Utility Usage Report

for

Fiscal Year

2018–2019

Pennsylvania's
STATE SYSTEM
of Higher Education

PennState
College of Engineering

FACILITIES
ENGINEERING
INSTITUTE

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for
Fiscal Year 2018–2019

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.

Director

Mark A. Bodenschatz

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A Message from the Director

The Penn State Facilities Engineering Institute is proud to serve Pennsylvania's State System of Higher Education in ways that improve the effectiveness, efficiency, reliability, environmental responsibility, safety, and security of your facilities and operations. Our Institute strives to be a responsive partner as you navigate the growing demands, options, and expectations facing today's facility personnel. Above all, we value our relationships with each university and the Office of the Chancellor and appreciate the opportunity to serve you.

The *Utility Usage Report for Fiscal Year 2018–2019* contains information about our collective services, a summary of the engineering and energy services provided to each university, and a compilation of the monthly utility and energy use data that each university submits throughout the year. The utility and energy data provided by the respective PASSHE facilities has been summarized into a useful format to aid in your planning and budgeting. This data also proved invaluable in helping our Institute reduce future energy supply costs for PASSHE universities by over $1.85 million in comparison to current contract rates and avoid over $4.3 million in projected annual electricity and natural gas expenditures as compared to utility-issued, price-to-compare costs.

Our Institute continues to provide professional development opportunities through workshops and short courses, and we encourage participation by your staff to maximize this benefit. In fiscal year 2019–2020, we are implementing an Educational Advisory Team that will include client representatives to help us plan educational programs to meet specific professional development needs.

Our Institute continues to grow to meet the demands and expectations of our clients. Our vision for the future includes broadening our scope of services from facilities engineering to full facilities management with an emphasis on effective strategic and operational planning. Much of our recent growth is in services outside of your current contract, such as facility condition assessments, sustainability, utility bill management support, data analytics, and structural analysis; however, if you are interested in any of these services, we would do our best to align our expertise to your needs.

I am personally honored to write this letter as the new director of the Institute. I am very optimistic about our future. We have a high-quality staff who are energized and passionate about helping you with your energy and engineering needs, and we look forward to continuing to serve Pennsylvania's State System of Higher Education.

Sincerely,

Mark A. Bodenschatz, PE, ProFM
Director

INTRODUCTION

The Penn State Facilities Engineering Institute (PSFEI) is pleased to present the *Utility Usage Report for Fiscal Year 2018–2019* for Pennsylvania's State System of Higher Education (PASSHE). This report includes two major components, a summary of services and utility usage data. The Summary of Services is a brief description of services that are provided both collectively and for individual universities. The utility usage data tables and graphs identify fuel consumption and energy costs for the past five years. The Energy Utilization Intensity (EUI), defined as British thermal units per square foot (Btu/sq-ft), remains the primary measure of a university's use intensity of all annual forms of energy relative to the conditioned space area. Identification of the EUI and other parameters in this report establish baseline data for past and future measurement and comparison. Additionally, the data reflects a five-year history for student population and a variety of energy, space, water, and sewage information.

The 2003−2004 EUI baseline has been maintained for fiscal year 2018–2019. The EUI baseline allows a comparison of the current year with the EUI for year one of the PASSHE Energy Plan. It is shown for all PASSHE universities in Table 1 and in the five-year tables for each university.

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

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

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

COLLECTIVE SERVICES

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

BOILER PLANT

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

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

ELECTRICAL

PSFEI provides a variety of electrical services that cover:

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

HEATING, VENTILATING, AND AIR CONDITIONING

PSFEI provides a variety of HVAC advisory services that include:

- Review of conventional and new technologies in HVAC designs that involve steam and hot water heating systems, chillers, and chilled water systems
- Review and troubleshooting of building air-distribution systems
- Assistance with automatic temperature controls (ATC) and building automation systems (BAS)
- Troubleshooting cooling and heating systems, airflow, refrigeration, and steam-related issues
- Review of plans for renovations and new building installations
- Evaluation of various pieces of HVAC equipment such as pumps, variable frequency drives, air handlers, chillers, terminal units and valves, and distribution equipment
- Participation in HVAC facility assessments, energy audits, and Guaranteed Energy Savings Act (GESA) project support.
- Annual training classes and onsite training by request

STRUCTURAL/ARCHITECTURAL

PSFEI provides the following structural/architectural engineering advisory services:

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

WATER/WASTEWATER TREATMENT

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

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

DEPARTMENT OF GENERAL SERVICES COAL COMMITTEE

PSFEI is a standing member of the Department of General Services (DGS) Coal Committee. The committee met in March 2019 to review performance from the previous contract year and determine any changes to contract requirements for the 2019–2020 year.

During the March 2019 meeting, personnel from the Pennsylvania Department of Environmental Protection (PADEP) were briefed on committee activities and issues that the committee deals with on a continuous basis. Support provided by PSFEI included coal specification reviews, development of actions to maintain desired coal quality, vendor meetings, assistance with the development of contract language to reflect changes to the program, and updates to the lab reporting spreadsheet to reflect changes in the Pennsylvania Commercial Item Description (PCID) 1069 coal specifications.

PASSHE DIRECTORS MEETINGS

PSFEI participated in the fall 2018 PASSHE Directors Meeting in Cranberry Township and the spring 2019 meeting at Millersville University. PSFEI presented updates for electricity and natural gas markets at each meeting, and a briefing on the PSFEI initiative surrounding the Governor's Executive Order 2019-01 (*Commonwealth Leadership in Addressing Climate Change and Promoting Energy Conservation and Sustainable Governance*), updates regarding our recent reorganization, and introduction of our new staff at the spring 2019 meeting.

ENERGY

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

During fiscal year 2018–2019, the PSFEI Energy Team helped PASSHE universities reduce future energy supply costs by over $1.85 million in comparison to current contract rates and avoid over $4.3 million in projected annual electricity and natural gas expenditures as compared to utility-issued, price-to-compare costs. Additionally, PASSHE universities received $392,875 in payments from participation in the PJM Demand Response program.

ENERGY RISK MANAGEMENT APPLICATION

PSFEI continued development efforts to improve the Energy Risk Management Application (ERMA), its proprietary, advanced, multifunction, web-based application that provides online access to detailed procurement and utility billing information allowing facility management personnel to make informed utility and commodity decisions. Development efforts during the fiscal year focused on upgrading and enhancing the graphical user interface, streamlining data import for administrators, general bug fixes, system optimization, and enhanced reporting.

ACT 129

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

Act 129 Phase III will operate from June 1, 2016 through May 31, 2021; it will provide cash rebates for electricity saving initiatives. The program includes an EDC-based demand response program that started in June 2017, which provides a financial benefit to users who can reduce their electric demand during periods of peak grid electric demand. Program specifics are available through each EDC.

PJM DEMAND RESPONSE PROGRAM SERVICES

PSFEI supported PASSHE universities with the PJM Demand Response Program. This support included review and dissemination of information on various PJM programs, proposed fees, procedures, and associated revenues for program participation. Six universities participated in the PJM program. Results from the 2018–2019 program are detailed in the following PJM Demand Response Program Results table.

PJM Demand Response Program Results

University	CSP	EDC	KW Commitment	KW Achieved	Total Payment
Clarion University	NRG	West Penn	1,762	1,762	$46,612
East Stroudsburg University	NRG	PPL	2,781	2,781	$46,993
Kutztown University	NRG	MetEd	3,500	3,500	$99,406
Millersville University	NRG	PPL	3,830	3,753	$51,024
Slippery Rock University	NRG	West Penn	2,303	2,303	$95,631
West Chester University	NRG	PECO	1,502	1,502	$53,209
Total Customer Payments					**$392,875**

ELECTRICITY PROCUREMENT

PSFEI worked with the PASSHE Collaborative Contract Manager to conduct an electricity commodity procurement event for large PASSHE accounts during fiscal year 2018−2019. To provide the most relevant projections of future avoided cost, PSFEI staff assembled recent utility billing data, hourly interval usage data, and generation and transmission Peak Load Contributions (PLCs) where applicable for larger accounts.

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

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

During fiscal year 2018–2019, contracts were awarded for seventy-two electric accounts. Total contract avoided cost in comparison to the utility rate for these accounts was projected to be $1,496,015. When comparing the newly awarded contracts to the existing pricing in place for these accounts, where available, a decrease in electricity commodity cost was projected to be $1,898,694 over the term of the new contracts. Details of the procurement event are provided in the following table.

Electricity Procurement Summary

University	No. of Accounts	Annual Avoided Cost vs Previous Contract	Contract Avoided Cost vs Previous Contract	Annual Avoided Cost vs Utility Rates	Contract Avoided Cost vs Utility Rates
Bloomsburg (1)	9	$319,142	$957,427	($45,602)	($136,805)
California	1	$90	$359	$201	$804
East Stroudsburg (1)	8	$189,274	$567,669	($57,656)	($173,034)
Kutztown	7	$1,032	$2,074	$450	$926
Lock Haven	6	$3,408	$10,225	$2,516	$7,549
Mansfield	1	$88,311	$353,245	$448,119	$1,792,476
Millersville	38	$2,520	$7,560	$1,860	$5,581
Slippery Rock (1)	2	$34	$135	($615)	($1,483)
Totals	**72**	**$603,812**	**$1,898,694**	**$349,274**	**$1,496,015**

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

NATURAL GAS PROCUREMENT

PSFEI held two natural gas commodity procurement events during the fiscal year. For each natural gas account, PSFEI shopped for bids, collected billing data, charted historical gas consumption, and estimated monthly gas nominations for bidding based on usage trends, weather data, and future university operations. Nominations were determined through verbal or written communications with university personnel. Subsequent approval by the University was then obtained via ERMA. Substantial savings were achieved as noted in the Natural Gas Procurement Summary table on page 8. The table

shows negative savings when compared to previous gas supply contracts. This is due to rising natural gas market prices. However, all agencies realized savings as compared to obtaining natural gas from their gas utilities.

Natural Gas Procurement Summary

University	No. of Accounts	Annual Avoided Cost vs Previous Contract	Contract Avoided Cost vs Previous Contract	Annual Avoided Cost vs Utility Rates	Contract Avoided Cost vs Utility Rates
Bloomsburg	1	($35,859)	($71,719)	$270,206	$540,413
East Stroudsburg	5	$47,399	$85,568	$289,783	$515,898
Indiana	2	$6,051	$18,153	$27,732	$83,197
Kutztown	4	($29,206)	($74,036)	$527,725	$1,395,637
Mansfield	3	($12,511)	($12,511)	$129,196	$129,196
Millersville	4	$4,179	$8,359	$113,455	$226,910
Totals	**19**	**($19,947)**	**($46,186)**	**$1,358,097**	**$2,891,250**

General Note: Negative annual and contract avoided cost vs previous contract reflects rising natural gas market pricing.

EDUCATION

Various educational opportunities were provided to PASSHE personnel during the fiscal year. Half-day workshops were held at various locations throughout the Commonwealth, and four short courses consisting of two and one-half days were held in State College. Other specialized trainings were available to PASSHE universities when requested. During the fiscal year, seventy-seven PASSHE personnel improved their engineering, maintenance, and operational skills through PSFEI short courses and workshops. Attendance by each university is shown in the Education Table on page 10.

The following PSFEI short course opportunities were provided in fiscal year 2018–2019:

- Effective Facility Management—Year 1, July 16–18, 2018. Topics of instruction focused on operations and maintenance best practices, fundamentals of BAS, sustainability, HVAC, utility basics and utility bill reading, lighting, and safety.
- Boiler Plant Operations and Maintenance Training, May 7–9, 2019. This course provided instruction on boiler properties of water and steam; boiler processes (combustion, fuels, heat transfer process, and efficiency); operations and safety; pumps and fans; the impact of environmental regulations; and a presentation on the SCI Laurel Highlands landfill gas plant. Course attendees toured Penn State's East Campus Combined Heat and Power Plant.
- Electrical Distribution Systems, May 22–24, 2019. Sessions taught during this course included single-line diagram and power systems studies; electrical distribution switchgear, transformers, conductors, and maintenance and testing; cable termination and splicing; National Electric Code (NEC) for conductors; and electrical panel wiring. Course attendees toured electrical distributions systems at Penn State's East Campus Combined Heat and Power Plant, Main Utility Plant, and North Chiller Plant.
- HVAC Technical Conference, June 5–7, 2019. This course provided instruction and certification testing for technicians and maintenance personnel who are required to have the EPA 608 Certification in order to perform their occupation. Sessions covered the Clean Air Act; Montreal Protocol; recovery, recycling, and reclaiming; Type 1 Technician Certification—Small Appliances; Type 2 Technician Certification—Medium and High Pressure Appliances; Type 3 Certification Testing—Low Pressure Appliances; and the EPA 608 certification exam.

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

- Boiler Workshop—boiler safety valves (what are they, why do we have them, function, and maintenance).
- Electrical and HVAC Workshop—principles of troubleshooting electrical and HVAC Issues.

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

Education Table

University	2018–2019 Short Courses				2018–2019 Workshops			Total Attendees	
	Boiler	EFM	Electrical	HVAC	Boiler	Electrical/ HVAC	Arc Flash	Short Courses	Work-shops
Bloomsburg			5					5	
California							18		
Chancellor's Office									
Cheyney									
Clarion						7			7
Clarion - Venango									
Dixon Center									
East Stroudsburg									
Edinboro						15			15
Indiana									
Kutztown			1					1	
Lock Haven						12			12
Mansfield									
Millersville		1		1				2	
Shippensburg			2					2	
Slippery Rock	2		2			9		4	9
West Chester		2						2	
Total	**2**	**3**	**10**	**1**		**43**	**18**	**16**	**61**

SERVICES TO INDIVIDUAL UNIVERSITIES

BLOOMSBURG UNIVERSITY

Attended a meeting in December 2018 regarding the boiler plant operation and the natural gas utility UGI Rate Large Firm Delivery (LFD) agreement.

Consulted with university personnel regarding a natural gas utility tariff rate switch to reduce burner tip cost at the central boiler plant. Work included a strategy for timing the switch, extensive communications with utility representatives and university personnel, investigation of daily gas demand for determining the most cost-efficient tariff agreement terms, and review of the utility service agreement. Efforts resulted in an 11 percent natural gas cost reduction for the central boiler plant account.

Retrieved and reviewed chilled water plant drawings in May 2019 to collaborate with university personnel to create and present education opportunities for campus maintenance staff. This effort is ongoing.

CALIFORNIA UNIVERSITY

Conducted electrical shock and arc flash safety training per National Fire Protection Association (NFPA) 70E standards for eighteen campus staff in September 2018, saving the University approximately $5,000 in training costs.

Reviewed a proposal in September 2018 from Faber Burner to update the boiler burner and controls, which required multiple conversations with original equipment manufacturer (OEM) and university personnel, research into the proposed systems, and generation of a recommended specification. Comments and recommendations were provided through telephone conversations and email correspondence to university staff.

Met with the Assistant Director, Utilities & Energy Management in October 2018 concerning high humidity issues in Morgan Hall. Researched the issue and found evidence of previous investigations into the humidity problem. This effort is ongoing.

Assisted with replacement of a failed fuel oil supply backpressure regulator in February 2019. PSFEI assistance entailed multiple conversations with university staff, review of the failed regulator specification, research into possible replacement parts, and review of contractor proposals. Recommendations were provided through telephone conversations and email correspondence to university staff.

Performed medium-voltage cable acceptance testing to verify cable integrity. PSFEI Report TR 18/19–12 issued March 20, 2019, documented the test results. PSFEI estimated a cost savings to the University of $7,500 for our efforts.

Responded to a call from the Assistant Director, Utilities & Energy Management in May 2019 for assistance with the continued development of automatic temperature control changes for Dixon Hall. The controls company was modifying the geothermal heating system condenser water loop control sequence to prevent freezing of the pipes to the cooling tower.

CHEYNEY UNIVERSITY

Conducted a site visit in July 2018 to perform an assessment of the electrical distribution system and assist with a long-term maintenance and replacement plan.

Assessed the condition of a faulted 5-kilovolt (kV) switch in the Dudley Building to determine temporary and long-term repair needs. This entailed a site visit in June 2019 to meet with university staff and evaluate the equipment. This effort is ongoing.

Conducted several site visits during June 2019 to assess the grease issue emanating from the Ada Georges Dining Hall and provide verbal advice on reducing and mitigating the issues. Conducted phone calls and email correspondence with a local plumber who performed contract work at the dining hall. Efforts included a tour of the wastewater treatment plant and communications with the contracted treatment plant operator to gain information on current flows and design capacity.

CLARION UNIVERSITY

Met with the Director and Assistant Director of Facilities Management in July 2018 to discuss PSFEI services and assess site-specific needs.

Assisted with troubleshooting high-energy usage in the central boiler plant. Performed an assessment of energy usage to develop an EUI. This entailed multiple site visits to evaluate the energy usage of different campus systems. Details of these efforts were provided in PSFEI Report EN 18/19–1 issued October 22, 2018.

Met with the Director of Facilities Management and the Director of Procurement Services in November 2018 to discuss and provide advice on the upcoming GESA project. Efforts included meetings with university personnel, review of the GESA Request for Proposal (RFP), and engagement in numerous discussions and site visits regarding project planning. Reviewed past PSFEI reports for Clarion University to develop a building priority list in preparation for site visits to develop preliminary suggested Energy Conservation Measures (ECMs) for bid document submittal. This effort is ongoing.

Teleconferenced with the Director of Procurement Services regarding electricity supply offers received from Integrity Energy. Followed up with an email communicating that such offers should be ignored and that PSFEI continues to manage energy procurement activities on behalf of Clarion University.

Replied to email inquiry from the Director of Procurement Services regarding the lowering of West Penn Power's hourly pricing threshold from 400 kilowatt (kW) to 100 kW. Confirmed that hourly

charges only apply to customers receiving default service from the utility. Therefore, the change will not impact Clarion University's electricity accounts.

Responded to email inquiry from the Director of Procurement Services regarding an increase in West Penn Power's Rider J costs. Provided an email confirming that the rate change will impact Clarion University and that the projected impact would be approximately $4,238 per month.

Assisted with investigation into replacement of boiler steam and gas flow meters, which required a site visit in May 2019 to perform a walkthrough of the central boiler plant and examine existing installation, research into new steam and gas flow meters, and development of a specification for the meters. This effort is ongoing.

CLARION UNIVERSITY–VENANGO CAMPUS

Toured Suhr Library in March 2019 to evaluate building system requirements for a planned library renovation. A report documenting findings and recommendations will be issued in fiscal year 2019–2020.

DIXON UNIVERSITY CENTER

Conducted research in January 2019 to determine potential reasons for the South Building blue water complaints and piping leaks. Work culminated with an email listing potential options and recommendations.

EAST STROUDSBURG UNIVERSITY

Met with the Interim Director of Facilities Management and the Manager, Energy & Utilities Plant Services in December 2018 to review available PSFEI services and tour the campus.

Prepared for and participated in a discussion with facilities management regarding development of a GESA project for the University. This effort is ongoing.

Provided advice on a service agreement proposal from the natural gas utility. Corresponded with the utility regarding the terms of the service agreement. PSFEI recommended that the University execute the agreement with the utility to avoid a lump sum payment for pipeline extension. The agreement was signed by the University in June 2019.

Provided technical support during discussions regarding replacement or upgrading of existing heating systems, which included a review of PSFEI Report 16/17–4 issued August 26, 2016, on the evaluation of an Entech Engineering study on possible heating system options for the University. Multiple conversations were held with university staff to determine the status of the existing systems and university goals. This effort is ongoing.

EDINBORO UNIVERSITY

Reviewed a natural gas price lock performed by National Fuel Resources to ensure prices were consistent with the wholesale market and monthly nomination volumes. Updated the PSFEI ERMA database to reflect the recent price lock.

Met with the Facilities Management and Planning team in November 2018 to review available PSFEI services and tour the campus. Several projects were identified for investigation by PSFEI.

Assessed the installation of medium-voltage terminations within a pad-mounted switchgear section, which included communication with the termination manufacturer to evaluate the system. Recommendations to remedy the issue were emailed to university staff in May 2019.

Responded to a request from the Director of Facilities Management and Planning to investigate issues at Baron-Forness Library, Cooper Science Center, Crawford Center, Jeremy D. Brown Human Services Building, and Van Houten Dining Hall. PSFEI representatives visited the campus in January 2019 to investigate the various issues and briefed university staff on our observations and recommendations prior to leaving. PSFEI Report HR 18/19–12 issued May 13, 2019, provided findings and recommendations for the Jeremy D. Brown Human Services Building comfort issues. Reports detailing findings and recommendations for the other buildings will be issued in fiscal year 2019–2020.

INDIANA UNIVERSITY OF PENNSYLVANIA

Met with the Engineering and Construction Manager in July 2018 to discuss the proposed construction of the new science building HVAC system options. Reviewed three options for mechanical systems proposed by Stantec and provided feedback via email.

Reviewed the campus chilled water master plan draft by Entech Engineering in July 2018. Discussed the project scope and direction with Entech Engineering representatives and university staff at the Entech Engineering master plan presentation.

Reviewed the Entech Engineering study and proposal to install stub stacks on boilers in the auxiliary plant. This entailed several conversations with university and Entech personnel, research, and review of the proposed systems. The recommendation to pursue installation of the stub stacks was provided to university staff via email.

Assisted with security and buffer zone protection planning for the cogeneration plant at the request of the Interim Associate Vice President for Facilities Management. This effort included site visits, a meeting in August 2018, development of draft plans, and several telephone conversations.

Assisted the University's Budget Analyst with Constellation natural gas issues, which included analyzing the financial impact of Constellation’s failure to enroll the Kovalchick Convention and Athletic Complex and Robertshaw Building natural gas accounts on time, adjusting nomination volumes for losses and

British thermal units (Btu) content, and properly applying nomination volumes. Corresponded with Constellation via email and telephone to negotiate a refund of over $6,450.

Attended a design meeting in December 2018 for the new science building project for mechanical HVAC review at the request of the senior project manager.

Toured the campus in May 2019 and met with the university's engineering staff to assess potential needs of the University.

KUTZTOWN UNIVERSITY

Assisted with troubleshooting corrosion in the boiler deaerator (DA) tank, which included a site visit in August 2018 to investigate the cause of the corrosion and discussions with university staff pertaining to boiler chemistry. Consulted with the water treatment vendor and provided recommendations to university staff via email and telephone conversations

Toured the campus in January 2019 and met with the Assistant Vice President of Facilities, Maintenance and Construction to discuss available PSFEI services.

Performed infrared surveys of the main electrical services within university buildings in June 2019. PSFEI Report ER 18/19–13 issued June 24, 2019, documented the results of the survey. PSFEI estimated a cost savings of $4,000 to the University for our efforts.

Secured two Penn State architectural engineering student interns to perform facility assessments for the University during summer 2019. Efforts included defining and posting the position; interviewing and hiring the interns; providing orientation and safety training; and overseeing the work in team with university staff.

Initiated a discussion with and provided consultation to university personnel regarding a natural gas utility tariff rate switch to reduce burner tip cost at the central boiler plant. Work included a strategy for timing the switch, parsing twenty-one meters into two separate accounts, extensive communication with utility and university personnel, investigation of daily gas demand for determining the most cost-efficient tariff agreement terms, and review of utility service agreements. Efforts resulted in a 39 percent reduction of natural gas cost for the central boiler plant account.

LOCK HAVEN UNIVERSITY

Responded to a request for assistance from the Director of Facilities in August 2018 regarding a chiller that stopped working due to a compressor failure. Provided information for a vendor that could provide a temporary chiller until permanent repairs could be made.

Assisted with the engineering design review of the electrical DGS Project 409-63 Phase II, which required several site visits to attend design meetings, provide recommendations, and review design documents.

Worked with university staff and the natural gas utility to switch tariff rate classes and adjust the terms of service for three accounts to increase gas delivery reliability while decreasing the potential for gas curtailments during extreme winter weather.

Provided previous PSFEI reports to university staff in June 2019 regarding the Charlotte Smith Field water system issue and communicated with university staff regarding the issue.

LOCK HAVEN–CLEARFIELD CAMPUS

No site-specific services requested during fiscal year 2018–2019.

MANSFIELD UNIVERSITY

Investigated an issue with the electrical distribution switchgear in July 2018 and met with university staff to communicate findings and recommendations.

Reviewed the central steam plant natural gas utility UGI Rate Interruptible Service (IS) agreement in preparation for meeting with UGI in December 2018.

Performed infrared surveys of the main steam line to identify leaks within the system. This entailed a site visit in November 2018 to perform the surveys and review the results. PSFEI estimated a cost savings of $4,000 to the University for our efforts.

Toured the campus in December 2018 and met with the Director of Facilities Management and the Associate Director of Facilities Management to review available PSFEI services and assess campus needs.

Reviewed design documents for partial decentralization of the campus heating system project, which required a site visit to meet with university staff and the design professional to discuss details of the project and perform a walkthrough of the mechanical spaces. Reviewed design documents and provided comments and recommendations throughout the project. PSFEI Report MR-E 18/19–1 issued February 18, 2019, detailed these efforts.

Assisted with rectifying an issue regarding the boiler steam piping weld certifications, including a site visit to evaluate the steam piping welds. Discussed the violation and proposed solution with university staff. PSFEI Report MR 18/19–1 issued March 22, 2019, documented these efforts and recommendations.

Performed an assessment of the potable water treatment system in April 2019 and provided advice on operational issues and possible reasons for high iron and manganese test results. Coordinated a meeting between PADEP and the University to brainstorm ways to improve water quality and operations. Provided recommendations in May 2019 via email on ways to improve operations and several alternatives for tank mixing.

Assisted with retrofitting the main switchgear protective relays. Several site visits were required to program, install, test, and commission the relays in addition to extensive communication with the relay manufacturer to ensure successful installation. Test results were provided in PSFEI Report TR 18/19–12 issued June 24, 2019. PSFEI estimated a cost savings to the University of $25,000 due to this effort.

MILLERSVILLE UNIVERSITY

Provided advice and draft information in October 2018 on the new PADEP disinfection requirements rule (DRR) for water regulation. Investigated groundwater well requirements for Pennsylvania and provided information to university staff for the science department's concept of drilling test wells on campus for research purposes.

Met with the Building Maintenance Foreman in December 2018 to review and make recommendations regarding domestic water expansion loops in the science building.

SHIPPENSBURG UNIVERSITY

Assessed emergency generator electrical interconnections in July 2018. Evaluated the system and met with university staff to communicate findings and recommendations.

Met with the Director of Facilities Management in July 2018 to discuss PSFEI structural services and assess site-specific needs.

Administered a peak load management strategy by providing curtailment alerts to facility staff on potential coincident peak days. By operating the chilled water storage system and effectively curtailing electricity usage, the University reduced their capacity costs. A 250 kW reduction in usage during peak days in summer 2018 equated to nearly $12,000 in cost savings in Energy Year 2019–2020 (June 1 through May 31).

Toured the University's water, wastewater, boiler, and chilled water systems in December 2018 to enhance PSFEI's knowledge of these systems and review PSFEI's available services with university staff.

Corresponded with the Assistant Director of Planning and Engineering and specialty contractor Masonry Preservation Services, Inc. in January 2019 regarding potential masonry and roofing repair work at Old Main Building.

SLIPPERY ROCK UNIVERSITY

Reviewed stack test reports for Boiler No. 3 in August 2018. Provided a method to calculate pounds per hour (lbs/hr) of nitrogen oxide (NOx) from parts per million (ppm) NOx for reporting to PADEP.

Provided technical support in submitting proper documentation to PADEP for temporary deactivation of Boiler No. 1 since it would be shut down for longer than one year for mechanical reasons. Activities

included discussions with university staff and PADEP, providing sample documents, and review of the draft deactivation letter.

Provided technical support for the replacement of the gas control valves on the co-firing burners for Boiler Nos. 1, 2, and 4, and upgrade of the controls on those boilers to support the new valves. Activities included facility visits, meetings with university staff and the controls contractor to develop the scope of work, and review of proposals for sequence of operations and equipment to be installed.

Toured the campus in November 2018 and met with the Assistant Vice President Facilities and Planning to review available PSFEI services and discuss campus needs.

Provided technical support regarding metering discrepancies following the installation of new steam meters in the supply lines to the Foundation housing units. Activities included review of meter specifications, investigation into how the steam totalizations were generated, discussions on possible sources of meter discrepancies with university staff, and a review of the billing calculator spreadsheet.

Conducted research concerning water and sewer over-billing issues and conveyed the research information to university staff in January 2019. Research avenues included the Pennsylvania Public Utility Commission (PUC), Pennsylvania State Association of Boroughs, and local sewer provider Harrisville Borough.

Communicated with university staff and Honeywell representatives regarding an opportunity to jointly present at the Eastern Region of Association of Physical Plant Administrators (ERAPPA) conference to be held in Erie, PA in fall 2019, including development of a presentation outline.

Investigated a transfer switch issue to determine maintenance and repair actions in March 2019 and provided recommendations to university staff.

Assisted with the purchase of a replacement uninterruptable power supply (UPS) for the boiler house control system in March 2019. This entailed a site visit to evaluate the requirements for the UPS and communicate a specification to university staff.

Performed a power quality study of utility power to an off-site building, which required multiple site visits to perform the study. Findings of the study, which included an estimated cost savings of $7,000, were communicated to university staff.

Provided technical support regarding coal quality violations, which included collecting coal data to determine which violations were violations of the air quality permit, generating a spreadsheet to calculate emission rates as required by the air quality permit, and discussing the issues with DGS Bureau of Procurement personnel. Attended a meeting with coal supplier Strishock, LLC. in April 2019 that included representatives from the University, DGS Bureau of Procurement, DGS Quality Assurance, and PADEP. A consensus was reached that actions taken by the supplier had successfully corrected the coal quality issues.

WEST CHESTER UNIVERSITY

Performed an assessment of the medium-voltage electrical distribution system testing and maintenance needs. Visited the University in July 2018 to evaluate the equipment and meet with university staff and electrical contractors to discuss recommendations.

Met with the Director and Associate Director of Facilities Management in August 2018 to discuss available PSFEI services and assess campus needs.

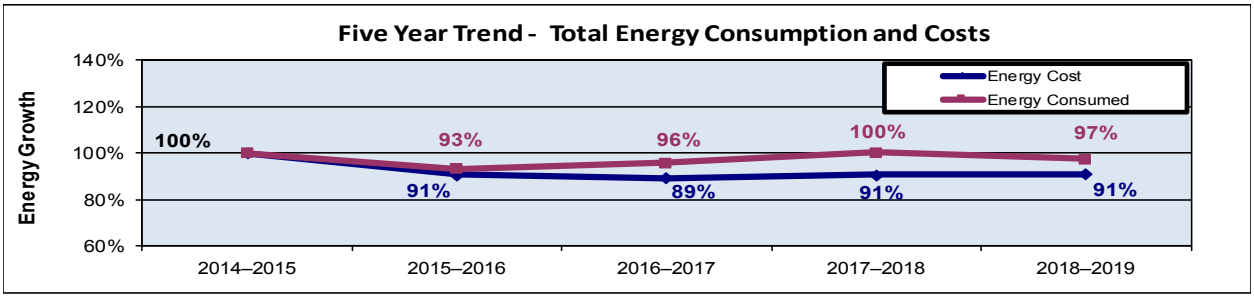
Conducted facility condition assessments and developed a capital planning report for three parking garages. Issued PSFEI Report SR 18/19–3 September 20, 2018, to document observations and recommendations.

Commenced investigative work to enable the University to reduce energy costs by preparing approximately forty-five natural gas accounts for competitive bidding of natural gas supply contracts. Efforts included correspondence with university staff and the natural gas utility to determine the most cost-effective tariff rate; the bidding event will occur in fiscal year 2019–2020.

Coordinated efforts between the University and the DGS Bureau of Procurement for submittal of a Request for Quote (RFQ) for Renewable Energy Certificates (REC). Provided assistance with determining the number of RECs required for offsetting 100 percent of usage.

UTILITY DATA TABLES AND CHARTS

Fuel and Energy Consumption and Costs



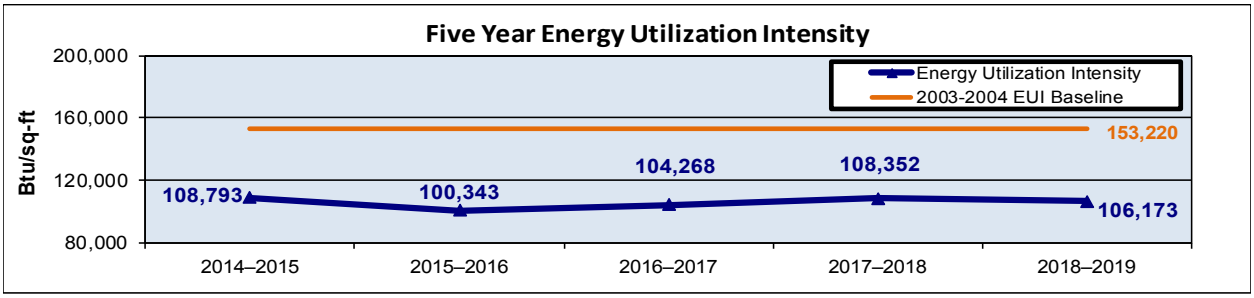
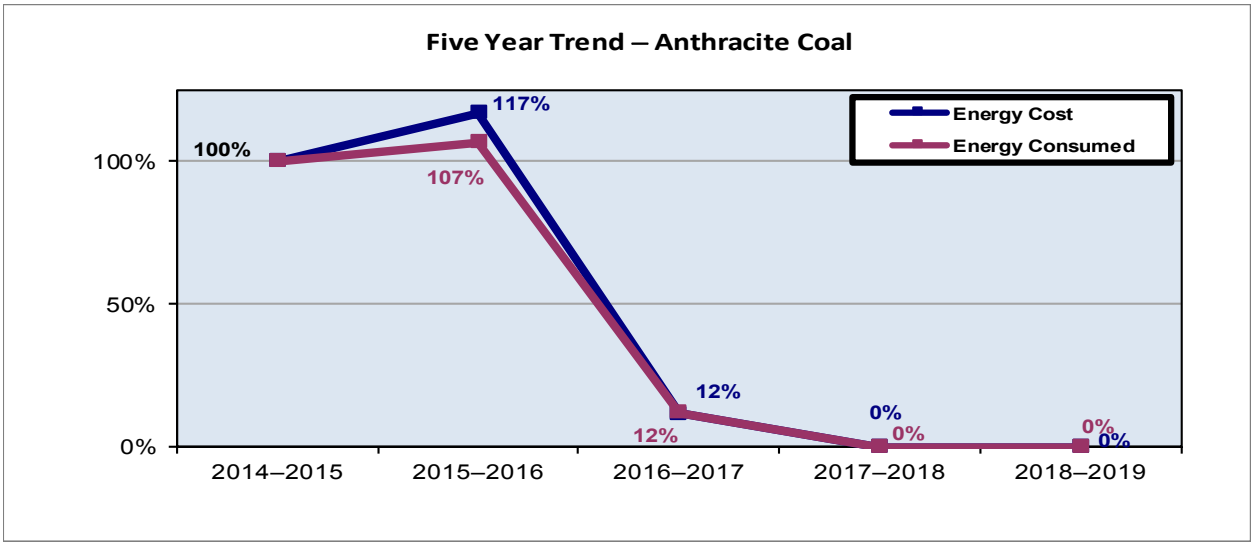


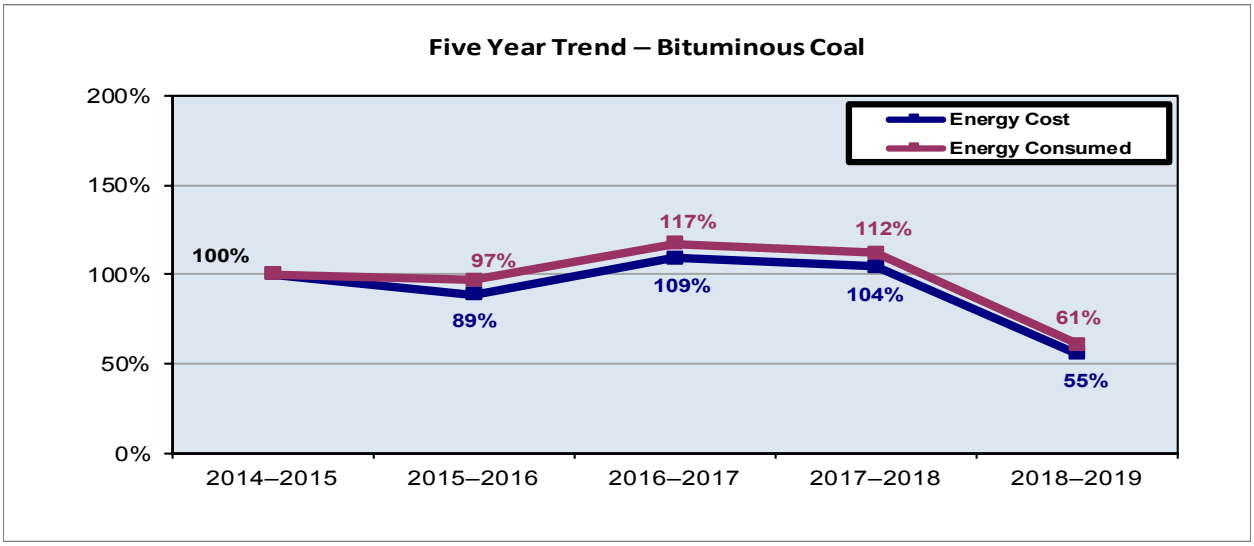
Table 1. Five-Year Comparison: 2014–2015 to 2018–2019

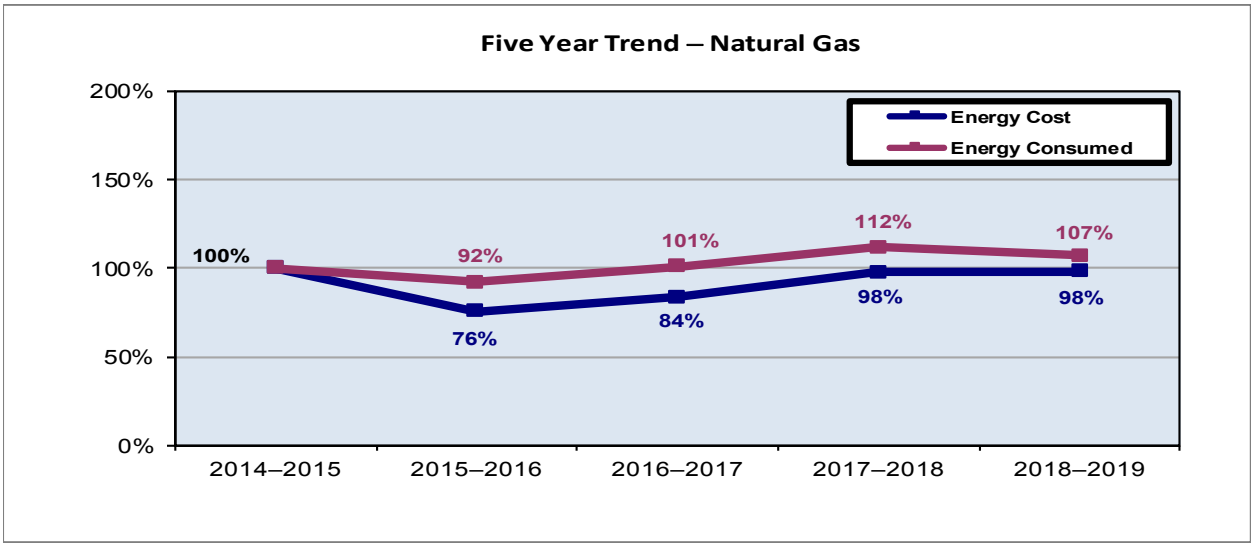
	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	3,783	4,041	456	---	---
Bituminous Coal	tons	2,303	2,226	2,698	2,574	1,399
Gas	mcf	1,787,192	1,638,610	1,796,746	1,988,721	1,912,839
Oil	gal	277,674	106,728	86,121	113,244	106,525
Wood	tons	12,450	9,464	6,809	4,842	5,200
Electric	kWh	392,487,595	380,306,590	387,247,229	383,522,455	387,683,148
Energy Costs						
Anthracite Coal	$	$528,482	$618,678	$61,560	---	---
Bituminous Coal	$	$237,333	$210,478	$259,366	$247,887	$131,670
Gas	$	$11,196,199	$8,480,300	$9,384,821	$10,933,894	$11,014,050
Oil	$	$655,355	$199,900	$177,751	$266,791	$204,759
Wood	$	$493,500	$376,136	$270,668	$197,505	$296,400
Electric (1)	$	$26,519,345	$26,103,240	$25,290,899	$24,294,128	$24,456,845
Total	**$**	**$39,630,215**	**$35,988,733**	**$35,445,065**	**$35,940,205**	**$36,103,724**
Energy Consumption						
Anthracite Coal	mmBtu	95,710	102,237	11,537	---	---
Bituminous Coal	mmBtu	61,260	59,212	71,767	68,468	37,213
Gas	mmBtu	1,835,917	1,687,768	1,850,648	2,048,383	1,970,223
Oil	mmBtu	38,874	14,942	12,057	15,854	14,913
Wood	mmBtu	105,825	80,444	57,877	41,157	44,200
Electric	mmBtu	1,383,308	1,341,421	1,364,172	1,353,853	1,364,057
Total	**mmBtu**	**3,520,894**	**3,286,024**	**3,368,058**	**3,527,715**	**3,430,607**
Energy Utilization Intensity	**Btu/sq-ft**	**108,793**	**100,343**	**104,268**	**108,352**	**106,173**
Unit Fuel Costs						
Anthracite Coal	$/ton	$139.70	$153.10	$135.00	---	---
Bituminous Coal	$/ton	$103.05	$94.55	$96.13	$96.30	$94.12
Gas	$/mcf	$6.26	$5.18	$5.22	$5.50	$5.76
Oil	$/gal	$2.36	$1.87	$2.06	$2.36	$1.92
Wood	$/ton	$39.64	$39.74	$39.75	$40.79	$57.00
Electric	¢/kWh	6.76 ¢	6.86 ¢	6.53 ¢	6.33 ¢	6.31 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	$5.52	$6.05	$5.34	---	---
Bituminous Coal	$/mmBtu	$3.87	$3.55	$3.61	$3.62	$3.54
Gas	$/mmBtu	$6.10	$5.02	$5.07	$5.34	$5.59
Oil	$/mmBtu	$16.86	$13.38	$14.74	$16.83	$13.73
Wood	$/mmBtu	$4.66	$4.68	$4.68	$4.80	$6.71
Electric	$/mmBtu	$19.17	$19.46	$18.54	$17.94	$17.93
Weighted Average	**$/mmBtu**	**$11.26**	**$10.95**	**$10.52**	**$10.19**	**$10.52**

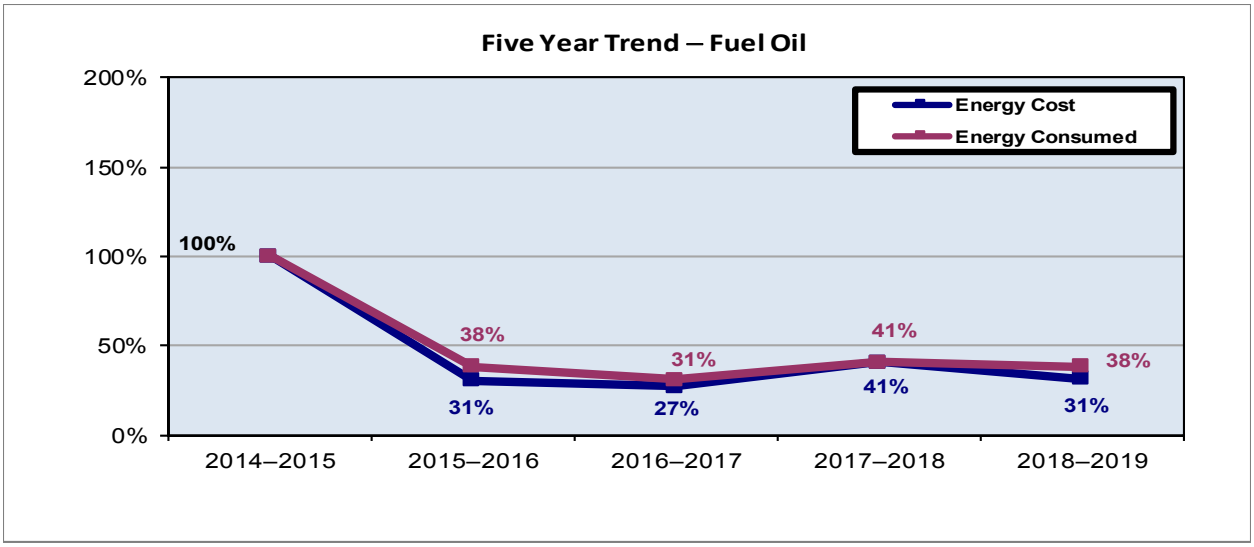
(1) Excludes total cost of operation and maintenance for electric generation with the cogeneration plant for Indiana University.

Five-Year Trend – Energy Consumption and Costs








Five Year Trend – Fuel Oil
200%
150%
100%
50%
0%
Energy Cost
Energy Consumed
100%
38%
31%
31%
27%
41%
41%
38%
31%
2014–2015
2015–2016
2016–2017
2017–2018
2018–2019

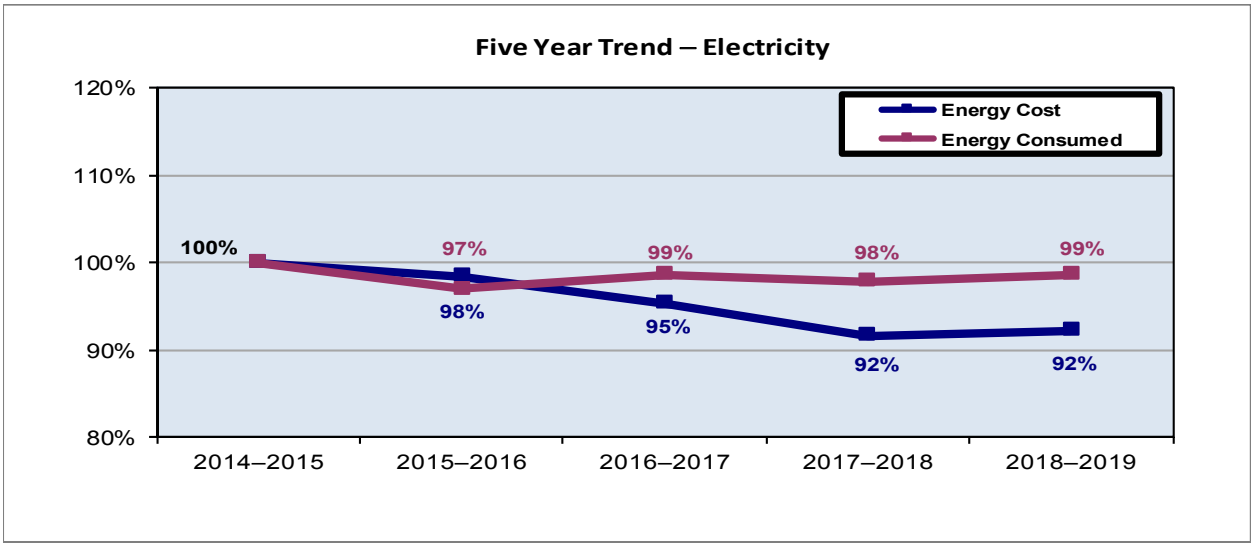

Five Year Trend – Electricity
120%
110%
100%
90%
80%
Energy Cost
Energy Consumed
100%
97%
98%
99%
95%
98%
92%
99%
92%
2014–2015
2015–2016
2016–2017
2017–2018
2018–2019

Table 2. Energy Consumption and Costs 2018–2019

University	Energy Sources Utilized						Total Energy (mmBtu)	Total Energy Cost ($)	Unit Energy Cost ($/mmBtu)	Total Building Area (sq-ft)	Unit Energy Cost ($/sq-ft)	Energy Utilization Intensity (Btu/sq-ft)
	Anthracite Coal	Bituminous Coal	Gas	Oil	Wood	Electric						
Bloomsburg Lower			x		x	x	431,441	$3,757,850	$8.71	1,973,756	$1.90	218,589
Bloomsburg Upper						x	21,899	$416,716	$19.03	552,821	$0.75	39,614
California			x			x	157,071	$1,995,235	$12.70	1,869,536	$1.07	84,016
Cheyney			x			x	88,799	$1,023,840	$11.53	963,243	$1.06	92,187
Clarion			x			x	206,374	$1,647,187	$7.98	1,423,379	$1.16	144,989
Clarion-Venango			x			x	7,419	$115,094	$15.51	82,036	$1.40	90,430
Dixon Center			x			x	9,871	$143,711	$14.56	145,734	$0.99	67,731
East Stroudsburg			x	x		x	211,770	$2,308,993	$10.90	2,033,051	$1.14	104,164
Edinboro			x			x	196,424	$2,729,813	$13.90	2,276,885	$1.20	86,269
Indiana (1)			x	x		x	603,330	$4,235,199	$7.02	4,020,722	$1.05	150,055
Kutztown			x	x		x	269,088	$2,872,409	$10.67	2,813,404	$1.02	95,645
Lock Haven			x			x	134,917	$1,514,042	$11.22	1,621,044	$0.93	83,228
Lock Haven-Clearfield			x			x	9,280	$122,222	$13.17	92,373	$1.32	100,463
Mansfield			x			x	147,412	$1,523,741	$10.34	1,530,411	$1.00	96,322
Millersville			x	x		x	197,826	$2,748,285	$13.89	2,224,939	$1.24	88,913
Shippensburg			x			x	179,062	$2,161,593	$12.07	2,390,502	$0.90	74,906
Slippery Rock		x	x			x	287,720	$2,845,904	$9.89	2,517,458	$1.13	114,290
West Chester			x	x		x	270,904	$3,941,890	$14.55	3,780,311	$1.04	71,662
	Anthracite Coal	Bituminous Coal	Gas	Oil	Wood	Electric						
Total							3,430,607	$36,103,724		32,311,605		
Average									$10.52		$1.12	106,173

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

Table 3. Central Boiler Plant 2018–2019

University	Makeup %	Heating Degree Days	Peak Steam Demand (lbs/hr)	Fuel Cost	Operation and Maintenance Cost	Total Operation Cost	Unit Cost Total Operation ($/mlb)	Unit Cost Total Operation ($/mmBtu)	Average Plant Efficiency
Bloomsburg Lower (1)	15%	5,536	56,000	$962,431	$950,659	$1,913,090	$11.41	$11.17	98%
California	20%	5,555	9,300	$136,622	$352,872	$489,494	$23.02	$18.04	78%
Clarion	46%	6,710	35,375	$524,186	$681,936	$1,206,122	$11.23	$9.28	83%
Dixon Center (3)	---	4,913	---	$44,609	---	$44,609	---	$8.00	---
East Stroudsburg (2)	22%	5,213	35,100	$497,579	$532,934	$1,030,513	$12.22	$10.26	84%
Indiana (4)	39%	5,575	45,880	$1,262,040	$2,634,992	$3,897,032	$18.70	$14.86	80%
Kutztown (2)	39%	5,193	57,000	$730,075	$570,208	$1,300,283	$12.52	$10.59	85%
Lock Haven (3) (5)	---	5,613	---	---	$153,076	$153,076	---	---	---
Lock Haven-Clearfield (3) (5)	---	6,586	---	---	$76,540	$76,540	---	---	---
Mansfield (1)	32%	5,595	56,500	$430,526	$543,925	$974,451	$12.81	$11.75	92%
Slippery Rock	41%	5,809	40,000	$1,023,496	$1,195,428	$2,218,924	$17.49	$14.02	80%
Total				$5,611,564	$7,692,570	$13,304,135			

(1) Average Plant Efficiency is excessive and indicates metering errors.
(2) Average Plant Efficiency is elevated and indicates possible metering errors.
(3) No steam produced.
(4) Excludes FIUP usage and cost of steam.
(5) Operations and maintenance costs for Lock Haven represent decentralized boilers.

Table 3A. Boiler Performance 2018–2019

University	Fuel Type	Number of Boilers	Steam Capacity (lbs/hr)	Steam Generated (mlbs)	Fuel Consumed		Fuel Consumed (mmBtu)	Central Plant Fuel Cost	Central Plant Fuel Cost ($/mlb)	Average Boiler Efficiency
Bloomsburg Lower (1)	Gas	2	22,000	118,103	123,336	mcf	127,036	$666,031	$5.64	93%
	Wood	1	15,000	49,552	5,200	tons	44,200	$296,400	$5.98	112%
California	Gas	3	45,000	21,261	26,337	mcf	27,127	$136,622	$6.43	78%
Clarion	Gas	3	70,000	107,414	126,156	mcf	129,941	$524,186	$4.88	83%
Dixon Center (3)	Gas	3	---	---	5,414	mcf	5,576	$44,609	---	---
East Stroudsburg (2)	Gas	4	95,000	81,253	94,151	mcf	96,976	$459,468	$5.65	84%
Indiana (4)	Gas	3	92,000	243,866	285,399	mcf	293,961	$1,401,335	$4.77	83%
	Cogen-Gas	4	44,000	13,541	28,463	mcf	29,317	$127,772	$4.36	46%
	Cogen-Oil			632	9,885	gal	1,384	$15,194	$10.98	46%
Kutztown (2)	Gas	3	90,000	101,806	116,994	mcf	120,504	$695,082	$6.83	84%
Mansfield (1)	Gas	3	64,000	76,061	80,499	mcf	82,914	$430,526	$5.66	92%
Slippery Rock	Bituminous Coal	3	120,000	27,371	1,399	tons	37,213	$131,670	$4.81	74%
	Gas	1		99,483	117,528	mcf	121,054	$891,826	$8.96	82%

(1) Average Boiler Efficiency is excessive and indicates metering errors.
(2) Average Boiler Efficiency is elevated and indicates possible metering errors.
(3) No steam produced.
(4) Includes FIUP.

Table 4. Electric Consumption and Costs 2018–2019

University	Total Building Area (sq-ft)	Heating Degree Days	Cooling Degree Days	Electric Consumed (kWh)	Electric Consumed (kWh/sq-ft)	Peak Demand (kW)	Peak Demand (W/sq-ft)	Load Factor	Electric Cost (¢/kWh)	Total Electric Cost	Electric Cost ($/sq-ft)
Bloomsburg Lower	1,973,756	5,536	943	28,412,546	14.4	6,769	3.4	0.66	6.63	$1,882,790	$0.95
Bloomsburg Upper	552,821			6,416,470	11.6	1,495	2.7	0.57	6.49	$416,716	$0.75
California	1,869,536	5,555	994	28,827,905	15.4	5,521	3.0	0.67	5.89	$1,697,890	$0.91
Cheyney	963,243	4,478	1,583	10,932,185	11.3	2,448	2.5	0.77	5.95	$650,287	$0.68
Clarion	1,423,379	6,710	522	18,820,148	13.2	3,927	2.8	0.71	5.60	$1,053,777	$0.74
Clarion-Venango	82,036	6,619	615	1,224,486	14.9	400	4.9	0.47	8.03	$98,304	$1.20
Dixon Center	145,734	4,913	1,589	1,258,200	8.6	423	2.9	0.40	7.88	$99,102	$0.68
East Stroudsburg	2,033,051	5,213	861	23,988,174	11.8	5,723	2.8	0.69	6.71	$1,609,486	$0.79
Edinboro	2,276,885	6,142	1,071	35,702,601	15.7	7,355	3.2	0.75	6.67	$2,379,912	$1.05
Indiana - Gross (1)	4,020,722	5,575	813	50,827,766	12.6	9,681	---	---	5.80	$2,946,183	$0.73
Indiana - Net (2)	2,781,346			38,845,791	14.0	---	---	---	4.03	$1,563,767	$0.56
Kutztown	2,813,404	5,193	1,337	30,384,631	10.8	6,890	2.4	0.76	6.05	$1,839,654	$0.65
Lock Haven	1,621,044	5,613	990	16,225,040	10.0	3,759	2.3	0.64	6.63	$1,075,474	$0.66
Lock Haven-Clearfield	92,373	6,586	547	1,012,438	11.0	347	3.8	0.50	7.79	$78,840	$0.85
Mansfield	1,530,411	5,595	463	13,867,594	9.1	3,009	2.0	0.70	7.32	$1,015,070	$0.66
Millersville	2,224,939	5,218	1,200	36,465,356	16.4	7,441	3.3	0.65	5.93	$2,161,951	$0.97
Shippensburg	2,390,502	3,890	2,045	23,064,988	9.6	5,040	2.1	0.66	6.67	$1,538,722	$0.64
Slippery Rock	2,517,458	5,809	461	26,952,194	10.7	6,895	2.7	0.62	6.30	$1,697,773	$0.67
West Chester	3,780,311	5,474	1,200	45,282,401	12.0	8,341	2.2	0.82	6.46	$2,924,913	$0.77
Total	32,311,605			387,683,148						$25,166,844	
Weighted Average					12.0			0.65	6.49		$0.78

(1) Includes total electricity produced by the cogeneration plant, purchased from Penelec, and redistributed to the campus and FIUP through the cogeneration plant; includes total cost of operation and maintenance for electric generation with the cogeneration plant.
(2) Includes electricity produced by the cogeneration plant that was consumed by the campus and elecricity purchased from Penelec and redistributed to the campus, excluding Residential Revival (FIUP) through the cogeneration plant, once the operating scenario for the cogeneration engines changed after December 10, 2007.

Table 5. Water, Sewage, and Miscellaneous Utilities Consumption and Costs 2018–2019

University	Water (mgal)	Water Cost	Water Cost ($/mgal)	Sewage (mgal)	Sewage Cost	Sewage Cost ($/mgal)	Misc Gas (mcf)	Misc Gas Cost	Misc Gas ($/mcf)	Misc Oil (gal)	Misc Oil Cost	Misc Oil ($/gal)
Bloomsburg (1)	51,209	$331,193	$6.47	---	$409,522	---	158,479	$912,629	$5.76	---	---	---
California	36,610	$326,902	$8.93	---	$906,514	---	30,635	$160,723	$5.25	---	---	---
Cheyney	22,021	$88,054	$4.00	22,207	$140,123	$6.31	49,988	$373,553	$7.47	---	---	---
Clarion	40,183	$349,054	$8.69	35,367	$381,645	$10.79	11,845	$69,224	$5.84	---	---	---
Clarion-Venango	364	$3,170	$8.71	364	$2,310	$6.35	3,145	$16,790	$5.34	---	---	---
Dixon Center	718	$19,333	$26.93	---	$602	---	---	---	---	---	---	---
East Stroudsburg	138,284	$266,006	$1.92	---	$113,170	---	28,179	$193,534	$6.87	3,133	$8,394	$2.68
Edinboro	68,749	$429,744	$6.25	---	$447,975	---	72,399	$349,901	$4.83	---	---	---
Indiana	24,013	$391,945	$16.32	24,013	$304,520	$12.68	59,589	$254,592	$4.27	---	---	---
Kutztown	63,523	$709,333	$11.17	58,483	$842,992	$14.41	40,857	$293,551	$7.18	4,085	$9,129	$2.23
Lock Haven	17,844	$51,850	$2.91	17,430	$76,314	$4.38	77,224	$438,568	$5.68	---	---	---
Lock Haven-Clearfield	99	$4,133	$41.75	99	$5,042	$50.93	5,655	$43,382	$7.67	---	---	---
Mansfield	31,569	$92,749	$2.94	---	$183,000	---	16,668	$78,145	$4.69	---	---	---
Millersville	47,635	$101,560	$2.13	52,064	$431,392	$8.29	67,560	$523,849	$7.75	27,018	$62,485	$2.31
Shippensburg	28,238	$139,481	$4.94	25,098	$194,435	$7.75	97,419	$622,871	$6.39	---	---	---
Slippery Rock	47,089	$346,934	$7.37	42,150	$400,562	$9.50	36,374	$124,635	$3.43	---	---	---
West Chester (2)	83,011	$970,188	$11.69	77,315	$575,674	$7.45	112,072	$1,001,884	$8.94	6,580	$15,093	$2.29
Total	701,159	$4,621,629		354,590	$5,415,792		868,088	$5,457,831		40,816	$95,101	
Weighted Average			$6.59			$9.46			$6.29			$2.33

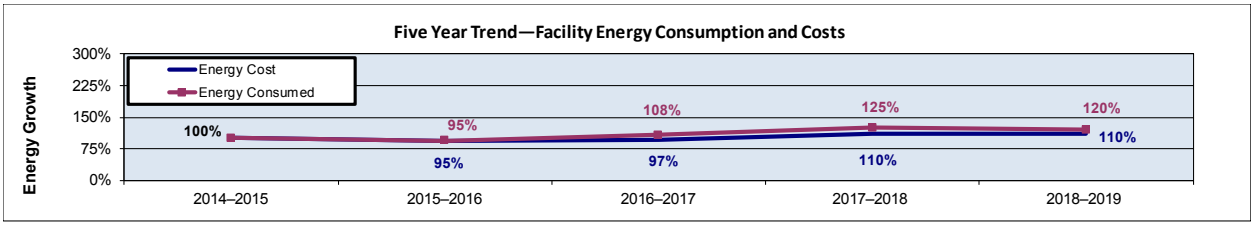
(1) Bloomsburg Upper and Lower campuses are combined.
(2) Water and sewer data includes University Student Housing.

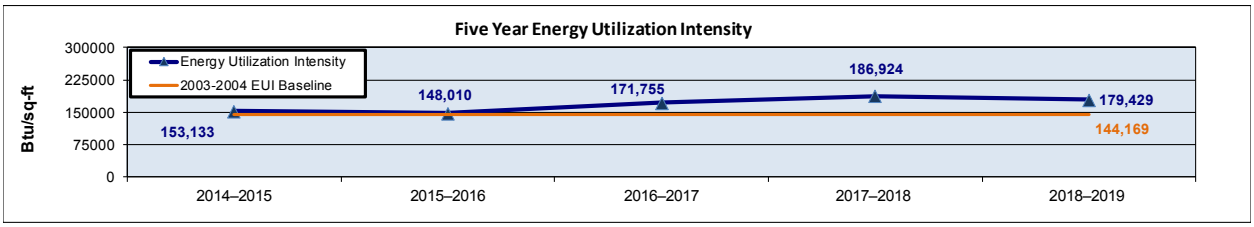
Table 6. Indiana University Cogeneration Summary 2018–2019
Production of Electricity and Steam

Input / Fuel Cost	Units	mmBtu	Cost
Natural Gas Contract (mcf)	92,839	95,624	$415,826
Natural Gas IUP (mcf)	0	0	$0
Diesel Fuel (gal)	33,524	4,693	$49,448
Total Input/Fuel Cost		**100,317**	**$465,274**
Operating Expenses			
Personnel Cost			$188,925
Repairs and Parts			$357,516
Gas Royalty			$0
Lube Oil			$13,219
Water			$8,803
Sewage			$166
Chemicals			$0
Total Operating Expenses			**$568,629**
Total Fuel and Operating Costs			**$1,033,903**
Output (1)			
Electricity	**kWh**	**mmBtu**	
Sold to Penelec	3,502,514	11,954	
Sold to FIUP	0	0	
Sold to Massaro	0	0	
Supplied to Campus	5,859,230	19,998	
Consumed by Cogeneration Plant	0	0	
Lost in Transmission	0	0	
Total Electricity	**9,361,744**	**31,952**	
Steam	**lbs**	**mmBtu**	
Sold to FIUP from Cogeneration Plant	2,723,192	2,723	
Supplied to Campus	11,449,605	11,450	
Total Steam	**14,172,797**	**14,173**	
Total Output (mmBtu)			**46,125**
Revenue: Electricity and Steam Sold to FIUP and Exported			$747,113
Net Cost (2) (3)			$286,790
Summary of Data			
Total Thermal Efficiency (mmBtu Output/mmBtu Input)			45.98%
% of Output as Electricity			69.27%
% of Output as Steam			30.73%
	Total Dollars	**$/kWh**	
Cost of Electricity—Before Revenue	$716,212	$0.0765	
Cost of Electricity—Net of Revenue	$198,667	$0.0212	
	Total Dollars	**$/mlbs**	
Cost of Steam—Before Revenue	$317,690	$22.42	
Cost of Steam—Net of Revenue	$88,123	$6.22	
	Electricity (KW)	**Steam (lbs/hr)**	
Peak Capacity	24,320	72,000	
Average Production Level	12.50%	6.39%	
Effective Unit Energy cost—Before Revenue ($/mmbtu)			**$22.42**
Effective Unit Energy cost—Net of Revenue ($/mmbtu)			**$6.22**

(1) Production levels of the cogeneration plant were lower than prior years due to limited dispatching by Icetec.
(2) Costs do not include bond cost or amortized capital cost of the cogeneration plant.
(3) Net cost does not include avoided cost of utilities assuming traditional systems.

Bloomsburg University

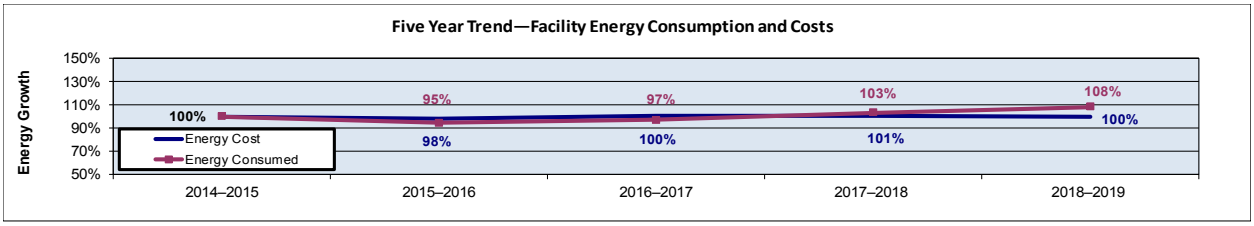


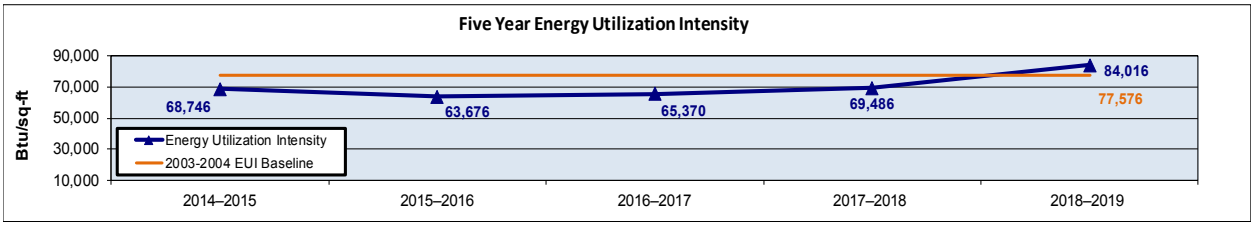


	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	3,783	4,041	456	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	62,540	57,376	218,002	307,039	281,815
Oil	gal	---	---	---	---	---
Wood	tons	12,450	9,464	6,809	4,842	5,200
Electric	kWh	32,662,388	33,697,313	32,893,391	33,656,966	34,829,016
Energy Costs						
Anthracite Coal	$	$ 528,482	$ 618,678	$ 61,560	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 331,048	$ 212,899	$ 1,048,554	$ 1,603,339	$ 1,578,660
Oil	$	---	---	---	---	---
Wood	$	$ 493,500	$ 376,136	$ 270,668	$ 197,505	$ 296,400
Electric	$	$ 2,444,866	$ 2,382,674	$ 2,289,045	$ 2,378,816	$ 2,299,506
Total	$	$ 3,797,896	$ 3,590,387	$ 3,669,827	$ 4,179,660	$ 4,174,566
Energy Consumption						
Anthracite Coal	mmBtu	95,710	102,237	11,537	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	64,416	59,097	224,542	316,250	290,269
Oil	mmBtu	---	---	---	---	---
Wood	mmBtu	105,825	80,444	57,877	41,157	44,200
Electric	mmBtu	111,477	115,009	112,265	114,871	118,871
Total	mmBtu	377,428	356,788	406,221	472,278	453,341
Energy Utilization Intensity	Btu/sq-ft	153,133	148,010	171,755	186,924	179,429
Unit Fuel Costs						
Anthracite Coal	$/ton	$ 139.70	$ 153.10	$ 135.00	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 5.29	$ 3.71	$ 4.81	$ 5.22	$ 5.60
Oil	$/gal	---	---	---	---	---
Wood	$/ton	$ 39.64	$ 39.74	$ 39.75	$ 40.79	$ 57.00
Electric	¢/kWh	7.49 ¢	7.07 ¢	6.96 ¢	7.07 ¢	6.60 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	$ 5.52	$ 6.05	$ 5.34	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 5.14	$ 3.60	$ 4.67	$ 5.07	$ 5.44
Oil	$/mmBtu	---	---	---	---	---
Wood	$/mmBtu	$ 4.66	$ 4.68	$ 4.68	$ 4.80	$ 6.71
Electric	$/mmBtu	$ 21.93	$ 20.72	$ 20.39	$ 20.71	$ 19.34
Weighted Average	$/mmBtu	$ 10.06	$ 10.06	$ 9.03	$ 8.85	$ 9.21
Misc Facility Costs						
Water Cost	$	$ 453,787	$ 341,772	$ 393,768	$ 326,823	$ 331,193
Sewage Cost	$	$ 279,788	$ 277,972	$ 295,628	$ 361,162	$ 409,522
Reported Information						
Gross Area	sq-ft	2,464,713	2,410,556	2,365,115	2,526,577	2,526,577
Reported Student Population		8,982	8,613	8,480	8,055	7,667
Reported Heating Degree Days	degree days	5,994	4,889	5,425	5,827	5,536
Reported Cooling Degree Days	degree days	740	774	946	740	943

Note: Data reflects both Upper and Lower campuses.

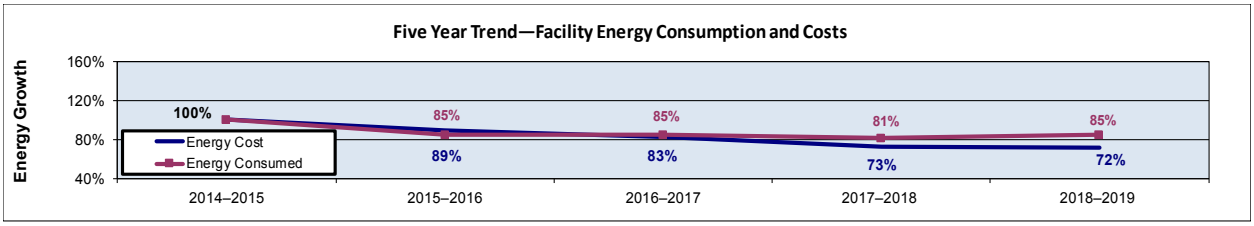
California University

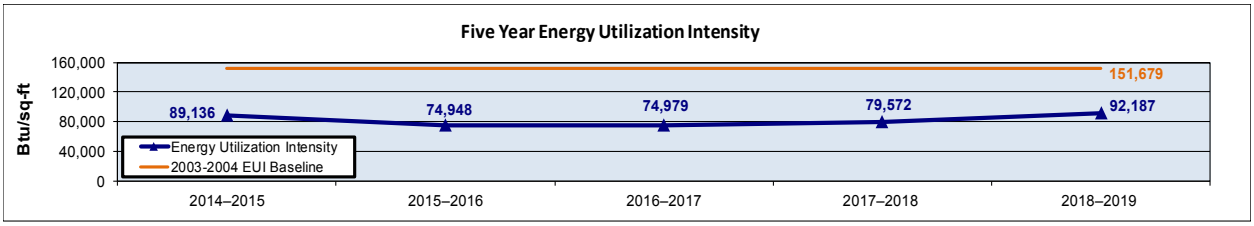




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	44,577	43,213	43,562	56,713	56,972
Oil	gal	---	---	---	---	---
Electric	kWh	29,069,924	27,235,948	28,201,970	26,837,147	28,827,905
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 281,491	$ 242,138	$ 248,175	$ 294,450	$ 297,345
Oil	$	---	---	---	---	---
Electric	$	$ 1,714,231	$ 1,715,360	$ 1,756,278	$ 1,715,864	$ 1,697,890
Total	$	$ 1,995,722	$ 1,957,498	$ 2,004,453	$ 2,010,314	$ 1,995,235
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	45,914	44,510	44,869	58,414	58,681
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	99,216	92,956	96,253	91,595	98,390
Total	mmBtu	145,130	137,466	141,122	150,009	157,071
Energy Utilization Intensity	Btu/sq-ft	68,746	63,676	65,370	69,486	84,016
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 6.31	$ 5.60	$ 5.70	$ 5.19	$ 5.22
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	5.90 ¢	6.30 ¢	6.23 ¢	6.39 ¢	5.89 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 6.13	$ 5.44	$ 5.53	$ 5.04	$ 5.07
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 17.28	$ 18.45	$ 18.25	$ 18.73	$ 17.26
Weighted Average	$/mmBtu	$ 13.75	$ 14.24	$ 14.20	$ 13.40	$ 12.70
Misc Facility Costs						
Water Cost	$	$ 337,368	$ 448,023	$ 408,583	$ 339,471	$ 326,902
Sewage Cost	$	$ 892,000	$ 892,000	$ 893,620	$ 893,345	$ 906,514
Reported Information						
Gross Area	sq-ft	2,111,111	2,158,832	2,158,832	2,158,832	1,869,536
Reported Student Population		4,716	4,300	3,893	3,628	3,570
Reported Heating Degree Days	degree days	5,968	4,696	4,648	5,537	5,555
Reported Cooling Degree Days	degree days	768	929	1,116	981	994

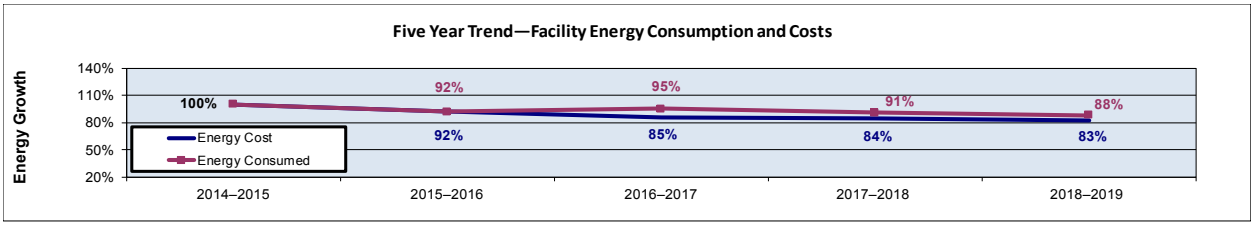
Cheyney University

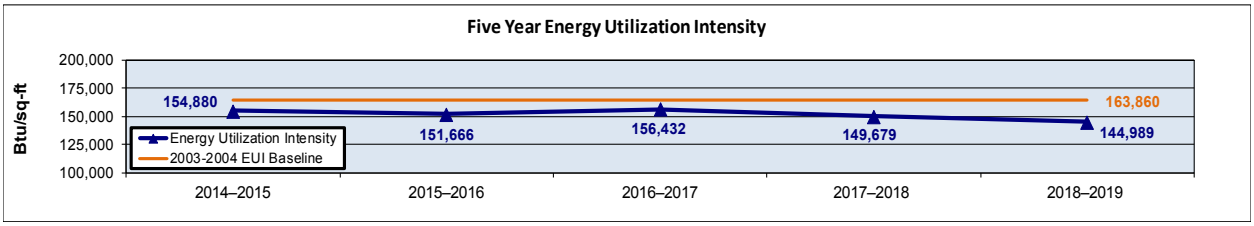




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	58,514	45,088	45,854	43,975	49,988
Oil	gal	---	---	---	---	---
Electric	kWh	13,084,514	12,464,319	12,243,940	11,661,113	10,932,185
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 516,540	$ 315,943	$ 329,991	$ 339,590	$ 373,553
Oil	$	---	---	---	---	---
Electric	$	$ 902,615	$ 947,557	$ 845,093	$ 696,869	$ 650,287
Total	$	$ 1,419,155	$ 1,263,500	$ 1,175,084	$ 1,036,459	$ 1,023,840
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	60,269	46,441	47,230	45,294	51,487
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	44,657	42,541	41,789	39,799	37,312
Total	mmBtu	104,927	88,981	89,018	85,093	88,799
Energy Utilization Intensity	Btu/sq-ft	89,136	74,948	74,979	79,572	92,187
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 8.83	$ 7.01	$ 7.20	$ 7.72	$ 7.47
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	6.90 ¢	7.60 ¢	6.90 ¢	5.98 ¢	5.95 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 8.57	$ 6.80	$ 6.99	$ 7.50	$ 7.26
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 20.21	$ 22.27	$ 20.22	$ 17.51	$ 17.43
Weighted Average	$/mmBtu	$ 13.53	$ 14.20	$ 13.20	$ 12.18	$ 11.53
Misc Facility Costs						
Water Cost	$	$ 106,266	$ 103,516	$ 95,335	$ 120,943	$ 88,054
Sewage Cost	$	$ 174,509	$ 128,127	$ 143,028	$ 141,241	$ 140,123
Reported Information						
Gross Area	sq-ft	1,177,154	1,187,234	1,187,234	1,069,390	963,243
Reported Student Population		993	630	740	656	416
Reported Heating Degree Days	degree days	5,963	3,764	4,023	4,584	4,478
Reported Cooling Degree Days	degree days	987	1,622	1,762	1,496	1,583

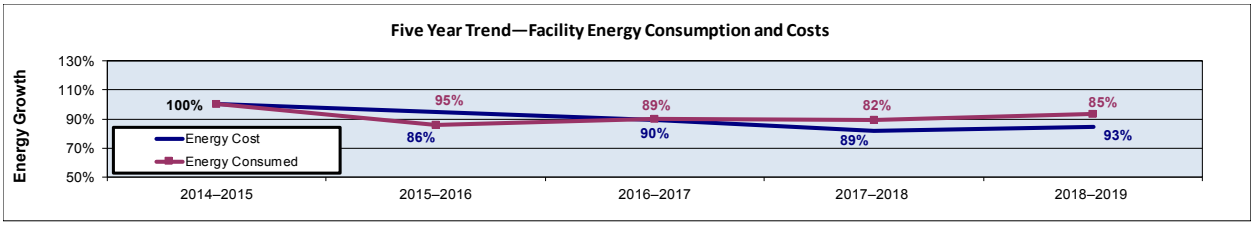
Clarion University

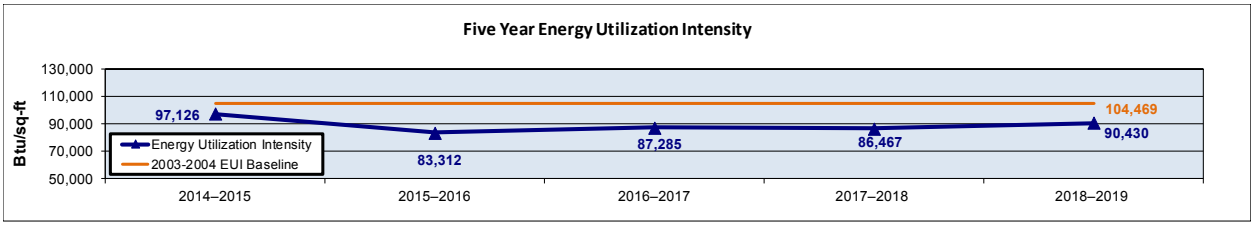




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	169,654	148,599	151,937	144,569	138,001
Oil	gal	---	---	---	---	---
Electric	kWh	17,576,012	18,406,323	19,386,520	18,794,042	18,820,148
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 939,543	$ 643,727	$ 493,744	$ 629,961	$ 593,410
Oil	$	---	---	---	---	---
Electric	$	$ 1,054,063	$ 1,198,168	$ 1,207,627	$ 1,042,139	$ 1,053,777
Total	$	$ 1,993,607	$ 1,841,895	$ 1,701,371	$ 1,672,100	$ 1,647,187
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	174,744	153,057	156,495	148,906	142,141
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	59,987	62,821	66,166	64,144	64,233
Total	mmBtu	234,731	215,878	222,662	213,050	206,374
Energy Utilization Intensity	Btu/sq-ft	154,880	151,666	156,432	149,679	144,989
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 5.54	$ 4.33	$ 3.25	$ 4.36	$ 4.30
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	6.00 ¢	6.51 ¢	6.23 ¢	5.55 ¢	5.60 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 5.38	$ 4.21	$ 3.16	$ 4.23	$ 4.17
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 17.57	$ 19.07	$ 18.25	$ 16.25	$ 16.41
Weighted Average	$/mmBtu	$ 8.49	$ 8.53	$ 7.64	$ 7.85	$ 7.98
Misc Facility Costs						
Water Cost	$	$ 238,778	$ 345,621	$ 419,060	$ 419,838	$ 349,054
Sewage Cost	$	$ 244,495	$ 267,167	$ 372,125	$ 419,107	$ 381,645
Reported Information						
Gross Area	sq-ft	1,515,568	1,423,379	1,423,379	1,423,379	1,423,379
Reported Student Population		3,599	3,212	3,048	2,963	2,669
Reported Heating Degree Days	degree days	7,191	5,957	5,951	8,404	6,710
Reported Cooling Degree Days	degree days	574	706	774	608	522

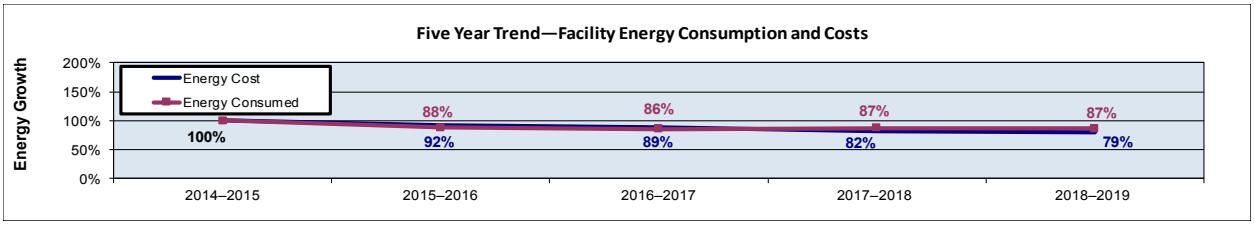
Clarion University—Venango Campus

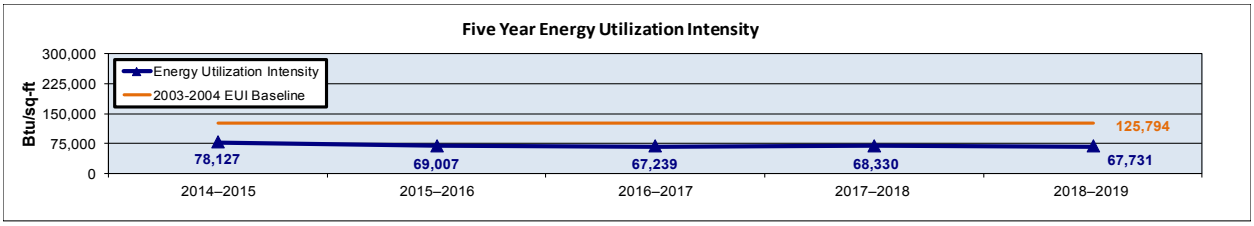




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	3,546	2,833	2,788	2,958	3,145
Oil	gal	---	---	---	---	---
Electric	kWh	1,264,440	1,147,554	1,256,640	1,185,668	1,224,486
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 21,141	$ 15,192	$ 16,458	$ 15,747	$ 16,790
Oil	$	---	---	---	---	---
Electric	$	$ 114,479	$ 113,343	$ 104,836	$ 94,937	$ 98,304
Total	$	$ 135,620	$ 128,535	$ 121,294	$ 110,684	$ 115,094
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	3,652	2,918	2,872	3,047	3,239
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	4,316	3,917	4,289	4,047	4,179
Total	mmBtu	7,968	6,835	7,161	7,093	7,419
Energy Utilization Intensity	Btu/sq-ft	97,126	83,312	87,285	86,467	90,430
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 5.96	$ 5.36	$ 5.90	$ 5.32	$ 5.34
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	9.05 ¢	9.88 ¢	8.34 ¢	8.01 ¢	8.03 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 5.79	$ 5.21	$ 5.73	$ 5.17	$ 5.18
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 26.53	$ 28.94	$ 24.44	$ 23.46	$ 23.52
Weighted Average	$/mmBtu	$ 17.02	$ 18.81	$ 16.94	$ 15.60	$ 15.51
Misc Facility Costs						
Water Cost	$	$ 2,697.65	$ 2,955.25	$ 3,477.60	$ 3,393.00	$ 3,170.00
Sewage Cost	$	$ 2,140.80	$ 2,529.30	$ 2,952.91	$ 2,739.00	$ 2,310.00
Reported Information						
Gross Area	sq-ft	82,037	82,036	82,036	82,036	82,036
Reported Student Population		486	307	283	282	199
Reported Heating Degree Days	degree days	7,413	6,079	6,041	6,790	6,619
Reported Cooling Degree Days	degree days	499	640	747	540	615

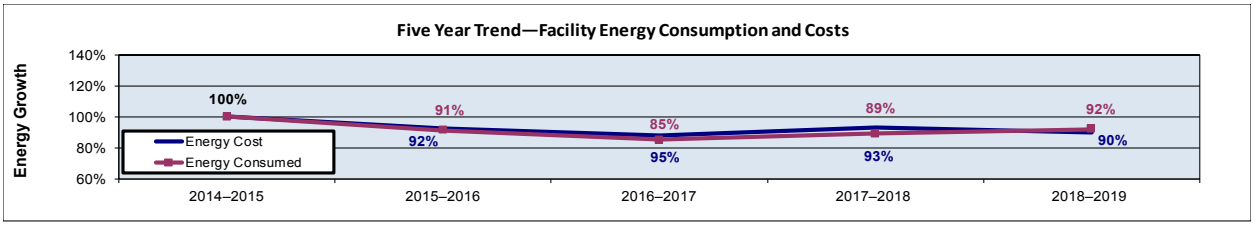
Dixon University Center

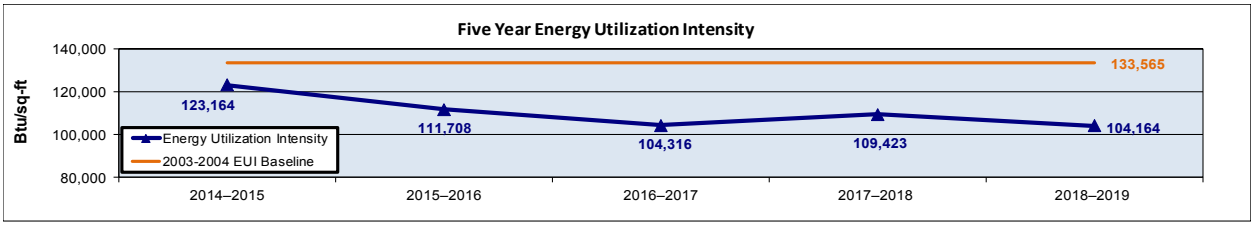




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	6,275	5,029	4,870	5,345	5,414
Oil	gal	---	---	---	---	---
Electric	kWh	1,442,300	1,428,900	1,401,400	1,304,600	1,258,200
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$56,153	$41,234	$42,784	$47,621	$44,609
Oil	$	---	---	---	---	---
Electric	$	$124,921	$125,515	$117,747	$99,970	$99,102
Total	$	$181,074	$166,749	$160,531	$147,591	$143,711
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	6,463	5,180	5,016	5,505	5,576
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	4,923	4,877	4,783	4,453	4,294
Total	mmBtu	11,386	10,057	9,799	9,958	9,871
Energy Utilization Intensity	Btu/sq-ft	78,127	69,007	67,239	68,330	67,731
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 8.95	$ 8.20	$ 8.79	$ 8.91	$ 8.24
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	8.66 ¢	8.78 ¢	8.40 ¢	7.66 ¢	7.88 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 8.69	$ 7.96	$ 8.53	$ 8.65	$ 8.00
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 25.38	$ 25.74	$ 24.62	$ 22.45	$ 23.08
Weighted Average	$/mmBtu	$ 15.90	$ 16.58	$ 16.38	$ 14.82	$ 14.56
Misc Facility Costs						
Water Cost	$	$13,901	$16,028	$17,581	$18,473	$19,333
Sewage Cost	$	$3,147	$3,192	$2,879	$560	$602
Reported Information						
Gross Area	sq-ft	145,734	145,734	145,734	145,734	145,734
Reported Student Population		---	---	---	---	---
Reported Heating Degree Days	degree days	5,684	4,539	4,369	5,045	4,913
Reported Cooling Degree Days	degree days	1,080	1,299	1,594	1,363	1,589

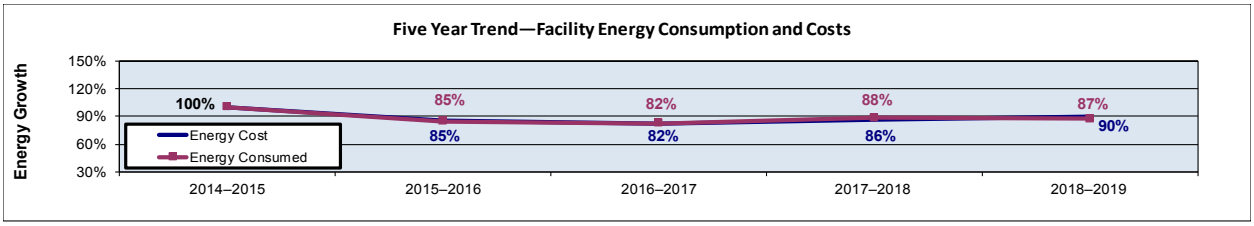
East Stroudsburg University

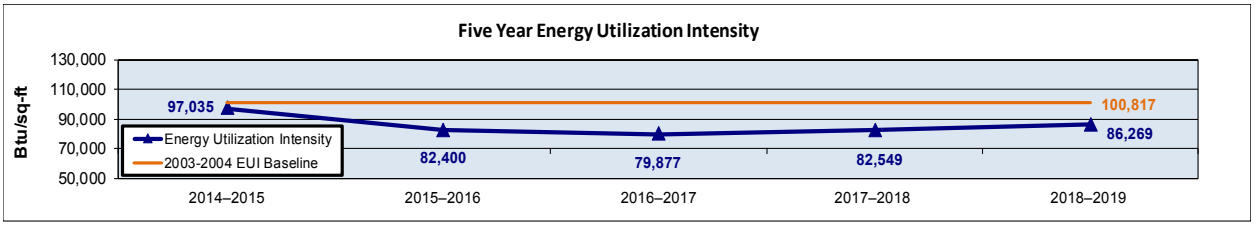




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	149,038	126,545	114,259	118,684	122,330
Oil	gal	4,968	20,448	3,375	33,781	27,842
Electric	kWh	22,276,800	22,395,600	22,739,364	22,856,987	23,988,174
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$841,395	$694,626	$700,479	$667,926	$653,002
Oil	$	$9,733	$24,027	$7,040	$96,594	$46,505
Electric	$	$1,727,536	$1,662,972	$1,557,421	$1,626,034	$1,609,486
Total	$	$2,578,664	$2,381,625	$2,264,939	$2,390,554	$2,308,993
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	153,509	130,342	117,687	122,244	126,000
Oil	mmBtu	696	2,863	473	4,729	3,898
Electric	mmBtu	76,031	76,436	77,609	78,011	81,872
Total	mmBtu	230,236	209,640	195,769	204,984	211,770
Energy Utilization Intensity	Btu/sq-ft	123,164	111,708	104,316	109,423	104,164
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 5.65	$ 5.49	$ 6.13	$ 5.63	$ 5.34
Oil	$/gal	$ 1.96	$ 1.18	$ 2.09	$ 2.86	$ 1.67
Electric	¢/kWh	7.75 ¢	7.43 ¢	6.85 ¢	7.11 ¢	6.71 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 5.48	$ 5.33	$ 5.95	$ 5.46	$ 5.18
Oil	$/mmBtu	$ 13.99	$ 8.39	$ 14.90	$ 20.42	$ 11.93
Electric	$/mmBtu	$ 22.72	$ 21.76	$ 20.07	$ 20.84	$ 19.66
Weighted Average	$/mmBtu	$ 11.20	$ 11.36	$ 11.57	$ 11.66	$ 10.90
Misc Facility Costs						
Water Cost	$	$131,285	$141,598	$203,039	$270,104	$266,006
Sewage Cost	$	$85,303	$115,417	$117,663	$125,643	$113,170
Reported Information						
Gross Area	sq-ft	1,869,339	1,876,685	1,876,685	1,873,318	2,033,051
Reported Student Population		6,018	6,101	5,909	5,770	5,462
Reported Heating Degree Days	degree days	5,727	4,570	4,867	5,370	5,213
Reported Cooling Degree Days	degree days	1,015	539	978	739	861

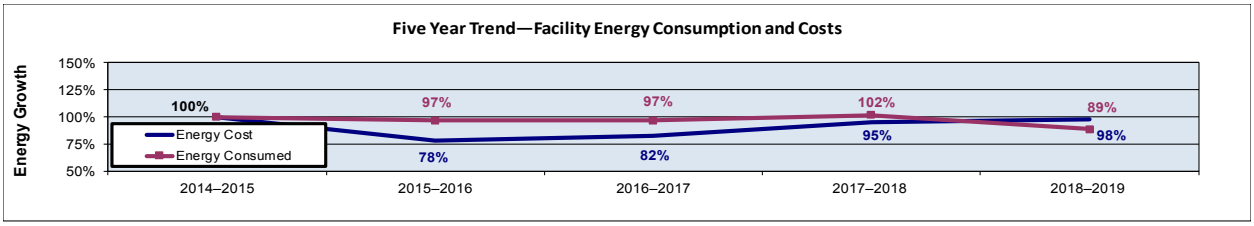
Edinboro University

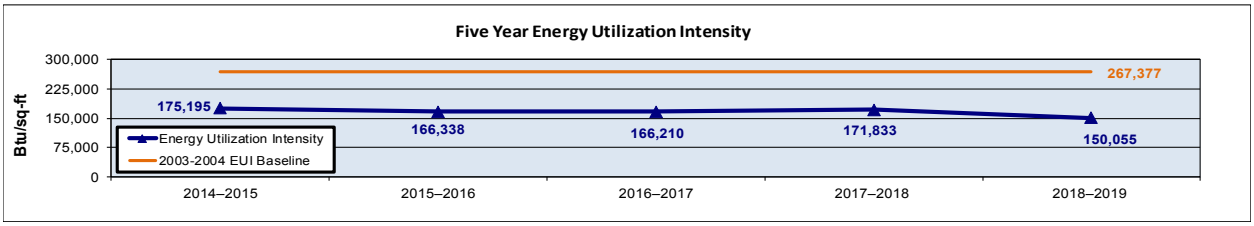




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	85,871	71,227	64,147	75,453	72,399
Oil	gal	---	---	---	---	---
Electric	kWh	39,871,554	34,245,247	34,675,202	35,391,683	35,702,601
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$590,107	$304,102	$303,397	$319,392	$349,901
Oil	$	---	---	---	---	---
Electric	$	$2,449,502	$2,285,405	$2,197,488	$2,302,284	$2,379,912
Total	$	$3,039,609	$2,589,507	$2,500,885	$2,621,676	$2,729,813
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	88,447	73,364	66,071	77,717	74,571
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	136,082	116,879	118,346	120,792	121,853
Total	mmBtu	224,528	190,243	184,418	198,509	196,424
Energy Utilization Intensity	Btu/sq-ft	97,035	82,400	79,877	82,549	86,269
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 6.87	$ 4.27	$ 4.73	$ 4.23	$ 4.83
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	6.14 ¢	6.67 ¢	6.34 ¢	6.51 ¢	6.67 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 6.67	$ 4.15	$ 4.59	$ 4.11	$ 4.69
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 18.00	$ 19.55	$ 18.57	$ 19.06	$ 19.53
Weighted Average	$/mmBtu	$ 13.54	$ 13.61	$ 13.56	$ 13.21	$ 13.90
Misc Facility Costs						
Water Cost	$	$269,126	$289,873	$303,595	$359,318	$429,744
Sewage Cost	$	$427,038	$411,548	$378,899	$422,785	$447,975
Reported Information						
Gross Area	sq-ft	2,313,897	2,308,761	2,308,761	2,404,741	2,276,885
Reported Student Population		5,264	4,909	4,470	3,989	3,304
Reported Heating Degree Days	degree days	6,794	5,318	5,287	6,128	6,142
Reported Cooling Degree Days	degree days	610	883	1,089	843	1,071

Indiana University of Pennsylvania





	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption (1)						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	489,038	461,168	462,364	494,934	413,925
Oil	gal	51,634	38,602	44,162	37,157	25,094
Electric	kWh	50,884,814	52,172,812	51,435,850	51,541,018	50,827,766
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 2,409,046	$ 1,665,630	$ 1,798,372	$ 2,175,896	$ 1,962,461
Oil	$	$ 168,566	$ 105,772	$ 98,366	$ 77,121	$ 36,554
Electric Purchased (2)	$	$ 1,740,218	$ 1,583,377	$ 1,654,263	$ 1,864,790	$ 2,236,184
Total	$	$ 4,317,830	$ 3,354,779	$ 3,551,001	$ 4,117,807	$ 4,235,199
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	498,819	475,004	476,235	509,783	426,342
Oil	mmBtu	7,229	5,404	6,183	5,202	3,513
Electric Purchased	mmBtu	173,670	178,066	175,551	175,909	173,475
Total	mmBtu	679,718	658,474	657,968	690,894	603,331
Energy Utilization Intensity	Btu/sq-ft	175,195	166,338	166,210	171,833	150,055
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 5.72	$ 3.61	$ 3.89	$ 4.40	$ 4.74
Oil	$/gal	$ 3.29	$ 2.74	$ 2.23	$ 2.08	$ 1.46
Electric Purchased	¢/kWh	4.01 ¢	3.03 ¢	3.22 ¢	3.62 ¢	4.40 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 4.83	$ 3.51	$ 3.78	$ 4.27	$ 4.60
Oil	$/mmBtu	$ 23.32	$ 19.57	$ 15.91	$ 14.83	$ 10.41
Electric Purchased	$/mmBtu	$ 10.02	$ 8.89	$ 9.42	$ 10.60	$ 12.89
Weighted Average	$/mmBtu	$ 6.35	$ 5.09	$ 5.40	$ 5.96	$ 7.02
Misc Facility Costs						
Water Cost	$	$ 783,210	$ 838,137	$ 813,549	$ 846,190	$ 729,673
Sewage Cost	$	$ 729,505	$ 738,152	$ 742,854	$ 723,841	$ 727,578
Reported Information						
Gross Area (3)	sq-ft	3,992,357	3,958,653	3,958,653	4,020,722	4,020,722
Reported Student Population (4)		12,537	12,051	11,097	10,566	9,546
Reported Heating Degree Days	degree days	5,956	5,000	5,010	5,570	5,575
Reported Cooling Degree Days	degree days	667	739	864	723	813

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

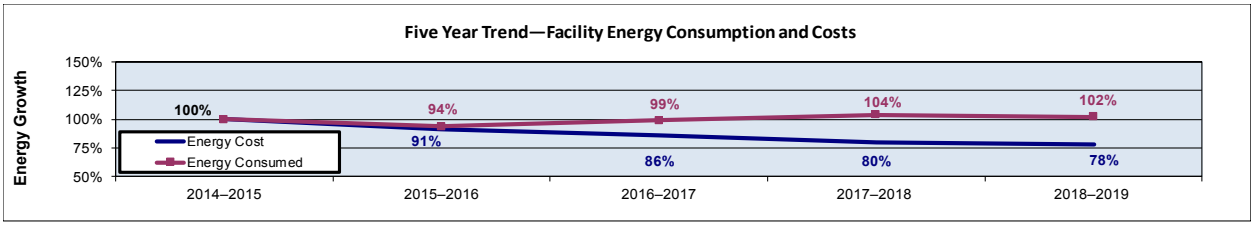
(1) Data includes FIUP usage for Residential Revival.

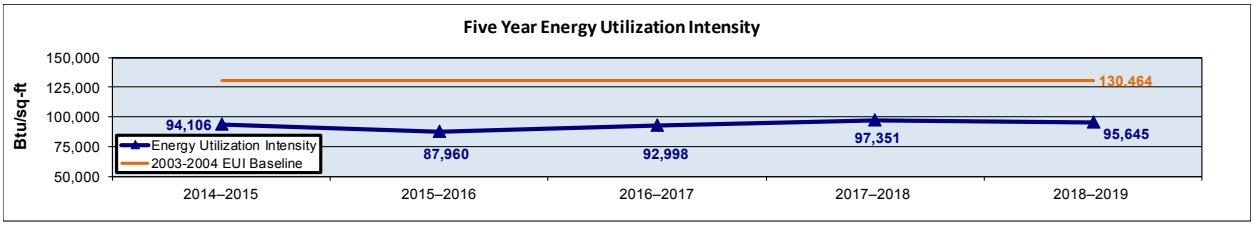
(2) Excludes total cost of operation and maintenance for electric generation with the cogeneration plant.

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

(4) Data reflects main and branch campuses.

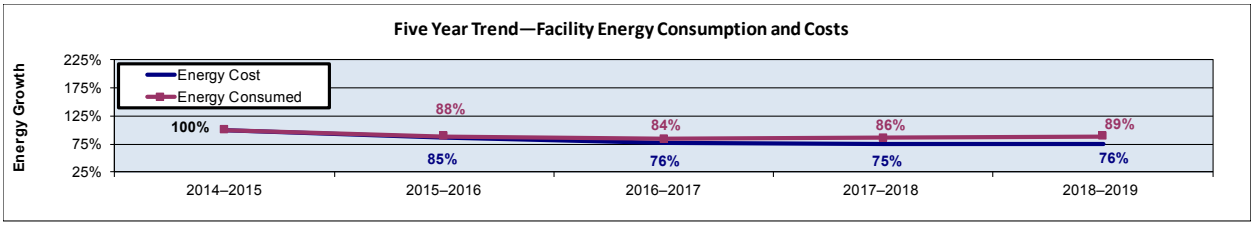
Kutztown University

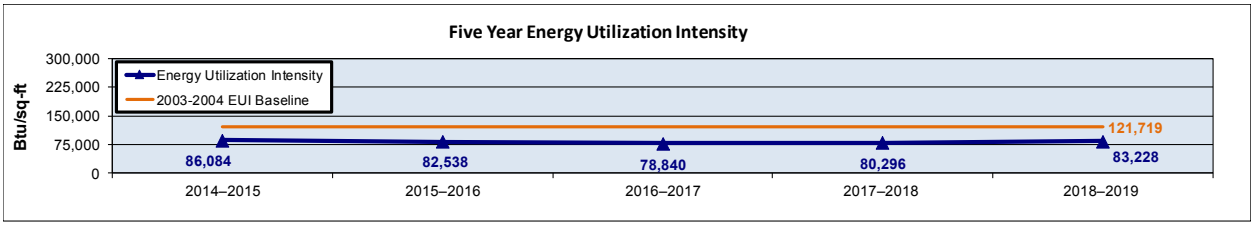




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	129,414	148,474	150,923	163,237	157,851
Oil	gal	173,923	1,733	4,434	5,535	19,991
Electric	kWh	31,257,662	27,656,432	30,979,865	30,809,041	30,384,631
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 814,339	$ 1,051,256	$ 998,750	$ 1,039,055	$ 988,633
Oil	$	$ 391,327	$ 2,259	$ 7,948	$ 12,140	$ 44,122
Electric	$	$ 2,483,599	$ 2,300,948	$ 2,158,188	$ 1,905,837	$ 1,839,654
Total	$	$ 3,689,265	$ 3,354,463	$ 3,164,886	$ 2,957,032	$ 2,872,409
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	133,296	152,928	155,451	168,134	162,587
Oil	mmBtu	24,349	243	621	775	2,799
Electric	mmBtu	106,682	94,391	105,734	105,151	103,703
Total	mmBtu	264,328	247,562	261,806	274,060	269,088
Energy Utilization Intensity	Btu/sq-ft	94,106	87,960	92,998	97,351	95,645
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 6.29	$ 7.08	$ 6.62	$ 6.37	$ 6.26
Oil	$/gal	$ 2.25	$ 1.30	$ 1.79	$ 2.19	$ 2.21
Electric	¢/kWh	7.95 ¢	8.32 ¢	6.97 ¢	6.19 ¢	6.05 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 6.11	$ 6.87	$ 6.42	$ 6.18	$ 6.08
Oil	$/mmBtu	$ 16.07	$ 9.31	$ 12.80	$ 15.67	$ 15.76
Electric	$/mmBtu	$ 23.28	$ 24.38	$ 20.41	$ 18.12	$ 17.74
Weighted Average	$/mmBtu	$ 13.96	$ 13.55	$ 12.09	$ 10.79	$ 10.67
Misc Facility Costs						
Water Cost	$	$ 508,136	$ 510,877	$ 556,368	$ 589,597	$ 709,333
Sewage Cost	$	$ 577,908	$ 550,967	$ 621,535	$ 672,416	$ 842,992
Reported Information						
Gross Area	sq-ft	2,808,832	2,814,471	2,815,176	2,815,176	2,813,404
Reported Student Population		8,207	8,048	7,449	7,179	7,058
Reported Heating Degree Days	degree days	5,701	4,471	4,580	5,186	5,193
Reported Cooling Degree Days	degree days	1,307	1,335	1,345	1,097	1,337

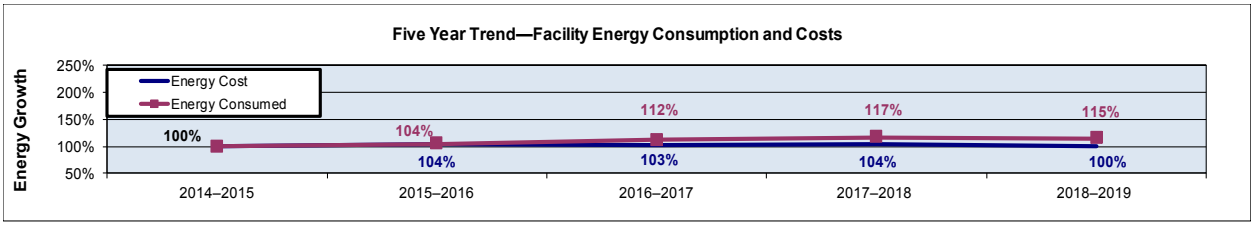
Lock Haven University

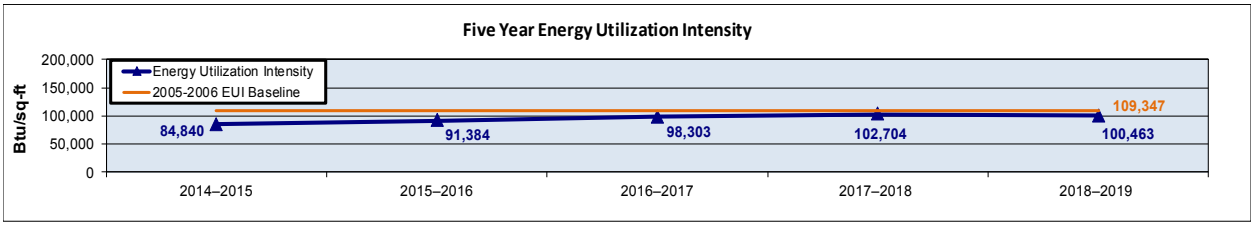




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	90,321	72,303	70,084	74,782	77,224
Oil	gal	---	11,264	---	---	---
Electric	kWh	17,235,350	16,908,586	16,256,513	15,569,480	16,225,040
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 634,909	$ 373,715	$ 343,191	$ 448,595	$ 438,568
Oil	$	---	---	---	---	---
Electric	$	$ 1,359,262	$ 1,310,761	$ 1,173,939	$ 1,039,224	$ 1,075,474
Total	$	$ 1,994,171	$ 1,703,807	$ 1,519,300	$ 1,487,819	$ 1,514,042
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	93,031	74,472	72,187	77,025	79,541
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	58,824	57,709	55,483	53,139	55,376
Total	mmBtu	151,855	133,758	127,803	130,164	134,917
Energy Utilization Intensity	Btu/sq-ft	86,084	82,538	78,840	80,296	83,228
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 7.03	$ 5.17	$ 4.90	$ 6.00	$ 5.68
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	7.89 ¢	7.75 ¢	7.22 ¢	6.67 ¢	6.63 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 6.82	$ 5.02	$ 4.75	$ 5.82	$ 5.51
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 23.11	$ 22.71	$ 21.16	$ 19.56	$ 19.42
Weighted Average	$/mmBtu	$ 13.13	$ 12.74	$ 11.88	$ 11.43	$ 11.22
Misc Facility Costs						
Water Cost	$	$ 56,327	$ 48,996	$ 53,260	$ 54,213	$ 51,850
Sewage Cost	$	$ 100,790	$ 90,155	$ 54,066	$ 127,409	$ 76,314
Reported Information						
Gross Area	sq-ft	1,764,033	1,620,562	1,621,044	1,621,044	1,621,044
Reported Student Population		3,829	3,588	3,205	2,807	2,472
Reported Heating Degree Days	degree days	6,179	4,918	4,968	5,594	5,613
Reported Cooling Degree Days	degree days	781	791	1,120	934	990

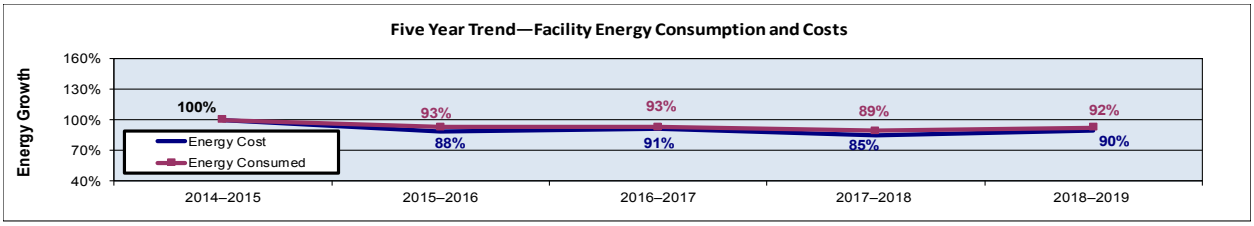
Lock Haven University—Clearfield Campus

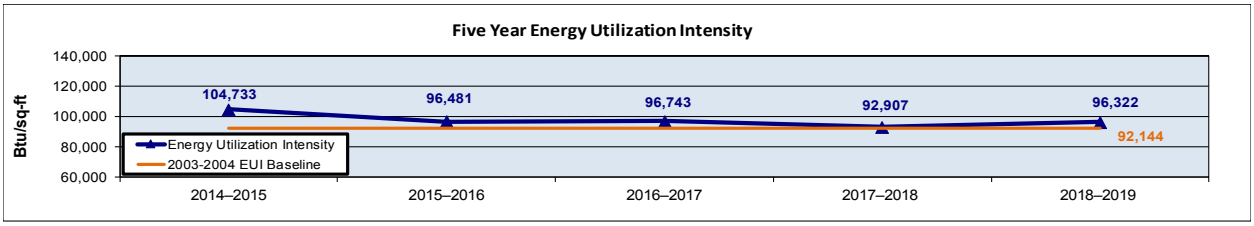




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	4,652	4,691	5,578	6,002	5,655
Oil	gal	---	---	---	---	---
Electric	kWh	968,200	1,057,640	977,200	968,360	1,012,438
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$35,993	$31,204	$39,117	$50,402	$ 43,382
Oil	$	---	---	---	---	---
Electric	$	$86,159	$95,974	$86,694	$76,097	$ 78,840
Total	$	$122,152	$127,178	$125,811	$126,499	$ 122,222
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	4,792	4,832	5,745	6,182	5,825
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	3,304	3,610	3,335	3,305	3,455
Total	mmBtu	8,096	8,441	9,081	9,487	9,280
Energy Utilization Intensity	Btu/sq-ft	84,840	91,384	98,303	102,704	100,463
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 7.74	$ 6.65	$ 7.01	$ 8.40	$ 7.67
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	8.90 ¢	9.07 ¢	8.87 ¢	7.86 ¢	7.79 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 7.51	$ 6.46	$ 6.81	$ 8.15	$ 7.45
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 26.07	$ 26.59	$ 25.99	$ 23.02	$ 22.82
Weighted Average	$/mmBtu	$ 15.09	$ 15.07	$ 13.86	$ 13.33	$ 13.17
Misc Facility Costs						
Water Cost	$	$4,210	$4,222	$4,356	$4,118	$ 4,133
Sewage Cost	$	$4,610	$4,625	$5,916	$5,316	$ 5,042
Reported Information						
Gross Area	sq-ft	95,427	92,373	92,373	92,373	92,373
Reported Student Population		203	201	205	189	169
Reported Heating Degree Days	degree days	6,973	5,752	5,731	6,541	6,586
Reported Cooling Degree Days	degree days	456	532	695	462	547

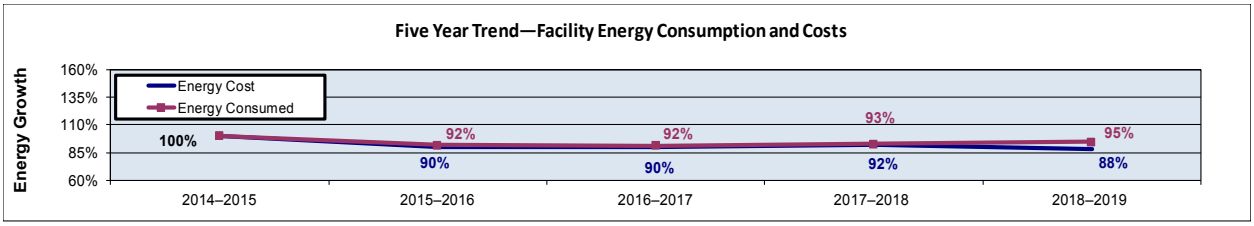
Mansfield University

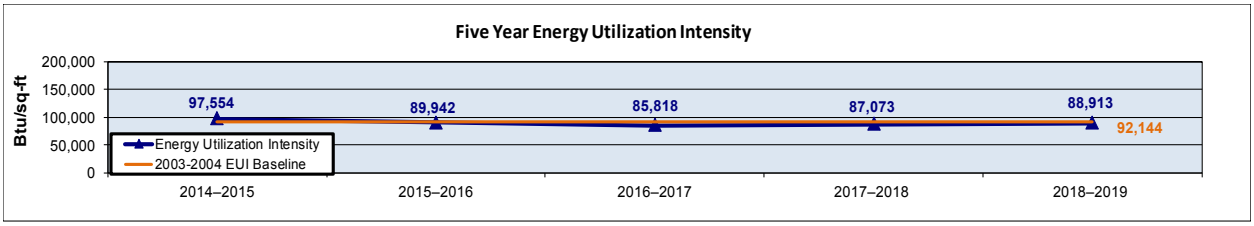




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	103,769	95,212	95,228	92,206	97,167
Oil	gal	---	---	---	---	---
Electric	kWh	15,379,342	14,528,983	14,641,466	13,833,365	13,867,594
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 560,637	$ 420,947	$ 474,910	$ 400,355	$ 508,671
Oil	$	---	---	---	---	---
Electric	$	$ 1,137,844	$ 1,073,822	$ 1,079,182	$ 1,043,883	$ 1,015,070
Total	$	$ 1,698,481	$ 1,494,769	$ 1,554,092	$ 1,444,238	$ 1,523,741
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	106,882	98,068	98,085	94,972	100,082
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	52,490	49,587	49,971	47,213	47,330
Total	mmBtu	159,372	147,656	148,056	142,185	147,412
Energy Utilization Intensity	Btu/sq-ft	104,733	96,481	96,743	92,907	96,322
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 5.40	$ 4.42	$ 4.99	$ 4.34	$ 5.24
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	7.40 ¢	7.39 ¢	7.37 ¢	7.55 ¢	7.32 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 5.25	$ 4.29	$ 4.84	$ 4.22	$ 5.08
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 21.68	$ 21.66	$ 21.60	$ 22.11	$ 21.45
Weighted Average	$/mmBtu	$ 10.66	$ 10.12	$ 10.50	$ 10.16	$ 10.34
Misc Facility Costs						
Water Cost	$	$ 82,679	$ 86,074	$ 85,362	$ 89,361	$ 92,749
Sewage Cost	$	$ 183,000	$ 183,000	$ 183,000	$ 198,972	$ 183,000
Reported Information						
Gross Area	sq-ft	1,521,695	1,530,411	1,530,411	1,530,411	1,530,411
Reported Student Population		2,157	1,890	1,755	1,407	1,260
Reported Heating Degree Days	degree days	6,816	5,840	5,738	6,385	5,595
Reported Cooling Degree Days	degree days	400	398	725	512	463

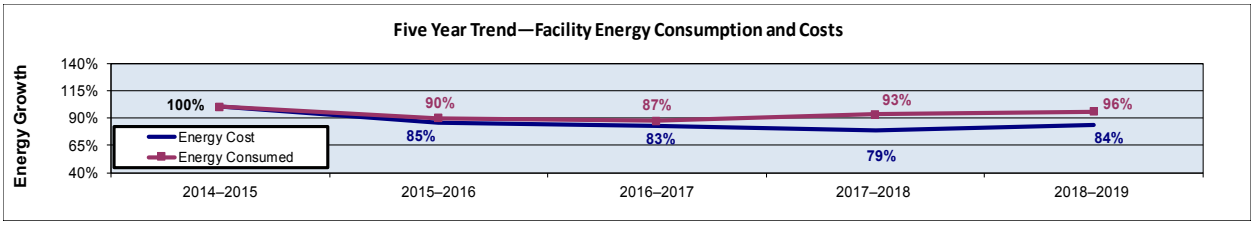
Millersville University

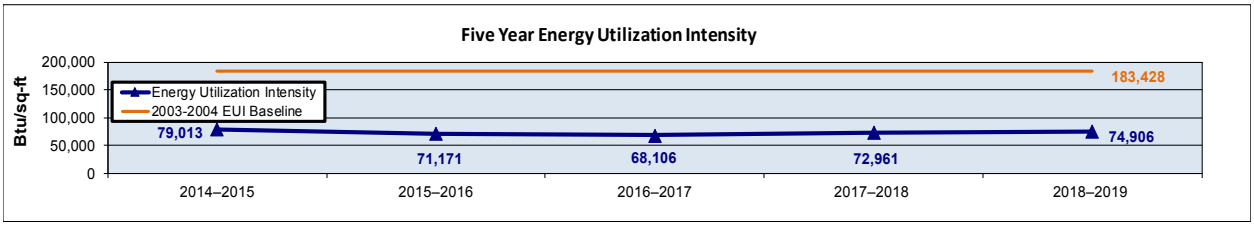




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	70,384	63,060	62,439	66,972	67,560
Oil	gal	37,072	27,222	23,731	26,614	27,018
Electric	kWh	38,366,523	35,966,225	36,138,385	35,470,390	36,465,356
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 558,525	$ 455,900	$ 500,969	$ 581,309	$ 523,849
Oil	$	$ 64,799	$ 36,649	$ 43,898	$ 57,922	$ 62,485
Electric	$	$ 2,483,613	$ 2,308,270	$ 2,257,427	$ 2,210,262	$ 2,161,951
Total	$	$ 3,106,937	$ 2,800,819	$ 2,802,294	$ 2,849,493	$ 2,748,285
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	72,496	64,952	64,312	68,981	69,587
Oil	mmBtu	5,190	3,811	3,322	3,726	3,783
Electric	mmBtu	130,945	122,753	123,340	121,060	124,456
Total	mmBtu	208,631	191,516	190,975	193,768	197,826
Energy Utilization Intensity	Btu/sq-ft	97,554	89,942	85,818	87,073	88,913
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 7.94	$ 7.23	$ 8.02	$ 8.68	$ 7.75
Oil	$/gal	$ 1.75	$ 1.35	$ 1.85	$ 2.18	$ 2.31
Electric	¢/kWh	6.47 ¢	6.42 ¢	6.25 ¢	6.23 ¢	5.93 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 7.70	$ 7.02	$ 7.79	$ 8.43	$ 7.53
Oil	$/mmBtu	$ 12.49	$ 9.62	$ 13.21	$ 15.55	$ 16.52
Electric	$/mmBtu	$ 18.97	$ 18.80	$ 18.30	$ 18.26	$ 17.37
Weighted Average	$/mmBtu	$ 14.89	$ 14.62	$ 14.67	$ 14.71	$ 13.89
Misc Facility Costs						
Water Cost	$	$ 98,163	$ 106,365	$ 149,830	$ 141,033	$ 101,560
Sewage Cost	$	$ 389,944	$ 386,368	$ 440,393	$ 433,450	$ 431,392
Reported Information						
Gross Area	sq-ft	2,138,617	2,129,320	2,225,354	2,225,354	2,224,939
Reported Student Population		6,291	6,473	6,130	5,935	5,772
Reported Heating Degree Days	degree days	5,244	4,652	4,836	5,450	5,218
Reported Cooling Degree Days	degree days	756	935	746	834	1,200

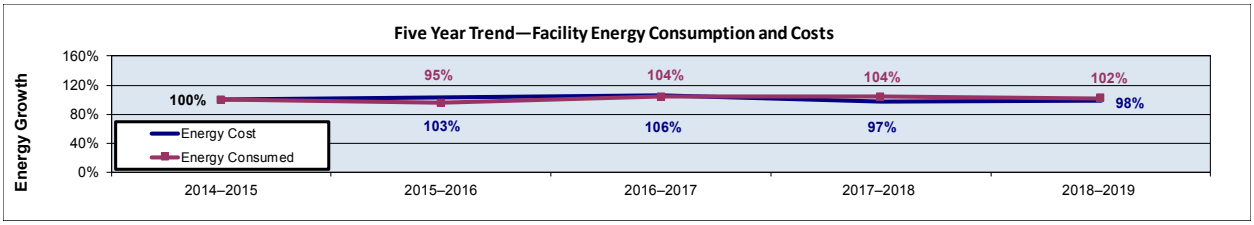
Shippensburg University

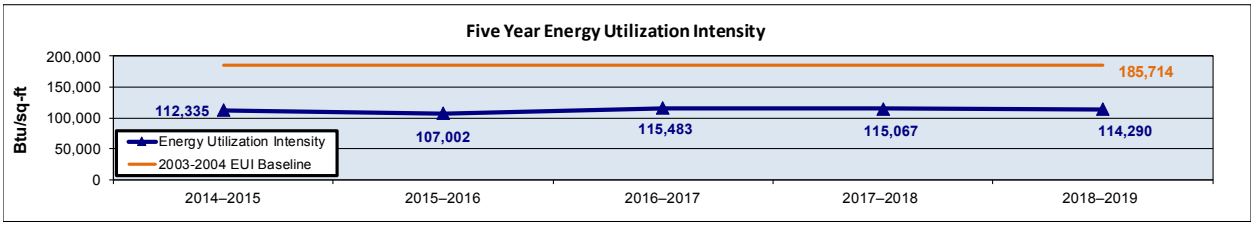




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	98,373	86,362	83,978	94,831	97,419
Oil	gal	---	---	---	---	---
Electric	kWh	25,059,567	23,001,149	22,542,285	22,484,225	23,064,988
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 853,258	$ 527,418	$ 552,033	$ 624,125	$ 622,871
Oil	$	---	---	---	---	---
Electric	$	$ 1,719,136	$ 1,669,298	$ 1,582,463	$ 1,410,962	$ 1,538,722
Total	$	$ 2,572,394	$ 2,196,716	$ 2,134,496	$ 2,035,087	$ 2,161,593
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	101,324	88,953	86,497	97,676	100,342
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	85,528	78,503	76,937	76,739	78,721
Total	mmBtu	186,852	167,456	163,434	174,415	179,062
Energy Utilization Intensity	Btu/sq-ft	79,013	71,171	68,106	72,961	74,906
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 8.67	$ 6.11	$ 6.57	$ 6.58	$ 6.39
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	6.86 ¢	7.26 ¢	7.02 ¢	6.28 ¢	6.67 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 8.42	$ 5.93	$ 6.38	$ 6.39	$ 6.21
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 20.10	$ 21.26	$ 20.57	$ 18.39	$ 19.55
Weighted Average	$/mmBtu	$ 13.77	$ 13.12	$ 13.06	$ 11.67	$ 12.07
Misc Facility Costs						
Water Cost	$	$ 195,586	$ 209,698	$ 171,421	$ 160,684	$ 139,481
Sewage Cost	$	$ 150,512	$ 129,336	$ 138,393	$ 182,989	$ 194,435
Reported Information						
Gross Area	sq-ft	2,364,846	2,352,881	2,399,700	2,390,502	2,390,502
Reported Student Population		6,161	6,146	6,011	5,556	5,412
Reported Heating Degree Days	degree days	5,813	3,488	3,363	3,960	3,890
Reported Cooling Degree Days	degree days	1,656	1,626	2,041	1,768	2,045

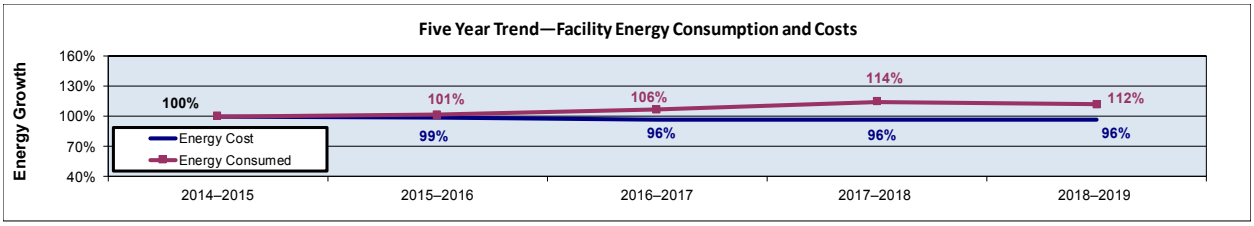
Slippery Rock University

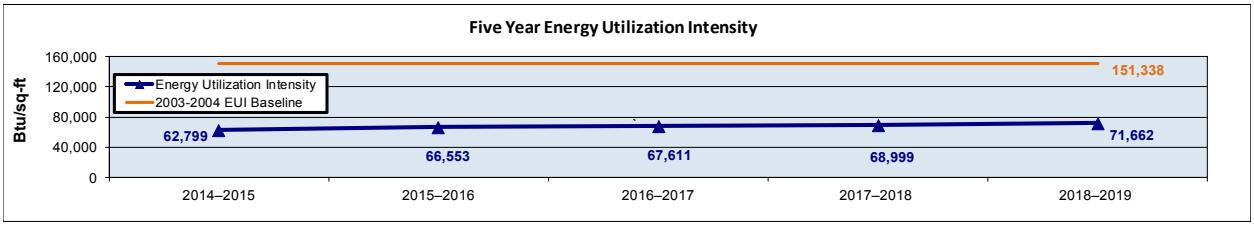




	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	2,303	2,226	2,698	2,574	1,399
Gas	mcf	125,177	110,824	119,689	128,270	153,902
Oil	gal	---	---	---	---	---
Electric	kWh	27,263,933	28,242,001	29,264,497	27,793,971	26,952,194
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	$ 237,333	$ 210,478	$ 259,366	$ 247,887	$ 131,670
Gas	$	$ 913,573	$ 807,112	$ 779,660	$ 847,147	$ 1,016,461
Oil	$	---	---	---	---	---
Electric	$	$ 1,750,309	$ 1,973,794	$ 2,025,151	$ 1,717,551	$ 1,697,773
Total	$	$ 2,901,214	$ 2,991,384	$ 3,064,177	$ 2,812,585	$ 2,845,904
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	61,260	59,212	71,767	68,468	37,213
Gas	mmBtu	128,932	114,149	123,280	132,118	158,519
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	93,052	96,390	99,880	94,861	91,988
Total	mmBtu	283,244	269,750	294,926	295,447	287,720
Energy Utilization Intensity	Btu/sq-ft	112,335	107,002	115,483	115,067	114,290
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	$ 103.05	$ 94.55	$ 96.13	$ 96.30	$ 94.12
Gas	$/mcf	$ 7.30	$ 7.28	$ 6.51	$ 6.60	$ 6.60
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	6.42 ¢	6.99 ¢	6.92 ¢	6.18 ¢	6.30 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	$ 3.87	$ 3.55	$ 3.61	$ 3.62	$ 3.54
Gas	$/mmBtu	$ 7.09	$ 7.07	$ 6.32	$ 6.41	$ 6.41
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 18.81	$ 20.48	$ 20.28	$ 18.11	$ 18.46
Weighted Average	$/mmBtu	$ 10.24	$ 11.09	$ 10.39	$ 9.52	$ 9.89
Misc Facility Costs						
Water Cost	$	$ 354,749	$ 325,513	$ 413,059	$ 395,519	$ 346,934
Sewage Cost	$	$ 343,139	$ 354,201	$ 469,850	$ 439,963	$ 400,562
Reported Information						
Gross Area	sq-ft	2,521,422	2,520,983	2,553,845	2,567,609	2,517,458
Reported Student Population		7,327	7,367	7,509	7,478	7,399
Reported Heating Degree Days	degree days	6,554	5,100	5,269	6,221	5,809
Reported Cooling Degree Days	degree days	539	800	831	500	461

West Chester University





	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	96,049	96,605	101,044	112,751	112,072
Oil	gal	10,077	7,459	9,470	10,157	6,580
Electric	kWh	41,642,179	42,477,897	44,664,365	46,517,314	45,282,401
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 838,501	$ 677,258	$ 714,238	$ 848,985	$ 1,001,884
Oil	$	$ 20,931	$ 11,862	$ 18,329	$ 23,014	$ 15,093
Electric	$	$ 3,226,992	$ 3,356,002	$ 3,198,058	$ 3,068,609	$ 2,924,913
Total	$	$ 4,086,424	$ 4,045,122	$ 3,930,625	$ 3,940,608	$ 3,941,890
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	98,930	99,503	104,075	116,134	115,434
Oil	mmBtu	1,411	1,044	1,326	1,422	921
Electric	mmBtu	142,125	144,977	152,439	158,764	154,549
Total	mmBtu	242,466	245,524	257,841	276,319	270,904
Energy Utilization Intensity	Btu/sq-ft	62,799	66,553	67,611	68,999	71,662
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 8.73	$ 7.01	$ 7.07	$ 7.53	$ 8.94
Oil	$/gal	$ 2.08	$ 1.59	$ 1.94	$ 2.27	$ 2.29
Electric	¢/kWh	7.75 ¢	7.90 ¢	7.16 ¢	6.60 ¢	6.46 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 8.48	$ 6.81	$ 6.86	$ 7.31	$ 8.68
Oil	$/mmBtu	$ 14.84	$ 11.36	$ 13.82	$ 16.18	$ 16.38
Electric	$/mmBtu	$ 22.71	$ 23.15	$ 20.98	$ 19.33	$ 18.93
Weighted Average	$/mmBtu	$ 16.85	$ 16.48	$ 15.24	$ 14.26	$ 14.55
Misc Facility Costs						
Water Cost (1)	$	$ 919,084	$ 953,186	$ 948,349	$ 930,124	$ 970,188
Sewage Cost (1)	$	$ 547,283	$ 577,046	$ 579,653	$ 553,179	$ 575,674
Reported Information						
Gross Area	sq-ft	3,860,973	3,689,154	3,813,580	4,004,701	3,780,311
Reported Student Population		13,701	14,164	14,192	14,217	14,274
Reported Heating Degree Days	degree days	5,963	4,935	5,041	5,634	5,474
Reported Cooling Degree Days	degree days	987	1,113	1,285	988	1,200

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

GLOSSARY

Energy Utilization Intensity (Btu/sq-ft)
Determined by dividing energy (Btu) by total space (sq-ft).

Load Factor
A measure of effective use of electricity, the ratio of the average load over a designated period to the peak load occurring during that period. Load factor is determined by dividing the kWh by the product of the kW demand and 730 (the average number of hours in a month).

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.

Miscellaneous Gas or Oil Used
The amount of gas or oil used to operate those buildings not served by the central boiler plant.

Steam Capacity
Plant steam capacity is based on the continuous output rating for all boilers in the central plant.

Total Energy (Btu)
The total amount of all energy (coal, electricity, landfill gas, natural gas, oil, propane, purchased steam, and wood) converted to Btus as delivered to the facility.

Total Energy Cost
Total cost of all energy used at the facility. Energy cost includes coal, electricity, landfill gas, natural gas, oil, propane, purchased steam, and wood.

Total Fuel Cost
All fuel cost for coal, electricity, landfill gas, natural gas, oil, propane, purchased steam, and wood combined.

Total Space
The gross total space at a facility measured in square feet. This includes heated and non-heated space.

Unit Energy Cost ($/MMBtu)
Determined by dividing the energy cost by the total million Btus.

Unit Cost of Steam ($/mlb)
The total cost to produce 1,000 pounds of steam in the boiler plant. It is determined by dividing the steam into the total operating cost including charges for fuel, labor, parts, services, and suppliers.

Weighted Average
A statistical method used when individual figures are dependent on another factor that varies by facility. For example, a straight average of per unit energy cost could be misleading because it is dependent on two variables at each facility—Total Energy Consumed and Total Energy Cost. Each value differs by facility.

ACRONYMS AND ABBREVIATIONS

$/gal	Dollars per gallon
$/mcf	Dollars per thousand cubic feet
$/mgal	Dollars per thousand gallons
$/mlbs	Dollars per thousand pounds
$/mmBtu	Dollars per million British thermal units
$/sq-ft	Dollars per square foot
¢/kWh	Cents per kilowatt-hour
ATC	Automatic temperature control
BAS	Building automation system
Btu	British thermal unit
Btu/sq-ft	British thermal units per square foot
CDD	Cooling degree days
CFR	Code of Federal Regulations
DA	Deaerator
DGS	Department of General Services
DRR	Disinfection requirements rule
ECM	Energy Conservation Measures
EDC	Electrical distribution company
EE&C	Energy Efficiency and Conservation
EPA	United States Environmental Protection Agency
ERMA	Energy Risk Management Application
EUI	Energy Utilization Intensity
GESA	Guaranteed Energy Savings Act
GHG	Greenhouse gas
HDD	Heating degree days
IS	Interruptible Service
IUP	Indiana University of Pennsylvania
HVAC	Heating, ventilating, and air conditioning
kV	Kilovolt

kW	Kilowatt
kWh	Kilowatt hour
lbs/hr	Pounds per hour
LFD	Large Firm Delivery
mmBtu	One million British thermal units
NEC	National Electric Code
NFPA	National Fire Protection Association
NOx	Oxides of nitrogen
OEM	Original equipment manufacturer
PADEP	Pennsylvania Department of Environmental Protection
PASSHE	Pennsylvania's State System of Higher Education
PCID	Pennsylvania Commercial Item Description
PLC	Peak Load Contribution
PSFEI	Penn State Facilities Engineering Institute
PUC	Public Utility Commission
REC	Renewable Energy Certificates
RFQ	Request for Quote
UPS	Uninterruptable power supply