

Utility Usage Report for Fiscal Year 2015–2016



Pennsylvania's
STATE SYSTEM
of Higher Education



PennState
College of Engineering

**FACILITIES
ENGINEERING
INSTITUTE**

*Utility Usage Report
for Fiscal Year
2015–2016*

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

The Penn State Facilities Engineering Institute (PSFEI) has served Pennsylvania's State System of Higher Education since its inception in 1983 and during its previous affiliation with the Pennsylvania Department of Education since 1947. As I prepare to retire from Penn State, I want to express my appreciation for having had the privilege of being part of our service to the System for the past 32 years, first as a mechanical engineer working with central steam plants and for the past 22 years as the Director of PSFEI.

During my 32 years of service, I have seen significant changes to the System, its people, and ways of doing business. As you can imagine, facilities needs have also changed dramatically. However, some things remain the same such as the need to use resources efficiently including energy, finances, and people. This report provides valuable information about the Universities' energy use as well as a summary of the many services provided to you by PSFEI. The utility use section of this report is a decision-making tool that System executives, facilities managers, and operations personnel can use to plan, budget, and operate their Universities. Our assistance with energy markets and energy procurement continues to provide tangible savings to the System. Last, but certainly not least, training, operations and maintenance support, and project assistance have once again proved to be invaluable services to the System over the past year.

A sincere thank you to everyone at Pennsylvania's State System of Higher Education for providing the information that goes into this report and thank you for providing me with the opportunity to work for so many years with such a great organization that delivers valued higher education to Pennsylvanians.

Sincerely,

A handwritten signature in black ink that reads "James Myers".

James Myers, P.E.
Director

INTRODUCTION

Penn State Facilities Engineering Institute (PSFEI) is pleased to present the Utility Usage Report for Fiscal Year 2015–2016. 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 facilities. 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 facility’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 reflect a five-year history for student population and a variety of energy, space, water, and sewage information.

New to the Utility Usage Report this year is the 2003–2004 Energy Utilization (EUI) Baseline. The EUI baseline allows comparison of current year with the EUI for year one of the PASSHE Energy Plan. It is shown for all PASSHE facilities in Table 1 and also in the Five-Year tables for each university. Additionally, the two-year data comparison bar charts were removed from the report.

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

Professional and technical services for boiler plant; electrical; energy; heating, ventilating, and air conditioning (HVAC); and water treatment areas for the universities 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. A general description of services provided for Pennsylvania’s State System of Higher Education (PASSHE) universities is presented in this report. Specific boiler plant and energy data for the fiscal year are also provided.

Collective Services

Boiler Plant

Wayne Macafee provided central heating plant services for PSFEI. Wayne specializes in all aspects of boiler plant operations and provides support over a broad range of issues, including but not limited to system troubleshooting, specification document review for capital projects, and air quality permitting and reporting. Other related services involve evaluation of new and proposed air quality regulations for impact on PASSHE boiler plants, boiler plant equipment and control system assessments, annual training classes, and on-site training by request. Wayne taught workshops on “Heating Plant Maintenance—what should you be doing?” at various locations

throughout the Commonwealth and coordinated, prepared, and presented the two and one-half day Boiler Plant Operations and Maintenance Training short course in May, 2016 in State College.

Electrical

G. Scott McCall and Brian Johnson provided PSFEI electrical services. Scott concentrated on medium-voltage electrical distribution systems, arc flash, and National Fire Protection Association (NFPA) Standard 70E evaluations, reviewed capital projects, and made recommendations on the operation, maintenance, and replacement of electrical equipment. Brian provided infrared (IR) surveys and maintenance recommendations and specialized in field engineering services that included on-site testing and troubleshooting.

Brian prepared and taught workshops at five locations throughout the Commonwealth on electrical system diagrams. Scott coordinated, prepared, and presented the two and one-half day short course, Medium Voltage Systems and Cable Terminations, in May 2016 held in State College. Sessions taught during the course included single-line diagram reading, fuses and circuit breakers, and cable terminations and testing.

Heating, Ventilating, and Air Conditioning

Mi Kim is the HVAC Systems Specialist for PSFEI. Mi's services to PASSHE during the past year included technical assistance and resolution of issues concerning deaerator controls, condensate lines, chillers, and building humidity problems.

Mi prepared and taught HVAC workshops at five locations across the Commonwealth on "The Anatomy of an Air Handler Unit: Its Purpose and Components." In addition, the 2015 HVAC Technical Conference held in Boalsburg in July 2015 was planned, developed, and presented by Mi. This two and one-half day course focused on Chiller Fundamentals/Central Plant.

Water Treatment

Robert (Bob) Bruce provided water treatment and related advisory services to PASSHE. Services available to the universities included technical evaluations and advice relative to boiler water, cooling towers, potable water, and wastewater as well as review of daily boiler water chemistry logs and utility usage data. When requested, Bob also conducts on-site water and wastewater training presentations for PASSHE universities.

The PASSHE annual Utility Usage Report is prepared by Bob. This report provides important information for PASSHE officials, facility directors, managers, and operations personnel for planning, budgeting, and operation of PASSHE universities. The report presents a five-year comparison of utilities for PASSHE universities, both individually and collectively. These utilities include coal, electric, fuel oil, natural gas, propane, water, and wastewater. The report illustrates energy growth, consumption, and costs, and provides detailed usage data by facility and fuel-type, which enables PSFEI to monitor energy costs and better assist PASSHE universities during energy procurement events and energy-savings projects.

Bob also developed and updated greenhouse gas (GHG) and fuel-combustion emissions data for all PASSHE facilities. The data represent general emissions data for various direct-fuel usage as well as that consumed by electric utility suppliers. The data was developed from the U.S. Environmental Protection Agency's (EPA) eGRID data for electricity and 40 Code of Federal Regulations (CFR) emission information for other fuels.

Standard Operating Procedures for the prevention of Legionella, pursuant to ASHRAE Standard 188, for guidance purposes was prepared by Bob for the PASSHE Universities.

Coal Committee

James (Jim) Myers and Wayne Macafee are standing members of the Department of General Services (DGS) Coal Committee. Wayne is the PASSHE representative on the committee. The committee met in February 2016 to review performance from the previous contract year and determine any changes to contract requirements for the 2016–2017 contract year.

During the meeting, new 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. PSFEI supported the Coal Committee with coal specification reviews, actions developed to maintain desired coal quality, attendance at vendor meetings, assistance in 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. Wayne also closely followed reviews and reconsiderations on the Maximum Achievable Control Technology (MACT) 6J rule for any potential additional impact on the Commonwealth's coal-fired facilities.

PASSHE Directors Meetings

In addition to the university-specific services listed within this report, PSFEI participated in the semi-annual PASSHE Directors Meetings that were held at Dixon University Center in November 2015 and California University in April 2016.

At the fall meeting at Dixon University Center, Paul Meister and Scott Harford provided updates on the natural gas and electricity markets, as well as procurement event results performed in conjunction with PASSHE. Bob Bruce provided information on ASHRAE Standard 188, prevention of Legionnaire's disease, and updated the group on changes to the annual utilities usage report.

Jim Myers, Kurt Homan, and Bob Bruce were present at the spring meeting at California University. Bob presented standard operating procedures for Legionella prevention. Kurt provided a presentation titled "Energy Conservation Measure—Cost Avoidance Scenarios and Risks." He also provided an introduction to the EnergyCAP Utility Bill Management software.

Energy

The PSFEI Energy Team, consisting of Kurt Homan, Paul Meister, Scott Harford, Devin Pennebaker, and Diane Haldeman, serves the energy needs of PASSHE. 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.

PSFEI provides web-based electricity and natural gas energy procurement services for all PASSHE universities. The Energy Risk Management Application (ERMA), allows pre-qualified energy commodity suppliers to submit a diverse mix of electricity and natural gas pricing and term bids on multiple accounts. The automated system enables the user to easily compare, select, and award contracts and electronically send out award notifications. Ease of use allows suppliers to submit bids and receive award notifications quickly, resulting in aggressive price competition. As part of our procurement services, PSFEI compiles billing histories, assists suppliers in registering accounts, analyzes tariff information, and provides ongoing support regarding supplier/utility issues.

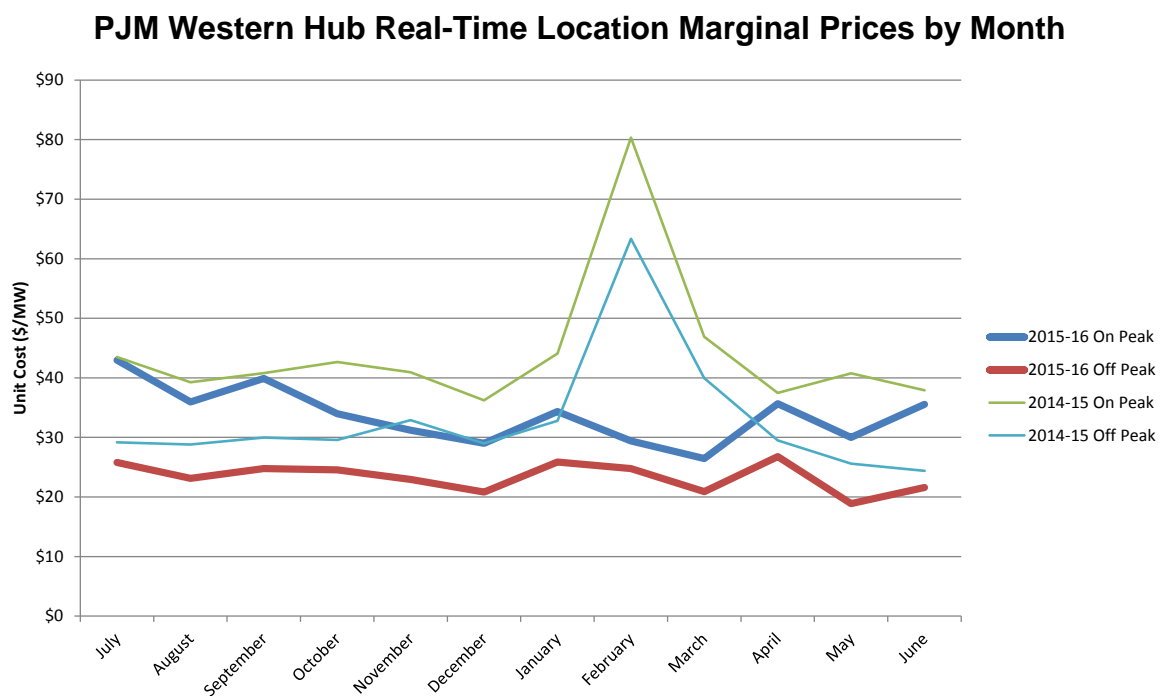
Energy Risk Management Application

PSFEI continued to develop the ERMA capabilities, allowing PASSHE facility management personnel to make informed utility and commodity decisions. Enhancements during the year included electric demand response contract tracking. ERMA provides online access to detailed procurement and utility billing information.

Electric Market Update

Energy markets continue to demonstrate a strong correlation between natural gas and electricity. With rich deposits of Marcellus Shale gas injecting a plentiful source of energy into the Commonwealth’s footprint, natural gas and electricity pricing, secured through competitively bid solicitations, have remained favorable.

To review market changes, PSFEI analyzed the PJM Western Hub Real Time Locational Marginal Price (LMP) hourly energy market and compared data from the 2014–2015 and 2015–2016 fiscal years. The average monthly on-peak and off-peak prices are shown below.



During fiscal year 2015–2016, real time pricing deviated from the winter-peaking trend experienced in fiscal years 2014–2015 and 2013–2014. Providing a more consistent and tighter band than the previous fiscal year, real-time energy pricing, on an hourly-compared basis, was approximately 25 percent lower and 18 percent less volatile than the previous fiscal year. Real-time energy pricing reverted to a more traditional summer-peaking pricing pattern, in a shift from the aforementioned winter-peaking trend experienced in the previous two fiscal years.

With an average on-peak price of \$42.98 per megawatt (MW), July 2015 represented the highest average real-time energy pricing experienced in fiscal year 2015–2016. This correlates with the fact that 3 of the 5 electric distribution companies (EDC) coincident peak (CP) load hours, were experienced in the month of July 2015. The highest 5 CP hour, representing the largest coincident load experienced by the entire PJM system, was Tuesday, July 28, 2015, at 5:00 p.m. with a system-wide load of 143,496 MW. The locational marginal price at the Western Hub pricing point during this single hour was \$146.03 per MW.

The cost of generation capacity, set by PJM and effective on a June through May cycle, varied widely by utility zones in fiscal year 2015–2016, as compared to fiscal year 2014–2015. In general, capacity prices in the eastern portion of the Commonwealth, served by MetEd, PECO, and PPL, ranged tightly between \$188 and \$190 per MW/day. The western portion of the Commonwealth, served by Duquesne Light Company, Penelec, Penn Power, and West Penn Power varied more widely with Penn Power exhibiting the highest capacity pricing of \$335.98 per MW/day while Duquesne Light Company represented the lower end of capacity pricing at \$156.50 per MW/day. Capacity charges represent approximately 16 percent of total electric bill charges for larger Commonwealth facilities.

Modest rises in capacity pricing in all EDCs were experienced in comparison to fiscal year 2014–2015 with a 12 to 24 percent cost increase across all EDCs except the Penn Power territory, where generation capacity rose by 136 percent. Going forward, capacity costs are expected to steadily rise due to the PJM’s Capacity Performance Program which is designed to address peak load outage rates by imposing more stringent regulations regarding resource availability during critical hours.

Across the Commonwealth, transmission charges in fiscal year 2015–2016 experienced little change except for the Duquesne Light Company, Penn Power, and PPL territories. Both Duquesne and Penn Power experienced increases of 17 percent and 30 percent, while transmission costs decreased by 11 percent. All other territories remained constant. These transmission charges account for approximately 9 percent of the total cost of electricity for larger Commonwealth facilities.

Going forward, transmission pricing for the First Energy territories of MetEd, Penelec, and West Penn Power is expected to change due to a recent conversion from standard rate transmission pricing to formula rate based transmission pricing, whereby the transmission costs can be altered on a yearly basis as opposed to being stagnant.

Regulated EDC rate increases were approved for PECO (2.9 percent) and Pennsylvania Power & Light Co. (5.1 percent) by the Public Utility Commission (PUC) and implemented in January 2016.

PECO and the First Energy companies filed plans with, and received approval from, the PUC to implement a Distribution System Improvement Charge (DSIC) for each of the distribution zones. The DSIC rates are implemented as an additional line-item charge based on the repair, improvement and replacement of prescribed distribution company equipment. No DSIC charges for the aforementioned companies were implemented in fiscal year 2015–2016. When implemented, these charges will marginally affect overall distribution costs and will be adjusted quarterly.

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 EDCs in the Commonwealth 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 the cost of this program is funded by the consumers, it is advantageous to participate in the program.

There is significant opportunity to increase program participation across the Commonwealth. The effort required by the Commonwealth is minor as each EDC has hired consultants to support applicants in identifying and processing the rebate applications. Virtually any retrofit that results in electricity savings is eligible to apply for and receive rebate money. The rebates can be issued as utility bill credits or it can be delivered as a check paid directly to the facility that earned the rebate.

Act 129 program Phase III will operate from June 2016 through May 2021 and provide cash rebates for electricity saving initiatives. The program also includes an EDC-based demand response program which will start in June 2017, providing 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.

PJM Demand Response Program Services

PSFEI supported Commonwealth agencies with the PJM Emergency Demand Response program. This support included soliciting of curtailment service providers (CSP) for new and expiring contracts, helping improve communications during scheduled events, and collecting and reporting facility-specific program information. Six universities participated in the PJM program. Results from the 2015–2016 program are detailed in the PJM Demand Response Program Results table on page 7.

PJM Demand Response Program Results

University	CSP	EDC	KW Reduction	Total Payment*
Clarion	ECS	West Penn	1,500	\$29,332
East Stroudsburg	CPower	PPL	910	\$35,580
Kutztown	ECS	Met Ed	1,800	\$39,132
Millersville	CPower	PPL	1,160	\$41,345
Slippery Rock	ECS	West Penn	2,930	\$60,437
West Chester	ECS	PECO	750	\$16,305
Total Customer Payments				\$222,131

* Estimated payments provided by CSP as of 11/11/2016

Electric Procurement

PSFEI conducted two electric procurement events for 76 PASSHE accounts. Choosing an alternate energy provider, as compared to remaining on default service pricing with the local EDC, resulted in projected annual avoided costs of \$4,935,149. Total contract avoided costs are estimated to be \$12,116,079. The results are found in the Electric Procurement Summary table.

Electric Procurement Summary

University	Number of Accounts	Annual Avoided Costs	Contract Avoided Costs
California	2	\$358,498	\$719,234
Dixon Center	1	\$10,273	\$41,092
East Stroudsburg	1	\$449,301	\$1,347,902
Edinboro	1	\$1,021,844	\$4,087,377
Lock Haven	8	\$18,932	\$56,795
Mansfield	1	\$294,882	\$884,647
Millersville	50	\$838,808	\$1,694,365
Shippensburg	1	\$568,094	\$568,094
West Chester	1	\$703,490	\$703,490
Bloomsburg	10	\$671,027	\$2,013,082
Total Avoided Costs		\$4,935,149	\$12,116,079

Natural Gas Market Update

The average monthly NYMEX settlement price fell 33.6 percent from \$3.42 per million British thermal units (mmBtu) in fiscal year 2014–2015 to \$2.27 per mmBtu in fiscal year 2015–2016. This decrease in price was due largely to the continuing surplus of natural gas supply and low demand. However, demand for natural gas has been slowly rising, and price will follow.

Gas in storage, weather, electric power generation, gas exports, and local gas production in the northeast United States continued to be principal drivers in the price of natural gas.

- Stored gas inventory remains approximately 400 billion cubic feet above the five-year average level at 3.4 trillion cubic feet. This is 11 percent higher than levels at this time a

year ago, and almost 14 percent higher than the five-year average for this time of year. There are no indications that the surplus will rise or fall significantly.

- The winter of 2015–2016 was very warm in the northeast United States. Because of that, gas storage withdrawals were lower than expected, helping the winter gas price decrease rather dramatically from the January 2016 settlement price of \$2.37 per mmBtu to the March 2016 settlement price of \$1.711 per mmBtu. This follows the nationwide four-year trend of a 14 percent decrease in winter heating degree days, which placed further downward pressure on gas price. Conversely, summer cooling degree days have increased approximately 15 percent from 2013 to 2016, helping to offset winter gas price declines.
- Just as last fiscal year, the emerging driver of demand is natural gas-fired electric power generation. In the United States, consumption of natural gas for power generations increased 9 percent from 2014–2015.
- Natural gas exports are increasing, especially to Mexico’s electric power sector. According to the U.S. Energy Information Administration (EIA), exports to Mexico are expected to increase by 14 percent in 2016. Liquefied natural gas (LNG) exports also added to growing demand, with expected exports to reach 0.5 billion cubic feet of gas per day (Bcf/day) with a new gas liquefaction plant in Louisiana, where the first exports occurred in February 2016. EIA predicts that the United States will be a net exporter of natural gas in mid-2017.
- Many natural gas pipeline projects are underway, which should help stimulate gas drilling and production, increase supply, and stabilize locational pricing. In 2017 and beyond, many new pipelines are expected to start moving gas to existing and new markets like New England and to LNG export points.
- Natural gas production in Pennsylvania reached a ten-year high in February 2016 of 14.9 Bcf/day but has been decreasing about one percent per month, and is representative of all Marcellus shale production in general (New York, Ohio, Pennsylvania, and West Virginia).

Growing demand for natural gas is expected to offset storage surpluses and warmer winters, and prices are expected to slowly rise in the coming fiscal year.

Natural Gas Procurement

Three natural gas commodity procurement events were held during the fiscal year. For each of the accounts shopped, PSFEI collected billing data, developed and confirmed monthly nomination quantities with facility managers, analyzed tariff issues, and conducted competitive bidding events with prequalified suppliers. These procurement events resulted in projected contract avoided costs of \$630,651 as compared to utility retail tariff rates. Projected avoided costs by university are shown in the Natural Gas Procurement Summary table on page 9.

Natural Gas Procurement Summary

University	Number of Accounts	Annual Avoided Costs	Contract Avoided Costs
Bloomsburg	6	\$107,178	\$112,514
Dixon Center	1	\$1,972	\$3,944
Indiana	1	\$3,106	\$3,106
Lock Haven	3	\$207,158	\$379,790
Millersville	4	\$15,633	\$18,238
Shippensburg	1	\$96,908	\$113,060
Total Avoided Costs		\$431,954	\$630,651

Note: A detailed procurement report can be provided by PSFEI upon request.

Education

Various educational opportunities were provided to PASSHE during the past fiscal year. One-day regional workshops were held at various locations throughout the Commonwealth. Workshops and arc flash training for specific universities were also held. Workshops, arc flash, and other specialized trainings are available to PASSHE universities when requested. Four short courses consisting of two and one-half days were held in the State College area.

PSFEI periodically reviews and updates courses to remain current with PASSHE needs and new developments in technology. During the fiscal year, 150 PASSHE personnel improved their engineering, maintenance, and operational skills at the PSFEI short courses and workshops, and other trainings.

Education Table

University	Short Courses 2015–2016				Workshops 2015–2016			Arc Flash Training	Lockout/ Tagout Training	Confined Space Training	Total Attendees	
	Boiler	Electric	HVAC	Effective Management	Boiler	Electric	HVAC	Electrical	Electrical	Electrical	Short Courses	Workshops and Other Training
Bloomsburg												
California					3	4						7
Chancellor's Office												
Cheyney								6				6
Clarion						2	5					7
Clarion - Venango							2					2
Dixon Center												
East Stroudsburg												
Edinboro												
Indiana			4			3	9				4	12
Kutztown				1			2	26	26	26	1	80
Lock Haven	3	1	3		2						7	2
Mansfield												
Millersville			1					3			1	3
Shippensburg		3	2	1							6	
Slippery Rock												
West Chester								12				12
Totals	3	4	10	2	5	9	18	47	26	26	19	131

Services to Individual Universities

Bloomsburg University

Met with the Assistant Vice President of Facilities Management to discuss the future of the central boiler plant, review the study that PSFEI conducted on the central boiler plant in 2012 and get an update on what has happened since, and discuss PSFEI's available services.

Held one electricity commodity procurement event during fiscal year 2015–2016. Ten fixed-price contracts were signed, one with Jack Rich, Inc. d/b/a Anthracite Power & Light, and nine with WGL Energy, resulting in projected total contract avoided costs of \$2,013,082.

Advised university personnel and negotiated with the natural gas utility to determine the most feasible option for upgrading the gas service distribution system to meet the increased demands of the central heating plant. Effort included review of utility agreement offers, tariff analysis, and coordination of effort between the university and the utility to ensure that the work would commence prior to PennDOT road paving of the gas line route.

Assisted the PASSHE Collaborative Contracts Manager by conducting a natural gas commodity procurement event during fiscal year 2015–2016 for six accounts. PSFEI effort included compiling billing data, charting historical gas consumption, and estimating monthly gas nominations for bidding. This effort was followed by verbal or written correspondence with the university to confirm nominations and subsequent approval by the university via PSFEI's web-based procurement software. A fixed-price, 10-month contract was awarded to Talen Energy, resulting in projected avoided cost of \$91,169 for the central heating plant. For the other five accounts, an aggregated basis-priced contract was also awarded to Talen Energy, resulting in a projected avoided cost of \$21,344 versus retail tariff cost for the 16-month contract term.

Contacted the Safety Administrator in June 2016 to schedule and conduct arc flash and safety training.

California University

Researched regulations and laws regarding boiler plant staffing in order to answer questions posed by the university. PSFEI found no statutes, laws, or regulations in Pennsylvania dictating boiler plant staffing or monitoring, and suggested the university contact their insurance carrier for any additional input.

Held one electricity commodity procurement event during fiscal year 2015–2016. Two fixed-price contracts were signed, one with Constellation New Energy, Inc., and one with WGL Energy, resulting in projected total contract avoided costs of \$719,234.

Reviewed and discussed gas nominations and procurement for the university with the Director of Facilities Management in October 2015. Also discussed various projects and PSFEI services available to the university.

Met with the Assistant Director for Utilities and Energy Management and the Director of Facilities Management in November 2015 to provide assistance with the Student Building expansion tanks and Coover Hall renovation issues. These are ongoing projects.

Provided assistance to the Assistant Director for Utilities and Energy Management in May 2016 on whether to replace or retrofit the Convention Center expansion tanks.

Cheyney University

Met with the Facilities Manager in December 2015 to discuss current university needs and how PSFEI can be of assistance.

Conducted arc flash training for six maintenance personnel in December 2015. While on site, a campus tour was completed to review the main power distribution switchgear in a random selection of buildings. Several electrical safety concerns and code violations were witnessed. PSFEI Report ER 15/16–15 was submitted on December 23, 2015, detailing these items. A return visit was conducted several months after the report was submitted and the concerns had been addressed and corrected.

Met with the Facilities Manager in May 2016 to assist with exhaust control issues and system instability in the Carver Building.

Clarion University

Responded to a request by the university to investigate problems with the boiler control system. It was determined that upon loss of both servers, boiler control was not affected, but the ability of the operators to interact with the controllers was lost. PSFEI assisted the facility and a controls supplier to develop another layer of control for the drum level so that both servers crashing would not impact the operator's ability to interact with and view level controller data. A final report on the control system will be issued early in fiscal year 2016–2017.

Investigated problems with boiler makeup water as reported in the Monthly Utilities Usage Report. Investigation revealed that one of the impulse lines for the makeup flow transmitter was plugged, causing the reported makeup amount to be invalid.

Discussed PSFEI services and offered assistance to the Director of Facilities Planning and Management during a meeting in August 2015.

Met with the new Director of Facilities Planning and Management in September 2015 to continue assisting the university with their ongoing campus electrical upgrade project via meetings and site visits as requested.

Met with the Director of Facilities Planning and Management, the E&G and Structural Services Supervisor, and the Building Maintenance Supervisor in November 2015 to assess and provide assistance regarding structural damage and safety issues with the service tunnels and manholes.

Visited the university in February 2016 to meet with facility and financial personnel to discuss their interests in pursuing energy conservation with a focus on saving money, the Guaranteed Energy Savings Act (GESAs) program, and the opportunity to pursue energy saving projects on their own. Following the meeting, PSFEI visited a new housing building that utilized ground source heat pumps. A follow-up visit was scheduled for several campus buildings to identify energy saving opportunities.

Met with university personnel in April 2016 to conduct a Becker Hall capital project planning assessment. PSFEI personnel performed assessments of the roof, building structure, and paved areas; electrical and HVAC systems; and Americans with Disabilities Act (ADA) compliance issues. The objective was to identify 0–5 Year, 5–10 Year, and 10–15 Year capital project needs. The information in this report will present the capital project requirements identified and the estimated cost for each project. A draft report will be submitted in July 2016 and finalized upon receipt of comments from university personnel.

Met with the Director of Facilities Planning and Management in May 2016 to discuss water source heat pump (WSHP) control integration in the newly constructed dormitories. PSFEI will revisit when the dormitories are turned over to the university.

Clarion University–Venango Campus

Met with the Director of Finance and Administration and the Maintenance Repairman in June 2016 regarding mold-causing humidity and condensation issues in the gymnasium. PSFEI made recommendations for a resolution.

Dixon University Center

Held one electricity commodity procurement event during fiscal year 2015–2016. One fixed-price contract was signed with Constellation New Energy, Inc., resulting in projected total contract avoided costs of \$41,092.

Assisted the Center with a natural gas billing issue; the gas supplier incorrectly billed for gas delivered. PSFEI corresponded with the gas supplier and gas utility and a revised bill was issued.

Assisted the PASSHE Collaborative Contracts Manager by conducting a natural gas commodity procurement event during fiscal year 2015–2016. PSFEI effort included compiling billing data, charting historical gas consumption, and estimating monthly gas nominations for bidding. This effort was followed by verbal or written correspondence with the university to confirm nominations and subsequent approval by the university via PSFEI’s web-based procurement software. A fixed-priced contract was signed with Compass Energy, resulting in a projected avoided cost of \$3,944 versus retail tariff cost for the 24-month contract term.

Met with the Director of Facility Operations and Maintenance and the Facilities Supervisor in July 2015 concerning chilled water flow issues in South Hall and other buildings. This project was postponed due to budget constraints.

East Stroudsburg University

Held one electricity commodity procurement event during fiscal year 2015–2016. One fixed-price contract was signed with Talen Energy, resulting in projected total contract avoided costs of \$1,347,902.

Responded to the university’s question regarding the natural gas utility’s service curtailment due to an extremely cold weather event by providing a detailed explanation of the university’s service agreement with the gas utility. PSFEI’s response covered the gas utility’s curtailment protocols and recommendations on how to respond to future curtailment events.

Met with the Director and the Interim Director of Facilities Management in November 2015. Discussed projects and how PSFEI can support the university with our services.

Edinboro University

Provided on-site training for preparation of the Monthly Utilities Usage Reports. Developed and reviewed specific bills for entry into the utility report form.

Held one electricity commodity procurement event during fiscal year 2015–2016. One fixed-price contract was signed with WGL Energy, resulting in projected total contract avoided costs of \$4,087,377.

Worked with the natural gas utility to split accounts between residence hall gas meters and classroom gas meters. Residence halls require standby pipeline capacity at a cost of \$1.179 per thousand cubic feet (mcf) of gas to ensure service on cold days, whereas classrooms do not require standby capacity. By splitting up the meters assigned to the accounts, the university will save \$1.179 for each mcf of gas delivered to classrooms.

Met with the Facilities Operations Manager, the Manager of Capital Projects, and the Director of Facilities Management and Planning in January 2016 to discuss the needs of the university and how PSFEI can be of assistance.

Indiana University of Pennsylvania

Advised the university about technical items for generation of the request for proposal (RFP), reviewed proposals when received, and served as a non-voting technical advisor to the RFP Review Committee.

Attended monthly project meetings regarding the high voltage switchgear replacement project at the request of the Associate Vice President for Facilities Management. The project is in the construction phase. Due to various contractor errors, a constant presence was, and will be, necessary to ensure the university receives a quality finished product and maintains continuous electrical service to the campus.

Participated in monthly conference calls and periodic site meetings with the university staff and the electric energy dispatching consultant, Ictec. PSFEI recommended means, methods, and strategies for managing natural gas costs and electricity generation revenue efficiently.

Assisted the PASSHE Collaborative Contracts Manager by conducting a natural gas commodity procurement event during fiscal year 2015–2016 for the Robertshaw Building account. PSFEI effort included compiling billing data, charting historical gas consumption, and estimating monthly gas nominations for bidding. This effort was followed by verbal or written correspondence with the university to confirm nominations and subsequent approval by the university via PSFEI's web-based procurement software. A fixed-price contract with Dominion Retail, Inc., resulted in a projected avoided cost of \$3,106 versus retail tariff cost for the 12-month contract term.

Met with the Electrical Foreman in October 2015 to evaluate an electrical fault and the resulting power outage. PSFEI Report ER 15/16–10 was issued November 20, 2016, with details of the incident.

Visited the university in July 2015 at the request of the Maintenance Manager to review the need to move the flue recirculation extraction point. PSFEI provided review results in Report MR 15/16-1 on July 29, 2015, which the university needed to include with the Plan Approval application to PADEP, and assisted in obtaining approvals to proceed with the project.

Discussed the need for additional expansion joint installation with the catalyst beds. PSFEI looked at the intended installation site and reviewed installation plans. It was determined that no additional expansion joints were necessary as documented in PSFEI Report MR 15/16-2 issued July 29, 2015.

Met with the Project Manager of Engineering and Construction and the HVAC Foreman in October 2015 to receive an update on the chiller plant expansion and renovation project. Provided a contact at Shippensburg University regarding a used chiller that could possibly be acquired for use at the university.

Assisted the university in its efforts to replace the burners on the three auxiliary boilers by reviewing the conditions of the burners and their ability to meet required NOx emission levels. PSFEI issued Report MR 15/16-5 on December 16, 2015, documenting the problems, listing potential options, and providing final recommendations. Advised the university about technical items for generation of the RFP, reviewed proposals when received, and served as a non-voting technical advisor to the RFP Review Committee.

Provided guidance on the Science Building animal room cooling options for emergency backup in January 2016 during a meeting with the Associate Vice President for Facilities Management, the Project Manager, Engineering and Construction, and the HVAC Foreman.

Met with the Vice President for Administration and Finance and the Associate Vice President for Facilities Management in February 2016 to discuss current projects and tour the cogeneration plant.

Attended a RFP Review Committee meeting in June 2016 to discuss the Reasonably Available Control Technology (RACT) 2 regulation with the cogeneration plant engineer and reviewed how the new requirements would impact the university.

Kutztown University

Provided information and discussed chloride concentrations in boiler water with university personnel.

Met with the Acting Assistant Vice President for Facilities; the Director of Facilities Energy Management and Campus Utilities; the Director, Facilities Operations – Maintenance; and Environmental Health and Safety in August 2015 to review past work supported by PSFEI and discussed how PSFEI can provide future assistance.

Completed arc flash, lockout/tagout, and confined space training in November 2015, at the request of the Director of Facilities Operations and Maintenance, for 26 maintenance staff.

Visited the university in January 2016 to investigate tubes in one of the fire tube boilers and determined a number of tubes in the upper two rows were sagging, but showed no observable signs of thermal damage. PSFEI recommended that inspections of the other two boilers be

conducted as soon as possible to determine if similar issues existed in those units. PSFEI will continue to work with the university to attempt to resolve the issue. Inspections of the other two boilers should occur in July 2016 after which a final report will be issued.

Assisted the university by troubleshooting a sudden increase in building electrical consumption. A power logger, requested by the Electrical Foreman, was installed during a site visit in January 2016.

Lock Haven University

Held one electricity commodity procurement event during fiscal year 2015–2016. Eight fixed-price contracts were signed with WGL Energy, resulting in projected total contract avoided costs of \$56,795.

Assisted the PASSHE Collaborative Contracts Manager by conducting a natural gas commodity procurement event during fiscal year 2015–2016. PSFEI effort included compiling billing data, charting historical gas consumption, and estimating monthly gas nominations for bidding. This effort was followed by verbal or written correspondence with the university to confirm nominations and subsequent approval by the university via PSFEI's web-based procurement software. For two aggregated accounts, a fixed-price contract with Talen Energy resulted in a projected avoided cost of \$51,463 for the 22-month contract. For the main account, a fixed-price contract, also with Talen Energy, resulted in a projected avoided cost of \$328,327 for the 22-month contract.

Met with the Director of Facilities and university personnel in February 2016 to discuss university needs and how PSFEI can be of assistance.

Met with the Director of Facilities in February 2016 to review and recommend a project scope for a campus electrical upgrade project.

Mansfield University

Prepared a water service area map for submission to PADEP.

Held one electricity commodity procurement event during fiscal year 2015–2016. One fixed-price contract was signed with WGL Energy, resulting in projected total contract avoided costs of \$884,647.

Assisted the PASSHE Collaborative Contracts Manager by conducting a natural gas commodity procurement event during fiscal year 2015–2016. PSFEI effort included compiling billing data, charting historical gas consumption, and estimating monthly gas nominations for bidding. This effort was followed by verbal or written correspondence with the university to confirm nominations and subsequent approval by the university via PSFEI's web-based procurement software. A fixed-price contract with Talen Energy resulted in a projected avoided cost of \$21,752 versus retail tariff cost for the 24-month contract term.

Met with the Interim Facilities Director and the Assistant Director of Facilities in October 2015 to offer PSFEI's assistance to the university during their time of transition. The university provided a tour of the water plant and thanked PSFEI for their assistance in the success of the project.

Reviewed and assessed the steam plant, steam distribution and condensate return systems, and building mechanical rooms to develop and provide a scope of work for a heating system study. Site visits were conducted in October 2015 to examine all of the areas previously noted. During the steam plant examination visit, an apparent combustion problem on Boiler No. 2 was noted as evidenced by a significant amount of yellow flame. PSFEI issued Report MR 15/16-4 on November 12, 2015, to identify the potential causes, recommend a service technician visit to investigate and correct the problem on Boiler No. 2, and verify and correct conditions on the other two boilers as necessary. PSFEI also issued Report MR15/16-6 on March 1, 2016, to provide the results of our assessment, including noted problem areas and budgetary cost estimates to correct. The report also included the life-cycle cost study scope of work.

Evaluated cable terminations at the request of the Electrical Foreman. The cable terminations had burned areas (hot spots) on them. The hot spots indicated that extensive current passed through the connections as a result of a fault elsewhere on that circuit. The terminations are suspect and the cable ends should be replaced. PSFEI recommended replacing the terminations in the near future. The complete report and detailed recommendations were submitted in PSFEI Report ER 15/16-6 issued November 4, 2015.

Millersville University

Held one electricity commodity procurement event during fiscal year 2015-2016. Fifty fixed-price contracts were signed, 1 with Jack Rich, Inc. d/b/a Anthracite Power & Light, 11 with Constellation New Energy, Inc., and 38 with WGL Energy, resulting in projected total contract avoided costs of \$1,694,365.

Assisted the PASSHE Collaborative Contracts Manager by conducting a natural gas commodity procurement event during fiscal year 2015-2016. PSFEI effort included compiling billing data, charting historical gas consumption, and estimating monthly gas nominations for bidding. This effort was followed by verbal or written correspondence with the university to confirm nominations and subsequent approval by the university via PSFEI's web-based procurement software. For four aggregated accounts, a fixed-price contract with Talen Energy resulted in a projected avoided cost of \$18,238 versus retail tariff cost for the 14-month contract term.

Provided arc flash training to 15 maintenance staff in November 2015 at the request of the Director of Maintenance and Operations.

Visited the university at the request of the Director of Maintenance and Operations to review the campus electrical infrastructure project. Several items of concern were noticed and documented in the PSFEI Report ER 15/16-13 issued December 4, 2015.

Shippensburg University

Held one electricity commodity procurement event during fiscal year 2015-2016. One fixed-price contract was signed with WGL Energy, resulting in projected total contract avoided costs of \$568,094.

Assisted the PASSHE Collaborative Contracts Manager by conducting a natural gas commodity procurement event during fiscal year 2015-2016. PSFEI effort included compiling billing data, charting historical gas consumption, and estimating monthly gas nominations for bidding. This

effort was followed by verbal or written correspondence with the university to confirm nominations and subsequent approval by the university via PSFEI's web-based procurement software. A fixed-price contract with Talen Energy resulted in a projected avoided cost of \$113,908 versus retail tariff cost for the 14-month contract term.

Met with the Director of Facilities Management and Planning and the Associate Vice President Administration and Finance in August 2015 to discuss the needs of the university, PSFEI services, and how PSFEI could assist the university. Also toured the chiller water storage system and dormitories under construction.

Attended a meeting with the Director of Facilities Management and Planning and his staff in August 2015. Discussed the implementation of four potential Act 129 Projects: thermal energy storage (centralized chiller), building heating system upgrades, Performing Arts Center, and LED lighting upgrades. These projects were initiated through PSFEI and then forwarded to a CLEAResult engineer.

Attended a meeting in October 2015 with the Director of Facilities Management and Planning, the Associate Director of Operations, the Mechanical Foreman, and Penn State University's Senior Mechanical Engineer to exchange information on operation of the chilled water central plant.

Attended a State Transportation Innovation Council (STIC) site visit at Shippensburg University in April 2016. After the visit, met with university facility personnel to discuss their utility bill and energy information needs.

Scheduled a demonstration of EnergyCAP for Shippensburg University in June 2016. Provided follow-up information including software and implementation costs.

Slippery Rock University

Met with facility and financial personnel in July 2015 with a focus on energy projects and objectives to save energy and money. PSFEI discussed potential pitfalls of a GESA project and suggested methods to mitigate the risks of entering into a GESA agreement. Following the meeting, PSFEI toured some of the campus facilities.

Visited the university in August 2015, at the request of the Director of Facilities, to discuss and conduct a cost estimate for upgrading the upper campus electrical system. Based on the information gathered and various discussions, it was determined that a complete campus electrical upgrade project should be completed.

Conducted a site visit in August 2015 to investigate and make recommendations regarding lightning protection for the new stadium scoreboard. The project increased to include all stadium components. Details and recommendations were provided in PSFEI Report ER 15/16-16, issued February 22, 2016.

Investigated natural gas utility accounts to determine if sales tax was being charged. Confirmed with the utility that sales tax was not being charged on a regular basis; however, PSFEI discovered three accounts that had been charged sales tax for a total of \$903.05. PSFEI obtained form letters from the utility and assisted the university with completing them to enable

recovery of the sales tax charged in error. PSFEI also provided additional information on other taxes charged, such as gross receipts tax (GRT), state tax adjustment surcharge (STAS), and DSIC.

Received and reviewed Energy Service Companies (ESCO) proposals, and developed and submitted a list of questions and comments to the university in December 2015. PSFEI participated in the university's ESCO presentations in January 2016 and provided comments and recommendations resulting from the interview. Provided follow-up discussions with the university pursuant to their selecting an ESCO to perform the investment grade audit (IGA). Submitted review and comment on proposals for the Foundation/student housing buildings and submitted to the university in February 2016.

Supported the university in Phase 2 of their GESA process by answering questions posed by the shortlisted ESCOs; preparing preliminary proposals; and developing questions to ask the ESCO during each firm's presentation/interview.

Evaluated boiler plant energy conservation measures in GESA proposals and provided comments.

Reviewed a draft renewal air quality permit and provided comments via email in May 2016.

West Chester University

Held one electricity commodity procurement event during fiscal year 2015–2016. One fixed-price contract was signed with Jack Rich, Inc. d/b/a Anthracite Power & Light, resulting in projected total contract avoided costs of \$703,490.

Investigated the feasibility of bidding for natural gas supply contracts for university gas accounts. Because of the utility's policy of complex tariffs and aggregated billing of all accounts, PSFEI submitted questions to the utility and the university on tariff options, billing discrepancies, and consumption data inconsistencies. This investigation is still underway.

Met with the Associate Vice President for Facilities and university personnel in December 2015 to provide an overview of PSFEI services available to the university and toured areas of concern, including some aspects of the geothermal system.

Provided arc flash training to 12 maintenance staff in December 2015 at the request of the Maintenance Manager.

Met with the Associate Vice President for Facilities and the Energy Project Manager in March 2016 to advise on geothermal makeup water high-volume anomalies. This issue is part of a larger facility review.

Provided information in March 2016 about a power purchase agreement (PPA) and CO₂ sustainability plan.

PASSHE UTILITY DATA, RELATED COSTS, AND ILLUSTRATIONS

Table 1 – PASSHE Fuel and Energy Consumption and Costs

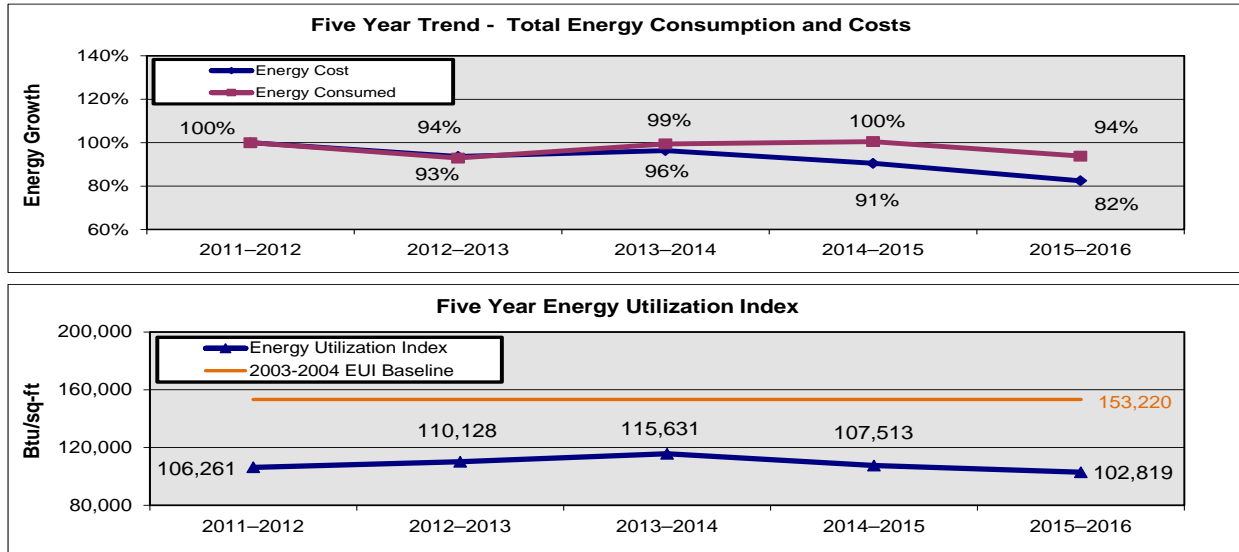
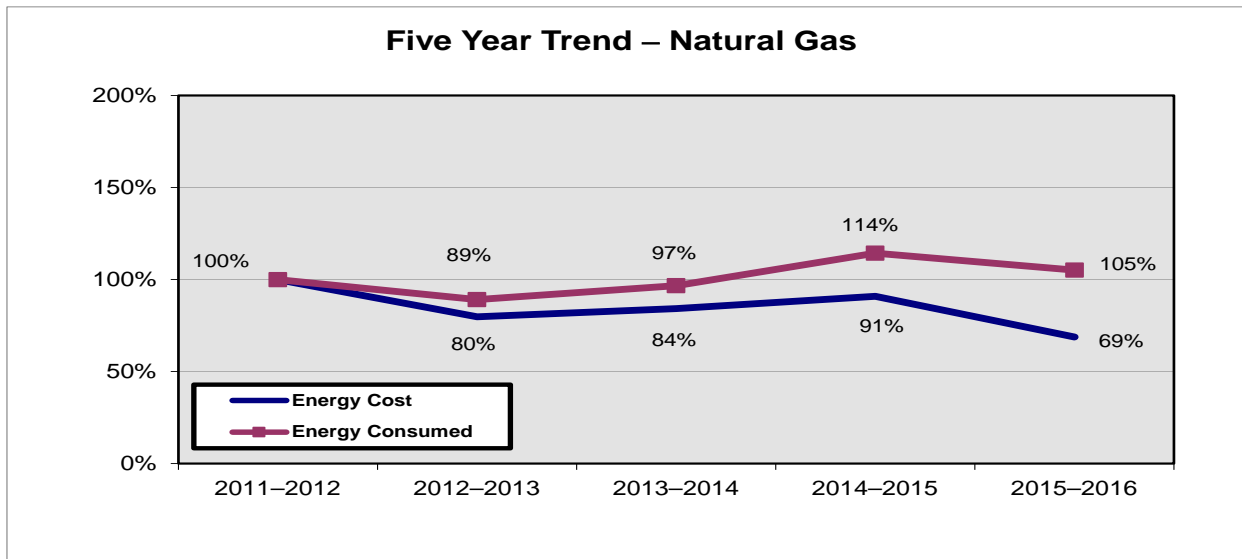
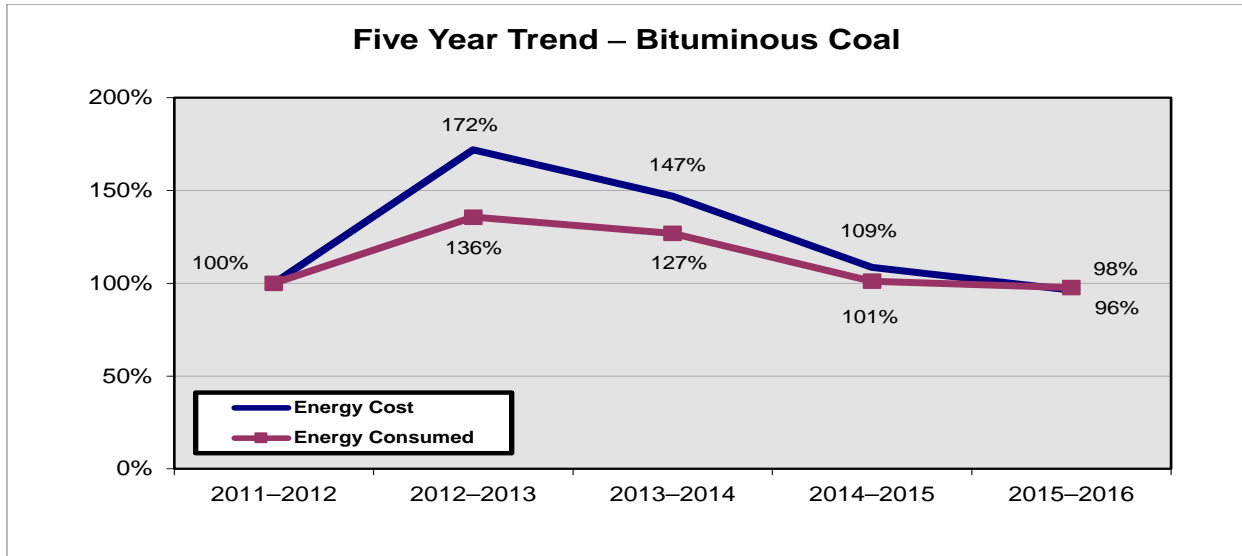
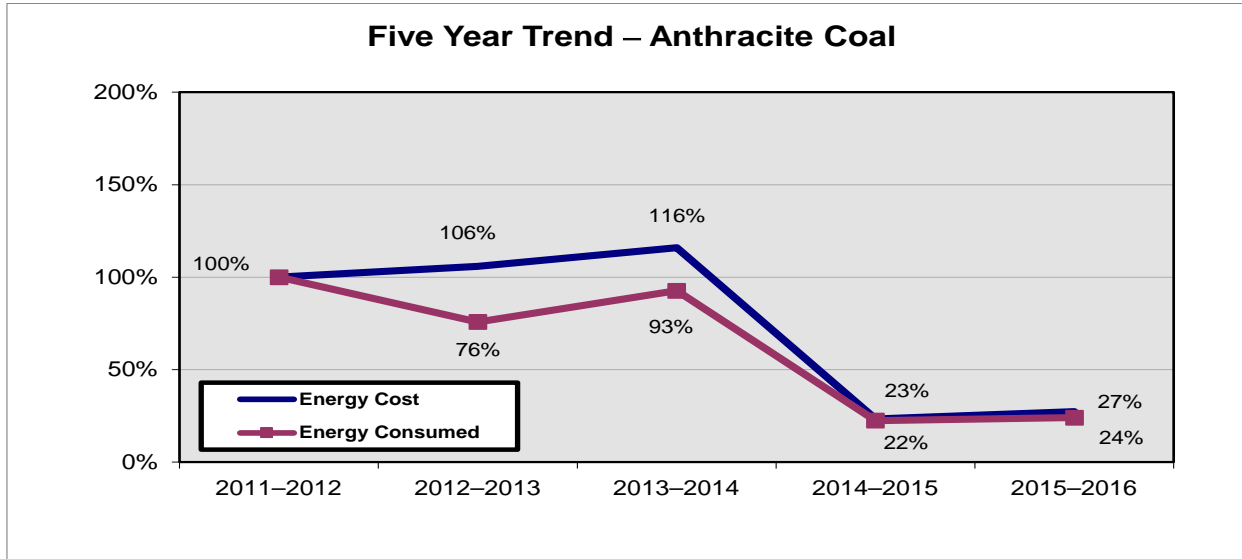


Table 1
PASSHE Fuel and Energy Consumption and Costs
 Pennsylvania's State System of Higher Education
 Five Year Comparison: 2011-2012 to 2015-2016

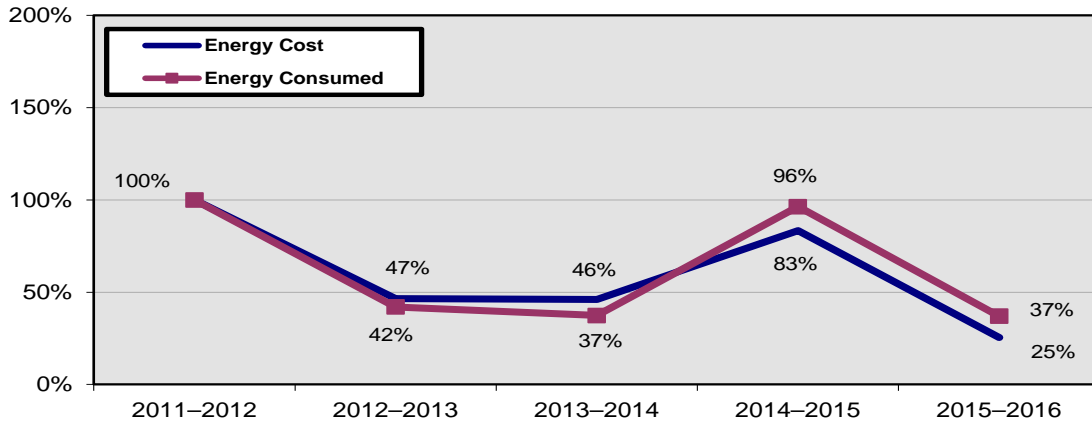
	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	16,841	12,763	15,608	3,783	4,041
Bituminous Coal	tons	2,278	3,091	2,891	2,303	2,226
Gas	mcf	1,573,323	1,405,029	1,521,299	1,787,192	1,638,610
Oil	gal	288,260	121,052	107,850	277,675	106,728
Wood	tons	5,591	10,539	9,884	12,450	9,464
Electric	kWh	388,008,669	385,240,520	398,920,027	376,211,172	380,306,590
Energy Costs						
Anthracite Coal	\$	\$ 2,267,021	\$ 2,398,820	\$ 2,626,705	\$ 528,482	\$ 618,678
Bituminous Coal	\$	\$ 218,494	\$ 375,602	\$ 321,093	\$ 237,333	\$ 210,478
Gas	\$	\$ 12,315,134	\$ 9,828,897	\$ 10,367,631	\$ 11,196,345	\$ 8,480,301
Oil	\$	\$ 786,869	\$ 365,989	\$ 362,464	\$ 655,356	\$ 199,900
Wood	\$	\$ 215,475	\$ 406,194	\$ 376,243	\$ 493,500	\$ 376,136
Electric	\$	\$ 27,833,262	\$ 27,498,196	\$ 28,003,390	\$ 26,384,782	\$ 26,103,240
Total	\$	\$ 43,636,255	\$ 40,873,698	\$ 42,057,526	\$ 39,495,798	\$ 35,988,733
Energy Consumption						
Anthracite Coal	mmBtu	425,871	322,660	394,656	95,710	102,237
Bituminous Coal	mmBtu	60,595	82,221	76,901	61,260	59,212
Gas	mmBtu	1,604,790	1,430,549	1,551,725	1,835,917	1,687,768
Oil	mmBtu	40,357	16,948	15,099	38,875	14,942
Wood	mmBtu	47,524	88,052	84,014	105,825	80,444
Electric	mmBtu	1,324,272	1,314,825	1,361,515	1,383,224	1,341,422
Total	mmBtu	3,503,409	3,255,255	3,483,910	3,520,811	3,286,025
Energy Utilization Index	Btu/sq-ft	106,261	110,128	115,631	107,513	102,819
Unit Fuel Costs						
Anthracite Coal	\$/ton	\$ 134.61	\$ 187.95	\$ 168.29	\$ 139.70	\$ 153.10
Bituminous Coal	\$/ton	\$ 95.91	\$ 121.51	\$ 111.07	\$ 103.05	\$ 94.55
Gas	\$/mcf	\$ 7.83	\$ 7.00	\$ 6.81	\$ 6.26	\$ 5.18
Oil	\$/gal	\$ 2.73	\$ 3.02	\$ 3.36	\$ 2.36	\$ 1.87
Wood	\$/ton	\$ 38.54	\$ 38.54	\$ 38.07	\$ 39.64	\$ 39.74
Electric	¢/kWh	7.18 ¢	7.14 ¢	7.02 ¢	7.01 ¢	6.86 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	\$ 5.32	\$ 7.43	\$ 6.66	\$ 5.52	\$ 6.05
Bituminous Coal	\$/mmBtu	\$ 3.61	\$ 4.57	\$ 4.18	\$ 3.87	\$ 3.55
Gas	\$/mmBtu	\$ 7.67	\$ 6.87	\$ 6.68	\$ 6.10	\$ 5.02
Oil	\$/mmBtu	\$ 19.50	\$ 21.59	\$ 24.01	\$ 16.86	\$ 13.38
Wood	\$/mmBtu	\$ 4.53	\$ 4.61	\$ 4.48	\$ 4.66	\$ 4.68
Electric	\$/mmBtu	\$ 21.02	\$ 20.91	\$ 20.57	\$ 19.07	\$ 19.46
Weighted Average	\$/mmBtu	\$ 12.46	\$ 12.56	\$ 12.07	\$ 11.22	\$ 10.95

Note: Natural gas Btu factor changed from 1,020 to 1,030 Btu/cf in fiscal year 2013-2014.

Five Year Trend – Energy Consumption and Costs



Five Year Trend – Fuel Oil



Five Year Trend – Electricity

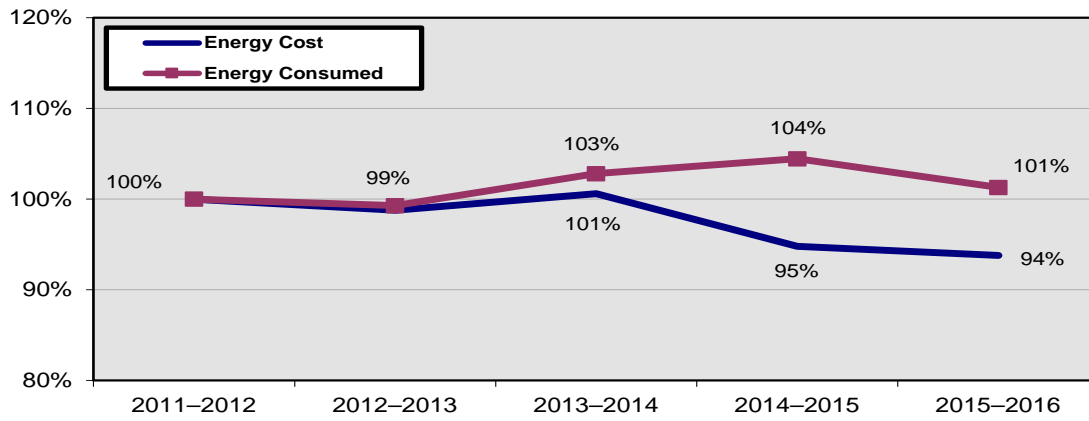


Table 2 – Energy Consumption and Costs 2015–2016
Pennsylvania’s State System of Higher Education

	Energy Sources Utilized						Total Energy	Total Energy Cost	Unit Energy Cost	Total Building Area	Unit Energy Cost	Energy Utilization Index
	Anthracite Coal	Bituminous Coal	Gas	Oil	Wood	Electric	(mmBtu)	(\$)	(\$/mmBtu)	(sq-ft)	(\$/sq-ft)	(Btu/sq-ft)
Bloomsburg Lower	x		x		x	x	335,665	\$3,168,936	\$9.44	1,857,735	\$1.71	180,685
Bloomsburg Upper						x	21,122	\$421,451	\$19.95	552,821	\$0.76	38,208
California			x			x	137,466	\$1,957,498	\$14.24	2,158,832	\$0.91	63,676
Cheyney			x			x	88,981	\$1,263,500	\$14.20	1,187,234	\$1.06	74,948
Clarion			x			x	215,878	\$1,841,895	\$8.53	1,423,379	\$1.29	151,666
Clarion-Venango			x			x	6,835	\$128,535	\$18.81	82,036	\$1.57	83,312
Dixon Center			x			x	10,057	\$166,749	\$16.58	145,734	\$1.14	69,011
East Stroudsburg			x	x		x	209,640	\$2,381,625	\$11.36	1,876,685	\$1.27	111,708
Edinboro			x			x	190,243	\$2,589,507	\$13.61	2,308,761	\$1.12	82,400
Indiana (1)			x	x		x	658,474	\$3,354,779	\$5.09	3,958,653	\$0.85	166,338
Kutztown			x	x		x	247,562	\$3,354,463	\$13.55	2,471,807	\$1.36	100,154
Lock Haven			x	x		x	133,758	\$1,703,807	\$12.74	1,620,562	\$1.05	82,538
Lock Haven-Clearfield			x			x	8,441	\$127,178	\$15.07	92,373	\$1.38	91,384
Mansfield			x			x	147,656	\$1,494,769	\$10.12	1,530,411	\$0.98	96,481
Millersville			x	x		x	191,516	\$2,800,819	\$14.62	2,129,320	\$1.32	89,942
Shippensburg			x			x	167,456	\$2,196,716	\$13.12	2,352,881	\$0.93	71,171
Slippery Rock		x	x			x	269,750	\$2,991,384	\$11.09	2,520,983	\$1.19	107,002
West Chester			x	x		x	245,524	\$4,045,122	\$16.48	3,689,154	\$1.10	66,553
	Anthracite Coal	Bituminous Coal	Gas	Oil	Wood	Electric						
Total							3,286,026	\$35,988,733		31,959,361		
Average								\$10.95			\$1.13	102,819

(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.

Table 3 – Central Boiler Plant 2015–2016
Pennsylvania’s State System of Higher Education

	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	13%	4,889	38,000	\$1,023,960	\$938,739	\$1,962,699	\$15.98	\$10.03	63%
California	22%	4,696	6,000	\$128,251	\$342,352	\$470,603	\$26.39	\$19.51	74%
Clarion (1)	8%	5,957	36,743	\$574,787	\$445,366	\$1,020,152	\$8.54	\$7.36	---
Dixon Center (2)	---	4,539	---	\$41,234	---	\$41,234	---	\$7.96	---
East Stroudsburg (1)	24%	4,570	40,000	\$561,762	\$326,000	\$887,762	\$9.46	\$8.46	---
Indiana (3)	28%	5,000	47,022	\$1,004,183	\$3,157,214	\$4,161,397	\$20.60	\$14.78	72%
Kutztown	13%	4,471	51,000	\$759,720	\$725,331	\$1,485,051	\$16.70	\$13.22	79%
Lock Haven (4)	---	4,918	---	---	\$125,760	\$125,760	---	---	---
(4)	---	5,752	---	---	\$62,880	\$62,880	---	---	---
Mansfield	27%	5,840	23,400	\$340,392	\$400,195	\$740,587	\$11.95	\$8.87	74%
Slippery Rock	37%	5,100	41,000	\$936,746	\$914,978	\$1,851,724	\$16.78	\$11.73	70%
Total				\$5,371,035	\$7,438,815	\$12,809,850			

- (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 2015–2016
Pennsylvania’s State System of Higher Education

	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	Anthracite Coal	3	45,000	61,512	4,041 tons	102,237	\$618,678	\$10.06	60%
	Gas	2	22,000	8,200	12,558 mcf	12,935	\$29,146	\$3.55	63%
	Wood	1	15,000	53,083	9,464 tons	80,444	\$376,136	\$10.06	66%
California	Gas	3	45,000	17,832	23,414 mcf	24,116	\$128,251	\$7.19	74%
Clarion (1)	Gas	3	70,000	119,525	134,595 mcf	138,633	\$574,787	\$4.81	---
Dixon Center (2)	Gas	3	---	---	5,029 mcf	5,180	\$41,234	---	---
East Stroudsburg (1)	Gas	4	95,000	91,581	99,586 mcf	102,574	\$542,800	\$5.93	---
Indiana (3)	Gas	3	92,000	211,424	265,420 mcf	273,382	\$893,947	\$3.27	77%
	Cogen-Gas	4	44,000	38,564	72,265 mcf	74,433	\$245,480	\$3.30	52%
	Cogen-Oil			1,242	17,215 gal	2,410	\$47,897	\$19.87	52%
Kutztown	Gas	3	90,000	88,931	109,052 mcf	112,324	\$759,720	\$8.54	79%
Mansfield	Gas	3	64,000	61,983	81,054 mcf	83,486	\$340,392	\$5.49	74%
Slippery Rock	Bituminous Coal	3	120,000	40,322	2,226 tons	59,212	\$210,478	\$5.22	68%
	Gas	1		70,043	95,807 mcf	98,681	\$726,268	\$10.37	71%

- (1) Excessive boiler efficiency not shown.
(2) No steam produced.
(3) Includes FIUP.

Table 4 – Electric Consumption and Costs 2015–2016
Pennsylvania’s State System of Higher Education

	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	1,857,735	4,889	774	27,508,507	14.8	6,372	3.4	0.66	7.13	\$1,961,223	\$1.06
Bloomsburg Upper	552,821			6,188,806	11.2	1,824	3.3	0.57	6.81	\$421,451	\$0.76
California	2,158,832	4,696	929	27,235,948	12.6	5,495	2.5	0.64	6.30	\$1,715,360	\$0.79
Cheyney	1,187,234	3,764	1,622	12,464,319	10.5	2,171	1.8	0.81	7.60	\$947,557	\$0.80
Clarion	1,423,379	5,957	706	18,406,323	12.9	3,680	2.6	0.75	6.51	\$1,198,168	\$0.84
Clarion-Venango	82,036	6,079	640	1,147,554	14.0	348	4.2	0.44	9.88	\$113,343	\$1.38
Dixon Center	145,734	4,539	1,299	1,428,900	9.8	418	2.9	0.43	8.78	\$125,515	\$0.86
East Stroudsburg	1,876,685	4,570	539	22,395,600	11.9	5,169	2.8	0.67	7.43	\$1,662,972	\$0.89
Edinboro	2,308,761	5,318	883	34,245,247	14.8	7,168	3.1	0.71	6.67	\$2,285,405	\$0.99
Indiana - Gross (1)	3,958,653	5,000	739	52,172,812	13.2	9,817	---	---	6.63	\$3,457,273	\$0.87
Indiana - Net (2)	2,719,277			39,446,473	14.5	---	---	---	3.08	\$1,214,215	\$0.45
Kutztown	2,471,807	4,471	1,335	27,656,432	11.2	7,248	2.9	0.61	8.32	\$2,300,948	\$0.93
Lock Haven	1,620,562	4,918	791	16,908,586	10.4	3,614	2.2	0.63	7.75	\$1,310,761	\$0.81
Lock Haven-Clearfield	92,373	5,752	532	1,057,640	11.4	316	3.4	0.53	9.07	\$95,974	\$1.04
Mansfield	1,530,411	5,840	398	14,528,983	9.5	2,806	1.8	0.69	7.39	\$1,073,822	\$0.70
Millersville	2,129,320	4,652	935	35,966,225	16.9	7,451	3.5	0.66	6.42	\$2,308,270	\$1.08
Shippensburg	2,352,881	3,488	1,626	23,001,149	9.8	4,989	2.1	0.64	7.26	\$1,669,298	\$0.71
Slippery Rock	2,520,983	5,100	800	28,242,001	11.2	7,011	2.8	0.60	6.99	\$1,973,794	\$0.78
West Chester	3,689,154	4,935	1,113	42,477,897	11.5	7,850	2.1	0.79	7.90	\$3,356,002	\$0.91
Total	31,959,361			380,306,590						\$27,977,137	
Weighted Average					11.9			0.64	7.36		\$0.88

(1) Contains total electric produced by cogeneration and purchased from Penelec and redistributed to campus and FIUP through cogeneration plant.

(2) Contains electric produced by cogeneration that was consumed by campus and electricity purchased from Penelec and redistributed to campus excluding Residential Revival (FIUP) through the cogeneration plant.

**Table 5 – Water, Sewage, Miscellaneous Utilities, and Costs 2015–2016
Pennsylvania’s State System of Higher Education**

	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)	63,246	\$341,772	\$5.40	---	\$277,972	---	44,818	\$183,753	\$4.10	---	---	---
California	50,846	\$448,023	\$8.81	---	\$892,000	---	19,800	\$113,887	\$5.75	---	---	---
Cheyney	27,232	\$103,516	\$3.80	23,559	\$128,127	\$5.44	45,088	\$315,943	\$7.01	---	---	---
Clarion	37,200	\$345,621	\$9.29	37,200	\$267,167	\$7.18	14,004	\$68,940	\$4.92	---	---	---
Clarion-Venango	343	\$2,955	\$8.61	295	\$2,529	\$8.58	2,833	\$15,192	\$5.36	---	---	---
Dixon Center	776	\$16,028	\$20.67	---	\$3,192	---	---	---	---	---	---	---
East Stroudsburg	124,596	\$141,474	\$1.14	---	\$115,417	---	26,959	\$151,826	\$5.63	3,215	\$5,065	\$1.58
Edinboro	51,447	\$289,873	\$5.63	---	\$411,548	---	71,227	\$304,102	\$4.27	---	---	---
Indiana	37,867	\$477,241	\$12.60	37,867	\$338,217	\$8.93	36,143	\$230,648	\$6.38	---	---	---
Kutztown	51,117	\$510,877	\$9.99	47,443	\$550,967	\$11.61	39,422	\$291,536	\$7.40	1,733	\$2,259	\$1.30
Lock Haven	21,144	\$48,996	\$2.32	20,895	\$90,155	\$4.31	72,303	\$373,715	\$5.17	11,264	\$19,331	\$1.72
Lock Haven- Clearfield	148	\$4,222	\$28.53	148	\$4,625	\$31.25	4,691	\$31,204	\$6.65	---	---	---
Mansfield	32,042	\$86,074	\$2.69	---	\$183,000	---	14,158	\$80,555	\$5.69	---	---	---
Millersville	56,421	\$106,365	\$1.89	60,472	\$386,368	\$6.39	63,060	\$455,900	\$7.23	27,222	\$36,649	\$1.35
Shippensburg	45,626	\$209,698	\$4.60	20,032	\$129,336	\$6.46	86,362	\$527,418	\$6.11	---	---	---
Slippery Rock	57,725	\$325,513	\$5.64	51,422	\$354,201	\$6.89	15,017	\$80,844	\$5.38	---	---	---
West Chester (2)	92,441	\$953,186	\$10.31	69,683	\$577,046	\$8.28	96,605	\$677,258	\$7.01	7,459	\$11,862	\$1.59
Total	750,217	\$4,411,434		369,016	\$4,711,867		652,490	\$3,902,720		50,893	\$75,166	
Weighted Average			\$5.88			\$7.79			\$5.98			\$1.48

(1) Bloomsburg Lower and Upper Campuses are combined.
(2) Water and sewer data includes University Student Housing.

Table 6 – Indiana University Cogeneration Summary 2015–2016

Production of Electric & Steam

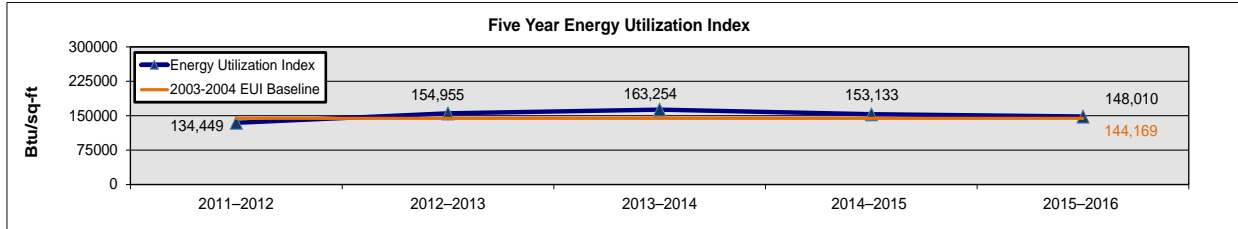
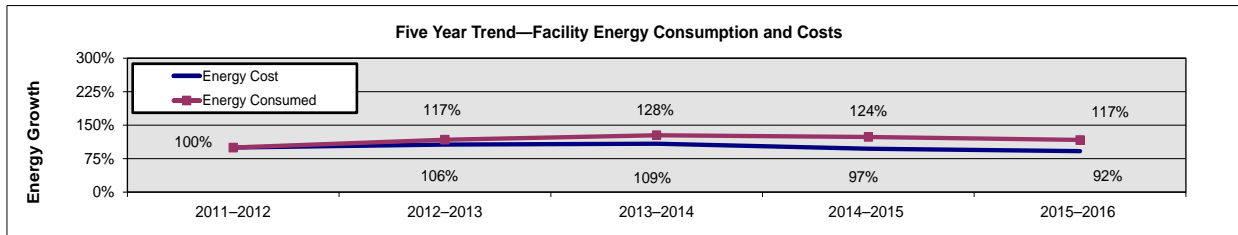
Excludes Auxiliary Boilers & Cost of Purchased Electricity

Input/Fuel Cost	Units	mmBtu	Cost
Natural Gas - Contract (mcf)	230,690	237,610	\$779,973
Natural Gas - IUP (mcf)	0	0	\$0
Diesel Fuel (gal)	55,525	7,774	\$152,184
Total Input/Fuel Cost		245,384	\$932,157
Operating Expenses			
Personnel Cost			\$380,973
Repairs and Parts			\$1,421,401
Gas Royalty			\$0
Lube Oil			\$0
Water			\$12,872
Sewage			\$325
Chemicals			\$11,023
Total Operating Expenses			\$1,826,594
Total Fuel and Operating Costs			\$2,758,751
Output	kWh	mmBtu	
Electric			
Sold to Penelec	11,423,241	38,988	
Sold to FIUP	0	0	
Sold to Massaro	0	0	
Supplied to Campus	13,971,409	47,684	
Consumed by Cogen	0	0	
Lost in Transmission	0	0	
Total Electric	25,394,650	86,672	
Steam			
Sold to FIUP from Cogen (lbs.)	7,802,572	7,803	
Supplied to Campus	32,003,741	32,004	
Total Steam	39,806,313	39,807	
Total Output (mmBtu)			126,478
Revenue: Electric & Steam Sold to FIUP & Exported			\$1,772,332
Net Cost (1) (2)			\$986,420
Summary of Data			
Total Thermal Efficiency (mmBtu Output/mmBtu Input)		51.54 %	
% Output of Electric		68.53 %	
% Output of Steam		31.47 %	
	Total Dollars	\$/kWh	\$/mmBtu
Cost of Electric - Before Revenue	\$1,890,494	\$0.0744	\$21.81
Cost of Electric - Net of Revenue	\$675,965	\$0.0266	\$7.80
Cost of Steam - Before Revenue	\$868,258	\$21.81	\$21.81
Cost of Steam - Net of Revenue	\$310,454	\$7.80	\$7.80
	Electric (kW)	Steam (lb/hr)	
Peak Capacity	24,320	72,000	
Average Production Level	33.90 %	17.95 %	

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

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

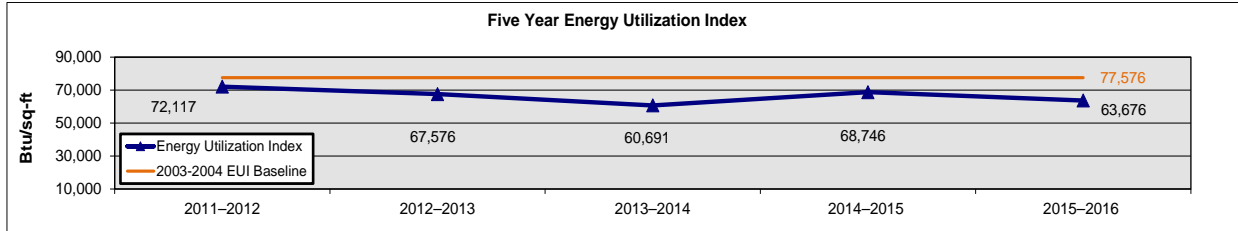
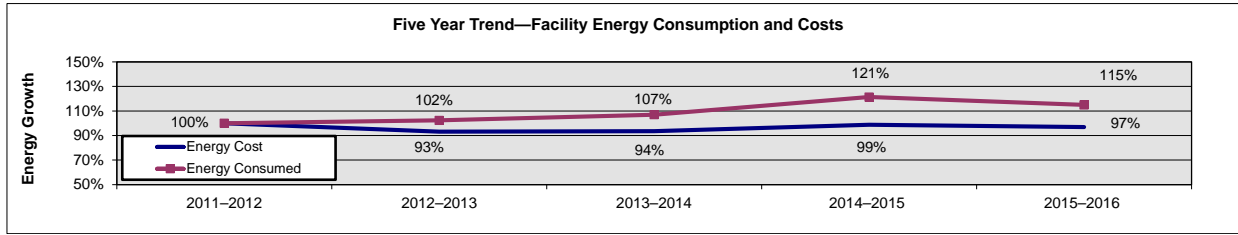
Bloomsburg University



	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	2,319	3,993	3,793	3,783	4,041
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	51,416	61,504	88,058	62,540	57,376
Oil	gal	---	---	---	---	---
Wood	tons	10,359	9,884	10,595	12,450	9,464
Electric	kWh	30,953,609	32,308,525	33,156,182	32,662,388	33,697,313
Energy Costs						
Anthracite Coal	\$	\$ 417,420	\$ 604,716	\$ 405,836	\$ 528,482	\$ 618,678
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 435,767	\$ 486,463	\$ 764,341	\$ 331,048	\$ 212,899
Oil	\$	---	---	---	---	---
Wood	\$	\$ 406,194	\$ 376,243	\$ 397,237	\$ 493,500	\$ 376,136
Electric	\$	\$ 2,640,056	\$ 2,685,412	\$ 2,671,855	\$ 2,444,866	\$ 2,382,674
Total	\$	\$ 3,899,437	\$ 4,152,834	\$ 4,239,269	\$ 3,797,896	\$ 3,590,387
Energy Consumption						
Anthracite Coal	mmBtu	58,671	101,023	95,963	95,710	102,237
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	52,444	62,734	89,819	64,416	59,097
Oil	mmBtu	---	---	---	---	---
Wood	mmBtu	88,052	84,014	90,058	105,825	80,444
Electric	mmBtu	105,645	110,269	113,162	111,477	115,009
Total	mmBtu	304,812	358,040	389,002	377,428	356,788
Energy Utilization Index	Btu/sq-ft	134,449	154,955	163,254	153,133	148,010
Unit Fuel Costs						
Anthracite Coal	\$/ton	\$ 180.00	\$ 151.44	\$ 107.00	\$ 139.70	\$ 153.10
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 8.48	\$ 7.91	\$ 8.68	\$ 5.29	\$ 3.71
Oil	\$/gal	---	---	---	---	---
Wood	\$/ton	\$ 39.21	\$ 38.07	\$ 37.49	\$ 39.64	\$ 39.74
Electric	¢/kWh	8.53 ¢	8.31 ¢	8.06 ¢	7.49 ¢	7.07 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	\$ 7.11	\$ 5.99	\$ 4.23	\$ 5.52	\$ 6.05
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 8.31	\$ 7.75	\$ 8.51	\$ 5.14	\$ 3.60
Oil	\$/mmBtu	---	---	---	---	---
Wood	\$/mmBtu	\$ 4.61	\$ 4.48	\$ 4.41	\$ 4.66	\$ 4.68
Electric	\$/mmBtu	\$ 24.99	\$ 24.35	\$ 23.61	\$ 21.93	\$ 20.72
Weighted Average	\$/mmBtu	\$ 12.79	\$ 11.60	\$ 10.90	\$ 10.06	\$ 10.06
Misc Facility Costs						
Water Cost	\$	\$ 418,682	\$ 493,438	\$ 477,003	\$ 453,787	\$ 341,772
Sewage Cost	\$	\$ 207,204	\$ 232,790	\$ 246,855	\$ 279,788	\$ 277,972
Reported Information						
Gross Area	sq-ft	2,267,118	2,310,607	2,382,801	2,464,713	2,410,556
Reported Student Population		9,166	9,047	9,169	8,982	8,613
Reported Heating Degree Days	degree days	4,724	5,640	6,349	5,994	4,889
Reported Cooling Degree Days	degree days	843	925	812	740	774

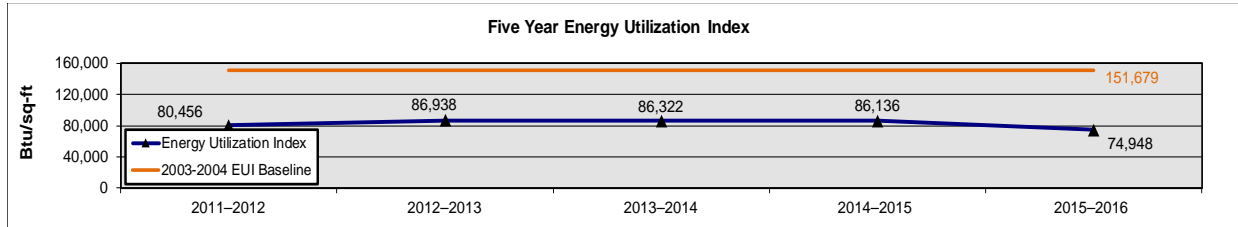
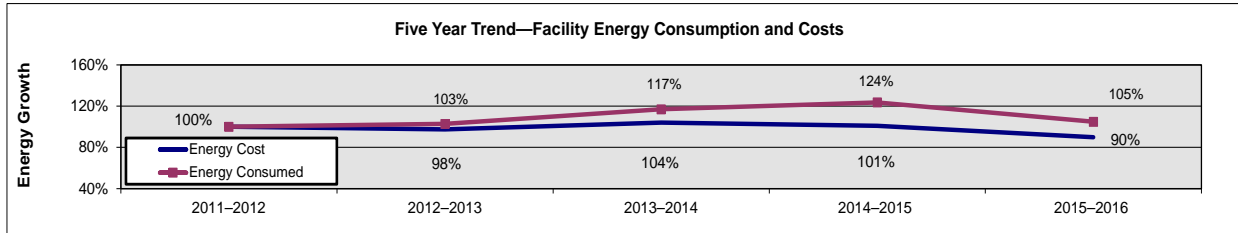
Note: Data reflect both upper and lower campuses.

California University



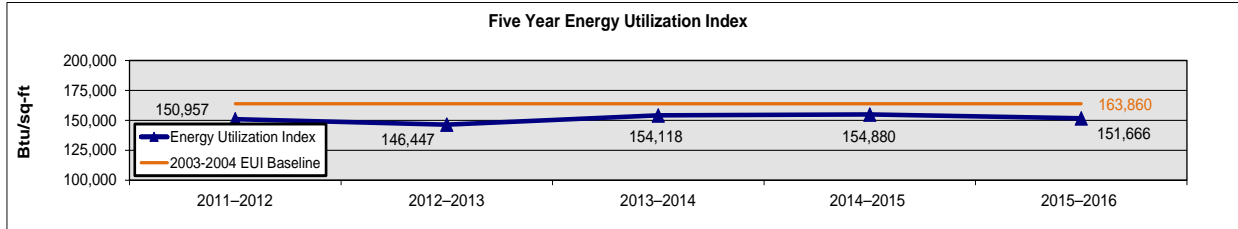
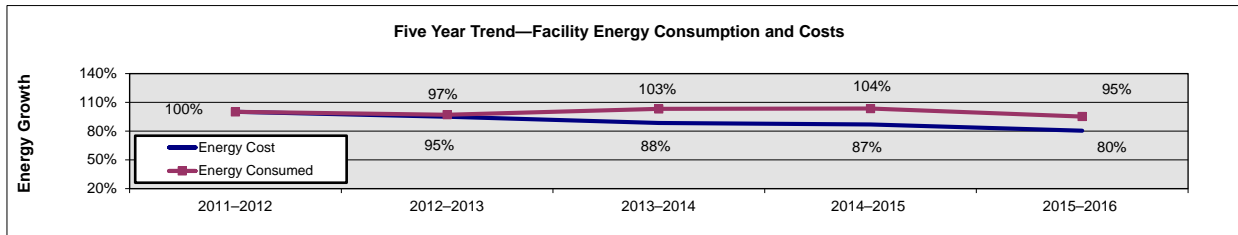
	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	33,998	32,733	38,104	44,577	43,213
Oil	gal	---	---	---	---	---
Electric	kWh	24,806,409	26,018,578	26,084,751	29,069,924	27,235,948
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 257,590	\$ 188,046	\$ 240,856	\$ 281,491	\$ 242,138
Oil	\$	---	---	---	---	---
Electric	\$	\$ 1,762,540	\$ 1,693,547	\$ 1,648,058	\$ 1,714,231	\$ 1,715,360
Total	\$	\$ 2,020,130	\$ 1,881,593	\$ 1,888,914	\$ 1,995,722	\$ 1,957,498
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	34,678	33,388	38,866	45,914	44,510
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	84,664	88,801	89,027	99,216	92,956
Total	mmBtu	119,589	122,423	127,893	145,130	137,466
Energy Utilization Index	Btu/sq-ft	72,117	67,576	60,691	68,746	63,676
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 7.58	\$ 5.74	\$ 6.32	\$ 6.31	\$ 5.60
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	7.11 ¢	6.51 ¢	6.32 ¢	5.90 ¢	6.30 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 7.43	\$ 5.63	\$ 6.20	\$ 6.13	\$ 5.44
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 20.82	\$ 19.07	\$ 18.51	\$ 17.28	\$ 18.45
Weighted Average	\$/mmBtu	\$ 16.93	\$ 15.40	\$ 14.77	\$ 13.75	\$ 14.24
Misc Facility Costs						
Water Cost	\$	\$ 382,268	\$ 380,192	\$ 365,231	\$ 337,368	\$ 448,023
Sewage Cost	\$	\$ 892,000	\$ 892,000	\$ 902,000	\$ 892,000	\$ 892,000
Reported Information						
Gross Area	sq-ft	1,658,269	1,811,630	2,107,278	2,111,111	2,158,832
Reported Student Population		6,229	6,246	5,461	4,716	4,300
Reported Heating Degree Days	degree days	5,808	4,627	5,576	5,968	4,696
Reported Cooling Degree Days	degree days	1,012	1,069	980	768	929

Cheyney University



	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	47,395	46,255	53,669	58,514	45,088
Oil	gal	---	---	---	---	---
Electric	kWh	10,707,971	11,725,364	13,041,040	13,084,514	12,464,319
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 477,365	\$ 438,080	\$ 496,799	\$ 516,540	\$ 315,943
Oil	\$	---	---	---	---	---
Electric	\$	\$ 930,133	\$ 934,355	\$ 966,336	\$ 902,615	\$ 947,557
Total	\$	\$ 1,407,498	\$ 1,372,435	\$ 1,463,135	\$ 1,419,155	\$ 1,263,500
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	48,343	47,180	54,742	60,269	46,441
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	36,546	40,019	44,509	44,657	42,541
Total	mmBtu	84,889	87,199	99,251	104,927	88,981
Energy Utilization Index	Btu/sq-ft	80,456	86,938	86,322	86,136	74,948
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 10.07	\$ 9.47	\$ 9.26	\$ 8.83	\$ 7.01
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	8.69 ¢	7.97 ¢	7.41 ¢	6.90 ¢	7.60 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 9.87	\$ 9.29	\$ 9.08	\$ 8.57	\$ 6.80
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 25.45	\$ 23.35	\$ 21.71	\$ 20.21	\$ 22.27
Weighted Average	\$/mmBtu	\$ 16.58	\$ 15.74	\$ 14.74	\$ 13.53	\$ 14.20
Misc Facility Costs						
Water Cost	\$	\$ 129,700	\$ 112,210	\$ 120,736	\$ 106,266	\$ 103,516
Sewage Cost	\$	\$ 109,392	\$ 125,605	\$ 138,751	\$ 174,509	\$ 128,127
Reported Information						
Gross Area	sq-ft	1,055,096	1,003,000	1,149,779	1,177,154	1,187,234
Reported Student Population		1,462	1,155	1,244	993	630
Reported Heating Degree Days	degree days	5,311	4,304	4,496	5,963	3,764
Reported Cooling Degree Days	degree days	1,362	1,588	1,377	1,377	1,622

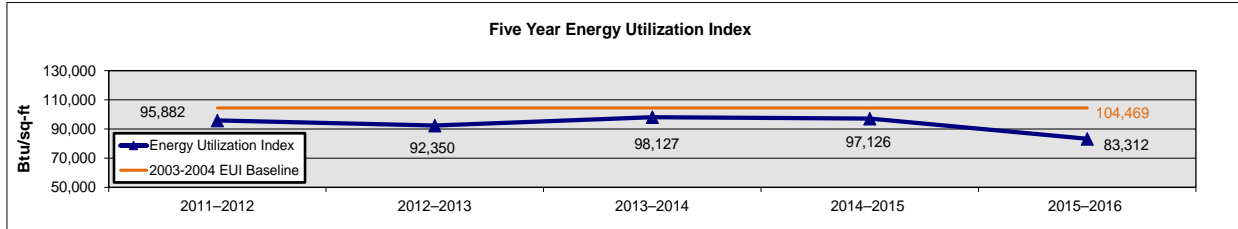
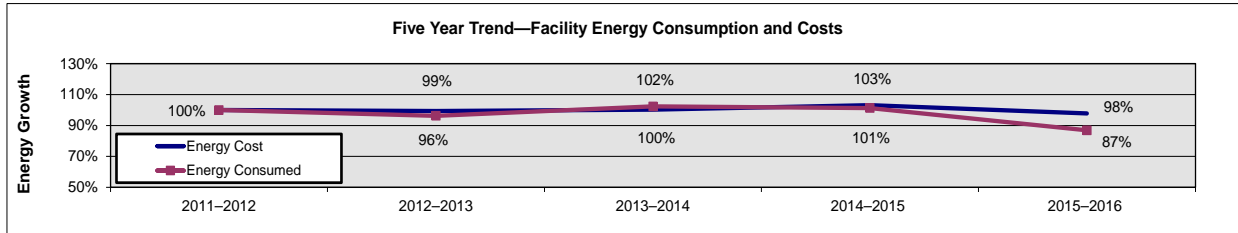
Clarion University



	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	156,447	151,305	167,270	169,654	148,599
Oil	gal	---	---	---	---	---
Electric	kWh	19,691,581	19,252,057	18,552,953	17,576,012	18,406,323
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 1,106,823	\$ 1,048,397	\$ 955,227	\$ 939,543	\$ 643,727
Oil	\$	---	---	---	---	---
Electric	\$	\$ 1,186,262	\$ 1,130,255	\$ 1,071,870	\$ 1,054,063	\$ 1,198,168
Total	\$	\$ 2,293,085	\$ 2,178,653	\$ 2,027,097	\$ 1,993,606	\$ 1,841,895
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	159,576	154,331	170,615	174,744	153,057
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	67,207	65,707	63,321	59,987	62,821
Total	mmBtu	226,783	220,038	233,937	234,731	215,878
Energy Utilization Index	Btu/sq-ft	150,957	146,447	154,118	154,880	151,666
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 7.07	\$ 6.93	\$ 5.71	\$ 5.54	\$ 4.33
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	6.02 ¢	5.87 ¢	5.78 ¢	6.00 ¢	6.51 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 6.94	\$ 6.79	\$ 5.60	\$ 5.38	\$ 4.21
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 17.65	\$ 17.20	\$ 16.93	\$ 17.57	\$ 19.07
Weighted Average	\$/mmBtu	\$ 10.11	\$ 9.90	\$ 8.67	\$ 8.49	\$ 8.53
Misc Facility Costs						
Water Cost	\$	\$ 355,876	\$ 310,450	\$ 331,167	\$ 238,778	\$ 345,621
Sewage Cost	\$	\$ 257,386	\$ 278,549	\$ 289,801	\$ 244,495	\$ 267,167
Reported Information						
Gross Area	sq-ft	1,511,916	1,511,916	1,527,663	1,515,568	1,423,379
Reported Student Population		4,724	4,416	3,900	3,599	3,212
Reported Heating Degree Days	degree days	5,383	5,491	6,794	7,191	5,957
Reported Cooling Degree Days	degree days	650	1,062	678	574	706

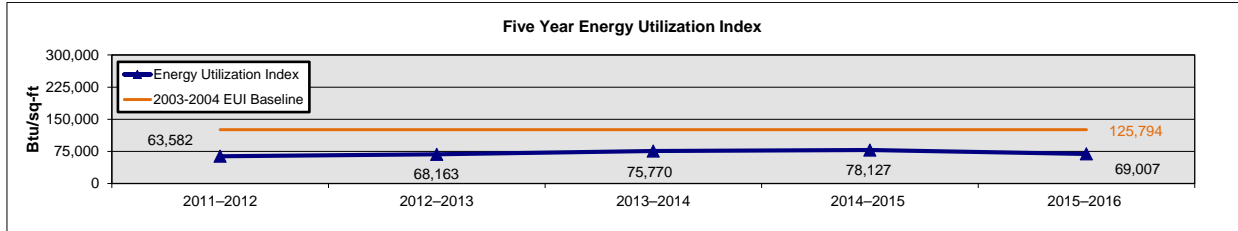
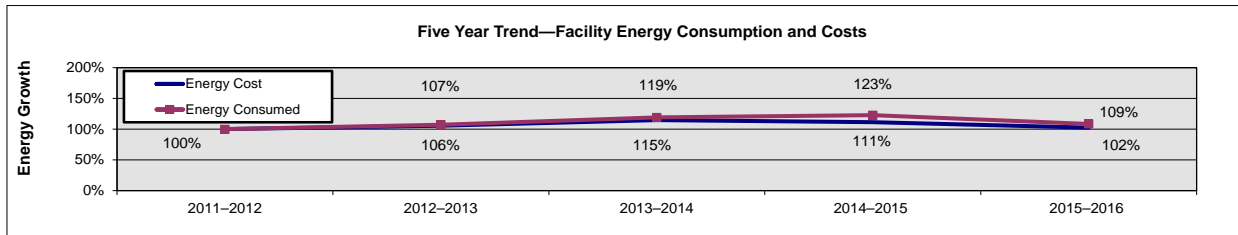
Note: Data do not include Clarion-Venango Campus.

Clarion University – Venango Campus



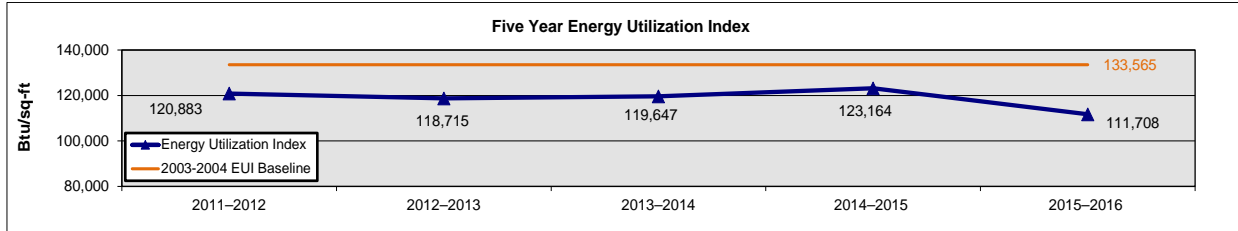
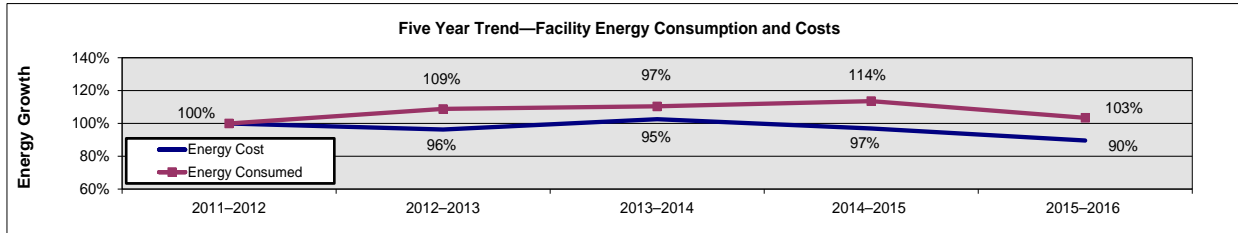
	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	3,070	3,221	3,716	3,546	2,833
Oil	gal	---	---	---	---	---
Electric	kWh	1,387,180	1,257,160	1,237,200	1,264,440	1,147,554
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 21,620	\$ 18,908	\$ 25,157	\$ 21,141	\$ 15,192
Oil	\$	---	---	---	---	---
Electric	\$	\$ 109,800	\$ 111,741	\$ 106,626	\$ 114,479	\$ 113,343
Total	\$	\$ 131,420	\$ 130,648	\$ 131,783	\$ 135,620	\$ 128,535
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	3,131	3,285	3,790	3,617	2,918
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	4,734	4,291	4,223	4,316	3,917
Total	mmBtu	7,866	7,576	8,050	7,968	6,835
Energy Utilization Index	Btu/sq-ft	95,882	92,350	98,127	97,126	83,312
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 7.04	\$ 5.87	\$ 6.77	\$ 5.96	\$ 5.36
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	7.92 ¢	8.89 ¢	8.62 ¢	9.05 ¢	9.88 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 6.90	\$ 5.75	\$ 6.64	\$ 5.85	\$ 5.21
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 23.19	\$ 26.04	\$ 25.25	\$ 26.53	\$ 28.94
Weighted Average	\$/mmBtu	\$ 16.71	\$ 17.24	\$ 16.45	\$ 17.10	\$ 18.81
Misc Facility Costs						
Water Cost	\$	\$ 1,776.40	\$ 2,586.04	\$ 2,649.35	\$ 2,697.65	\$ 2,955.25
Sewage Cost	\$	\$ 1,776.40	\$ 2,095.86	\$ 2,063.25	\$ 2,140.80	\$ 2,529.30
Reported Information						
Gross Area	sq-ft	82,037	82,037	82,037	82,037	82,036
Reported Student Population		606	609	515	486	307
Reported Heating Degree Days	degree days	---	---	6,892	7,413	6,079
Reported Cooling Degree Days	degree days	---	---	786	499	640

Dixon University Center



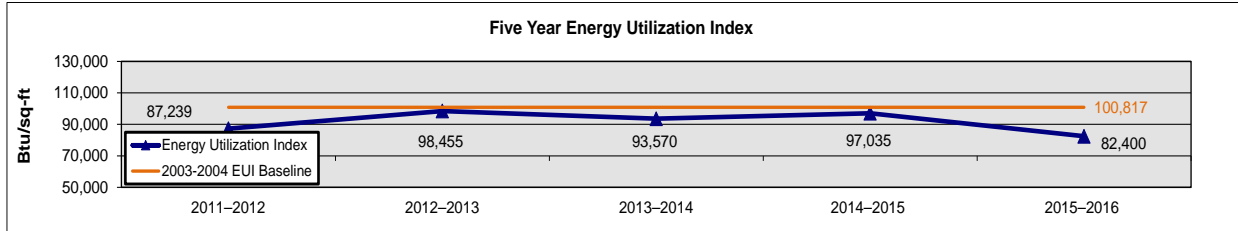
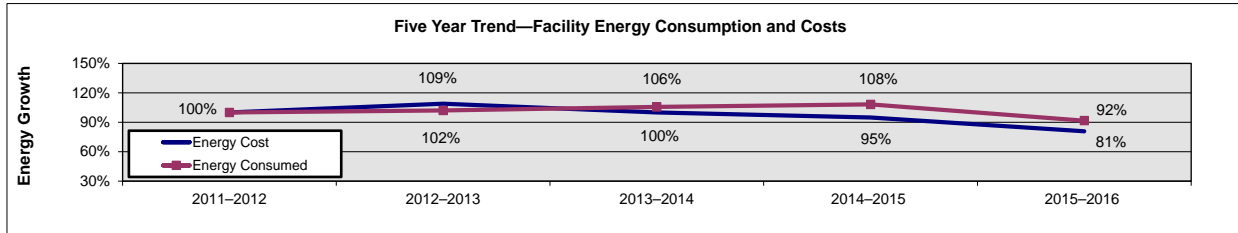
	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	4,331	4,959	5,910	6,275	5,029
Oil	gal	---	---	---	---	---
Electric	kWh	1,420,600	1,428,500	1,469,100	1,442,300	1,428,900
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$33,948	\$42,763	\$60,653	\$56,153	\$41,234
Oil	\$	---	---	---	---	---
Electric	\$	\$128,842	\$129,124	\$126,296	\$124,921	\$125,515
Total	\$	\$162,790	\$171,887	\$186,949	\$181,074	\$166,749
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	4,418	5,058	6,028	6,463	5,180
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	4,849	4,875	5,014	4,923	4,877
Total	mmBtu	9,266	9,934	11,042	11,386	10,057
Energy Utilization Index	Btu/sq-ft	63,582	68,163	75,770	78,127	69,007
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 7.84	\$ 8.62	\$ 10.26	\$ 8.95	\$ 8.20
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	9.07 ¢	9.04 ¢	8.60 ¢	8.66 ¢	8.78 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 7.68	\$ 8.45	\$ 10.06	\$ 8.69	\$ 7.96
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 26.57	\$ 26.48	\$ 25.19	\$ 25.38	\$ 25.74
Weighted Average	\$/mmBtu	\$ 17.57	\$ 17.30	\$ 16.93	\$ 15.90	\$ 16.58
Misc Facility Costs						
Water Cost	\$	\$9,927	\$9,928	\$11,166	\$13,901	\$16,028
Sewage Cost	\$	\$808	\$664	\$1,882	\$3,147	\$3,192
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	4,639	5,212	5,788	5,684	4,539
Reported Cooling Degree Days	degree days	1,315	1,258	1,154	1,080	1,299

East Stroudsburg University



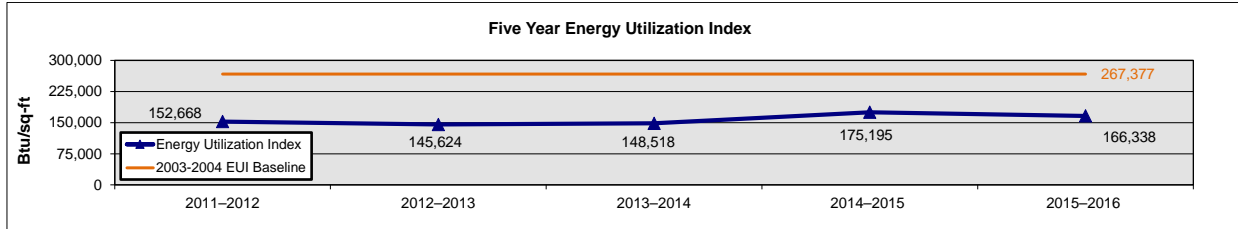
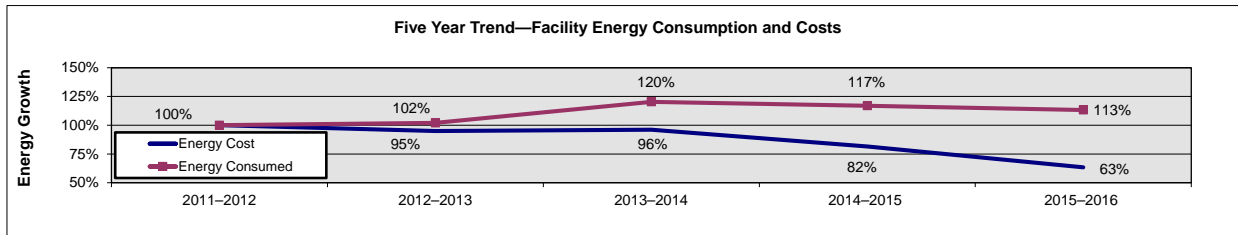
	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	127,501	141,122	144,093	149,038	126,545
Oil	gal	4,215	4,892	4,228	4,968	20,448
Electric	kWh	21,111,600	22,262,400	22,341,600	22,276,800	22,395,600
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$984,542	\$864,665	\$919,864	\$841,395	\$694,626
Oil	\$	\$14,679	\$17,333	\$15,149	\$9,733	\$24,027
Electric	\$	\$1,660,169	\$1,680,136	\$1,793,470	\$1,727,536	\$1,662,972
Total	\$	\$2,659,391	\$2,562,133	\$2,728,483	\$2,578,664	\$2,381,625
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	130,051	143,944	146,975	153,509	130,342
Oil	mmBtu	590	685	592	696	2,863
Electric	mmBtu	72,054	75,982	76,252	76,031	76,436
Total	mmBtu	202,695	220,610	223,819	230,236	209,640
Energy Utilization Index	Btu/sq-ft	120,883	118,715	119,647	123,164	111,708
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 7.72	\$ 6.13	\$ 6.38	\$ 5.65	\$ 5.49
Oil	\$/gal	\$ 3.48	\$ 3.54	\$ 3.58	\$ 1.96	\$ 1.18
Electric	¢/kWh	7.86 ¢	7.55 ¢	8.03 ¢	7.75 ¢	7.43 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 7.57	\$ 6.01	\$ 6.26	\$ 5.48	\$ 5.33
Oil	\$/mmBtu	\$ 24.87	\$ 25.31	\$ 25.60	\$ 13.99	\$ 8.39
Electric	\$/mmBtu	\$ 23.04	\$ 22.11	\$ 23.52	\$ 22.72	\$ 21.76
Weighted Average	\$/mmBtu	\$ 13.12	\$ 11.61	\$ 12.19	\$ 11.20	\$ 11.36
Misc Facility Costs						
Water Cost	\$	\$122,641	\$130,479	\$127,640	\$131,285	\$141,474
Sewage Cost	\$	\$101,709	\$116,977	\$96,266	\$85,303	\$115,417
Reported Information						
Gross Area	sq-ft	1,676,782	1,858,321	1,870,662	1,869,339	1,876,685
Reported Student Population		6,528	6,106	5,981	6,018	6,101
Reported Heating Degree Days	degree days	4,309	5,173	5,995	5,727	4,570
Reported Cooling Degree Days	degree days	1,208	863	1,023	1,015	539

Edinboro University



	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	74,010	72,673	76,431	85,871	71,227
Oil	gal	---	---	---	---	---
Electric	kWh	38,658,412	40,294,810	41,146,928	39,871,554	34,245,247
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$389,433	\$500,086	\$544,974	\$590,107	\$304,102
Oil	\$	---	---	---	---	---
Electric	\$	\$2,816,314	\$2,991,694	\$2,660,536	\$2,449,502	\$2,285,405
Total	\$	\$3,205,747	\$3,491,780	\$3,205,510	\$3,039,609	\$2,589,507
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	75,490	74,126	77,960	88,447	73,364
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	131,941	137,526	140,434	136,082	116,879
Total	mmBtu	207,431	211,653	219,158	224,528	190,243
Energy Utilization Index	Btu/sq-ft	87,239	98,455	93,570	97,035	82,400
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 5.26	\$ 6.88	\$ 7.13	\$ 6.87	\$ 4.27
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	7.29 ¢	7.42 ¢	6.47 ¢	6.14 ¢	6.67 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 5.16	\$ 6.75	\$ 6.99	\$ 6.67	\$ 4.15
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 21.35	\$ 21.75	\$ 18.95	\$ 18.00	\$ 19.55
Weighted Average	\$/mmBtu	\$ 15.45	\$ 16.50	\$ 14.68	\$ 13.54	\$ 13.61
Misc Facility Costs						
Water Cost	\$	\$221,754	\$327,363	\$295,805	\$269,126	\$289,873
Sewage Cost	\$	\$393,297	\$552,150	\$451,307	\$427,038	\$411,548
Reported Information						
Gross Area	sq-ft	2,377,726	2,149,738	2,342,175	2,313,897	2,308,761
Reported Student Population		6,345	5,864	5,516	5,264	4,909
Reported Heating Degree Days	degree days	6,267	6,559	6,892	6,794	5,318
Reported Cooling Degree Days	degree days	314	672	786	610	883

Indiana University



	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption (1)						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	391,885	404,981	501,956	489,038	461,168
Oil	gal	36,918	29,898	46,881	51,634	38,602
Electric (2)	kWh	51,711,728	51,470,848	51,527,414	50,884,814	52,172,812
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 2,579,396	\$ 2,437,664	\$ 2,872,496	\$ 2,409,046	\$ 1,665,630
Oil	\$	\$ 89,625	\$ 100,742	\$ 154,179	\$ 168,566	\$ 105,772
Electric Purchased	\$	\$ 2,627,515	\$ 2,494,484	\$ 2,064,588	\$ 1,740,218	\$ 1,583,377
Total	\$	\$ 5,296,536	\$ 5,032,890	\$ 5,091,264	\$ 4,317,830	\$ 3,354,779
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	399,772	413,081	517,015	498,819	475,004
Oil	mmBtu	5,169	4,186	6,563	7,229	5,404
Electric Purchased	mmBtu	176,492	175,670	175,863	173,670	178,066
Total	mmBtu	581,433	592,937	699,441	679,718	658,474
Energy Utilization Index	Btu/sq-ft	152,668	145,624	148,518	175,195	166,338
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 6.89	\$ 6.58	\$ 6.02	\$ 5.72	\$ 3.61
Oil	\$/gal	\$ 2.77	\$ 2.43	\$ 3.37	\$ 3.29	\$ 2.74
Electric Purchased	¢/kWh	4.75 ¢	5.08 ¢	4.85 ¢	4.01 ¢	3.03 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 6.45	\$ 5.90	\$ 5.56	\$ 4.83	\$ 3.51
Oil	\$/mmBtu	\$ 17.34	\$ 24.07	\$ 23.49	\$ 23.32	\$ 19.57
Electric Purchased	\$/mmBtu	\$ 14.89	\$ 14.20	\$ 11.74	\$ 10.02	\$ 8.89
Weighted Average	\$/mmBtu	\$ 9.11	\$ 8.49	\$ 7.28	\$ 6.35	\$ 5.09
Misc Facility Costs						
Water Cost	\$	\$ 670,104	\$ 723,989	\$ 759,249	\$ 783,210	\$ 838,137
Sewage Cost	\$	\$ 731,855	\$ 731,424	\$ 731,512	\$ 729,505	\$ 738,152
Reported Information						
Gross Area (2)	sq-ft	3,992,357	3,992,357	3,992,357	3,992,357	3,958,653
Reported Student Population (3)		13,415	13,531	13,116	12,537	12,051
Reported Heating Degree Days	degree days	4,379	5,618	6,600	5,956	5,000
Reported Cooling Degree Days	degree days	812	737	429	667	739

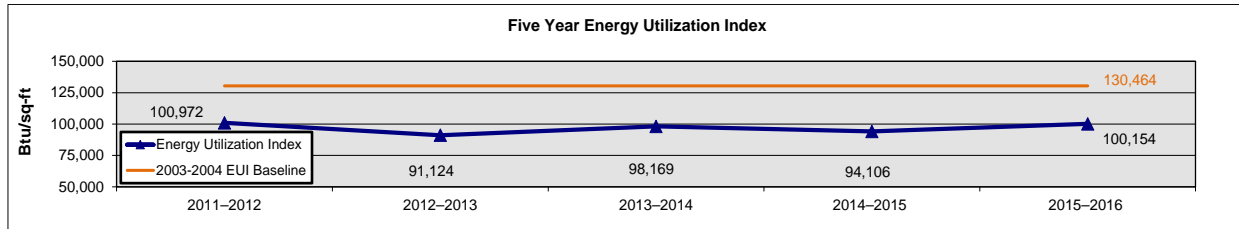
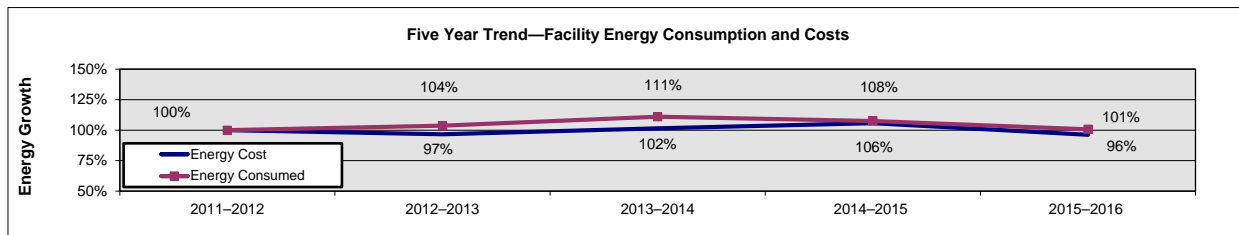
Note: Electric data represent all purchased and cogeneration-produced electricity, including electricity that flows through the cogeneration plant to be redistributed throughout campus including FIUP.

(1) Data includes FIUP usage for Residential Revival.

(2) Square footage is based on actual gross including Residential Revival square footage less the leased Monroeville Building.

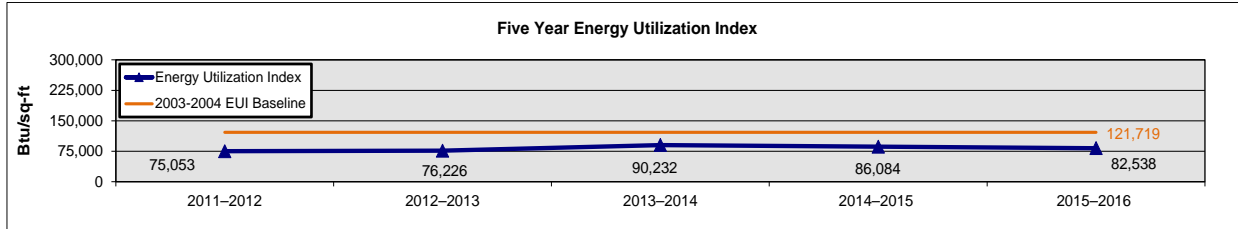
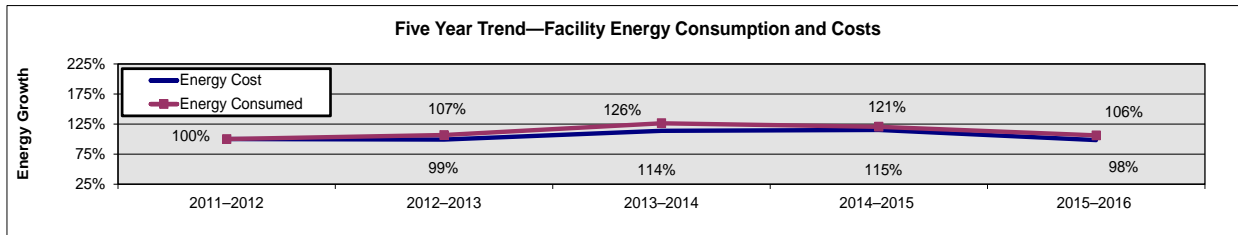
(3) Data reflects main and branch campuses.

Kutztown University



	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	135,772	147,672	164,114	129,414	148,474
Oil	gal	7,146	1,615	4,111	173,923	1,733
Electric	kWh	31,130,746	30,502,700	30,752,176	31,257,662	27,656,432
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 960,425	\$ 1,042,858	\$ 1,144,970	\$ 814,339	\$ 1,051,256
Oil	\$	\$ 26,885	\$ 5,390	\$ 14,633	\$ 391,327	\$ 2,259
Electric	\$	\$ 2,500,928	\$ 2,323,308	\$ 2,383,718	\$ 2,483,599	\$ 2,300,948
Total	\$	\$ 3,488,238	\$ 3,371,556	\$ 3,543,321	\$ 3,689,265	\$ 3,354,463
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	138,487	150,625	167,396	133,296	152,928
Oil	mmBtu	1,000	226	576	24,349	243
Electric	mmBtu	106,249	104,106	104,957	106,682	94,391
Total	mmBtu	245,737	254,957	272,929	264,328	247,562
Energy Utilization Index	Btu/sq-ft	100,972	91,124	98,169	94,106	100,154
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 7.07	\$ 7.06	\$ 6.98	\$ 6.29	\$ 7.08
Oil	\$/gal	\$ 3.76	\$ 3.34	\$ 3.56	\$ 2.25	\$ 1.30
Electric	¢/kWh	8.03 ¢	7.62 ¢	7.75 ¢	7.95 ¢	8.32 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 6.94	\$ 6.92	\$ 6.84	\$ 6.11	\$ 6.87
Oil	\$/mmBtu	\$ 26.87	\$ 23.84	\$ 25.42	\$ 16.07	\$ 9.31
Electric	\$/mmBtu	\$ 23.54	\$ 22.32	\$ 22.71	\$ 23.28	\$ 24.38
Weighted Average	\$/mmBtu	\$ 14.19	\$ 13.22	\$ 12.98	\$ 13.96	\$ 13.55
Misc Facility Costs						
Water Cost	\$	\$ 420,349	\$ 403,798	\$ 463,594	\$ 508,136	\$ 510,877
Sewage Cost	\$	\$ 439,881	\$ 508,682	\$ 546,158	\$ 577,908	\$ 550,967
Reported Information						
Gross Area	sq-ft	2,433,724	2,797,903	2,780,195	2,808,832	2,471,807
Reported Student Population		9,333	8,887	8,550	8,207	8,048
Reported Heating Degree Days	degree days	4,347	5,403	5,852	5,701	4,471
Reported Cooling Degree Days	degree days	1,371	909	1,181	1,307	1,335

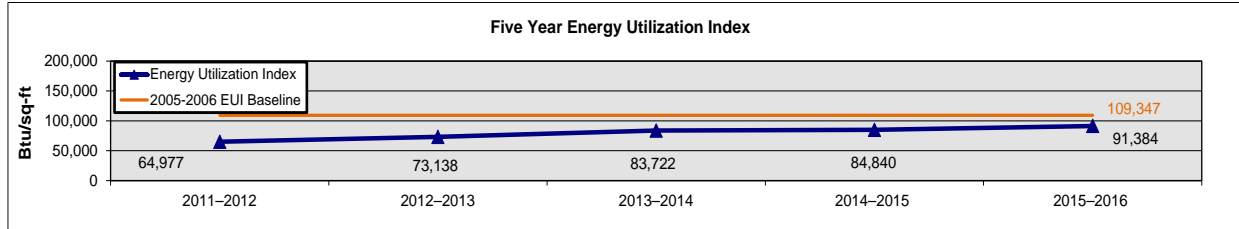
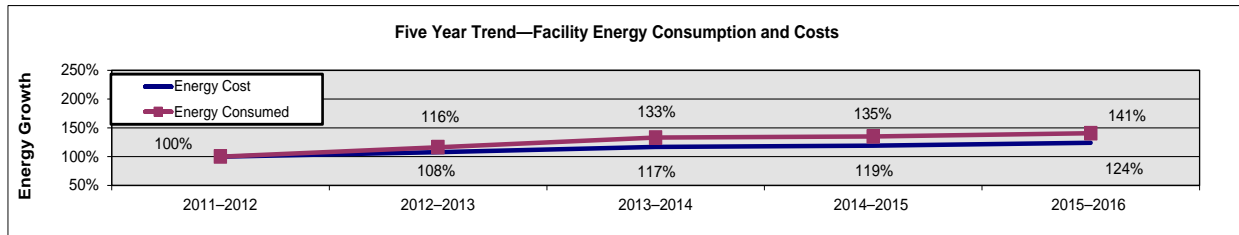
Lock Haven University



	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	77,929	80,531	96,893	90,321	72,303
Oil	gal	1,858	2,428	---	---	---
Electric	kWh	13,537,088	15,231,176	17,396,166	17,235,350	16,908,586
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 651,358	\$ 585,763	\$ 636,329	\$ 634,909	\$ 373,715
Oil	\$	\$ 6,225	\$ 8,171	---	---	---
Electric	\$	\$ 1,073,964	\$ 1,124,782	\$ 1,336,575	\$ 1,359,262	\$ 1,310,761
Total	\$	\$ 1,731,547	\$ 1,718,716	\$ 1,972,904	\$ 1,994,171	\$ 1,703,807
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	79,488	82,142	98,831	93,031	74,472
Oil	mmBtu	260	340	---	---	---
Electric	mmBtu	46,202	51,984	59,373	58,824	57,709
Total	mmBtu	125,950	134,466	159,173	151,855	133,758
Energy Utilization Index	Btu/sq-ft	75,053	76,226	90,232	86,084	82,538
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 8.36	\$ 7.27	\$ 6.57	\$ 7.03	\$ 5.17
Oil	\$/gal	\$ 3.35	\$ 3.37	---	---	---
Electric	¢/kWh	7.93 ¢	7.38 ¢	7.68 ¢	7.89 ¢	7.75 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 8.19	\$ 7.13	\$ 6.44	\$ 6.82	\$ 5.02
Oil	\$/mmBtu	\$ 23.93	\$ 24.04	---	---	---
Electric	\$/mmBtu	\$ 23.24	\$ 21.64	\$ 22.51	\$ 23.11	\$ 22.71
Weighted Average	\$/mmBtu	\$ 13.75	\$ 12.78	\$ 12.47	\$ 13.13	\$ 12.74
Misc Facility Costs						
Water Cost (1)	\$	\$ 151,095	\$ 68,581	\$ 59,158	\$ 56,327	\$ 48,996
Sewage Cost	\$	\$ 324,692	\$ 132,842	\$ 123,013	\$ 100,790	\$ 90,155
Reported Information						
Gross Area	sq-ft	1,678,153	1,764,033	1,764,033	1,764,033	1,620,562
Reported Student Population		4,439	4,327	4,226	3,829	3,588
Reported Heating Degree Days	degree days	4,817	5,683	6,513	6,179	4,918
Reported Cooling Degree Days	degree days	944	910	841	781	791

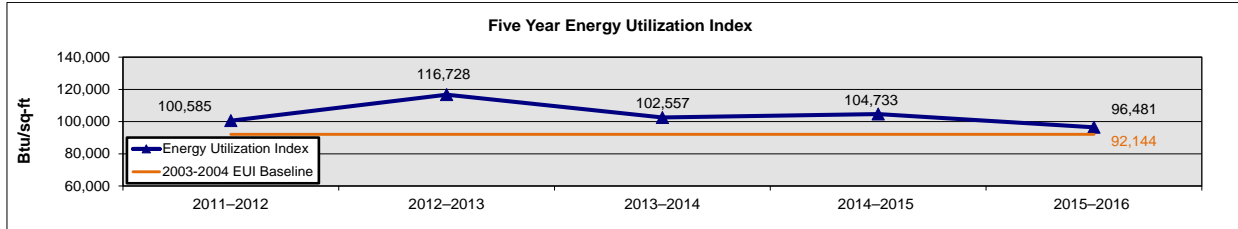
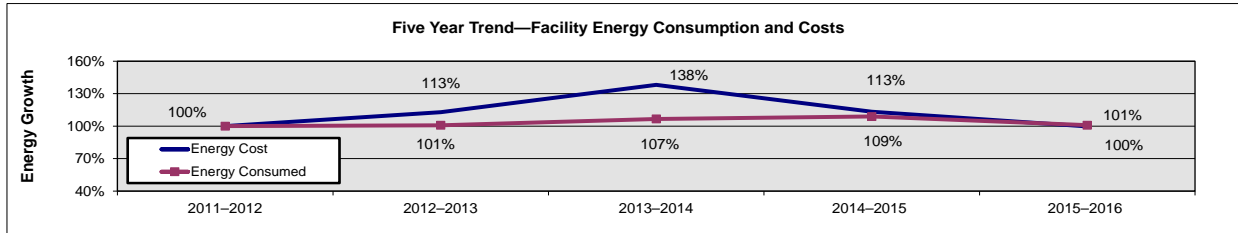
(1) Aggressive leak detection program significantly reduced water usage and costs in fiscal year 2012-2013.

Lock Haven University – Clearfield Campus



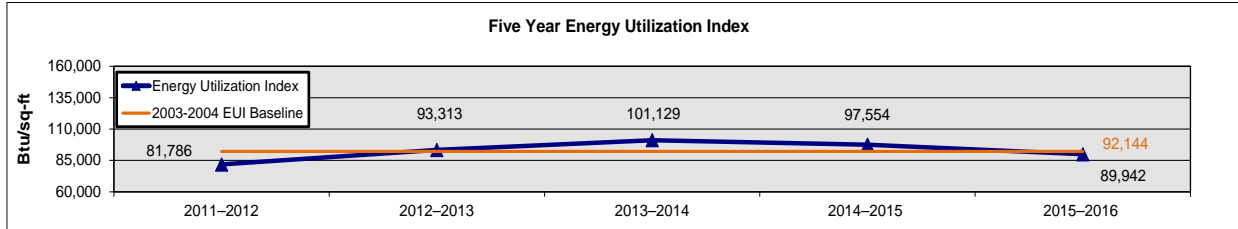
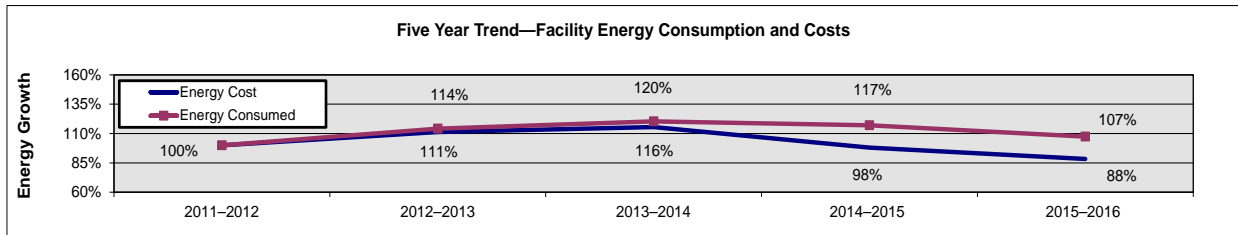
	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	3,064	4,039	4,745	4,652	4,691
Oil	gal	---	---	---	---	---
Electric	kWh	842,920	837,840	908,880	968,200	1,057,640
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$28,587	\$34,358	\$40,820	\$35,993	\$ 31,204
Oil	\$	---	---	---	---	---
Electric	\$	\$73,999	\$76,128	\$79,107	\$86,159	\$ 95,974
Total	\$	\$102,586	\$110,486	\$119,927	\$122,152	\$ 127,178
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	3,125	4,120	4,840	4,792	4,832
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	2,877	2,860	3,102	3,304	3,610
Total	mmBtu	6,002	6,979	7,989	8,096	8,441
Energy Utilization Index	Btu/sq-ft	64,977	73,138	83,722	84,840	91,384
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 9.33	\$ 8.51	\$ 8.60	\$ 7.74	\$ 6.65
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	8.78 ¢	9.09 ¢	8.70 ¢	8.90 ¢	9.07 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 9.15	\$ 8.34	\$ 8.43	\$ 7.51	\$ 6.46
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 25.72	\$ 26.62	\$ 25.50	\$ 26.07	\$ 26.59
Weighted Average	\$/mmBtu	\$ 17.09	\$ 15.83	\$ 15.10	\$ 15.09	\$ 15.07
Misc Facility Costs						
Water Cost	\$	\$ 3,717.00	\$ 3,798.00	\$4,014	\$4,210	\$ 4,222
Sewage Cost	\$	\$ 4,113.00	\$ 4,127.00	\$4,584	\$4,610	\$ 4,625
Reported Information						
Gross Area	sq-ft	92,373	95,427	95,427	95,427	92,373
Reported Student Population		287	236	238	203	201
Reported Heating Degree Days	degree days	5,725	6,620	6,958	6,973	5,752
Reported Cooling Degree Days	degree days	645	562	559	456	532

Mansfield University



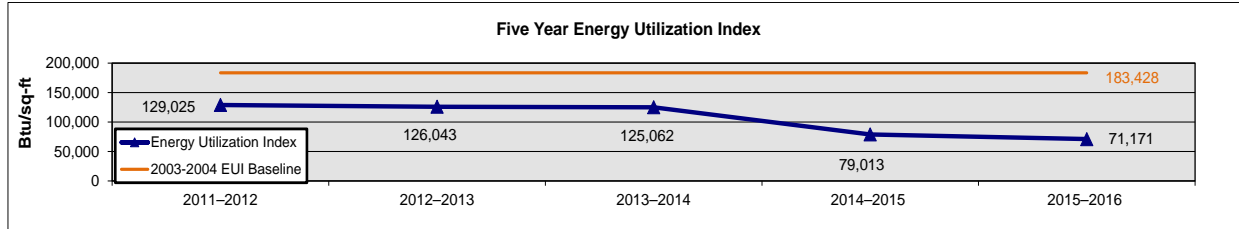
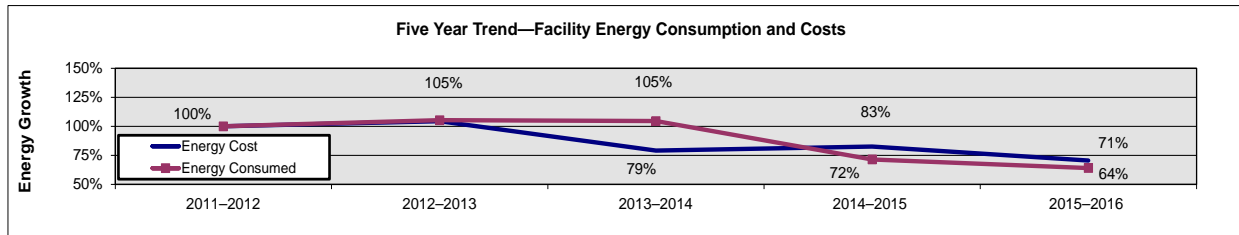
	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	95,614	99,828	102,269	103,769	95,212
Oil	gal	---	---	---	---	---
Electric	kWh	14,306,115	13,406,888	15,161,410	15,379,342	14,528,983
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 427,956	\$ 756,552	\$ 849,678	\$ 560,637	\$ 420,947
Oil	\$	---	---	---	---	---
Electric	\$	\$ 1,070,589	\$ 934,486	\$ 1,172,760	\$ 1,137,844	\$ 1,073,822
Total	\$	\$ 1,498,545	\$ 1,691,038	\$ 2,069,628	\$ 1,698,481	\$ 1,494,769
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	97,527	101,825	104,314	106,882	98,068
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	48,827	45,758	51,746	52,490	49,587
Total	mmBtu	146,353	147,582	156,060	159,372	147,656
Energy Utilization Index	Btu/sq-ft	100,585	116,728	102,557	104,733	96,481
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 4.48	\$ 7.58	\$ 8.31	\$ 5.40	\$ 4.42
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	7.48 ¢	6.97 ¢	7.74 ¢	7.40 ¢	7.39 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 4.39	\$ 7.43	\$ 8.15	\$ 5.25	\$ 4.29
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 21.93	\$ 20.42	\$ 22.66	\$ 21.68	\$ 21.66
Weighted Average	\$/mmBtu	\$ 10.24	\$ 11.46	\$ 12.96	\$ 10.66	\$ 10.12
Misc Facility Costs						
Water Cost	\$	\$ 83,930	\$ 80,005	\$ 78,205	\$ 82,679	\$ 86,074
Sewage Cost	\$	\$ 174,000	\$ 178,500	\$ 183,000	\$ 183,000	\$ 183,000
Reported Information						
Gross Area	sq-ft	1,455,025	1,264,323	1,521,695	1,521,695	1,530,411
Reported Student Population		2,591	2,471	2,322	2,157	1,890
Reported Heating Degree Days	degree days	5,113	5,899	6,558	6,816	5,840
Reported Cooling Degree Days	degree days	647	864	488	400	398

Millersville University



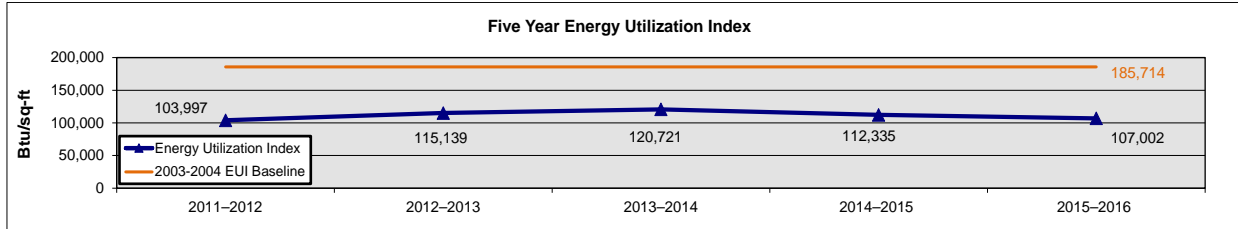
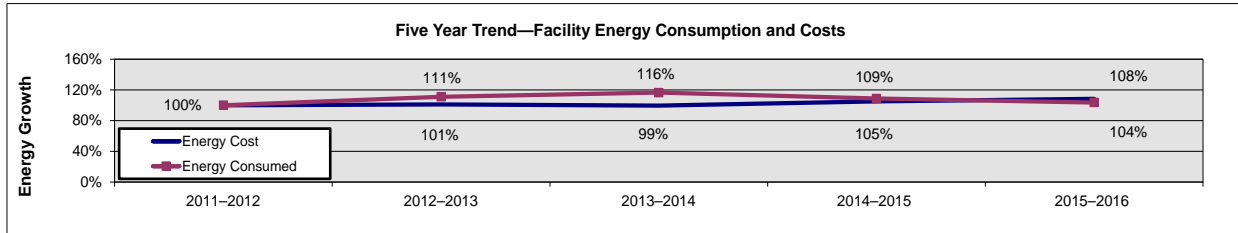
	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthraccite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	43,523	64,438	71,402	70,384	63,060
Oil	gal	27,096	33,636	37,972	37,072	27,222
Electric	kWh	38,107,022	39,016,124	39,770,287	38,366,523	35,966,225
Energy Costs						
Anthraccite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 389,255	\$ 550,876	\$ 746,345	\$ 558,525	\$ 455,900
Oil	\$	\$ 89,901	\$ 111,166	\$ 129,105	\$ 64,799	\$ 36,649
Electric	\$	\$ 2,691,594	\$ 2,867,255	\$ 2,788,524	\$ 2,483,613	\$ 2,308,270
Total	\$	\$ 3,170,750	\$ 3,529,297	\$ 3,663,974	\$ 3,106,937	\$ 2,800,819
Energy Consumption						
Anthraccite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	44,393	65,727	72,830	72,496	64,952
Oil	mmBtu	3,793	4,709	5,316	5,190	3,811
Electric	mmBtu	130,059	133,162	135,736	130,945	122,753
Total	mmBtu	178,246	203,598	214,596	208,631	191,516
Energy Utilization Index	Btu/sq-ft	81,786	93,313	101,129	97,554	89,942
Unit Fuel Costs						
Anthraccite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 8.94	\$ 8.55	\$ 10.45	\$ 7.94	\$ 7.23
Oil	\$/gal	\$ 3.32	\$ 3.30	\$ 3.40	\$ 1.75	\$ 1.35
Electric	¢/kWh	7.06 ¢	7.35 ¢	7.01 ¢	6.47 ¢	6.42 ¢
Unit Energy Costs						
Anthraccite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 8.77	\$ 8.38	\$ 10.25	\$ 7.70	\$ 7.02
Oil	\$/mmBtu	\$ 23.70	\$ 23.61	\$ 24.29	\$ 12.49	\$ 9.62
Electric	\$/mmBtu	\$ 20.70	\$ 21.53	\$ 20.54	\$ 18.97	\$ 18.80
Weighted Average	\$/mmBtu	\$ 17.79	\$ 17.33	\$ 17.13	\$ 14.89	\$ 14.62
Misc Facility Costs						
Water Cost	\$	\$ 93,925	\$ 112,770	\$ 127,817	\$ 98,163	\$ 106,365
Sewage Cost	\$	\$ 418,381	\$ 495,482	\$ 620,678	\$ 389,944	\$ 386,368
Reported Information						
Gross Area	sq-ft	2,179,412	2,181,879	2,122,013	2,138,617	2,129,320
Reported Student Population		7,199	6,791	6,658	6,291	6,473
Reported Heating Degree Days	degree days	4,491	5,186	5,190	5,244	4,652
Reported Cooling Degree Days	degree days	1,092	1,138	957	756	935

Shippensburg University



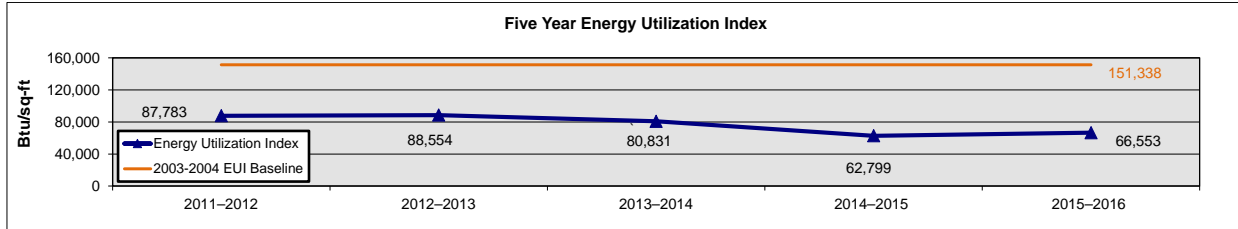
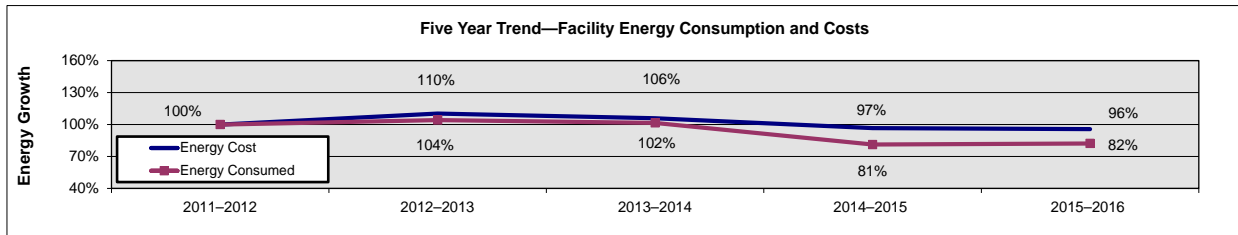
	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	6,443	6,940	6,772	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	22,623	21,250	21,709	98,373	86,362
Oil	gal	---	---	---	---	---
Electric	kWh	22,200,218	23,027,567	23,449,377	25,059,567	23,001,149
Energy Costs						
Anthracite Coal	\$	\$ 1,231,856	\$ 1,237,459	\$ 672,042	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 161,341	\$ 147,628	\$ 157,933	\$ 853,258	\$ 527,418
Oil	\$	---	---	---	---	---
Electric	\$	\$ 1,722,385	\$ 1,871,112	\$ 1,635,676	\$ 1,719,136	\$ 1,669,298
Total	\$	\$ 3,115,582	\$ 3,256,199	\$ 2,465,651	\$ 2,572,394	\$ 2,196,716
Energy Consumption						
Anthracite Coal	mmBtu	162,364	174,888	170,654	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	23,075	21,675	22,143	101,324	88,953
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	75,769	78,593	80,033	85,528	78,503
Total	mmBtu	261,246	275,189	273,047	186,852	167,456
Energy Utilization Index	Btu/sq-ft	129,025	126,043	125,062	79,013	71,171
Unit Fuel Costs						
Anthracite Coal	\$/ton	\$ 191.19	\$ 178.31	\$ 99.24	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 7.13	\$ 6.95	\$ 7.28	\$ 8.67	\$ 6.11
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	7.76 ¢	8.13 ¢	6.98 ¢	6.86 ¢	7.26 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	\$ 7.59	\$ 7.08	\$ 3.94	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 6.99	\$ 6.81	\$ 7.13	\$ 8.42	\$ 5.93
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 22.73	\$ 23.81	\$ 20.44	\$ 20.10	\$ 21.26
Weighted Average	\$/mmBtu	\$ 11.93	\$ 11.83	\$ 9.04	\$ 13.77	\$ 13.12
Misc Facility Costs						
Water Cost	\$	\$ 219,911	\$ 206,512	\$ 179,943	\$ 195,586	\$ 209,698
Sewage Cost	\$	\$ 139,969	\$ 104,459	\$ 132,700	\$ 150,512	\$ 129,336
Reported Information						
Gross Area	sq-ft	2,024,766	2,183,293	2,183,293	2,364,846	2,352,881
Reported Student Population		7,167	6,709	6,516	6,161	6,146
Reported Heating Degree Days	degree days	3,994	4,589	4,885	5,813	3,488
Reported Cooling Degree Days	degree days	864	558	1,214	1,656	1,626

Slippery Rock University



	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	3,091	2,891	3,761	2,303	2,226
Gas	mcf	80,992	108,995	102,705	125,177	110,824
Oil	gal	---	---	---	---	---
Electric	kWh	27,815,482	29,351,876	28,548,286	27,263,933	28,242,001
Energy Costs						
Anthracite Coal	\$	---	---	---	---	---
Bituminous Coal	\$	\$ 375,602	\$ 321,093	\$ 407,110	\$ 237,333	\$ 210,478
Gas	\$	\$ 689,718	\$ 787,440	\$ 737,516	\$ 913,573	\$ 807,112
Oil	\$	---	---	---	---	---
Electric	\$	\$ 1,697,039	\$ 1,681,868	\$ 1,602,206	\$ 1,750,309	\$ 1,973,794
Total	\$	\$ 2,762,358	\$ 2,790,401	\$ 2,746,832	\$ 2,901,214	\$ 2,991,384
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	82,221	76,901	100,043	61,260	59,212
Gas	mmBtu	82,612	111,175	104,759	128,932	114,149
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	94,934	100,178	97,435	93,052	96,390
Total	mmBtu	260,451	289,190	303,264	283,244	269,750
Energy Utilization Index	Btu/sq-ft	103,997	115,139	120,721	112,335	107,002
Unit Fuel Costs						
Anthracite Coal	\$/ton	---	---	---	---	---
Bituminous Coal	\$/ton	\$ 121.51	\$ 111.07	\$ 108.25	\$ 103.05	\$ 94.55
Gas	\$/mcf	\$ 8.52	\$ 7.22	\$ 7.18	\$ 7.30	\$ 7.28
Oil	\$/gal	---	---	---	---	---
Electric	¢/kWh	6.10 ¢	5.73 ¢	5.61 ¢	6.42 ¢	6.99 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	---	---	---	---	---
Bituminous Coal	\$/mmBtu	\$ 4.57	\$ 4.18	\$ 4.07	\$ 3.87	\$ 3.55
Gas	\$/mmBtu	\$ 8.35	\$ 7.08	\$ 7.04	\$ 7.09	\$ 7.07
Oil	\$/mmBtu	---	---	---	---	---
Electric	\$/mmBtu	\$ 17.88	\$ 16.79	\$ 16.44	\$ 18.81	\$ 20.48
Weighted Average	\$/mmBtu	\$ 10.63	\$ 9.68	\$ 9.09	\$ 10.24	\$ 11.09
Misc Facility Costs						
Water Cost	\$	\$ 256,210	\$ 324,315	\$ 353,598	\$ 354,749	\$ 325,513
Sewage Cost	\$	\$ 328,092	\$ 329,831	\$ 329,407	\$ 343,139	\$ 354,201
Reported Information						
Gross Area	sq-ft	2,504,406	2,511,667	2,512,107	2,521,422	2,520,983
Reported Student Population		7,842	7,874	7,525	7,327	7,367
Reported Heating Degree Days	degree days	5,359	5,910	6,763	6,554	5,100
Reported Cooling Degree Days	degree days	727	783	595	539	800

West Chester University



	Units	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016
Fuel Consumption						
Anthracite Coal	tons	4,001	4,675	3,585	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	69,513	47,043	61,324	96,049	96,605
Oil	gal	43,819	35,381	88,273	10,077	7,459
Electric	kWh	35,061,801	40,844,577	40,015,403	41,642,179	42,477,897
Energy Costs						
Anthracite Coal	\$	\$ 749,544	\$ 784,530	\$ 462,513	---	---
Bituminous Coal	\$	---	---	---	---	---
Gas	\$	\$ 412,466	\$ 418,720	\$ 574,105	\$ 838,501	\$ 677,258
Oil	\$	\$ 138,674	\$ 119,662	\$ 290,879	\$ 20,931	\$ 11,862
Electric	\$	\$ 2,926,845	\$ 3,345,673	\$ 3,152,030	\$ 3,226,992	\$ 3,356,002
Total	\$	\$ 4,227,529	\$ 4,668,585	\$ 4,479,527	\$ 4,086,424	\$ 4,045,122
Energy Consumption						
Anthracite Coal	mmBtu	101,625	118,745	91,059	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	70,903	47,984	62,550	97,970	99,503
Oil	mmBtu	6,135	4,953	12,358	1,411	1,044
Electric	mmBtu	119,666	139,403	136,573	142,125	144,977
Total	mmBtu	298,329	311,085	303,154	242,466	245,524
Energy Utilization Index	Btu/sq-ft	87,783	88,554	80,831	62,799	66,553
Unit Fuel Costs						
Anthracite Coal	\$/ton	\$ 187.34	\$ 167.81	\$ 129.01	---	---
Bituminous Coal	\$/ton	---	---	---	---	---
Gas	\$/mcf	\$ 5.93	\$ 8.90	\$ 9.36	\$ 8.73	\$ 7.01
Oil	\$/gal	\$ 3.16	\$ 3.38	\$ 3.30	\$ 2.08	\$ 1.59
Electric	¢/kWh	8.35 ¢	8.19 ¢	7.88 ¢	7.75 ¢	7.90 ¢
Unit Energy Costs						
Anthracite Coal	\$/mmBtu	\$ 7.38	\$ 6.61	\$ 5.08	---	---
Bituminous Coal	\$/mmBtu	---	---	---	---	---
Gas	\$/mmBtu	\$ 5.82	\$ 8.73	\$ 9.18	\$ 8.56	\$ 6.81
Oil	\$/mmBtu	\$ 22.61	\$ 24.16	\$ 23.54	\$ 14.84	\$ 11.36
Electric	\$/mmBtu	\$ 24.46	\$ 24.00	\$ 23.08	\$ 22.71	\$ 23.15
Weighted Average	\$/mmBtu	\$ 14.17	\$ 15.01	\$ 14.81	\$ 16.92	\$ 16.48
Misc Facility Costs						
Water Cost (1)	\$	\$ 605,246	\$ 983,433	\$ 754,846	\$ 919,084	\$ 953,186
Sewage Cost (1)	\$	\$ 267,687	\$ 435,587	\$ 317,711	\$ 547,283	\$ 577,046
Reported Information						
Gross Area	sq-ft	3,398,494	3,512,933	3,750,473	3,860,973	3,689,154
Reported Student Population		13,216	13,651	13,699	13,701	14,164
Reported Heating Degree Days	degree days	4,304	5,308	5,387	5,963	4,935
Reported Cooling Degree Days	degree days	1,588	1,139	1,344	987	1,113

(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 of time 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.