,729
Electric	mmBtu	76,252	76,031	76,436	77,609	78,011
Total	mmBtu	225,259	230,236	209,640	195,769	204,984
Energy Utilization Index	Btu/sq-ft	120,417	123,164	111,708	104,316	109,423
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 6.38	\$ 5.65	\$ 5.49	\$ 6.13	\$ 5.63
Oil	\$/gal	\$ 3.58	\$ 1.96	\$ 1.18	\$ 2.09	\$ 2.86
Electric	¢/kWh	8.03 ¢	7.75 ¢	7.43 ¢	6.85 ¢	7.11 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 6.20	\$ 5.48	\$ 5.33	\$ 5.95	\$ 5.46
Oil	\$/mmBtu	\$ 25.60	\$ 13.99	\$ 8.39	\$ 14.90	\$ 20.42
Electric	\$/mmBtu	\$ 23.52	\$ 22.72	\$ 21.76	\$ 20.07	\$ 20.84
Weighted Average	\$/mmBtu	\$ 12.11	\$ 11.20	\$ 11.36	\$ 11.57	\$ 11.66
Misc Facility Costs						
Water Cost	\$	\$127,640	\$131,285	\$141,598	\$203,039	\$270,104
Sewage Cost	\$	\$96,266	\$85,303	\$115,417	\$117,663	\$125,643
Reported Information						
Gross Area	sq-ft	1,870,662	1,869,339	1,876,685	1,876,685	1,873,318
Reported Student Population		5,981	6,018	6,101	5,909	5,770
Reported Heating Degree Days	degree days	5,995	5,727	4,570	4,867	5,370
Reported Cooling Degree Days	degree days	1,023	1,015	539	978	739

Edinboro University



	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	76,431	85,871	71,227	64,147	75,453
Oil	gal	---	---	---	---	---
Electric	kWh	41,146,928	39,871,554	34,245,247	34,675,202	35,391,683
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$544,974	\$590,107	\$304,102	\$303,397	\$319,392
Oil	\$	---	---	---	---	---
Electric	\$	\$2,660,536	\$2,449,502	\$2,285,405	\$2,197,488	\$2,302,284
Total	\$	\$3,205,510	\$3,039,609	\$2,589,507	\$2,500,885	\$2,621,676
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	78,724	88,447	73,364	66,071	77,717
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	140,434	136,082	116,879	118,346	120,792
Total	mmBtu	219,158	224,528	190,243	184,418	198,509
Energy Utilization Index	Btu/sq-ft	93,570	97,035	82,400	79,877	82,549
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 7.13	\$ 6.87	\$ 4.27	\$ 4.73	\$ 4.23
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	6.47 ¢	6.14 ¢	6.67 ¢	6.34 ¢	6.51 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 6.92	\$ 6.67	\$ 4.15	\$ 4.59	\$ 4.11
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 18.95	\$ 18.00	\$ 19.55	\$ 18.57	\$ 19.06
Weighted Average	\$/mmBtu	\$ 14.63	\$ 13.54	\$ 13.61	\$ 13.56	\$ 13.21
Misc Facility Costs						
Water Cost	\$	\$295,805	\$269,126	\$289,873	\$303,595	\$359,318
Sewage Cost	\$	\$451,307	\$427,038	\$411,548	\$378,899	\$422,785
Reported Information						
Gross Area	sq-ft	2,342,175	2,313,897	2,308,761	2,308,761	2,404,741
Reported Student Population		5,516	5,264	4,909	4,470	3,989
Reported Heating Degree Days	degree days	6,892	6,794	5,318	5,287	6,128
Reported Cooling Degree Days	degree days	786	610	883	1,089	843

Indiana University of Pennsylvania

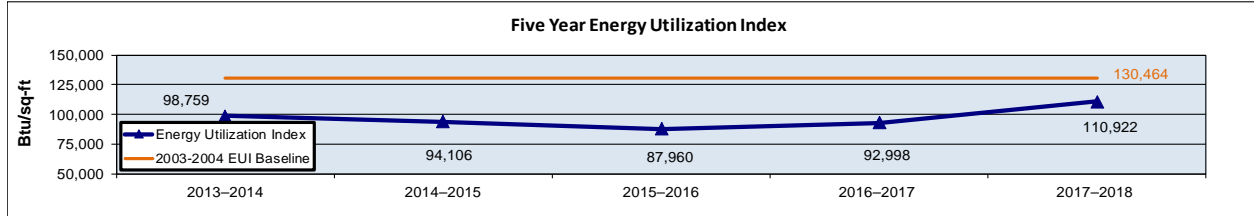
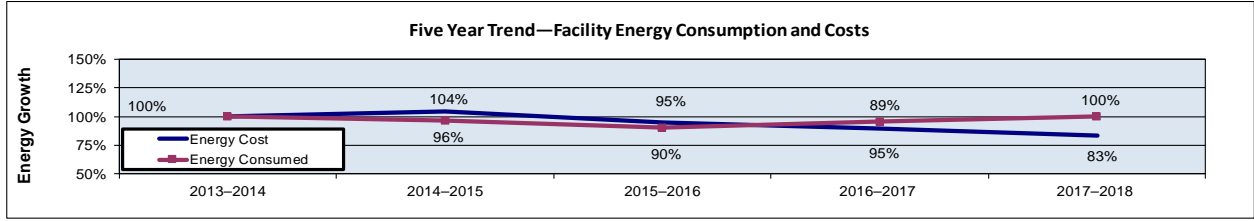


	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption (1)						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	501,956	489,038	461,168	462,364	494,934
Oil	gal	46,881	51,634	38,602	44,162	37,157
Electric	kWh	51,527,414	50,884,814	52,172,812	51,435,850	51,541,018
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 2,872,496	\$ 2,409,046	\$ 1,665,630	\$ 1,798,372	\$ 2,175,896
Oil	\$	\$ 154,179	\$ 168,566	\$ 105,772	\$ 98,366	\$ 77,121
Electric Purchased (2)	\$	\$ 2,064,588	\$ 1,740,218	\$ 1,583,377	\$ 1,654,263	\$ 1,864,790
Total	\$	\$ 5,091,264	\$ 4,317,830	\$ 3,354,779	\$ 3,551,001	\$ 4,117,807
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	517,015	498,819	475,004	476,235	509,783
Oil	mmBtu	6,563	7,229	5,404	6,183	5,202
Electric Purchased	mmBtu	175,863	173,670	178,066	175,551	175,909
Total	mmBtu	699,441	679,718	658,474	657,968	690,894
Energy Utilization Index	Btu/sq-ft	148,518	175,195	166,338	166,210	171,833
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 6.02	\$ 5.72	\$ 3.61	\$ 3.89	\$ 4.40
Oil	\$/gal	\$ 3.37	\$ 3.29	\$ 2.74	\$ 2.23	\$ 2.08
Electric Purchased	¢/kWh	4.85 ¢	4.01 ¢	3.03 ¢	3.22 ¢	3.62 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 5.56	\$ 4.83	\$ 3.51	\$ 3.78	\$ 4.27
Oil	\$/mmBtu	\$ 23.49	\$ 23.32	\$ 19.57	\$ 15.91	\$ 14.83
Electric Purchased	\$/mmBtu	\$ 11.74	\$ 10.02	\$ 8.89	\$ 9.42	\$ 10.60
Weighted Average	\$/mmBtu	\$ 7.28	\$ 6.35	\$ 5.09	\$ 5.40	\$ 5.96
Misc Facility Costs						
Water Cost	\$	\$ 759,249	\$ 783,210	\$ 838,137	\$ 813,549	\$ 846,190
Sewage Cost	\$	\$ 731,512	\$ 729,505	\$ 738,152	\$ 742,854	\$ 723,841
Reported Information						
Gross Area (3)	sq-ft	3,992,357	3,992,357	3,958,653	3,958,653	4,020,722
Reported Student Population (4)		13,116	12,537	12,051	11,097	10,566
Reported Heating Degree Days	degree days	6,600	5,956	5,000	5,010	5,570
Reported Cooling Degree Days	degree days	429	667	739	864	723

Note: Electric data represent all purchased and cogeneration-produced electricity, including electricity that flows through the cogeneration plant to be redistributed throughout campus including FIUP.

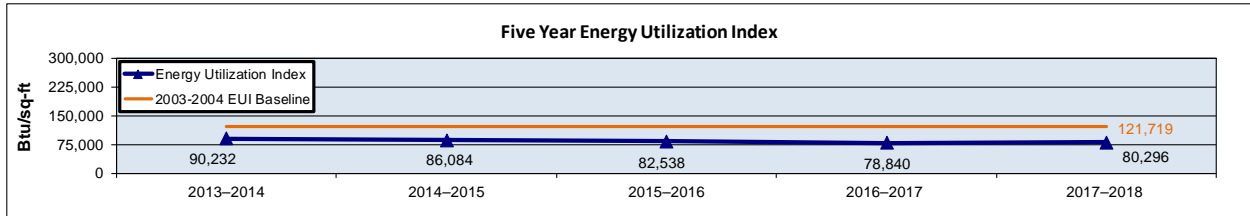
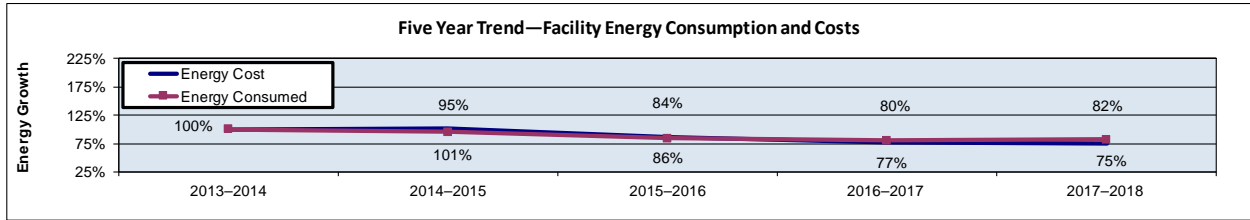
- (1) Data includes FIUP usage for Residential Revival.
- (2) Excludes total cost of operation and maintenance for electric generation with the cogeneration plant.
- (3) Square footage is based on actual gross including Residential Revival square footage less the leased Monroeville Building.
- (4) Data reflects main and branch campuses.

Kutztown University



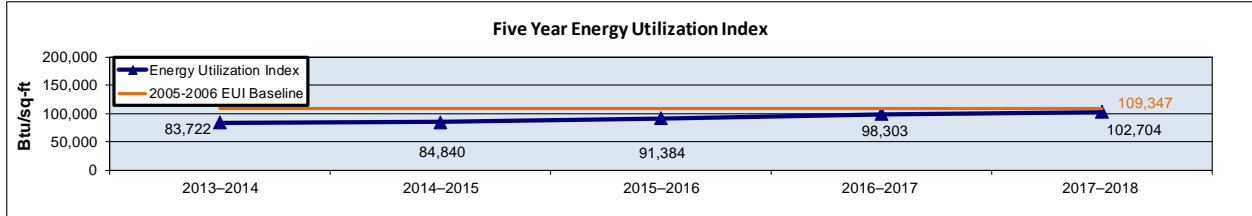
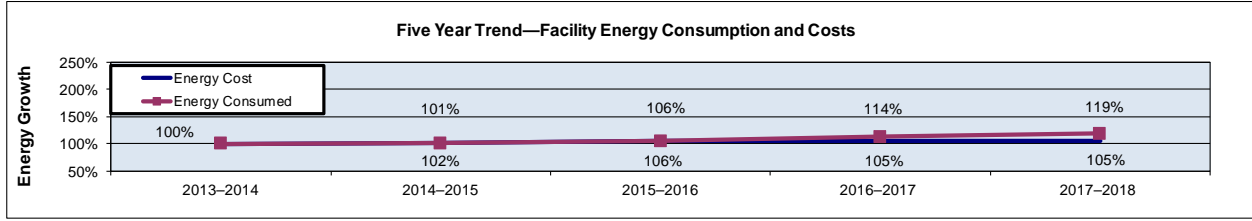
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	164,114	129,414	148,474	150,923	163,237
Oil	gal	4,111	173,923	1,733	4,434	5,535
Electric	kWh	30,752,176	31,257,662	27,656,432	30,979,865	30,809,041
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 1,144,970	\$ 814,339	\$ 1,051,256	\$ 998,750	\$ 1,039,055
Oil	\$	\$ 14,633	\$ 391,327	\$ 2,259	\$ 7,948	\$ 12,140
Electric	\$	\$ 2,383,718	\$ 2,483,599	\$ 2,300,948	\$ 2,158,188	\$ 1,905,837
Total	\$	\$ 3,543,321	\$ 3,689,265	\$ 3,354,463	\$ 3,164,886	\$ 2,957,032
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	169,037	133,296	152,928	155,451	168,134
Oil	mmBtu	576	24,349	243	621	775
Electric	mmBtu	104,957	106,682	94,391	105,734	105,151
Total	mmBtu	274,570	264,328	247,562	261,806	274,060
Energy Utilization Index	Btu/sq-ft	98,759	94,106	87,960	92,998	110,922
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 6.98	\$ 6.29	\$ 7.08	\$ 6.62	\$ 6.37
Oil	\$/gal	\$ 3.56	\$ 2.25	\$ 1.30	\$ 1.79	\$ 2.19
Electric	¢/kWh	7.75 ¢	7.95 ¢	8.32 ¢	6.97 ¢	6.19 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 6.77	\$ 6.11	\$ 6.87	\$ 6.42	\$ 6.18
Oil	\$/mmBtu	\$ 25.42	\$ 16.07	\$ 9.31	\$ 12.80	\$ 15.67
Electric	\$/mmBtu	\$ 22.71	\$ 23.28	\$ 24.38	\$ 20.41	\$ 18.12
Weighted Average	\$/mmBtu	\$ 12.90	\$ 13.96	\$ 13.55	\$ 12.09	\$ 10.79
Misc Facility Costs						
Water Cost	\$	\$ 463,594	\$ 508,136	\$ 510,877	\$ 556,368	\$ 589,597
Sewage Cost	\$	\$ 546,158	\$ 577,908	\$ 550,967	\$ 621,535	\$ 672,416
Reported Information						
Gross Area	sq-ft	2,780,195	2,808,832	2,814,471	2,815,176	2,470,753
Reported Student Population		8,550	8,207	8,048	7,449	7,179
Reported Heating Degree Days	degree days	5,852	5,701	4,471	4,580	5,186
Reported Cooling Degree Days	degree days	1,181	1,307	1,335	1,345	1,097

Lock Haven University



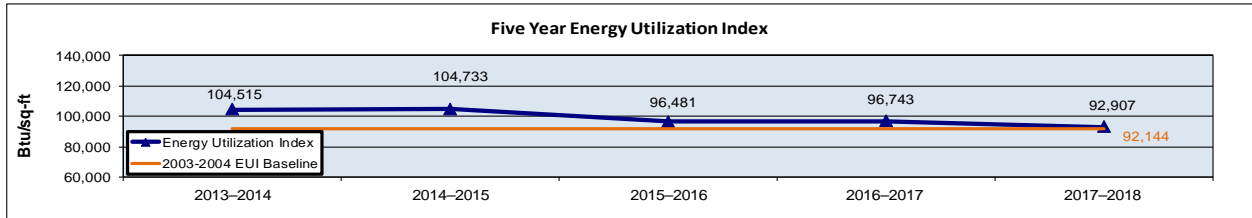
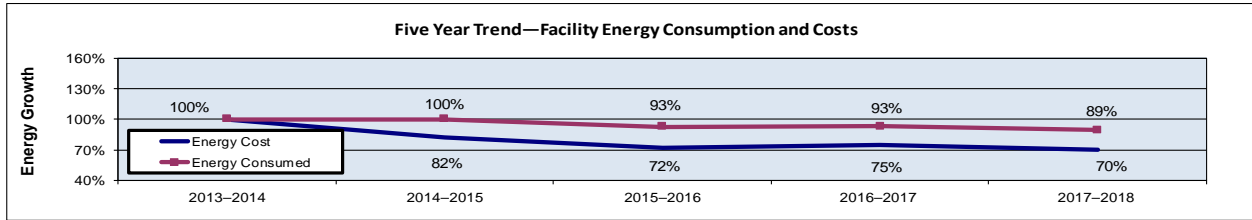
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	96,893	90,321	72,303	70,084	74,782
Oil	gal	---	---	---	---	---
Electric	kWh	17,396,166	17,235,350	16,908,586	16,256,513	15,569,480
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 636,329	\$ 634,909	\$ 373,715	\$ 343,191	\$ 448,595
Oil	\$	---	---	---	---	---
Electric	\$	\$ 1,336,575	\$ 1,359,262	\$ 1,310,761	\$ 1,173,939	\$ 1,039,224
Total	\$	\$ 1,972,904	\$ 1,994,171	\$ 1,703,807	\$ 1,519,300	\$ 1,487,819
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	99,800	93,031	74,472	72,187	77,025
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	59,373	58,824	57,709	55,483	53,139
Total	mmBtu	159,173	151,855	133,758	127,803	130,164
Energy Utilization Index	Btu/sq-ft	90,232	86,084	82,538	78,840	80,296
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 6.57	\$ 7.03	\$ 5.17	\$ 4.90	\$ 6.00
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	7.68 ¢	7.89 ¢	7.75 ¢	7.22 ¢	6.67 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 6.38	\$ 6.82	\$ 5.02	\$ 4.75	\$ 5.82
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 22.51	\$ 23.11	\$ 22.71	\$ 21.16	\$ 19.56
Weighted Average	\$/mmBtu	\$ 12.39	\$ 13.13	\$ 12.74	\$ 11.88	\$ 11.43
Misc Facility Costs						
Water Cost	\$	\$ 59,158	\$ 56,327	\$ 48,996	\$ 53,260	\$ 54,213
Sewage Cost	\$	\$ 123,013	\$ 100,790	\$ 90,155	\$ 54,066	\$ 127,409
Reported Information						
Gross Area	sq-ft	1,764,033	1,764,033	1,620,562	1,621,044	1,621,044
Reported Student Population		4,226	3,829	3,588	3,205	2,807
Reported Heating Degree Days	degree days	6,513	6,179	4,918	4,968	5,594
Reported Cooling Degree Days	degree days	841	781	791	1,120	934

Lock Haven University – Clearfield Campus



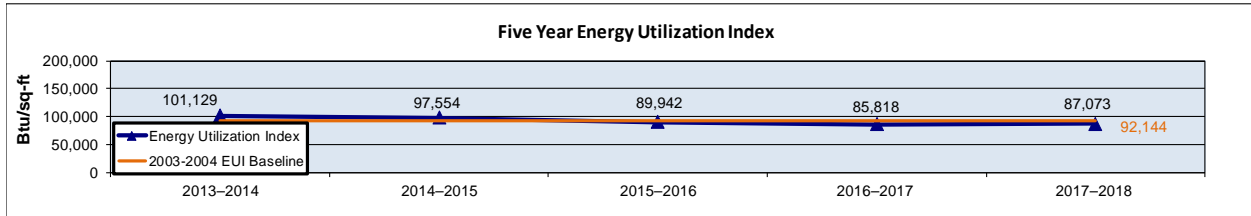
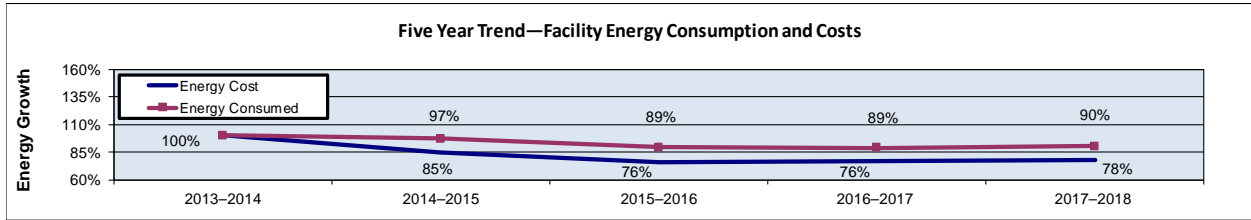
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	4,745	4,652	4,691	5,578	6,002
Oil	gal	---	---	---	---	---
Electric	kWh	908,880	968,200	1,057,640	977,200	968,360
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$40,820	\$35,993	\$31,204	\$39,117	\$ 50,402
Oil	\$	---	---	---	---	---
Electric	\$	\$79,107	\$86,159	\$95,974	\$86,694	\$ 76,097
Total	\$	\$119,927	\$122,152	\$127,178	\$125,811	\$ 126,499
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	4,887	4,792	4,832	5,745	6,182
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	3,102	3,304	3,610	3,335	3,305
Total	mmBtu	7,989	8,096	8,441	9,081	9,487
Energy Utilization Index	Btu/sq-ft	83,722	84,840	91,384	98,303	102,704
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 8.60	\$ 7.74	\$ 6.65	\$ 7.01	\$ 8.40
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	8.70 ¢	8.90 ¢	9.07 ¢	8.87 ¢	7.86 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 8.35	\$ 7.51	\$ 6.46	\$ 6.81	\$ 8.15
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 25.50	\$ 26.07	\$ 26.59	\$ 25.99	\$ 23.02
Weighted Average	\$/mmBtu	\$ 15.01	\$ 15.09	\$ 15.07	\$ 13.86	\$ 13.33
Misc Facility Costs						
Water Cost	\$	\$4,014	\$4,210	\$4,222	\$4,356	\$ 4,118
Sewage Cost	\$	\$4,584	\$4,610	\$4,625	\$5,916	\$ 5,316
Reported Information						
Gross Area	sq-ft	95,427	95,427	92,373	92,373	92,373
Reported Student Population		238	203	201	205	189
Reported Heating Degree Days	degree days	6,958	6,973	5,752	5,731	6,541
Reported Cooling Degree Days	degree days	559	456	532	695	462

Mansfield University



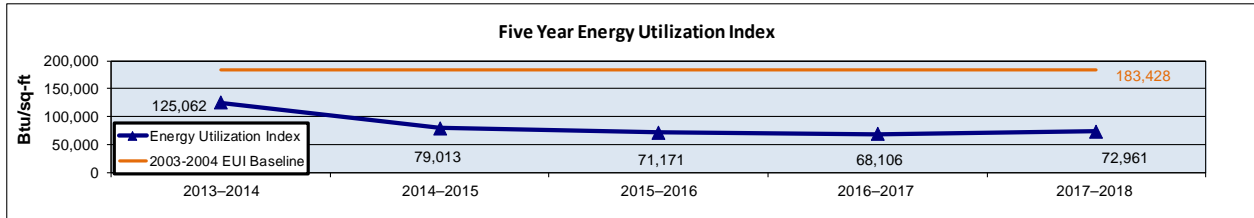
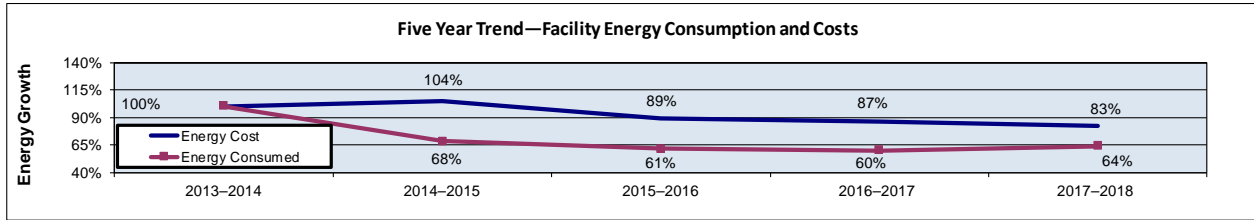
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	102,269	103,769	95,212	95,228	92,206
Oil	gal	13,978	---	---	---	---
Electric	kWh	15,161,410	15,379,342	14,528,983	14,641,466	13,833,365
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 849,678	\$ 560,637	\$ 420,947	\$ 474,910	\$ 400,355
Oil	\$	\$ 47,190	---	---	---	---
Electric	\$	\$ 1,172,760	\$ 1,137,844	\$ 1,073,822	\$ 1,079,182	\$ 1,043,883
Total	\$	\$ 2,069,628	\$ 1,698,481	\$ 1,494,769	\$ 1,554,092	\$ 1,444,238
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	105,337	106,882	98,068	98,085	94,972
Oil	mmBtu	1,957	---	---	---	---
Electric	mmBtu	51,746	52,490	49,587	49,971	47,213
Total	mmBtu	159,040	159,372	147,656	148,056	142,185
Energy Utilization Index	Btu/sq-ft	104,515	104,733	96,481	96,743	92,907
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 8.31	\$ 5.40	\$ 4.42	\$ 4.99	\$ 4.34
Oil	\$/gal	\$ 3.38	---	---	---	---
Electric	¢/kWh	7.74 ¢	7.40 ¢	7.39 ¢	7.37 ¢	7.55 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 8.07	\$ 5.25	\$ 4.29	\$ 4.84	\$ 4.22
Oil	\$/mmBtu	\$ 24.11	---	---	---	---
Electric	\$/mmBtu	\$ 22.66	\$ 21.68	\$ 21.66	\$ 21.60	\$ 22.11
Weighted Average	\$/mmBtu	\$ 13.01	\$ 10.66	\$ 10.12	\$ 10.50	\$ 10.16
Misc Facility Costs						
Water Cost	\$	\$ 78,205	\$ 82,679	\$ 86,074	\$ 85,362	\$ 89,361
Sewage Cost	\$	\$ 183,000	\$ 183,000	\$ 183,000	\$ 183,000	\$ 198,972
Reported Information						
Gross Area	sq-ft	1,521,695	1,521,695	1,530,411	1,530,411	1,530,411
Reported Student Population		2,322	2,157	1,890	1,755	1,407
Reported Heating Degree Days	degree days	6,558	6,816	5,840	5,738	6,385
Reported Cooling Degree Days	degree days	488	400	398	725	512

Millersville University



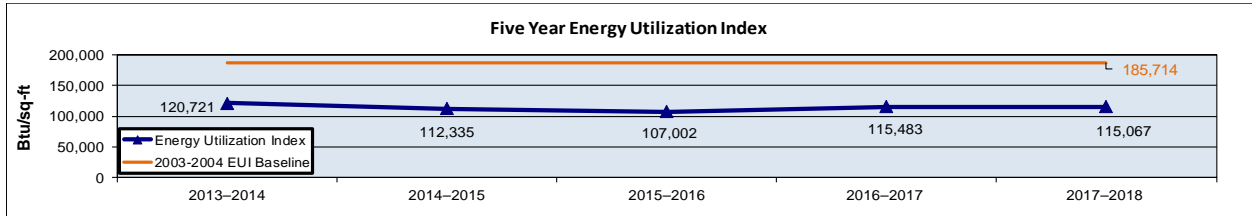
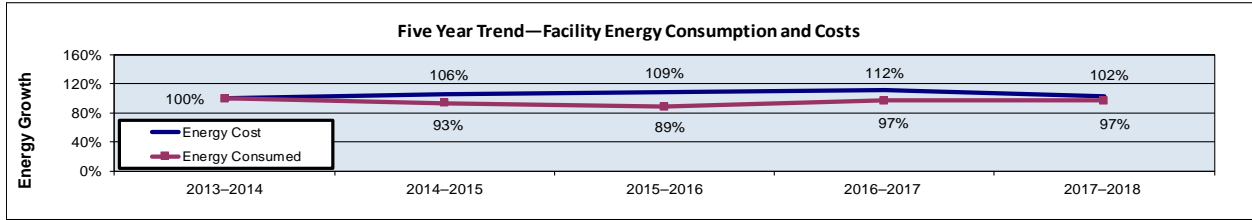
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	71,402	70,384	63,060	62,439	66,972
Oil	gal	37,972	37,072	27,222	23,731	26,614
Electric	kWh	39,770,287	38,366,523	35,966,225	36,138,385	35,470,390
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 746,345	\$ 558,525	\$ 455,900	\$ 500,969	\$ 581,309
Oil	\$	\$ 129,105	\$ 64,799	\$ 36,649	\$ 43,898	\$ 57,922
Electric	\$	\$ 2,788,524	\$ 2,483,613	\$ 2,308,270	\$ 2,257,427	\$ 2,210,262
Total	\$	\$ 3,663,974	\$ 3,106,937	\$ 2,800,819	\$ 2,802,294	\$ 2,849,493
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	73,544	72,496	64,952	64,312	68,981
Oil	mmBtu	5,316	5,190	3,811	3,322	3,726
Electric	mmBtu	135,736	130,945	122,753	123,340	121,060
Total	mmBtu	214,596	208,631	191,516	190,975	193,768
Energy Utilization Index	Btu/sq-ft	101,129	97,554	89,942	85,818	87,073
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 10.45	\$ 7.94	\$ 7.23	\$ 8.02	\$ 8.68
Oil	\$/gal	\$ 3.40	\$ 1.75	\$ 1.35	\$ 1.85	\$ 2.18
Electric	¢/kWh	7.01 ¢	6.47 ¢	6.42 ¢	6.25 ¢	6.23 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 10.15	\$ 7.70	\$ 7.02	\$ 7.79	\$ 8.43
Oil	\$/mmBtu	\$ 24.29	\$ 12.49	\$ 9.62	\$ 13.21	\$ 15.55
Electric	\$/mmBtu	\$ 20.54	\$ 18.97	\$ 18.80	\$ 18.30	\$ 18.26
Weighted Average	\$/mmBtu	\$ 17.07	\$ 14.89	\$ 14.62	\$ 14.67	\$ 14.71
Misc Facility Costs						
Water Cost	\$	\$ 127,817	\$ 98,163	\$ 106,365	\$ 149,830	\$ 141,033
Sewage Cost	\$	\$ 620,678	\$ 389,944	\$ 386,368	\$ 440,393	\$ 433,450
Reported Information						
Gross Area	sq-ft	2,122,013	2,138,617	2,129,320	2,225,354	2,225,354
Reported Student Population		6,658	6,291	6,473	6,130	5,935
Reported Heating Degree Days	degree days	5,190	5,244	4,652	4,836	5,450
Reported Cooling Degree Days	degree days	957	756	935	746	834

Shippensburg University



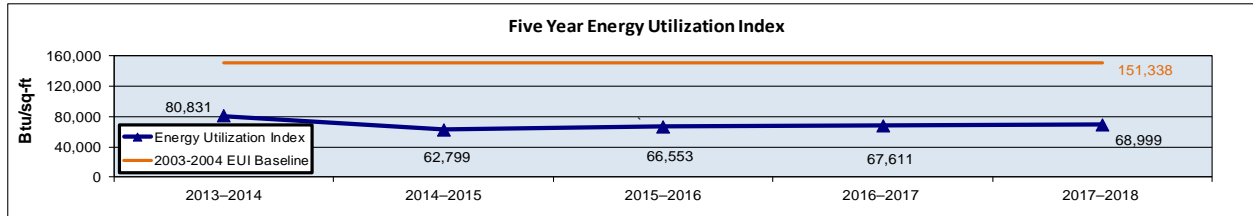
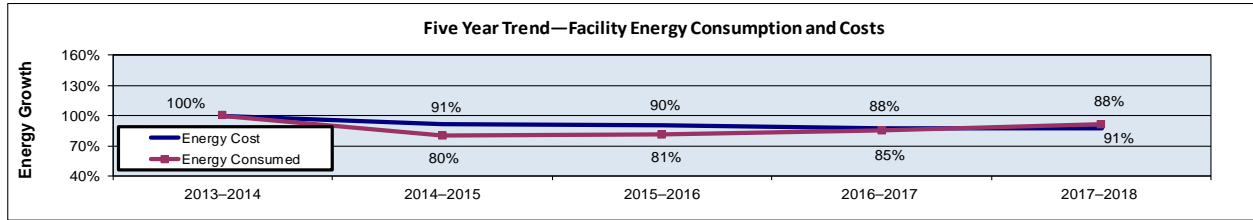
	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	6,772	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	21,709	98,373	86,362	83,978	94,831
Oil	gal	---	---	---	---	---
Electric	kWh	23,449,377	25,059,567	23,001,149	22,542,285	22,484,225
Energy Costs						
Anthracite Coal	\$	\$ 672,042	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 157,933	\$ 853,258	\$ 527,418	\$ 552,033	\$ 624,125
Oil	\$	---	---	---	---	---
Electric	\$	\$ 1,635,676	\$ 1,719,136	\$ 1,669,298	\$ 1,582,463	\$ 1,410,962
Total	\$	\$ 2,465,651	\$ 2,572,394	\$ 2,196,716	\$ 2,134,496	\$ 2,035,087
Energy Consumption						
Anthracite Coal	mmBtu	170,654	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	22,360	101,324	88,953	86,497	97,676
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	80,033	85,528	78,503	76,937	76,739
Total	mmBtu	273,047	186,852	167,456	163,434	174,415
Energy Utilization Index	Btu/sq-ft	125,062	79,013	71,171	68,106	72,961
Unit Fuel Costs						
Anthracite Coal	\$/ton	\$ 99.24	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 7.28	\$ 8.67	\$ 6.11	\$ 6.57	\$ 6.58
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	6.98 ¢	6.86 ¢	7.26 ¢	7.02 ¢	6.28 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	\$ 3.94	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 7.06	\$ 8.42	\$ 5.93	\$ 6.38	\$ 6.39
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 20.44	\$ 20.10	\$ 21.26	\$ 20.57	\$ 18.39
Weighted Average	\$/mmBtu	\$ 9.03	\$ 13.77	\$ 13.12	\$ 13.06	\$ 11.67
Misc Facility Costs						
Water Cost	\$	\$ 179,943	\$ 195,586	\$ 209,698	\$ 171,421	\$ 160,684
Sewage Cost	\$	\$ 132,700	\$ 150,512	\$ 129,336	\$ 138,393	\$ 182,989
Reported Information						
Gross Area	sq-ft	2,183,293	2,364,846	2,352,881	2,399,700	2,390,502
Reported Student Population		6,516	6,161	6,146	6,011	5,556
Reported Heating Degree Days	degree days	4,885	5,813	3,488	3,363	3,960
Reported Cooling Degree Days	degree days	1,214	1,656	1,626	2,041	1,768

Slippery Rock University



	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	3,761	2,303	2,226	2,698	2,574
Gas	mcf	102,705	125,177	110,824	119,689	128,270
Oil	gal	---	---	---	---	---
Electric	kWh	28,548,286	27,263,933	28,242,001	29,264,497	27,793,971
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	\$ 407,110	\$ 237,333	\$ 210,478	\$ 259,366	\$ 247,887
Gas	\$	\$ 737,516	\$ 913,573	\$ 807,112	\$ 779,660	\$ 847,147
Oil	\$	---	---	---	---	---
Electric	\$	\$ 1,602,206	\$ 1,750,309	\$ 1,973,794	\$ 2,025,151	\$ 1,717,551
Total	\$	\$ 2,746,832	\$ 2,901,214	\$ 2,991,384	\$ 3,064,177	\$ 2,812,585
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	100,043	61,260	59,212	71,767	68,468
Gas	mmBtu	105,786	128,932	114,149	123,280	132,118
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	97,435	93,052	96,390	99,880	94,861
Total	mmBtu	303,264	283,244	269,750	294,926	295,447
Energy Utilization Index	Btu/sq-ft	120,721	112,335	107,002	115,483	115,067
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	\$ 108.25	\$ 103.05	\$ 94.55	\$ 96.13	\$ 96.30
Gas	\$/mcf	\$ 7.18	\$ 7.30	\$ 7.28	\$ 6.51	\$ 6.60
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	5.61 ¢	6.42 ¢	6.99 ¢	6.92 ¢	6.18 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	\$ 4.07	\$ 3.87	\$ 3.55	\$ 3.61	\$ 3.62
Gas	\$/mmBtu	\$ 6.97	\$ 7.09	\$ 7.07	\$ 6.32	\$ 6.41
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 16.44	\$ 18.81	\$ 20.48	\$ 20.28	\$ 18.11
Weighted Average	\$/mmBtu	\$ 9.06	\$ 10.24	\$ 11.09	\$ 10.39	\$ 9.52
Misc Facility Costs						
Water Cost	\$	\$ 353,598	\$ 354,749	\$ 325,513	\$ 413,059	\$ 395,519
Sewage Cost	\$	\$ 329,407	\$ 343,139	\$ 354,201	\$ 469,850	\$ 439,963
Reported Information						
Gross Area	sq-ft	2,512,107	2,521,422	2,520,983	2,553,845	2,567,609
Reported Student Population		7,525	7,327	7,367	7,509	7,478
Reported Heating Degree Days	degree days	6,763	6,554	5,100	5,269	6,221
Reported Cooling Degree Days	degree days	595	539	800	831	500

West Chester University



	Units	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
Fuel Consumption						
Anthracite Coal	tons	3,585	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	61,324	96,049	96,605	101,044	112,751
Oil	gal	88,273	10,077	7,459	9,470	10,157
Electric	kWh	40,015,403	41,642,179	42,477,897	44,664,365	46,517,314
Energy Costs						
Anthracite Coal	\$	\$ 462,513	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 574,105	\$ 838,501	\$ 677,258	\$ 714,238	\$ 848,985
Oil	\$	\$ 290,879	\$ 20,931	\$ 11,862	\$ 18,329	\$ 23,014
Electric	\$	\$ 3,152,030	\$ 3,226,992	\$ 3,356,002	\$ 3,198,058	\$ 3,068,609
Total	\$	\$ 4,479,527	\$ 4,086,424	\$ 4,045,122	\$ 3,930,625	\$ 3,940,608
Energy Consumption						
Anthracite Coal	mmBtu	91,059	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	63,164	98,930	99,503	104,075	116,134
Oil	mmBtu	12,358	1,411	1,044	1,326	1,422
Electric	mmBtu	136,573	142,125	144,977	152,439	158,764
Total	mmBtu	303,154	242,466	245,524	257,841	276,319
Energy Utilization Index	Btu/sq-ft	80,831	62,799	66,553	67,611	68,999
Unit Fuel Costs						
Anthracite Coal	\$/ton	\$ 129.01	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 9.36	\$ 8.73	\$ 7.01	\$ 7.07	\$ 7.53
Oil	\$/gal	\$ 3.30	\$ 2.08	\$ 1.59	\$ 1.94	\$ 2.27
Electric	¢/kWh	7.88 ¢	7.75 ¢	7.90 ¢	7.16 ¢	6.60 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	\$ 5.08	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 9.09	\$ 8.48	\$ 6.81	\$ 6.86	\$ 7.31
Oil	\$/mmBtu	\$ 23.54	\$ 14.84	\$ 11.36	\$ 13.82	\$ 16.18
Electric	\$/mmBtu	\$ 23.08	\$ 22.71	\$ 23.15	\$ 20.98	\$ 19.33
Weighted Average	\$/mmBtu	\$ 14.78	\$ 16.85	\$ 16.48	\$ 15.24	\$ 14.26
Misc Facility Costs						
Water Cost (1)	\$	\$ 754,846	\$ 919,084	\$ 953,186	\$ 948,349	\$ 930,124
Sewage Cost (1)	\$	\$ 317,711	\$ 547,283	\$ 577,046	\$ 579,653	\$ 553,179
Reported Information						
Gross Area	sq-ft	3,750,473	3,860,973	3,689,154	3,813,580	4,004,701
Reported Student Population		13,699	13,701	14,164	14,192	14,217
Reported Heating Degree Days	degree days	5,387	5,963	4,935	5,041	5,634
Reported Cooling Degree Days	degree days	1,344	987	1,113	1,285	988

(1) Beginning in 2015, the water and sewer data includes University Student Housing.

Glossary

Energy Utilization Index (Btu/sq-ft)	Determined by dividing energy (Btu) by total space (sq-ft).
Load Factor	<p>A measure of effective use of electricity, the ratio of the average load over a designated period to the peak load occurring during that period. Load factor is determined by dividing the kWh by the product of the kW demand and 730 (the average number of hours in a month).</p> <p>The load factor value ranges from 0.0 to 1.0. Facilities with higher load factors (0.7-0.9) realize a lower cost per kWh. Very low load factors (0.3-0.5) point toward higher kWh costs and indicate the need for review of electricity use.</p>
Miscellaneous Gas or Oil Used	The amount of gas or oil used to operate those buildings not served by the central boiler plant.
Steam Capacity	Plant steam capacity is based on the continuous output rating for all boilers in the central plant.
Total Energy (Btu)	The total amount of all energy (coal, electricity, landfill gas, natural gas, oil, propane, purchased steam, and wood) converted to Btus as delivered to the facility.
Total Energy Cost	Total cost of all energy used at the facility. Energy cost includes coal, electricity, landfill gas, natural gas, oil, propane, purchased steam, and wood.
Total Fuel Cost	All fuel cost for coal, electricity, landfill gas, natural gas, oil, propane, purchased steam, and wood combined.
Total Space	The gross total space at a facility measured in square feet. This includes heated and non-heated space.
Unit Energy Cost (\$/MMBtu)	Determined by dividing the energy cost by the total million Btus.
Unit Cost of Steam (\$/mlb)	The total cost to produce 1,000 pounds of steam in the boiler plant. It is determined by dividing the steam into the total operating cost including charges for fuel, labor, parts, services, and suppliers.
Weighted Average	A statistical method used when individual figures are dependent on another factor that varies by facility. For example, a straight average of per unit energy cost could be misleading because it is dependent on two variables at each facility—Total Energy Consumed and Total Energy Cost. Each value differs by facility.

Acronyms and Abbreviations

\$/gal	Dollars per gallon
\$/mcf	Dollars per thousand cubic feet
\$/mgal	Dollars per thousand gallons
\$/mlbs	Dollars per thousand pounds
\$/mmBtu	Dollars per million British thermal units
\$/sq-ft	Dollars per square foot
c/kWh	Cents per kilowatt hour
AEPS	Alternative Energy Portfolio Standard
ATC	Automatic temperature control
BAS	Building automation system
BCF	Billion cubic feet
Btu	British thermal unit
Btu/sq-ft	British thermal units per square foot
5CP	Five coincident peak
CDD	Cooling degree days
CFR	Code of Federal Regulations
CSP	Curtailed service providers
DGS	Department of General Services
EDC	Electrical distribution company
EE&C	Energy Efficiency and Conservation
EPA	United States Environmental Protection Agency
ERMA	Energy Risk Management Application
EUI	Energy Utilization Index
FGR	Flue gas recirculation
GESA	Guaranteed Energy Savings Act
GHG	Greenhouse gas

HB	House Bill
HDD	Heating degree days
IUP	Indiana University of Pennsylvania
HVAC	Heating, ventilating, and air conditioning
kWh	Kilowatt hour
LMP	Locational Marginal Price
LNG	Liquefied natural gas
mmBtu	One million British thermal units
MW	Megawatt
MWh	Megawatt hour
NETA ATS	InterNational Electrical Testing Association Standard for Acceptance Testing Specifications
NOx	Oxides of nitrogen
NYMEX	New York Mercantile Exchange
OSHA	Occupational Safety and Health Administration
PADEP	Pennsylvania Department of Environmental Protection
PASSHE	Pennsylvania's State System of Higher Education
PCID	Pennsylvania Commercial Item Description
PLC	Peak Load Contribution
PP-R	Polypropylene Random Copolymer
PP-RCT	Polypropylene Random Crystalline Temperature
PSFEI	Penn State Facilities Engineering Institute
PUC	Public Utility Commission
RFQ	Request for Quote