Utility Usage Report

for

Fiscal Year

2020–2021

Pennsylvania's
STATE SYSTEM
of Higher Education

PennState
College of Engineering

FACILITIES
ENGINEERING
INSTITUTE

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(July 1, 2020 – June 30, 2021)

prepared for

Pennsylvania's State System of Higher Education

Penn State Facilities Engineering Institute

Our Vision

To lead the quest for optimized facilities.

Our Mission

PSFEI fulfills the land grant mission of The Pennsylvania State University by providing the highest quality engineering, energy, and education services leading to the most efficient, reliable, safe, sustainable, and innovative facilities for the citizens of the Commonwealth and beyond.

Director

Mark A. Bodenschatz

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A Message from the Director

As director of the Penn State Facilities Engineering Institute for the past several years, it has been my professional and personal pleasure to lead our Institute in providing Pennsylvania's State System of Higher Education (PASSHE) with extraordinary engineering, energy procurement, and education services in our pursuit of leading the quest for optimized facilities.

This reporting year, similar to last year, experienced unique challenges and opportunities. Our Institute successfully assisted the Commonwealth of Pennsylvania with a historic state-sponsored solar power purchase agreement that meets the goal of sourcing 40 percent of their electrical capacity from sustainable sources. We are using that experience and knowledge to assist PASSHE universities in pursuit of their own solar initiatives. The Institute's Energy Team reached out to each university's leadership to listen and learn about their unique energy needs, which will help us strategically plan for future procurement. Our engineering staff continued to help PASSHE navigate the challenges of the COVID-19 pandemic and evaluate options to mitigate transmission risks. And our Education Team took advantage of the virtual course platform to increase the number of subject matter expert instructors and continue to make improvements by implementing suggestions gleaned from survey comments provided by participants.

As in prior years, this report provides a synopsis of the education, energy, and engineering services our Institute provided throughout the year as well as a compilation of the monthly utility and energy use data each university submitted for the reporting year. The data provided by each PASSHE university is invaluable, not only to the universities for budgeting and planning purposes, but also to our staff who frequently use this data to assist with energy procurement and to identify potential opportunities for energy and cost savings.

We hope you have benefited from the services provided by our Institute throughout fiscal year 2020–2021. As we strive to make next year even better, we look forward to a continued, successful partnership with 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 2020–2021* for Pennsylvania's State System of Higher Education (PASSHE). This report covers accomplishments from July 1, 2020 through June 30, 2021, and includes two major components, 1) a summary of services and 2) utility usage data. The Summary of Services is a brief description of services that were provided to 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 2020–2021. 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. While COVID-19 has limited our meeting frequency, 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 to individual universities. 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 to these traditional services, PSFEI also provided the following assistance to all PASSHE universities.

- Provided guidance from the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) regarding HVAC mitigation measures for building reopening post COVID-19 shutdown.
- Reviewed pipeline master meter plan requirements to determine applicability to PASSHE universities. Efforts included researching federal and state regulations; communicating with representatives from the Pennsylvania Public Utility Commission (PA PUC), Douglas Pipeline, Penn State engineers, and PSFEI Energy Team members; compiling and issuing several reports to document findings and recommendations; and arranging a Zoom presentation by Douglas Pipeline Company on the Code of Federal Regulations (CFR), Title 49, Part 192, *Transportation of Natural and Other Gas by Pipe Line: Minimum Safety Standards* 192 and PA PUC Act 127 (Pipeline Act).

- Provided information regarding a February 2021 cyber-attack on a wastewater plant to increase vulnerability awareness.
- Developed a report at the request of Shippensburg's University that was distributed to all PASSHE universities for their reference and use regarding COVID-19 transmission modes.
- Made arrangements with Penn State's Office of Physical Plant (OPP) to share their Design & Construction Standards via a website with all PASSHE universities for their reference and use.
- Conducted a survey of computer maintenance management systems (CMMS) used by PASSHE universities as part of a PSFEI initiative to assist the universities by understanding their existing CMMS programs. Survey information gathered included the university's CMMS provider, extent of use, and key performance indicators. Twelve universities participated in the survey.

PSFEI develops 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 is developed from the United States Environmental Protection Agency's (EPA) eGRID data for electricity and CFR Title 40 emissions information for other fuels. Updated reports are provided to the Assistant Vice Chancellor for Facilities.

Note: Similar to fiscal year 2019–2020, many PASSHE universities continued to experience reduced energy consumption during this reporting year, most likely caused by the continuation of remote learning and working environments due to the COVID-19 pandemic, resulting in reduced building occupancy and activities.

COLLECTIVE SERVICES

Following is a comprehensive 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 listings 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:

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

ELECTRICAL

PSFEI provides a variety of electrical services that cover:

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

ENERGY DEMAND MANAGEMENT

PSFEI identifies building system inefficiencies and provides recommendations for improvements that reduce energy use and cost:

- Energy conservation measure scoping
- Performance contracting evaluations and support
- Strategic energy planning

HEATING, VENTILATING, AND AIR CONDITIONING

PSFEI provides a variety of HVAC advisory services that include:

- Annual training classes and onsite training by request
- Assistance with automatic temperature controls (ATC) and building automation systems (BAS)
- 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
- Review and troubleshooting of building air-distribution systems
- Review of conventional and new technologies in HVAC designs that involve steam and hot water heating systems, chillers, and chilled water systems
- Review of plans for renovations and new building installations
- Troubleshooting cooling and heating systems, airflow, refrigeration, and steam-related issues

STRUCTURAL/ARCHITECTURAL

PSFEI provides the following structural/architectural advisory services:

- Advice on implementing repair programs
- 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
- Logistical support for relocation of equipment
- Repair recommendations related to building structure and enclosure concerns

WATER/WASTEWATER TREATMENT

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

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

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.

At the beginning of 2021, the Energy Team met with members of each PASSHE university to discuss energy market trends, the energy impact of future facility infrastructure plans for each university, and to develop a unique strategy for energy procurement that balanced market risk avoidance with university needs.

Members of the team participated in various virtual meetings with PASSHE universities to discuss the potential of using the Commonwealth's PA PULSE model of procuring solar photovoltaic (PV) energy.

Energy Team members reviewed the Anthracite Power and Light request to increase contract rates in the PECO territory as a result of a network integrated transmission service rate increase and distributed an email documenting the findings to the Procurement Manager.

During fiscal year 2020–2021, the PSFEI Energy Team helped PASSHE universities reduce future energy supply costs by over $255,000 in comparison to current contract rates and avoid over $1.65 million in projected annual electricity and natural gas expenditures as compared to utility-issued, price-to-compare costs. Additionally, PASSHE universities received $115,832 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 on-line 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 minor adjustments while the bulk of the efforts were dedicated to developing a next-generation platform.

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 IV opened June 1, 2021 and provides cash rebates for electricity-saving initiatives. Program specifics vary across utility zones and are available through each EDC.

PJM DEMAND RESPONSE PROGRAM SERVICES

PSFEI supported PASSHE universities with the PJM Demand Response Program. Efforts included review and dissemination of information on various PJM programs, proposed fees, procedures, and associated revenues for program participation. Five universities participated in the PJM program; results are provided in the following table.

PJM Demand Response Program Results

University	CSP (1)	EDC (2)	KW Commitment	KW Achieved	Total Payment
Clarion University	Centrica	West Penn	1,021	1,041	$28,868
East Stroudsburg University	Centrica	PPL	92	499	$1,309
Kutztown University	Centrica	MetEd	1,529	1,867	$30,418
Millersville University	Centrica	PPL	738	0	$20,879
Slippery Rock University	Centrica	West Penn	1,609	1,568	$34,358
Total Customer Payments					**$115,832**

(1) Curtailment service provider
(2) Electrical distribution company

ELECTRICITY PROCUREMENT

PSFEI worked with the PASSHE Collaborative Contract Manager to conduct an electricity commodity procurement event for large PASSHE accounts during fiscal year 2020−2021. 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 2020–2021, contracts were awarded for fifty-five electric accounts. Total contract avoided cost in comparison to the utility rate for these accounts was projected to be $294,809. 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 $171,951 over the term of the new contracts. Details of the procurement event are provided in the table on the following page.

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
Cheyney (1)	1	---	---	---	---
Lock Haven	2	($21,932)	($43,863)	$14,745	$29,491
Shippensburg (1)	1	---	---	---	---
Slippery Rock (2)	3	---	---	$8	$17
West Chester	48	$105,813	$215,814	$132,938	$265,301
Totals	**55**	**$83,881**	**$171,951**	**$147,691**	**$294,809**

1 Accounts awarded were unmetered or no-usage accounts; therefore, no Avoided Cost could be calculated.
2 Accounts awarded were not previously solicited; therefore, no previous contract existed as a basis for calculation.

NATURAL GAS PROCUREMENT

PSFEI held one natural gas commodity procurement event during the fiscal year. For each of the natural gas accounts shopped, PSFEI collected billing data, charted historical consumption, and estimated monthly nominations for bidding based on usage trends, weather data, and future university operations. Nominations were determined through verbal or written communications with each university; subsequent approval by the university was then obtained via ERMA. The Natural Gas Procurement Summary table below shows negative savings when compared to previous natural gas supply contracts for some individual universities. This is due to rising natural gas market prices. However, PASSHE realized savings as a group versus previous contracts, as well as compared to obtaining natural gas from the natural 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 University	5	$10,141	$20,282	$38,590	$77,180
Dixon Center (1)	1	($6,510)	($6,510)	$712	$712
East Stroudsburg University	5	$23,859	$47,718	$408,802	$817,605
Mansfield University (1)	3	($17,947)	($17,947)	$250,481	$250,481
Millersville University	4	$16,922	$33,844	$47,198	$94,395
Slippery Rock Universtiy	1	$3,111	$6,222	$61,617	$123,233
Totals	**19**	**$29,576**	**$83,609**	**$807,400**	**$1,363,606**

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

DEPARTMENT OF GENERAL SERVICES COAL COMMITTEE

The 2020–2021 fiscal year Coal Committee meeting was cancelled due to the COVID-19 pandemic. Slippery Rock University is the last remaining PASSHE university with a contract for coal. Coal vendor RFI Resources agreed to renew their contract with no change in pricing for contract year 2021–2022. A specification modification was requested in support of a change to the university's operating permit. The Pennsylvania Commercial Item Description 1069 (PCID) was revised to reflect the modification and subsequently accepted by RFI Resources at no additional cost to the contract.

PSFEI is a standing member of the Department of General Services (DGS) Coal Committee. Support provided by PSFEI included review of coal sampling results, development of actions to maintain desired coal quality, and updates to the lab reporting spreadsheet.

PASSHE DIRECTOR MEETINGS

Due to restrictions imposed by the COVID-19 pandemic, PSFEI staff virtually participated in PASSHE Facility Director Check-In Meetings and provided information on the following topics:

- December 2020 — Energy procurement update
- January 2021 — Pipeline master meter plan requirements (presented by Douglas Pipeline Company)
- March 2021 — COVID-19 technologies update

EDUCATION

Various PSFEI education opportunities were available to PASSHE personnel during the fiscal year; however, due to ongoing restrictions imposed by the COVID-19 pandemic, all education offerings were provided virtually via Zoom.

Forty-one 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 2020–2021:

- Effective Facility Management—Year 3, July 22–24, 2020. Topics of instruction focused on capital planning, scheduling, and budgeting; asset management in a sustainable environment; prioritizing the maintenance management backlog; new sustainable technologies; and contract management.
- Central Plant Heating Systems and Equipment, May 18–20, 2021. This course provided instruction on central plant fuel sources, outputs, and heat plant types; steam systems; hot water system pumps, equipment and operations, and maintenance checklists; troubleshooting techniques and methodology; and water chemistry requirements for steam and hot water systems.
- Facility Electrical Loads, June 9–11, 2021. Sessions taught during this course included lighting fundamentals, electrical fundamentals for elevators, motors and motor starters, pairing variable frequency drives with motors, controllers and metering principles, wiring 101, system troubleshooting, surge arrestor fundamentals, and hands-on metering applications.
- HVAC Equipment Troubleshooting and Procedures, June 22–24, 2021. This course provided instruction on ventilation; technology versus fundamentals, refrigerants and net refrigerant effect, refrigerant application and engineered function of sealed system components, benchmarking equipment performance, subcooling and superheat, compressor issues, chiller calculations and log sheets, and fossil fuels combustion efficiency testing and procedures.

The following workshops were provided in fiscal year 2020–2021:

- Electrical Workshop—NFPA70E Electrical Safety Training, April 13, 2021. Workshop topics included an overview of National Fire Protection Association (NFPA) standards, electrically safe work condition, energized work, hazards of electricity, power system studies, electrical personal protective equipment (PPE), emergency response, arc flash mitigation, and electrical maintenance and testing.
- There were no boiler or HVAC workshops offered during the fiscal year.

Monthly Utilities Usage Report training and assistance was available to university personnel upon request throughout the fiscal year.

Education Table

University	Short Courses				Workshops			Total Attendees	
	Boiler	EFM	Electrical	HVAC	Boiler	Electrical	HVAC	Short Courses	Work-shops
Bloomsburg			1	2		7		3	7
California						4			4
Chancellor's Office									
Cheyney									
Clarion		1						1	
Clarion - Venango									
Dixon Center						2			2
East Stroudsburg									
Edinboro									
Indiana	3		2	3				8	
Kutztown	3			6				9	
Lock Haven						4			4
Mansfield						1			1
Millersville									
Shippensburg			1	1				2	
Slippery Rock									
West Chester									
Total	**6**	**1**	**4**	**12**		**18**		**23**	**18**

SERVICES TO INDIVIDUAL UNIVERSITIES

BLOOMSBURG UNIVERSITY

Assisted with Phase 7 of the electrical tie distribution project, which required multiple site visits in December 2020 and January 2021 to witness remote function testing of a medium voltage switch, verify proper protection settings in medium voltage relays, attend project meetings between university staff and the contracted project managers, and perform a technical review of the Tie Switchgear Coordination Study. PSFEI Report ER 20/21–5, issued October 12, 2020, detailed these efforts.

Trained university staff in April 2021 on infrared thermography procedures to enable use of an on-site infrared thermography camera.

Visited the university in May 2021 to discuss plans for central plant control system upgrades and examine the various natural gas and steam flow meters. This effort is ongoing.

Performed preventative maintenance and testing on feeder circuits 1202 and 1204 during multiple site visits in May 2021. Testing results were provided in PSFEI Report TR 20/21–25 issued June 17, 2021.

Facilitated a short-term supply contract to extend pricing through October 2021 as part of the overall natural gas procurement plan, which allowed the university to align specific natural gas accounts with the larger PASSHE group contract-end dates, enabling the university to join the larger Request for Quote (RFQ) group. PSFEI contacted the existing natural gas supplier, obtained multiple market quotes, and communicated purchasing recommendations to university personnel.

Coordinated efforts for participation in the PSFEI CMMS survey initiative.

CALIFORNIA UNIVERSITY

Assisted with a sporadic tripping issue of one of the main circuit breakers feeding the Convocation Center. Multiple site visits occurred during August 2020 to troubleshoot, test the trip unit on the breaker, and replace the unit. PSFEI Report ER-F 2021–1, issued August 6, 2020, detailed these efforts.

Responded to a request in August 2020 for suggested methods to track the university's refrigerants use. Recommended checking on the capabilities of using the existing School Dude CMMS; researched and provided two other sources of refrigerant tracking documents for review and use.

Developed a scope of work for performing maintenance and testing on the main switchgear, which required a site visit to perform the assessment and inventory the equipment. The assessment results and scope of work were provided in PSFEI Report ER 20/21–10, issued January 18, 2021. This effort is ongoing.

Provided instruction and support to university staff on proper completion of the PSFEI Monthly Utilities Usage Report.

Analyzed natural gas charges on supplier invoices and discovered Pennsylvania sales tax was being charged improperly. Communicated with the supplier to remove the tax on future invoices, obtained a refund credit of $276.40 for three months of charges, and advised university personnel how to obtain additional refunds for older invoices from the Commonwealth.

Coordinated efforts for participation in the PSFEI CMMS survey initiative.

CHEYNEY UNIVERSITY

Coordinated efforts for participation in the PSFEI CMMS survey initiative.

CLARION UNIVERSITY

Assisted in qualifying three boiler operator positions in July 2020 by providing verification of PSFEI boiler short course attendance by applicant, reviewing plans for testing the applicant's knowledge base, and reviewing and discussing resume merits.

Performed an assessment of the boiler controls upgrade project in January 2021, which included client discussions and a site visit to gather steam pressure data and information on the east and west header transmitters. Researched specifics on the age of the LMV52 controllers and data acquisition options with the controls and boiler equipment vendor. This effort is ongoing.

Assessed a medium voltage feeder protective relay issue in the North Main Switchgear. This entailed a site visit in January 2021 to perform the assessment and replace the failed relay with an existing spare relay. PSFEI report ER-F-20/21–9, issued January 21, 2021, detailed these efforts. Due to the age and onset failures of the relays, PSFEI is assisting the university with the replacement of all protective relays in both the North and South Main Switchgears. This effort is ongoing.

Conducted a site visit in January 2021 to assess and inventory the university's electrical equipment and develop a scope of work for preventative maintenance and testing. PSFEI Report ER 20/21–11, issued January 26, 2021, detailed these efforts. Preventative maintenance and testing were performed in May 2021; testing results were provided in PSFEI Report TR 20/21–23, issued June 8, 2021.

Participated in discussions in April 2021 with the university's Director of Facilities Management and Operations and Terra Works regarding an offer to sell electricity to the university.

Responded to email inquiry from the Director of Procurement Services regarding electricity broker service solicitations. Followed up with an email providing a summary of the university's accounts and contract end dates and advised that such offers can be ignored since PSFEI manages energy procurement activities on behalf of the university.

Participated in several discussions with the Director of Procurement Services and some faculty regarding a proposal to build a medical treatment facility for the Northwest Aids Alliance. Reviewed preliminary plans and cost estimates and provided comments to the university in May 2021.

Facilitated a short-term supply contract to extend pricing through October 2021 as part of the overall natural gas procurement plan, which allowed the university to align specific natural gas accounts with the larger PASSHE group contract-end dates, enabling the university to join the larger RFQ group. PSFEI contacted the existing natural gas supplier, obtained multiple market quotes, and communicated purchasing recommendations to university personnel.

Coordinated efforts for participation in the PSFEI CMMS survey initiative.

CLARION UNIVERSITY–VENANGO CAMPUS

No site-specific services were requested during fiscal year 2020–2021.

DIXON UNIVERSITY CENTER

Attended the PASSHE Sustainable Development Task Force meeting in April 2021. During the meeting, an overview of the DGS Pulse solar project was provided for PASSHE universities that have an interest developing solar energy. The PSFEI Energy Team, DGS, and PASSHE are working together to create a contracting mechanism to provide on-site solar generation for interested universities. This effort is ongoing.

EAST STROUDSBURG UNIVERSITY

Worked extensively with the Utilities and Plant Services Manager (Manager) on copper corrosion within the potable water piping of the Innovation Center. Coordinated with the local water suppliers and helped develop a water flushing and sampling plan for the building water system in an effort to mitigate any future corrosion. Connected the Manager with EPA officials who specialize in potable water pipe corrosion to broaden expertise and recommendations for the issue.

Coordinated efforts for participation in the PSFEI CMMS survey initiative.

EDINBORO UNIVERSITY

No site-specific services were requested during fiscal year 2020–2021.

INDIANA UNIVERSITY OF PENNSYLVANIA

Assisted the university's Budget Analyst with a Constellation natural gas billing issues. Calculated revised monthly natural gas invoice totals to assist with reconciliations at the accounts-payable level. Provided ongoing support with respect to obtaining revised invoices from Constellation and audited the revised invoices to ensure correct changes had been made. Efforts resulted in a total refund of over $6,400.

Performed an economic feasibility study for the university's combined heat and power plant (CHP). Attended multiple meetings with university staff to discuss the goals and findings, analysis of the

energy and financial data, and development of the feasibility study. PSFEI Report EN 20/21–1, issued July 29, 2020, detailed these efforts. Followed up in September 2020 to discuss and review the report findings. This effort is ongoing.

Facilitated virtual meetings in June 2021 with university staff to discuss chilled water issues. Drawings, sequence of operation, and commissioning documentation is required for further review. This effort is ongoing.

Coordinated efforts for participation in the PSFEI CMMS survey initiative.

KUTZTOWN UNIVERSITY

Provided instruction and support to university staff in October 2020 for proper completion of the PSFEI Monthly Utilities Usage Reports.

Held a virtual conference call in November 2020 with PSFEI and university staff to describe PSFEI services. During the call, the value of Kutztown University's use of EnergyCAP was discussed and PSFEI encouraged the university to upgrade their current version.

Reviewed a letter from utility Met-Ed regarding a rate class switch and provided an explanation of the findings to the Director of Facilities Maintenance via email.

Assessed the preventative maintenance and testing needs of the university's main switchgear in January 2021; developed a scope of work for performing the maintenance and testing. The results of the assessment and the scope of work were provided in PSFEI Report ER 20/21–16, issued March 30, 2021.

Provided direction for calculating emissions for annual reporting to the Utility Plant Supervisor in February 2021.

Responded to a request from the Director of Facilities Maintenance for PSFEI Monthly Utilities Usage Reports going back to 2016 to satisfy a request received by the university under a Right to Know (RTK) request for utility information. PSFEI's response was documented in PSFEI Report GN-E 20/21–2 issued March 16, 2021. This effort is ongoing.

Researched Pennsylvania's database and discussed the university’s stormwater status as it relates to the Municipal Separate Storm Sewer System (MS4). Reviewed and provided comments on the university’s Water Management and Safety Plan, with emphasis on how it relates to Legionella bacteria, and provided Standard Operating Procedures for cooling tower operation.

Facilitated a short-term supply contract to extend pricing through October 2021 as part of the overall natural gas procurement plan, which allowed the university to align specific natural gas accounts with the larger PASSHE group contract-end dates, enabling the university to join the larger RFQ group. PSFEI contacted the existing natural gas supplier, obtained multiple market quotes, and communicated purchasing recommendations to university personnel.

Coordinated efforts for participation in the PSFEI CMMS survey initiative.

LOCK HAVEN UNIVERSITY

No site-specific services were requested during fiscal year 2020–2021.

LOCK HAVEN–CLEARFIELD CAMPUS

No site-specific services were requested during fiscal year 2020–2021.

MANSFIELD UNIVERSITY

Assisted with troubleshooting and assessing the mechanical boiler “fail on air proving” fault code. Data gathering and recommendations were detailed in PSFEI Report MR-C-20/21–2, issued November 16, 2020. Follow up troubleshooting and diagnostics was provided by phone.

Responded to a request for information regarding the number of maintenance staff required per facility square foot. Collected, organized, and provided the data to the university's Director of Facilities in December 2020.

Discussed water treatment plant operations with the university's chief water operator; provided advice for a water valve replacement at the water plant.

Coordinated efforts for participation in the PSFEI CMMS survey initiative.

MILLERSVILLE UNIVERSITY

Engaged in discussions with the Assistant Chancellor for Facilities in October 2020 followed by discussions in November 2020 with university and PSFEI staff regarding implementation of projects using a (Guaranteed Energy Savings Act) GESA model without the contract or use of an Energy Service Company (ESCO). This effort is pending the university's identification of buildings to be used to develop Energy Conservation Measures (ECMs).

Evaluated manufacturer literature and vendor proposals inclusive of contract terms to determine the accuracy and merit of expectations of installing a system to apply dry hydrogen peroxide to control COVID-19 in the athletic facility. This effort was requested by the university's Assistant Vice President for Facilities in March 2021. The results of the research and discussions with the ASHRAE's Epidemic Task Force chair and Penn State athletic facility personnel were summarized in PSFEI Report MR-S-20/21–1 issued April 1, 2021.

Assessed the preventative maintenance and testing needs of the university's main electrical 15 kilovolt (kV) switchgear in March 2021; developed a scope of work for performing the maintenance and testing. The results of the assessment and the scope of work were provided in PSFEI Report ER 20/21–19, issued April 9, 2021. This effort is ongoing.

Worked with university personnel and natural gas local distribution companies (LDCs) to facilitate required contracts and paperwork to switch distribution rate from rate Non-Residential Transportation

(NT) to rate Delivery Service (DS) per the results of a previous RFQ. Efforts included recommendations on components of the distribution rate and an explanation of the components to university personnel.

Coordinated efforts for participation in the PSFEI CMMS survey initiative.

SHIPPENSBURG UNIVERSITY

Responded to a request from university personnel in November 2020 for information about Act 127 reporting requirements. Provided research results and a preliminary analysis to the Associate Director for Maintenance and Operations.

Engaged in discussions in November 2020 regarding the H. Ric Luhrs Performing Arts Center roof ballast delamination issue with the Associate Director for Maintenance and Operations. It was determined that PSFEI could provide a structural calculation to help determine the cause of the roof delamination but would not be able to sign and seal design documents.

Held discussions with the Associate Director for Maintenance and Operations in January 2021 regarding water damage to six housing units in an attempt to determine the extent of the problem. Further discussions and a request for assistance in assessing the building envelope and suggested preventative maintenance for the roof was received in June 2021. This effort is on going

Performed preventative maintenance and testing on the Main No. 1 Transformer, which required a site visit in December 2020 to complete the maintenance and testing. Testing results and recommendations were provided PSFEI Report TR 20/21–14, issued February 2, 2021.

Assessed an issue with the transfer function of the Chiller Plant 480V main-tie-main switchgear; a site visit was conducted in February 2021 to troubleshoot the issue. PSFEI Report ER-F 20/21–13, issued March 5, 2021, provided findings and recommendations from this visit; however, additional troubleshooting is required to resolve the issue. This effort is ongoing.

Performed a power system study for the university's electrical distribution system. Multiple site visits were made during February 2021 to collect system data, and model, analyze, and coordinate the system in the power system study software. A full report including recommendations will be provided to the university upon completion of this project. This effort is ongoing.

Administered a peak load management strategy by providing curtailment alerts to university staff on potential coincident peak days. By operating the chilled water storage system and effectively curtailing electricity usage, the university reduced their capacity costs. Every 250 kilowatt (kW) reduction in usage during peak days in summer 2020, resulted in approximately $15,000 in cost savings during Energy Year 2021–2022.

Spoke with the Facilities Resources Manager regarding PSFEI Monthly Utilities Usage Report data and provided guidance on which electric peak demand value should be used for reporting purposes.

Distributed a letter to the Associate Director for Maintenance and Operations addressing solar electricity procurement questions.

Provided an assessment of PSFEI's position on bi-polar ionization as it relates to COVID-19 at the request of the Associate Director for Maintenance and Operations in PSFEI Report GN-E 20/21–1 issued March 5, 2021. Subsequently provided updated ASHRAE guidelines for COVID-19 modes of transportation to support the discussion on the shift for the continued rigors of surface cleaning and suggested design standard updates for HVAC enhancements for mitigating virus transmission.

Performed a technical review of Shippensburg University's Design Guide as requested by the Assistant Director for Planning and Engineering; comprehensive electrical and mechanical design guide comments and recommendations were provided via email in April 2021.

Provided the Assistant Facilities Resource Manager with elevator testing requirements in June 2021.

Assisted the Associate Director for Maintenance and Operations with the Ceddia Union Building standalone lighting control system failure in June 2021. Efforts included review of a vendor proposal to replace the entire control system and devices, and on-site coordination with the current BAS controls vendor to provide a quote to replace the control system using existing devices. This effort in ongoing.

Reviewed the university's chilled water system drawings at the request of the Associate Director for Maintenance and Operations to determine the feasibility of adding chilled water heat exchangers to the existing chilled water system to increase energy savings by utilizing free cooling. This effort is ongoing.

Coordinated efforts for participation in the PSFEI CMMS survey initiative.

SLIPPERY ROCK UNIVERSITY

Provided assistance from August of 2020 through April 2021 for the design of a replacement coal ash silo, which included conference calls with university staff, various equipment vendors, and the design firm; research and assessment of proposed design system options; and providing commentary, recommendations, and cost estimates from conceptual through the design phase of the project. This effort assisted in defining the best approach, equipment, and options within the project financial constraints.

Researched the merits of seeking restitution for emergency generator engine failures maintained by a third-party manufacturer. However, after exhaustive efforts, no expert witness could be acquired to testify against the major equipment provider due to the extent of time, cost, and possible retribution.

Intervened at the request of the Assistant Vice President for Facilities and Planning with the Pennsylvania Department of Environmental Protection (PADEP) to clarify stack testing protocols. PSFEI resolved the issue with PADEP; results were communicated via email in September 2020 to the requestor. Subsequent follow up entailed researching the PADEP point of contact for notification of future planned stack testing and providing training for operators on stack testing procedures.

Provided additional stack testing guidance to operators and a training workshop in February 2021 on the purpose and operation of 1/3–2/3 parallel pressure reducing valves (PRV) systems at the request of the Assistant Vice President for Facilities and Planning.

Responded to a request for information from the Assistant Vice President for Facilities and Planning regarding a change in the university's air quality permit to state-only from Title V. Information was provided in PSFEI Report MR-E 20/21–6 issued September 30, 2020.

Participated in a virtual meeting in November 2020 to discuss and kick off the university's Carbon Neutrality Plan at the request of the Assistant Vice President for Facilities and Planning. Alerted internal PSFEI staff about corrosion in the steam sensor line.

Provided technical assistance during a November 2020 site visit when an economizer leak on Boiler No. 2 was observed during the boiler startup. Findings and recommendations for this issue were detailed in PSFEI Report MR-F 20/21–6 issued March 3, 2021.

Started a power systems study on the university's medium voltage electrical distribution system in May 2021. This entailed efforts to model, analyze, and coordinate the system in the power system study software. A report with the results of the study and recommendations will be provided upon completion. This effort is ongoing.

Provided electric budget projections for calendar year 2021, which included both regulated and supply charges for the university's large boiler plant account.

Observed a lack of condensate removal from the steam line around one of the PRVs and a blocked PRV sensing line located in the Smith Student Center mechanical room during the February 2021 visit for operator training. PSFEI Reports MR-F 20/21–5 (March 2, 2021), MR-F 20/21–8 (March 3, 2021), and MR-F 20/21–7 (March 30, 2021) detailed findings and recommendations for this issue.

Reviewed the university's boiler compliance testing report at the request of the Assistant Vice President for Facilities and Planning. Comments were transmitted via PSFEI Report MR-E 20/21–17 on March 3, 2021.

Provided a cost analysis of the utility plant operating on natural gas only versus natural gas and coal. Details of the analysis were provided to the Assistant Vice President for Facilities and Planning via email in March 2021.

Assessed an issue with inadvertent tripping of Feeder Breaker 1-1 in the main medium voltage switchgear. Performed testing on the medium voltage switch and transformer outside of the Jack Critchfield Park Stadium in April 2021. Findings and recommendations were provided in PSFEI Report ER 20/21–21 issued May 6, 2021.

Performed a rate analysis of more than two dozen small natural gas accounts to determine the optimal distribution rate. Obtained third-party natural gas supply pricing to compare with the utility price-to-compare and advised university personnel to change the rate class to utility supply.

Coordinated efforts for participation in the PSFEI CMMS survey initiative.

WEST CHESTER UNIVERSITY

Provided natural gas meter information to the Energy Project Manager in September 2020 as requested. A boiler efficiency evaluation approach was proposed using strategic calibrated boiler instrumentation to compare utility natural gas meter data and determine building EUI. This effort is ongoing.

Assisted the university and the new design firm via conference calls in September and October 2020 with reviewing the schematic design of the replacement makeup air handler, equipment, and upgrades to the duct distribution system and controls for increased ventilation at the Anderson Hall building to address issues previously identified in PSFEI report HR-E 19/20–7 issued March 3, 2020.

Reviewed and provided the university's Energy Project Manager with information on energy use versus weather regression for estimating energy consumption.

Developed a financial assessment of the economic advantage of installing a ground source heat pump system compared to a conventional heating and cooling system for the Sturzebecker Health Science Center. PSFEI Reports MR-C-20/21–10 (April 26, 2021) and EN 20/21–3 (May 14, 2021) were issued to document this effort.

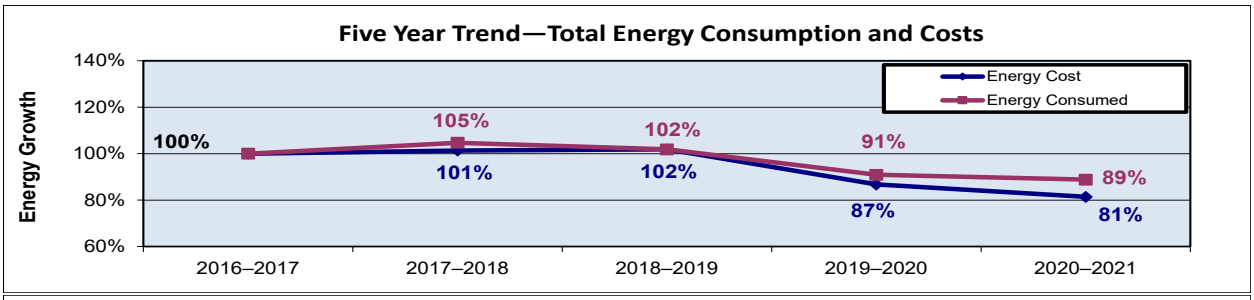
Assisted the Energy Project Manager in reviewing and understanding university building data scatter plots and plot relationships. Discussions and research were completed for vetting approaches to energy building optimization using core enthalpy and outside enthalpy in anticipation of a pilot facility condition assessment project; the pilot project was subsequently declined.

Worked with university personnel to obtain historic natural gas usage to prepare for participation in a natural gas RFQ. This effort is ongoing.

Coordinated efforts for participation in the PSFEI CMMS survey initiative.

UTILITY DATA TABLES AND CHARTS

Fuel and Energy Consumption and Costs



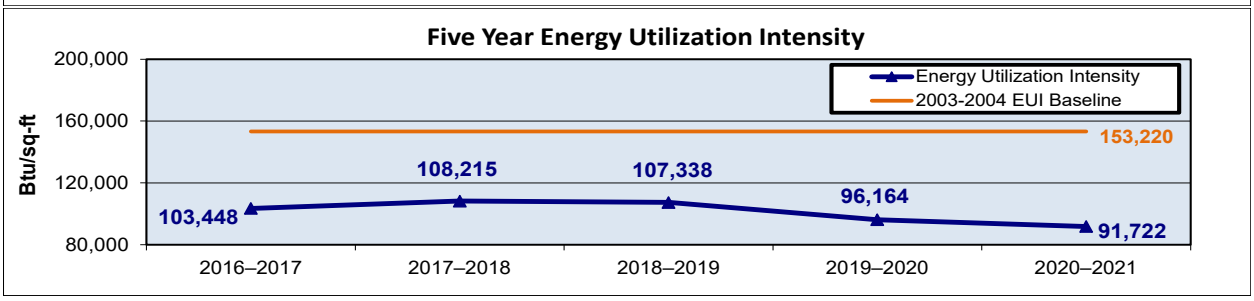
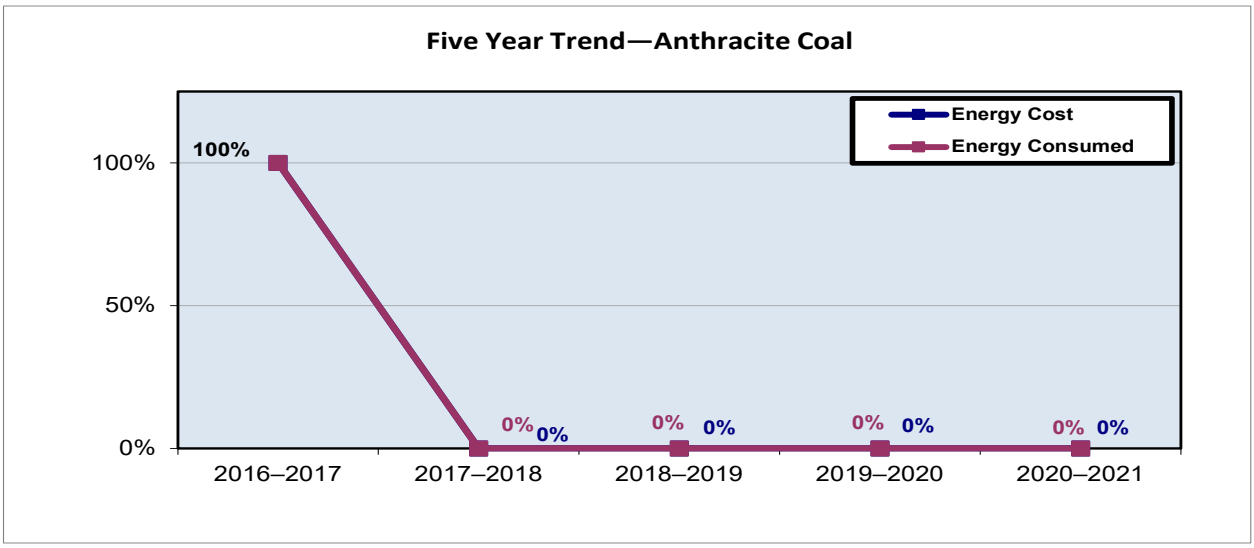


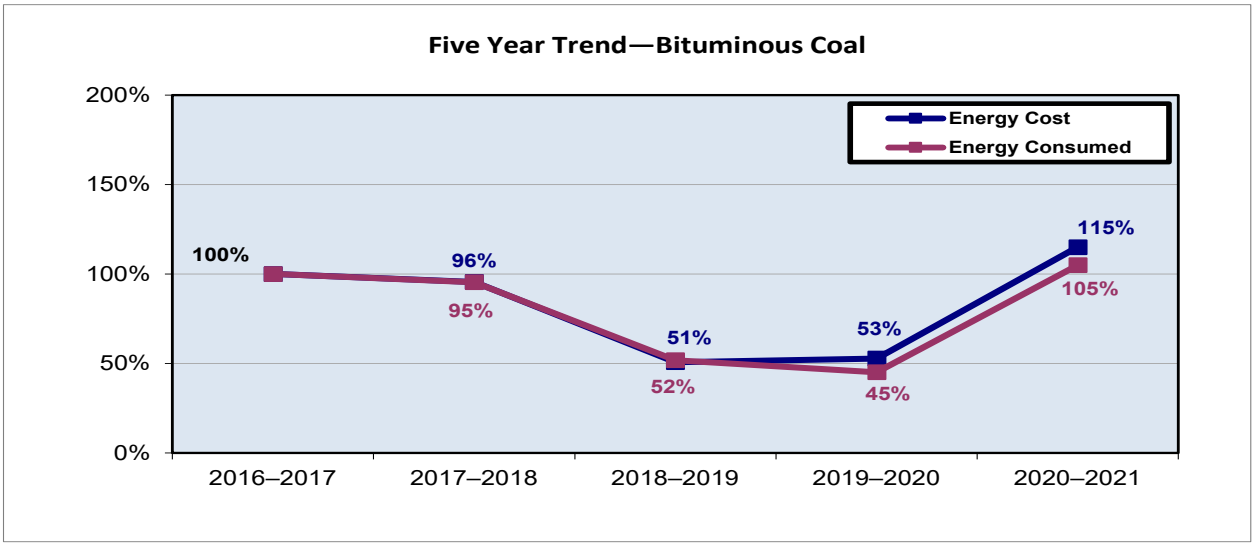
Table 1. Five-Year Comparison: 2016–2017 to 2020–2021

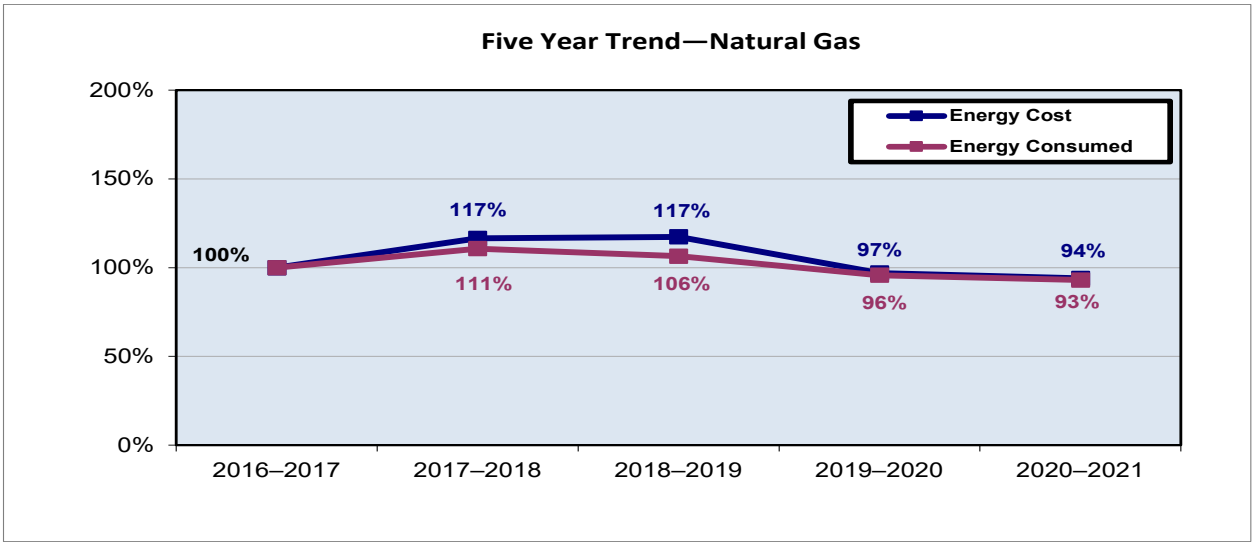
	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	456	---	---	---	---
Bituminous Coal	tons	2,698	2,574	1,399	1,217	2,831
Gas	mcf	1,796,746	1,988,721	1,912,838	1,719,270	1,671,428
Oil	gal	86,121	113,244	106,525	48,906	84,626
Wood	tons	6,809	4,842	5,200	4,081	4,021
Electric	kWh	399,698,853	396,675,370	399,665,123	356,553,099	336,618,812
Energy Costs						
Anthracite Coal	$	$61,560	---	---	---	---
Bituminous Coal	$	$259,366	$247,887	$131,670	$136,848	$298,279
Gas	$	$9,384,821	$10,933,894	$11,014,050	$9,096,897	$8,820,107
Oil	$	$177,751	$266,791	$204,759	$137,674	$162,211
Wood	$	$270,668	$197,505	$296,400	$250,743	$229,243
Electric (1)	$	$25,290,899	$24,294,128	$24,456,845	$21,127,705	$19,350,004
Total	**$**	**$35,445,065**	**$35,940,205**	**$36,103,725**	**$30,749,866**	**$28,859,844**
Energy Consumption						
Anthracite Coal	mmBtu	11,537	---	---	---	---
Bituminous Coal	mmBtu	71,767	68,468	37,213	32,372	75,305
Gas	mmBtu	1,850,648	2,048,383	1,970,223	1,770,848	1,721,571
Oil	mmBtu	12,057	15,854	14,913	6,847	11,848
Wood	mmBtu	57,877	41,157	44,200	34,689	34,179
Electric	mmBtu	1,364,172	1,353,853	1,364,057	1,216,916	1,148,880
Total	**mmBtu**	**3,368,058**	**3,527,715**	**3,430,607**	**3,061,671**	**2,991,782**
Energy Utilization Intensity (2)	**Btu/sq-ft**	**103,448**	**108,215**	**107,338**	**96,164**	**91,722**
Unit Fuel Costs						
Anthracite Coal	$/ton	$135.00	---	---	---	---
Bituminous Coal	$/ton	$96.13	$96.30	$94.12	$112.45	$105.36
Gas	$/mcf	$5.22	$5.50	$5.76	$5.29	$5.28
Oil	$/gal	$2.06	$2.36	$1.92	$2.82	$1.92
Wood	$/ton	$39.75	$40.79	$57.00	$61.44	$57.01
Electric	¢/kWh	6.33 ¢	6.12 ¢	6.12 ¢	5.93 ¢	5.75 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	$5.34	---	---	---	---
Bituminous Coal	$/mmBtu	$3.61	$3.62	$3.54	$4.23	$3.96
Gas	$/mmBtu	$5.07	$5.34	$5.59	$5.14	$5.12
Oil	$/mmBtu	$14.74	$16.83	$13.73	$20.11	$13.69
Wood	$/mmBtu	$4.68	$4.80	$6.71	$7.23	$6.71
Electric	$/mmBtu	$18.54	$17.94	$17.93	$17.36	$16.84
Weighted Average	**$/mmBtu**	**$10.52**	**$10.19**	**$10.52**	**$10.04**	**$9.65**

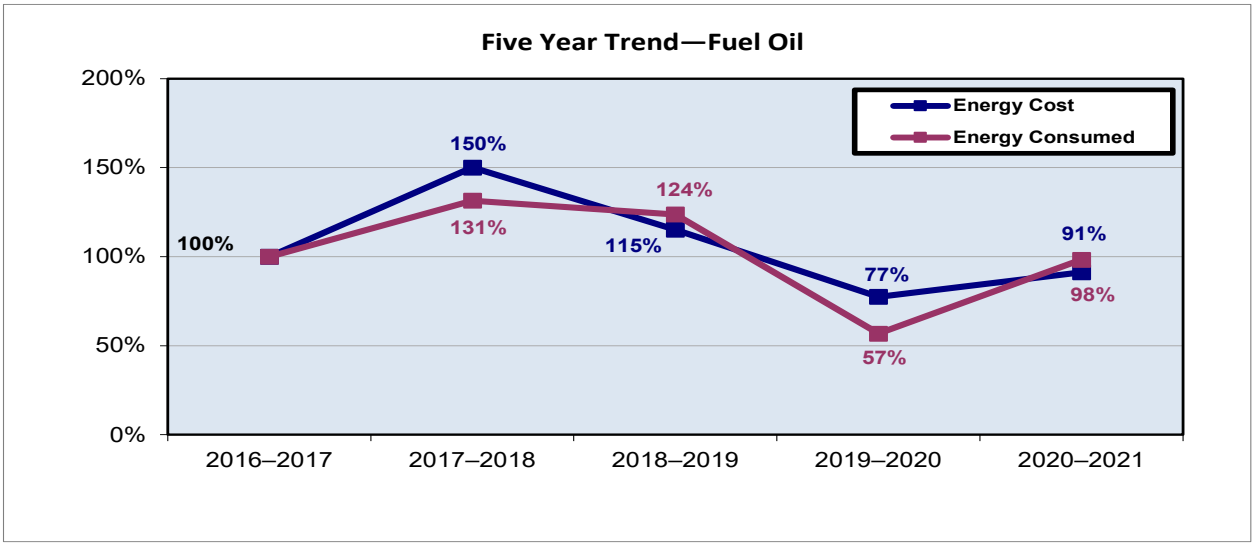
(1) Excludes total cost of operation and maintenance for electric generation with the cogeneration plant for Indiana University.
(2) Changes in historical gross area affected Energy Utilization Intensity reported in previously issued PASSHE Utility Usage Reports.

Five-Year Trend—Energy Consumption and Costs








Five Year Trend—Fuel Oil
200%
150%
100%
50%
0%
Energy Cost
Energy Consumed
100%
150%
131%
115%
124%
77%
57%
91%
98%
2016–2017
2017–2018
2018–2019
2019–2020
2020–2021

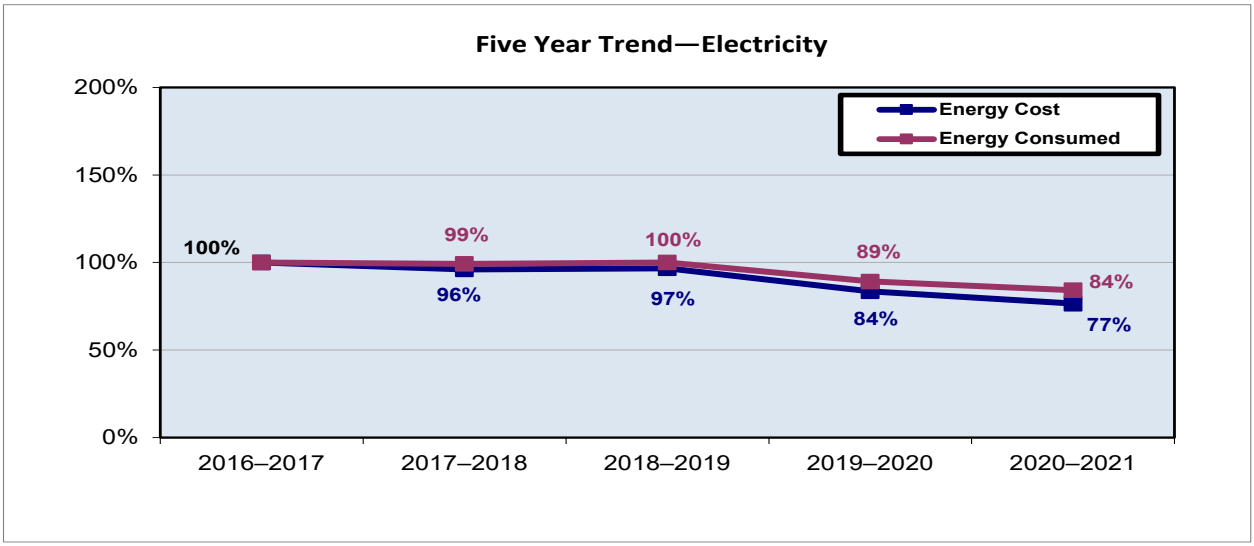

Five Year Trend—Electricity
200%
150%
100%
50%
0%
Energy Cost
Energy Consumed
100%
99%
96%
100%
97%
89%
84%
84%
77%
2016–2017
2017–2018
2018–2019
2019–2020
2020–2021

Table 2. Energy Consumption and Costs 2020–2021

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	432,016	$3,153,298	$7.30	2,145,612	$1.47	201,349
Bloomsburg Upper						x	19,553	$343,898	$17.59	552,821	$0.62	35,370
California			x			x	118,249	$1,605,141	$13.57	2,118,648	$0.76	55,813
Cheyney			x			x	79,028	$1,002,819	$12.69	963,243	$1.04	82,043
Clarion			x			x	170,444	$1,390,169	$8.16	1,423,379	$0.98	119,746
Clarion-Venango			x			x	5,484	$79,417	$14.48	82,036	$0.97	66,848
Dixon Center			x			x	8,578	$120,094	$14.00	145,734	$0.82	58,858
East Stroudsburg			x	x		x	189,348	$1,837,702	$9.71	2,032,927	$0.90	93,141
Edinboro			x			x	142,948	$1,788,550	$12.51	2,356,333	$0.76	60,665
Indiana (1)			x	x		x	527,322	$3,107,212	$5.89	4,001,727	$0.78	131,773
Kutztown			x			x	237,187	$2,440,169	$10.29	2,462,547	$0.99	96,318
Lock Haven			x			x	111,213	$1,261,691	$11.34	1,485,322	$0.85	74,875
Lock Haven-Clearfield			x			x	8,446	$114,067	$13.51	92,373	$1.23	91,431
Mansfield			x			x	126,661	$1,339,855	$10.58	1,530,411	$0.88	82,763
Millersville			x	x		x	156,073	$2,129,002	$13.64	2,345,035	$0.91	66,555
Shippensburg			x			x	159,199	$1,663,186	$10.45	2,299,487	$0.72	69,232
Slippery Rock		x	x			x	287,864	$2,395,894	$8.32	2,581,242	$0.93	111,522
West Chester			x	x		x	212,170	$3,087,681	$14.55	3,999,041	$0.77	53,055
	Anthracite Coal	Bituminous Coal	Gas	Oil	Wood	Electric						
Total							2,991,782	$28,859,844		32,617,918		
Average									$9.65		$0.88	91,722

(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 by the cogeneration plant.

Table 3. Central Boiler Plant 2020–2021

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)	18%	5,281	42,000	$825,327	$1,006,780	$1,832,107	$10.99	$10.58	96%
California (2)	19%	5,372	6,375	$167,529	$326,783	$494,312	$25.49	$16.68	65%
Clarion (1)	39%	6,201	31,312	$433,720	$687,419	$1,121,139	$12.45	$10.81	87%
Dixon Center (3)	---	4,523	---	$40,897	---	$40,897	---	$8.13	---
East Stroudsburg (1)	35%	4,825	30,700	$499,785	$523,202	$1,022,987	$11.79	$10.04	85%
Indiana (4)	35%	6,509	42,835	$1,014,765	$2,129,772	$3,144,537	$18.93	$15.00	79%
Kutztown	23%	5,113	36,400	$672,186	$463,326	$1,135,512	$12.48	$10.02	80%
Lock Haven (3) (5)	---	5,422	---	---	$159,113	$159,113	---	---	---
Lock Haven-Clearfield (3) (5)	---	6,101	---	---	$79,684	$79,684	---	---	---
Mansfield (1)	32%	6,012	673,000	$344,737	$535,700	$880,437	$12.37	$13.91	112%
Slippery Rock	39%	5,515	38,000	$818,852	$1,155,924	$1,974,775	$14.57	$11.06	76%
Total				$4,817,797	$7,067,703	$11,885,500			

(1) Average plant efficiency is above expected parameters and indicates probable metering errors.
(2) Average plant efficiency is below expected parameters and indicates possible metering, combustion, tube fouling, and/or other boiler/system issues.
(3) No steam produced.
(4) Excludes FIUP usage and cost of steam
(5) Operations and maintenance costs represent decentralized boilers.

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	4	68,000	130,573	134,865	mcf	138,911	$596,084	$4.57	94%
	Wood	1	15,000	36,125	4,021	tons	34,179	$229,243	$6.35	106%
California (2)	Gas	3	45,000	19,390	28,775	mcf	29,638	$167,529	$8.64	65%
Clarion (1)	Gas	3	70,000	90,040	100,671	mcf	103,691	$433,720	$4.82	87%
Dixon Center (3)	Gas	3	---	---	4,881	mcf	5,027	$40,897	---	---
East Stroudsburg (1)	Gas	4	95,000	86,739	98,883	mcf	101,849	$499,785	$5.76	85%
Indiana (1) (4)	Gas	3	92,000	195,114	217,792	mcf	224,326	$1,042,014	$4.65	87%
	Cogen-Gas	4	44,000	14,329	43,194	mcf	44,490	$143,717	$3.23	32%
	Cogen-Oil			1,315	24,311	gal	3,404	$45,931	$13.49	39%
Kutztown	Gas	3	90,000	91,008	109,983	mcf	113,282	$672,186	$7.39	80%
Mansfield (1)	Gas	3	64,000	71,153	61,444	mcf	63,287	$344,737	$4.84	112%
Slippery Rock	Bituminous Coal	3	120,000	55,237	2,831	tons	75,305	$298,279	$5.40	73%
	Gas	2		80,256	100,221	mcf	103,228	$520,573	$6.49	78%

(1) Average plant efficiency is above expected parameters and indicates probable metering errors.
(2) Average plant efficiency is below expected parameters and indicates possible metering, combustion, tube fouling, and/or other boiler/system issues.
(3) No steam produced.
(4) Includes FIUP.

Table 3A. Boiler Performance 2020–2021

Table 4. Electric Consumption and Costs 2020–2021

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	2,145,612	5,281	1,115	26,005,363	12.1	5,625	2.6	0.70	5.82	$1,512,733	$0.71
Bloomsburg Upper	552,821			5,728,986	10.4	1,260	2.3	0.65	6.00	$343,898	$0.62
California	2,118,648	5,372	1,039	22,278,618	10.5	4,674	2.2	0.56	5.93	$1,320,982	$0.62
Cheyney	963,243	4,270	1,584	10,301,491	10.7	1,758	1.8	0.81	6.65	$685,136	$0.71
Clarion	1,423,379	6,201	810	16,675,885	11.7	3,227	2.3	0.71	5.38	$896,952	$0.63
Clarion-Venango	82,036	6,243	783	724,958	8.8	237	2.9	0.40	8.74	$63,353	$0.77
Dixon Center	145,734	4,523	1,610	1,040,200	7.1	342	2.3	0.41	7.61	$79,197	$0.54
East Stroudsburg	2,032,927	4,825	863	18,055,824	8.9	4,117	2.0	0.67	6.53	$1,179,910	$0.58
Edinboro	2,356,333	5,379	1,148	27,015,319	11.5	5,065	2.1	0.76	5.78	$1,560,964	$0.66
Indiana - Gross (1)	4,001,727	6,509	852	46,391,619	11.6	9,681	---	---	5.75	$2,665,551	$0.67
Indiana - Net (2)	2,762,351			35,190,094	12.7	---	---	---	3.71	$1,305,209	$0.47
Kutztown	2,462,547	5,113	1,175	24,520,963	10.0	5,206	2.1	0.57	6.26	$1,535,703	$0.62
Lock Haven	1,485,322	5,422	1,105	13,499,562	9.1	3,544	2.4	0.61	6.97	$940,981	$0.63
Lock Haven-Clearfield	92,373	6,101	717	874,510	9.5	326	3.5	0.46	8.13	$71,118	$0.77
Mansfield	1,530,411	6,012	554	12,021,624	7.9	2,429	1.6	0.71	7.15	$860,025	$0.56
Millersville	2,345,035	4,803	1,378	29,357,479	12.5	5,745	2.4	0.65	5.80	$1,702,880	$0.73
Shippensburg	2,299,487	3,755	1,847	20,985,695	9.1	4,690	2.0	0.67	5.52	$1,158,847	$0.50
Slippery Rock	2,581,242	5,515	830	25,053,916	9.7	6,261	2.4	0.62	5.87	$1,471,867	$0.57
West Chester	3,999,041	5,352	1,106	36,086,800	9.0	6,476	1.6	0.84	6.82	$2,459,531	$0.62
Total	32,617,918			325,417,287						$20,509,628	
Weighted Average					10.0			0.64	6.30		$0.63

(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 by the cogeneration plant.
(2) Includes electricity produced by the cogeneration plant that was consumed by the campus and electricity 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 2020–2021

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)	37,169	$268,853	$7.23	---	$217,190	---	165,214	$815,238	$4.93	---	---	---
California	8,282	$100,743	$12.16	---	$895,684	---	12,208	$116,630	$9.55	---	---	---
Cheyney	21,162	$79,133	$3.74	19,054	$136,086	$7.14	42,591	$317,683	$7.46	---	---	---
Clarion	40,380	$352,093	$8.72	36,579	$437,518	$11.96	9,552	$59,497	$6.23	---	---	---
Clarion-Venango	125	$1,955	$15.64	125	$1,291	$10.33	2,922	$16,064	$5.50	---	---	---
Dixon Center	603	$19,456	$32.25	---	$535	---	---	---	---	---	---	---
East Stroudsburg	15,149	$157,566	$10.40	---	$166,737	---	24,914	$155,103	$6.23	1,408	$2,904	$2.06
Edinboro	42,740	$282,418	$6.61	---	$297,979	---	49,267	$227,586	$4.62	---	---	---
Indiana	15,040	$306,360	$20.37	15,040	$426,234	$28.34	33,484	$194,384	$5.81	---	---	---
Kutztown	46,706	$531,313	$11.38	42,291	$953,352	$22.54	39,043	$232,280	$5.95	---	---	---
Lock Haven	11,478	$39,202	$3.42	11,117	$70,927	$6.38	63,242	$320,710	$5.07	---	---	---
Lock Haven-Clearfield	77	$4,323	$56.14	77	$5,693	$73.94	5,302	$42,949	$8.10	---	---	---
Mansfield	22,974	$79,449	$3.46	---	$183,000	---	21,693	$135,093	$6.23	---	---	---
Millersville	40,670	$103,207	$2.54	34,778	$650,417	$18.70	51,993	$390,140	$7.50	16,594	$35,982	$2.17
Shippensburg	23,146	$130,602	$5.64	13,781	$183,000	$13.28	85,024	$504,339	$5.93	---	---	---
Slippery Rock	29,421	$214,789	$7.30	22,677	$236,857	$10.44	23,129	$105,175	$4.55	---	---	---
West Chester (2)	34,447	$646,659	$18.77	27,995	$229,247	$8.19	85,406	$612,864	$7.18	7,409	$15,286	$2.06
Total	389,570	$3,318,120		223,514	$5,091,748		714,983	$4,245,736		25,411	$54,172	
Weighted Average			$8.52			$15.40			$5.94			$2.13

(1) Bloomsburg Upper and Lower campuses are combined.
(2) Water and sewer data includes university student housing.

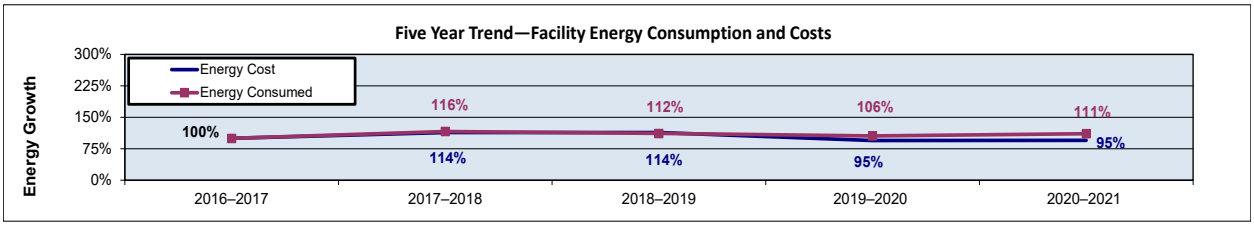
Table 6. Indiana University Cogeneration Summary 2020–2021

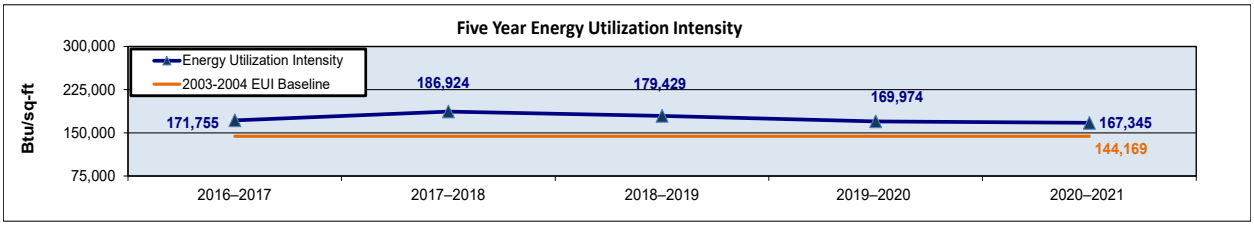
Production of Electricity and Steam

Input / Fuel Cost	Units	mmBtu	Cost
Natural Gas Contract (mcf)	161,730	166,582	$528,905
Natural Gas IUP (mcf)	0	0	$0
Diesel Fuel (gal)	92,677	12,975	$169,033
Total Input/Fuel Cost		**179,557**	**$697,938**
Operating Expenses			
Personnel Cost			$333,143
Repairs and Parts			$542,960
Gas Royalty			$0
Lube Oil			$18,252
Water			$7,114
Sewage			$236
Chemicals			$1,350
Total Operating Expenses			**$903,054**
Total Fuel and Operating Costs			**$1,600,992**
Output			
Electricity	**kWh**	**mmBtu**	
Sold to Penelec	8,552,018	29,188	
Sold to FIUP	0	0	
Sold to Massaro	0	0	
Supplied to Campus	7,650,730	26,112	
Consumed by Cogeneration Plant	0	0	
Lost in Transmission	0	0	
Total Electricity	**16,202,748**	**55,300**	
Steam	**lbs**	**mmBtu**	
Sold to FIUP from Cogeneration Plant	4,715,140	4,715	
Supplied to Campus	15,917,860	15,918	
Total Steam	**20,633,000**	**20,633**	
Total Output (mmBtu)			**75,933**
Revenue: Electricity and Steam Sold to FIUP and Exported			$856,437
Net Cost (1) (2)			$744,555
Summary of Data			
Total Thermal Efficiency (mmBtu Output/mmBtu Input)			42.29%
% of Output as Electricity			72.83%
% of Output as Steam			27.17%
	Total Dollars	**$/kWh**	
Cost of Electricity—Before Revenue	$1,165,960	$0.0720	
Cost of Electricity—Net of Revenue	$542,240	$0.0335	
	Total Dollars	**$/mlbs**	
Cost of Steam—Before Revenue	$435,032	$21.08	
Cost of Steam—Net of Revenue	$202,315	$9.81	
	Electricity (KW)	**Steam (lbs/hr)**	
Peak Capacity	24,320	72,000	
Average Production Level	21.63%	9.30%	
Effective Unit Energy cost—Before Revenue ($/mmbtu)			**$21.08**
Effective Unit Energy cost—Net of Revenue ($/mmbtu)			**$9.81**

(1) Costs do not include bond cost or amortized capital cost of the cogeneration plant.
(2) Net cost does not include avoided cost of utilities assuming traditional systems.

Bloomsburg University

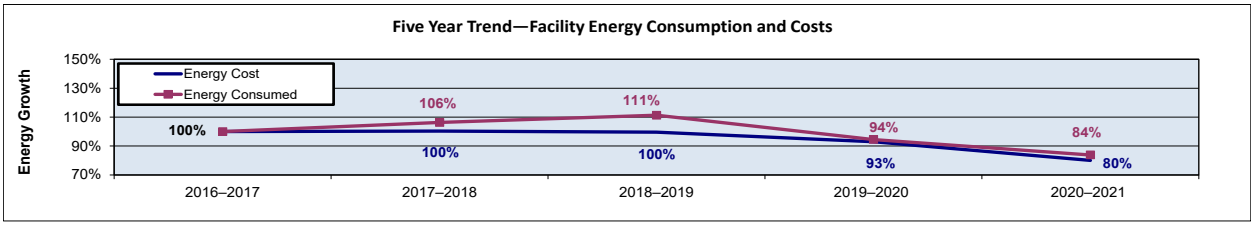


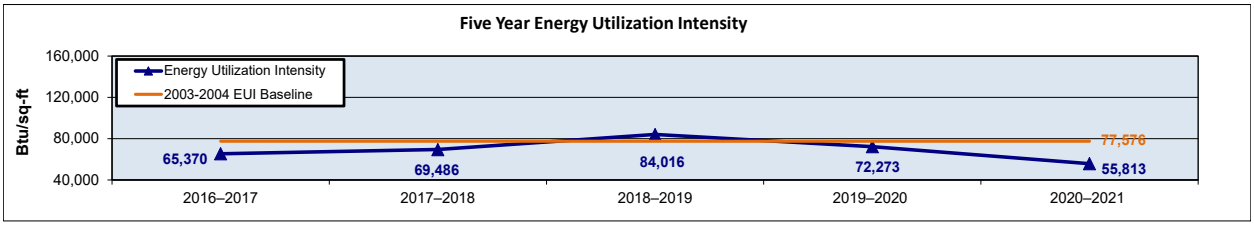


	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	456	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	218,002	307,039	281,815	280,201	300,079
Oil	gal	---	---	---	---	---
Wood	tons	6,809	4,842	5,200	4,081	4,021
Electric	kWh	32,893,391	33,656,966	34,829,016	31,103,502	31,734,349
Energy Costs						
Anthracite Coal	$	$ 61,560	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 1,048,554	$ 1,603,339	$ 1,578,660	$ 1,347,217	$ 1,411,322
Oil	$	---	---	---	---	---
Wood	$	$ 270,668	$ 197,505	$ 296,400	$ 250,743	$ 229,243
Electric	$	$ 2,289,045	$ 2,378,816	$ 2,299,506	$ 1,877,355	$ 1,856,631
Total	$	$ 3,669,827	$ 4,179,660	$ 4,174,566	$ 3,475,315	$ 3,497,196
Energy Consumption						
Anthracite Coal	mmBtu	11,537	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	224,542	316,250	290,269	288,607	309,081
Oil	mmBtu	---	---	---	---	---
Wood	mmBtu	57,877	41,157	44,200	34,689	34,179
Electric	mmBtu	112,265	114,871	118,871	106,156	108,309
Total	mmBtu	406,221	472,278	453,341	429,452	451,569
Energy Utilization Intensity	Btu/sq-ft	171,755	186,924	179,429	169,974	167,345
Unit Fuel Costs						
Anthracite Coal	$/ton	$ 135.00	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 4.81	$ 5.22	$ 5.60	$ 4.81	$ 4.70
Oil	$/gal	---	---	---	---	---
Wood	$/ton	$ 39.75	$ 40.79	$ 57.00	$ 61.44	$ 57.01
Electric	¢/kWh	6.96 ¢	7.07 ¢	6.60 ¢	6.04 ¢	5.85 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	$ 5.34	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 4.67	$ 5.07	$ 5.44	$ 4.67	$ 4.57
Oil	$/mmBtu	---	---	---	---	---
Wood	$/mmBtu	$ 4.68	$ 4.80	$ 6.71	$ 7.23	$ 6.71
Electric	$/mmBtu	$ 20.39	$ 20.71	$ 19.34	$ 17.68	$ 17.14
Weighted Average	$/mmBtu	$ 9.03	$ 8.85	$ 9.21	$ 8.09	$ 7.74
Misc Facility Costs						
Water Cost	$	$ 393,768	$ 326,823	$ 331,193	$ 369,945	$ 268,853
Sewage Cost	$	$ 295,628	$ 361,162	$ 409,522	$ 213,283	$ 217,190
Reported Information						
Gross Area	sq-ft	2,365,115	2,526,577	2,526,577	2,526,577	2,698,433
Reported Student Population		8,480	8,055	7,667	7,401	6,956
Reported Heating Degree Days	degree days	5,425	5,827	5,536	5,353	5,281
Reported Cooling Degree Days	degree days	946	740	943	928	1,115

Note: Data reflects both Upper and Lower campuses.

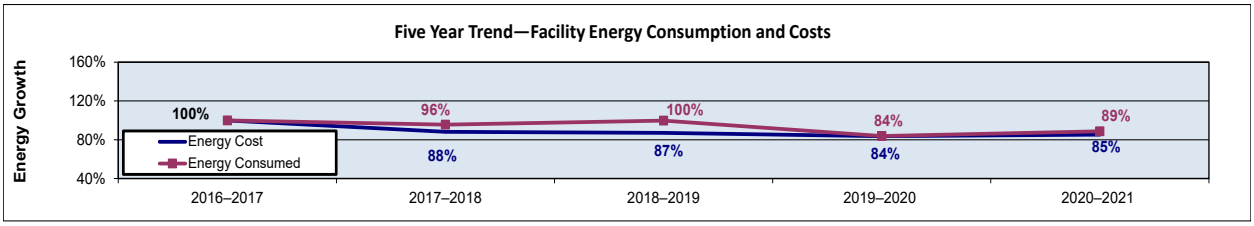
California University

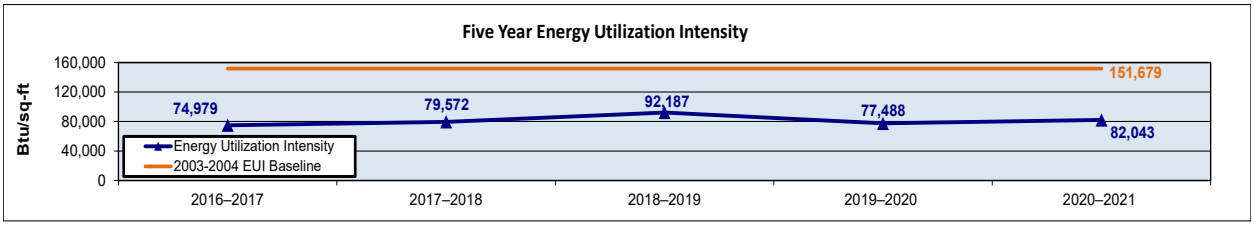




	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	43,562	56,713	56,972	45,518	40,982
Oil	gal	---	---	---	---	---
Electric	kWh	28,201,970	26,837,147	28,827,905	25,325,402	22,278,618
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 248,175	$ 294,450	$ 297,345	$ 292,336	$ 284,159
Oil	$	---	---	---	---	---
Electric	$	$ 1,756,278	$ 1,715,864	$ 1,697,890	$ 1,570,460	$ 1,320,982
Total	$	$ 2,004,453	$ 2,010,314	$ 1,995,235	$ 1,862,796	$ 1,605,141
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	44,869	58,414	58,681	46,884	42,212
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	96,253	91,595	98,390	86,436	76,037
Total	mmBtu	141,122	150,009	157,071	133,319	118,249
Energy Utilization Intensity	Btu/sq-ft	65,370	69,486	84,016	72,273	55,813
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 5.70	$ 5.19	$ 5.22	$ 6.42	$ 6.93
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	6.23 ¢	6.39 ¢	5.89 ¢	6.20 ¢	5.93 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 5.53	$ 5.04	$ 5.07	$ 6.24	$ 6.73
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 18.25	$ 18.73	$ 17.26	$ 18.17	$ 17.37
Weighted Average	$/mmBtu	$ 14.20	$ 13.40	$ 12.70	$ 13.97	$ 13.57
Misc Facility Costs						
Water Cost	$	$ 408,583	$ 339,471	$ 326,902	$ 285,510	$ 100,743
Sewage Cost	$	$ 893,620	$ 893,345	$ 906,514	$ 896,646	$ 895,684
Reported Information						
Gross Area	sq-ft	2,158,832	2,158,832	1,869,536	1,844,648	2,118,648
Reported Student Population		3,893	3,628	3,570	3,424	3,424
Reported Heating Degree Days	degree days	4,648	5,537	5,555	5,246	5,372
Reported Cooling Degree Days	degree days	1,116	981	994	951	1,039

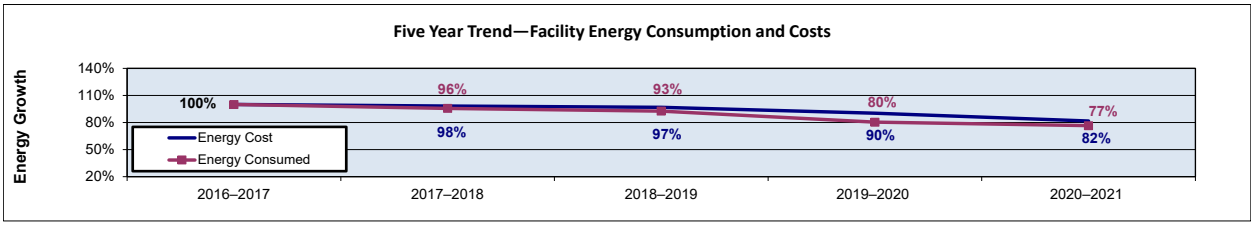
Cheyney University

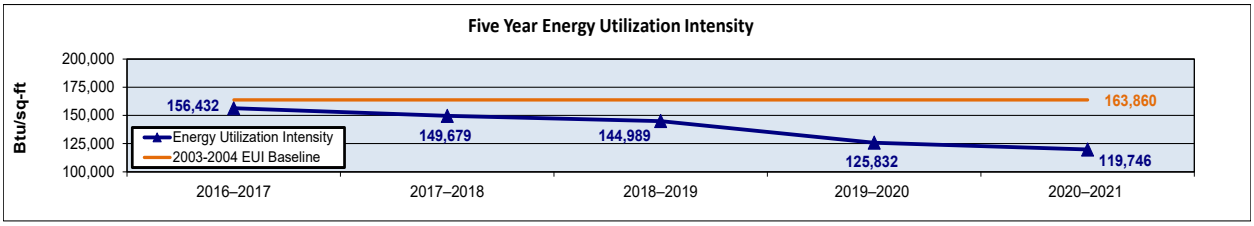




	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	45,854	43,975	49,988	39,152	42,591
Oil	gal	---	---	---	---	---
Electric	kWh	12,243,940	11,661,113	10,932,185	10,053,675	10,301,491
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 329,991	$ 339,590	$ 373,553	$ 340,498	$ 317,683
Oil	$	---	---	---	---	---
Electric	$	$ 845,093	$ 696,869	$ 650,287	$ 641,856	$ 685,136
Total	$	$ 1,175,084	$ 1,036,459	$ 1,023,840	$ 982,354	$ 1,002,819
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	47,230	45,294	51,487	40,327	43,869
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	41,789	39,799	37,312	34,313	35,159
Total	mmBtu	89,018	85,093	88,799	74,640	79,028
Energy Utilization Intensity	Btu/sq-ft	74,979	79,572	92,187	77,488	82,043
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 7.20	$ 7.72	$ 7.47	$ 8.70	$ 7.46
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	6.90 ¢	5.98 ¢	5.95 ¢	6.38 ¢	6.65 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 6.99	$ 7.50	$ 7.26	$ 8.44	$ 7.24
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 20.22	$ 17.51	$ 17.43	$ 18.71	$ 19.49
Weighted Average	$/mmBtu	$ 13.20	$ 12.18	$ 11.53	$ 13.16	$ 12.69
Misc Facility Costs						
Water Cost	$	$ 95,335	$ 120,943	$ 88,054	$ 81,013	$ 79,133
Sewage Cost	$	$ 143,028	$ 141,241	$ 140,123	$ 141,854	$ 136,086
Reported Information						
Gross Area	sq-ft	1,187,234	1,069,390	963,243	963,243	963,243
Reported Student Population		740	656	416	533	533
Reported Heating Degree Days	degree days	4,023	4,584	4,478	4,272	4,270
Reported Cooling Degree Days	degree days	1,762	1,496	1,583	1,518	1,584

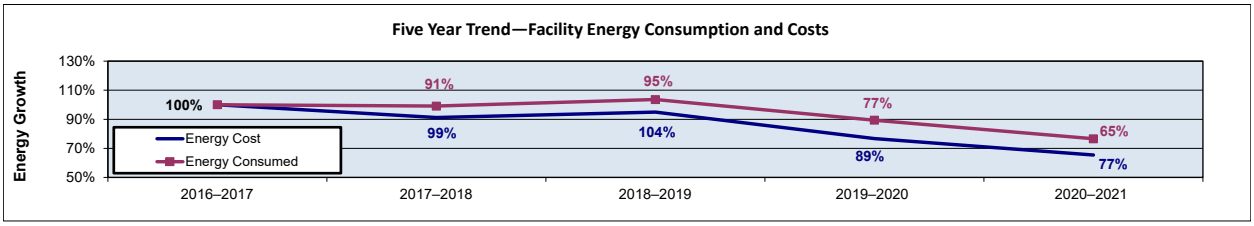
Clarion University

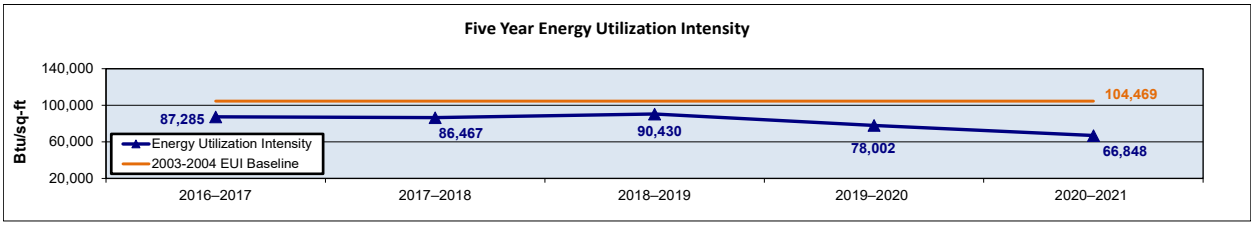




	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	151,937	144,569	138,001	114,390	110,223
Oil	gal	---	---	---	---	---
Electric	kWh	19,386,520	18,794,042	18,820,148	17,956,323	16,675,885
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 493,744	$ 629,961	$ 593,410	$ 505,728	$ 493,217
Oil	$	---	---	---	---	---
Electric	$	$ 1,207,627	$ 1,042,139	$ 1,053,777	$ 1,031,651	$ 896,952
Total	$	$ 1,701,371	$ 1,672,100	$ 1,647,187	$ 1,537,379	$ 1,390,169
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	156,495	148,906	142,141	117,822	113,530
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	66,166	64,144	64,233	61,285	56,915
Total	mmBtu	222,662	213,050	206,374	179,107	170,444
Energy Utilization Intensity	Btu/sq-ft	156,432	149,679	144,989	125,832	119,746
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 3.25	$ 4.36	$ 4.30	$ 4.42	$ 4.47
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	6.23 ¢	5.55 ¢	5.60 ¢	5.75 ¢	5.38 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 3.16	$ 4.23	$ 4.17	$ 4.29	$ 4.34
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 18.25	$ 16.25	$ 16.41	$ 16.83	$ 15.76
Weighted Average	$/mmBtu	$ 7.64	$ 7.85	$ 7.98	$ 8.58	$ 8.16
Misc Facility Costs						
Water Cost	$	$ 419,060	$ 419,838	$ 349,054	$ 428,535	$ 352,093
Sewage Cost	$	$ 372,125	$ 419,107	$ 381,645	$ 528,494	$ 437,518
Reported Information						
Gross Area	sq-ft	1,423,379	1,423,379	1,423,379	1,423,379	1,423,379
Reported Student Population		3,048	2,963	2,669	2,560	2,560
Reported Heating Degree Days	degree days	5,951	8,404	6,710	6,403	6,201
Reported Cooling Degree Days	degree days	774	608	522	567	810

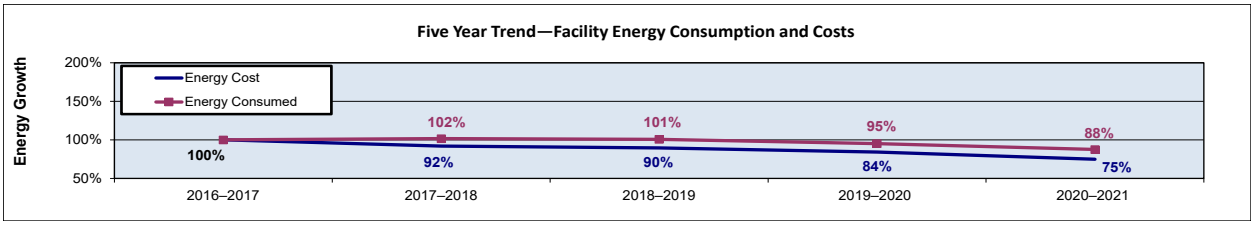
Clarion University—Venango Campus

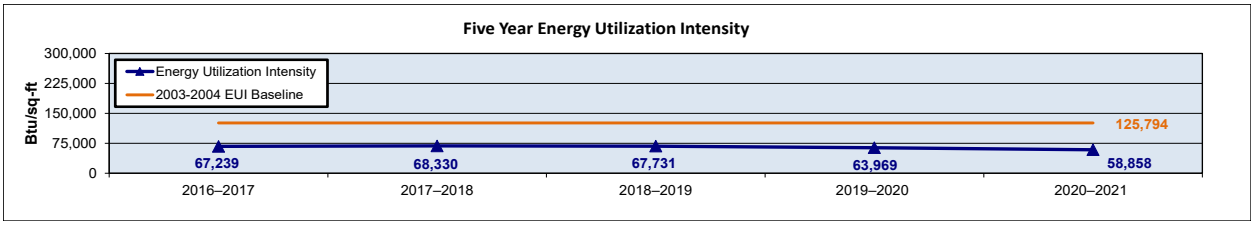




	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	2,788	2,958	3,145	3,379	2,922
Oil	gal	---	---	---	---	---
Electric	kWh	1,256,640	1,185,668	1,224,486	855,141	724,958
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 16,458	$ 15,747	$ 16,790	$ 17,218	$ 16,064
Oil	$	---	---	---	---	---
Electric	$	$ 104,836	$ 94,937	$ 98,304	$ 75,847	$ 63,353
Total	$	$ 121,294	$ 110,684	$ 115,094	$ 93,065	$ 79,417
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	2,872	3,047	3,239	3,480	3,010
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	4,289	4,047	4,179	2,919	2,474
Total	mmBtu	7,161	7,093	7,419	6,399	5,484
Energy Utilization Intensity	Btu/sq-ft	87,285	86,467	90,430	78,002	66,848
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 5.90	$ 5.32	$ 5.34	$ 5.10	$ 5.50
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	8.34 ¢	8.01 ¢	8.03 ¢	8.87 ¢	8.74 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 5.73	$ 5.17	$ 5.18	$ 4.95	$ 5.34
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 24.44	$ 23.46	$ 23.52	$ 25.99	$ 25.60
Weighted Average	$/mmBtu	$ 16.94	$ 15.60	$ 15.51	$ 14.54	$ 14.48
Misc Facility Costs						
Water Cost	$	$ 3,477.60	$ 3,393.00	$ 3,170.00	$ 3,255.00	$ 1,955.00
Sewage Cost	$	$ 2,952.91	$ 2,739.00	$ 2,310.00	$ 2,197.00	$ 1,291.00
Reported Information						
Gross Area	sq-ft	82,036	82,036	82,036	82,036	82,036
Reported Student Population		283	282	199	193	193
Reported Heating Degree Days	degree days	6,041	6,790	6,619	6,290	6,243
Reported Cooling Degree Days	degree days	747	540	615	676	783

Dixon University Center

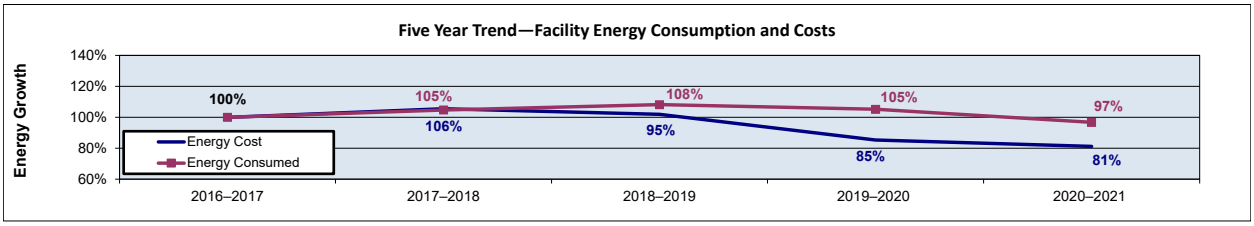


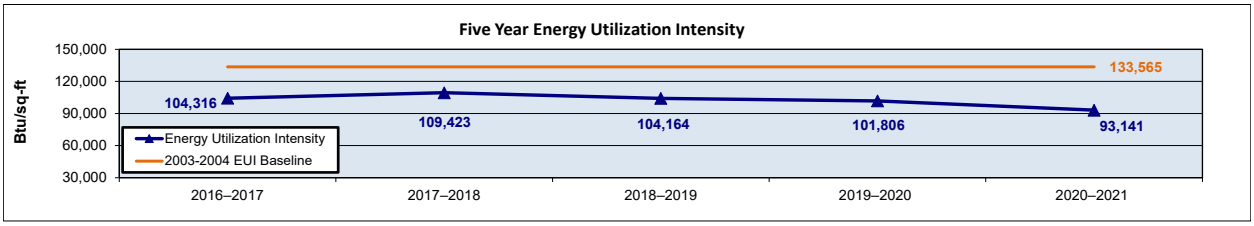


	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	4,870	5,345	5,414	5,016	4,881
Oil	gal	---	---	---	---	---
Electric	kWh	1,401,400	1,304,600	1,258,200	1,217,700	1,040,200
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$42,784	$47,621	$44,609	$41,323	$40,897
Oil	$	---	---	---	---	---
Electric	$	$117,747	$99,970	$99,102	$93,786	$79,197
Total	$	$160,531	$147,591	$143,711	$135,109	$120,094
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	5,016	5,505	5,576	5,166	5,027
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	4,783	4,453	4,294	4,156	3,550
Total	mmBtu	9,799	9,958	9,871	9,322	8,578
Energy Utilization Intensity	Btu/sq-ft	67,239	68,330	67,731	63,969	58,858
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 8.79	$ 8.91	$ 8.24	$ 8.24	$ 8.38
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	8.40 ¢	7.66 ¢	7.88 ¢	7.70 ¢	7.61 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 8.53	$ 8.65	$ 8.00	$ 8.00	$ 8.13
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 24.62	$ 22.45	$ 23.08	$ 22.57	$ 22.31
Weighted Average	$/mmBtu	$ 16.38	$ 14.82	$ 14.56	$ 14.49	$ 14.00
Misc Facility Costs						
Water Cost	$	$ 17,581	$ 18,473	$ 19,333	$ 18,932	$ 19,456
Sewage Cost (1)	$	$ 2,879	$ 560	$ 602	($ 144)	$ 535
Reported Information						
Gross Area	sq-ft	145,734	145,734	145,734	145,734	145,734
Reported Student Population		---	---	---	---	---
Reported Heating Degree Days	degree days	4,369	5,045	4,913	4,436	4,523
Reported Cooling Degree Days	degree days	1,594	1,363	1,589	1,518	1,610

(1) Negative sewage cost due to estimated meter readings and remote working conditions.

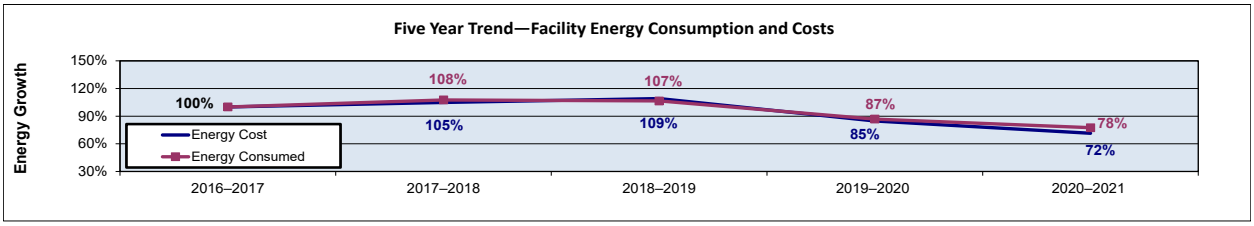
East Stroudsburg University

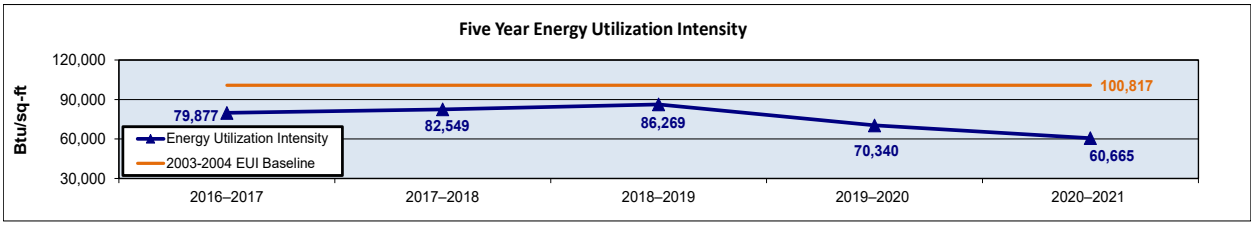




	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	114,259	118,684	122,330	128,790	123,797
Oil	gal	3,375	33,781	27,842	2,655	1,523
Electric	kWh	22,739,364	22,856,987	23,988,174	21,369,530	18,055,824
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$700,479	$667,926	$653,002	$596,742	$654,888
Oil	$	$7,040	$96,594	$46,505	$5,271	$2,904
Electric	$	$1,557,421	$1,626,034	$1,609,486	$1,329,143	$1,179,910
Total	$	$2,264,939	$2,390,554	$2,308,993	$1,931,156	$1,837,702
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	117,687	122,244	126,000	132,654	127,511
Oil	mmBtu	473	4,729	3,898	372	213
Electric	mmBtu	77,609	78,011	81,872	72,934	61,625
Total	mmBtu	195,769	204,984	211,770	205,960	189,348
Energy Utilization Intensity	Btu/sq-ft	104,316	109,423	104,164	101,806	93,141
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 6.13	$ 5.63	$ 5.34	$ 4.63	$ 5.29
Oil	$/gal	$ 2.09	$ 2.86	$ 1.67	$ 1.99	$ 1.91
Electric	¢/kWh	6.85 ¢	7.11 ¢	6.71 ¢	6.22 ¢	6.53 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 5.95	$ 5.46	$ 5.18	$ 4.50	$ 5.14
Oil	$/mmBtu	$ 14.90	$ 20.42	$ 11.93	$ 14.18	$ 13.62
Electric	$/mmBtu	$ 20.07	$ 20.84	$ 19.66	$ 18.22	$ 19.15
Weighted Average	$/mmBtu	$ 11.57	$ 11.66	$ 10.90	$ 9.38	$ 9.71
Misc Facility Costs						
Water Cost	$	$ 203,039	$ 270,104	$ 266,006	$ 242,722	$ 157,566
Sewage Cost	$	$ 117,663	$ 125,643	$ 113,170	$ 136,899	$ 166,737
Reported Information						
Gross Area	sq-ft	1,876,685	1,873,318	2,033,051	2,023,065	2,032,927
Reported Student Population		5,909	5,770	5,462	5,130	5,130
Reported Heating Degree Days	degree days	4,867	5,370	5,213	5,014	4,825
Reported Cooling Degree Days	degree days	978	739	861	822	863

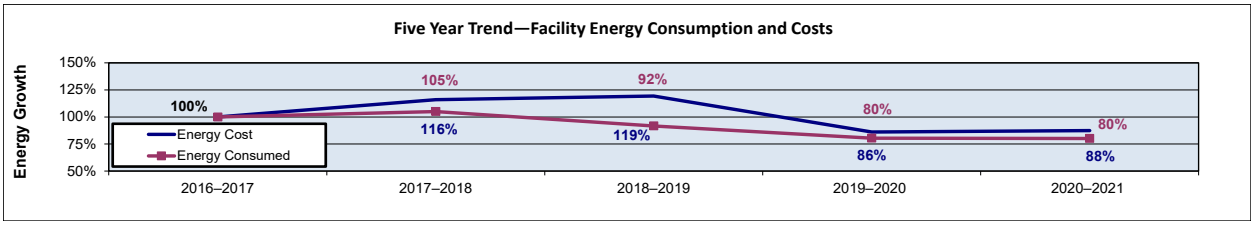
Edinboro University

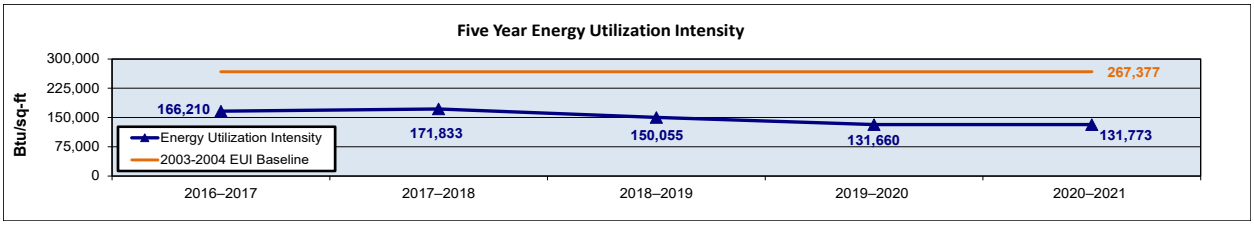




	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	64,147	75,453	72,399	56,558	49,267
Oil	gal	---	---	---	---	---
Electric	kWh	34,675,202	35,391,683	35,702,601	29,856,866	27,015,319
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$303,397	$319,392	$349,901	$245,107	$227,586
Oil	$	---	---	---	---	---
Electric	$	$2,197,488	$2,302,284	$2,379,912	$1,875,784	$1,560,964
Total	$	$2,500,885	$2,621,676	$2,729,813	$2,120,891	$1,788,550
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	66,071	77,717	74,571	58,254	50,744
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	118,346	120,792	121,853	101,901	92,203
Total	mmBtu	184,418	198,509	196,424	160,156	142,948
Energy Utilization Intensity	Btu/sq-ft	79,877	82,549	86,269	70,340	60,665
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 4.73	$ 4.23	$ 4.83	$ 4.33	$ 4.62
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	6.34 ¢	6.51 ¢	6.67 ¢	6.28 ¢	5.78 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 4.59	$ 4.11	$ 4.69	$ 4.21	$ 4.48
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 18.57	$ 19.06	$ 19.53	$ 18.41	$ 16.93
Weighted Average	$/mmBtu	$ 13.56	$ 13.21	$ 13.90	$ 13.24	$ 12.51
Misc Facility Costs						
Water Cost	$	$ 303,595	$ 359,318	$ 429,744	$ 321,850	$ 282,418
Sewage Cost	$	$ 378,899	$ 422,785	$ 447,975	$ 329,763	$ 297,979
Reported Information						
Gross Area	sq-ft	2,308,761	2,404,741	2,276,885	2,276,885	2,356,333
Reported Student Population		4,470	3,989	3,304	3,063	3,063
Reported Heating Degree Days	degree days	5,287	6,128	6,142	5,556	5,379
Reported Cooling Degree Days	degree days	1,089	843	1,071	1,004	1,148

Indiana University of Pennsylvania

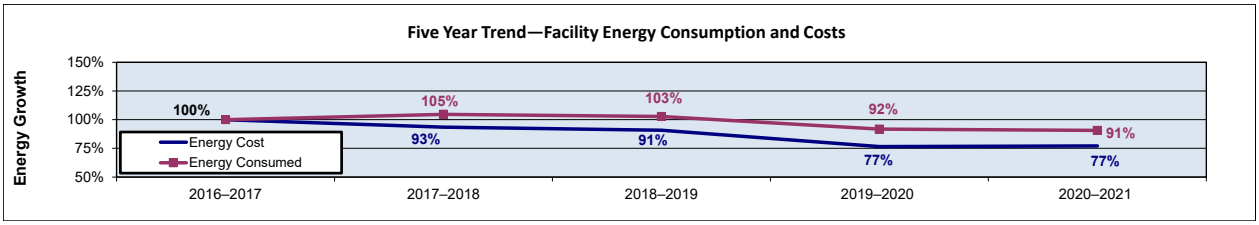


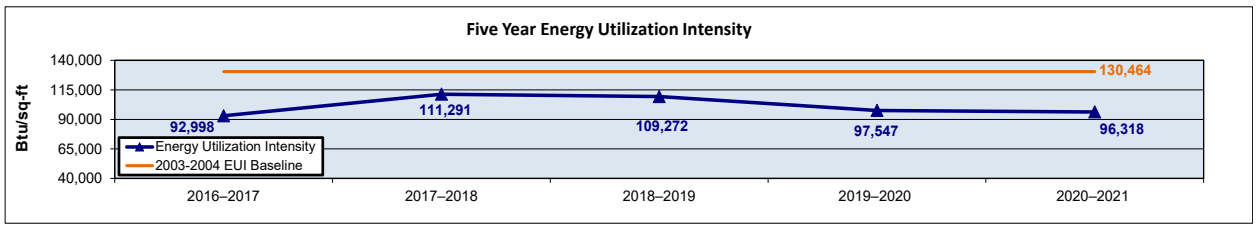


	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption (1)						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	462,364	494,934	413,925	359,532	350,207
Oil	gal	44,162	37,157	25,094	19,978	59,100
Electric	kWh	51,435,850	51,541,018	50,827,766	45,781,323	46,391,619
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 1,798,372	$ 2,175,896	$ 1,962,461	$ 1,499,332	$ 1,493,246
Oil	$	$ 98,366	$ 77,121	$ 36,554	$ 56,939	$ 108,039
Electric Purchased (2)	$	$ 1,654,263	$ 1,864,790	$ 2,236,184	$ 1,503,032	$ 1,505,927
Total	$	$ 3,551,001	$ 4,117,807	$ 4,235,199	$ 3,059,303	$ 3,107,212
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	476,235	509,783	426,342	370,318	360,713
Oil	mmBtu	6,183	5,202	3,513	2,797	8,274
Electric Purchased	mmBtu	175,551	175,909	173,475	156,252	158,335
Total	mmBtu	657,968	690,894	603,331	529,367	527,322
Energy Utilization Intensity	Btu/sq-ft	166,210	171,833	150,055	131,660	131,773
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 3.89	$ 4.40	$ 4.74	$ 4.17	$ 4.26
Oil	$/gal	$ 2.23	$ 2.08	$ 1.46	$ 2.85	$ 1.83
Electric Purchased	¢/kWh	3.22 ¢	3.62 ¢	4.40 ¢	3.28 ¢	3.25 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 3.78	$ 4.27	$ 4.60	$ 4.05	$ 4.14
Oil	$/mmBtu	$ 15.91	$ 14.83	$ 10.41	$ 20.36	$ 13.06
Electric Purchased	$/mmBtu	$ 9.42	$ 10.60	$ 12.89	$ 9.62	$ 9.51
Weighted Average	$/mmBtu	$ 5.40	$ 5.96	$ 7.02	$ 5.78	$ 5.89
Misc Facility Costs						
Water Cost	$	$ 813,549	$ 846,190	$ 729,673	$ 630,012	$ 575,159
Sewage Cost	$	$ 742,854	$ 723,841	$ 727,578	$ 823,464	$ 932,393
Reported Information						
Gross Area (3)	sq-ft	3,958,653	4,020,722	4,020,722	4,020,722	4,001,727
Reported Student Population (4)		11,097	10,566	9,546	8,678	8,678
Reported Heating Degree Days	degree days	5,010	5,570	5,575	5,249	6,509
Reported Cooling Degree Days	degree days	864	864	813	781	852

Note: Electric data represents all purchased and cogeneration-produced electricity, including electricity that flows through the cogeneration plant to be redistributed throughout the campus including FIUP.
(1) Data includes FIUP usage for Residential Revival.
(2) Excludes total cost of operation and maintenance for electric generation by 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

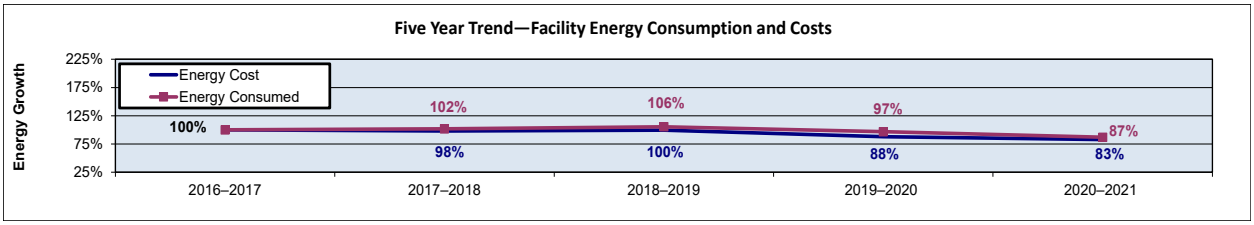


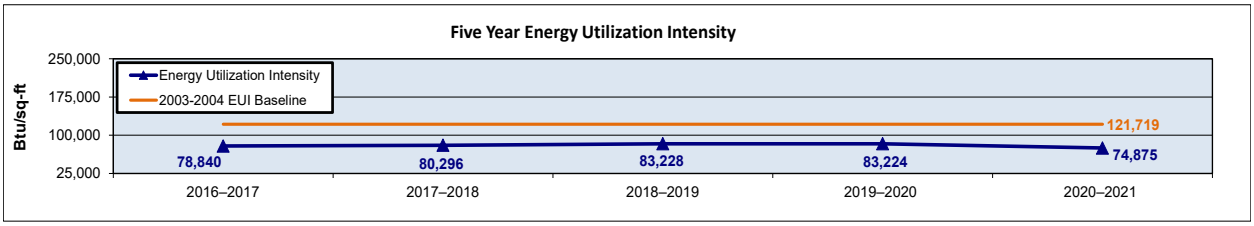


	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	150,923	163,237	157,851	147,372	149,026
Oil	gal	4,434	5,535	19,991	---	---
Electric	kWh	30,979,865	30,809,041	30,384,631	25,907,418	24,520,963
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 998,750	$ 1,039,055	$ 988,633	$ 877,840	$ 904,466
Oil	$	$ 7,948	$ 12,140	$ 44,122	---	---
Electric	$	$ 2,158,188	$ 1,905,837	$ 1,839,654	$ 1,545,618	$ 1,535,703
Total	$	$ 3,164,886	$ 2,957,032	$ 2,872,409	$ 2,423,458	$ 2,440,169
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	155,451	168,134	162,587	151,793	153,497
Oil	mmBtu	621	775	2,799	---	---
Electric	mmBtu	105,734	105,151	103,703	88,422	83,690
Total	mmBtu	261,806	274,060	269,088	240,215	237,187
Energy Utilization Intensity (1)	Btu/sq-ft	92,998	111,291	109,272	97,547	96,318
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 6.62	$ 6.37	$ 6.26	$ 5.96	$ 6.07
Oil	$/gal	$ 1.79	$ 2.19	$ 2.21	---	---
Electric	¢/kWh	6.97 ¢	6.19 ¢	6.05 ¢	5.97 ¢	6.26 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 6.42	$ 6.18	$ 6.08	$ 5.78	$ 5.89
Oil	$/mmBtu	$ 12.80	$ 15.67	$ 15.76	---	---
Electric	$/mmBtu	$ 20.41	$ 18.12	$ 17.74	$ 17.48	$ 18.35
Weighted Average	$/mmBtu	$ 12.09	$ 10.79	$ 10.67	$ 10.09	$ 10.29
Misc Facility Costs						
Water Cost	$	$ 556,368	$ 589,597	$ 709,333	$ 611,296	$ 531,313
Sewage Cost	$	$ 621,535	$ 672,416	$ 842,992	$ 718,745	$ 953,352
Reported Information						
Gross Area (1)	sq-ft	2,815,176	2,462,547	2,462,547	2,462,547	2,462,547
Reported Student Population		7,449	7,179	7,058	6,615	6,615
Reported Heating Degree Days	degree days	4,580	5,186	5,193	4,250	5,113
Reported Cooling Degree Days	degree days	1,345	1,097	1,337	1,406	1,175

(1) Changes in historical gross area affected Energy Utilization Intensity reported in previously issued PASSHE Utility Usage Reports.

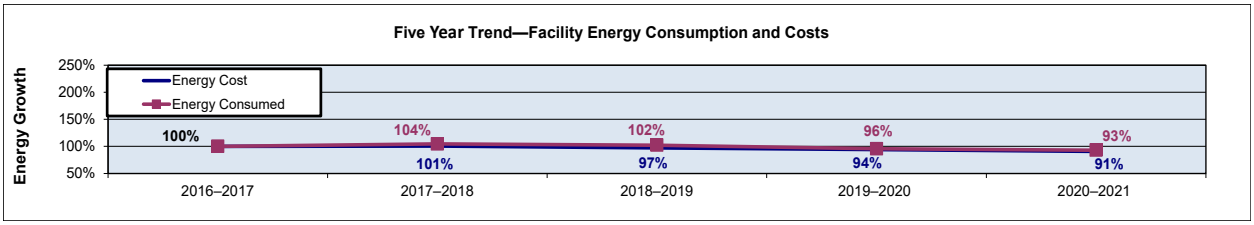
Lock Haven University

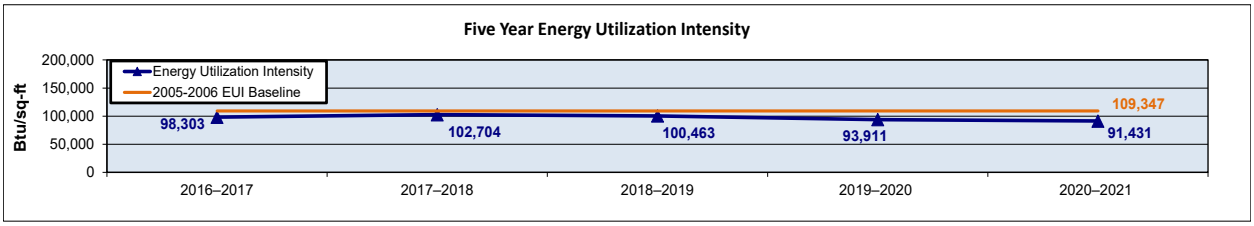




	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	70,084	74,782	77,224	71,028	63,242
Oil	gal	949	---	---	488	---
Electric	kWh	16,256,513	15,569,480	16,225,040	14,763,398	13,499,562
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 343,191	$ 448,595	$ 438,568	$ 351,937	$ 320,710
Oil	$	$ 2,170.00	---	---	$ 1,042.00	---
Electric	$	$ 1,173,939	$ 1,039,224	$ 1,075,474	$ 982,745	$ 940,981
Total	$	$ 1,519,300	$ 1,487,819	$ 1,514,042	$ 1,335,724	$ 1,261,691
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	72,187	77,025	79,541	73,159	65,139
Oil	mmBtu	133	---	---	68	---
Electric	mmBtu	55,483	53,139	55,376	50,387	46,074
Total	mmBtu	127,803	130,164	134,917	123,615	111,213
Energy Utilization Intensity	Btu/sq-ft	78,840	80,296	83,228	83,224	74,875
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 4.90	$ 6.00	$ 5.68	$ 4.95	$ 5.07
Oil	$/gal	$ 2.29	---	---	$ 2.14	---
Electric	¢/kWh	7.22 ¢	6.67 ¢	6.63 ¢	6.66 ¢	6.97 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 4.75	$ 5.82	$ 5.51	$ 4.81	$ 4.92
Oil	$/mmBtu	$ 16.33	---	---	$ 15.25	---
Electric	$/mmBtu	$ 21.16	$ 19.56	$ 19.42	$ 19.50	$ 20.42
Weighted Average	$/mmBtu	$ 11.89	$ 11.43	$ 11.22	$ 10.81	$ 11.34
Misc Facility Costs						
Water Cost	$	$ 53,260	$ 54,213	$ 51,850	$ 40,014	$ 39,202
Sewage Cost	$	$ 54,066	$ 127,409	$ 76,314	$ 68,800	$ 70,927
Reported Information						
Gross Area	sq-ft	1,621,044	1,621,044	1,621,044	1,485,322	1,485,322
Reported Student Population		3,205	2,807	2,472	2,310	2,310
Reported Heating Degree Days	degree days	4,968	5,594	5,613	5,467	5,422
Reported Cooling Degree Days	degree days	1,120	934	990	901	1,105

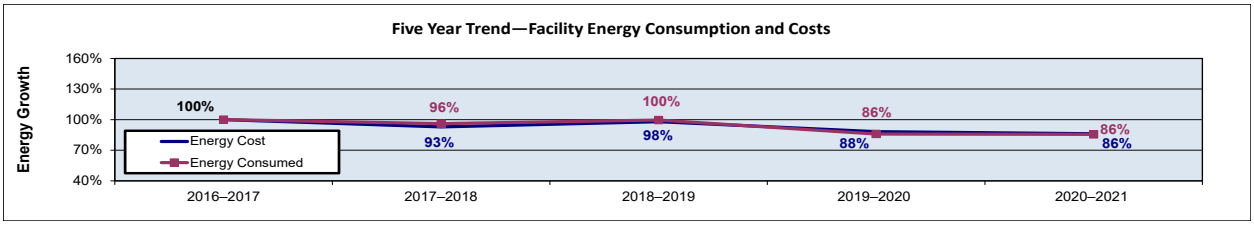
Lock Haven University—Clearfield Campus

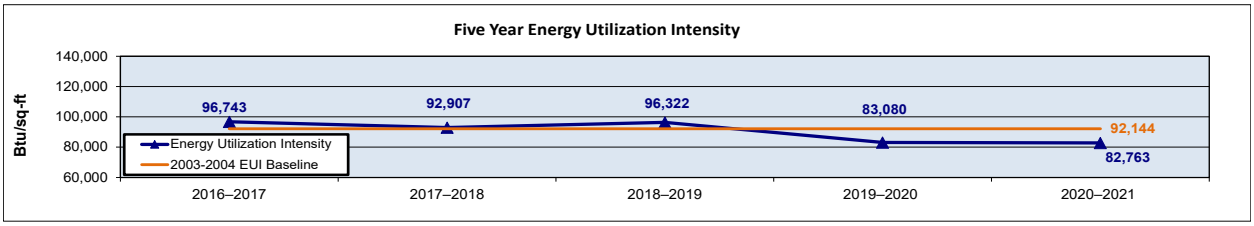




	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	5,578	6,002	5,655	5,479	5,302
Oil	gal	---	---	---	---	---
Electric	kWh	977,200	968,360	1,012,438	888,215	874,510
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 39,117	$ 50,402	$ 43,382	$ 44,506	$ 42,949
Oil	$	---	---	---	---	---
Electric	$	$ 86,694	$ 76,097	$ 78,840	$ 73,861	$ 71,118
Total	$	$ 125,811	$ 126,499	$ 122,222	$ 118,367	$ 114,067
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	5,745	6,182	5,825	5,643	5,461
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	3,335	3,305	3,455	3,031	2,985
Total	mmBtu	9,081	9,487	9,280	8,675	8,446
Energy Utilization Intensity	Btu/sq-ft	98,303	102,704	100,463	93,911	91,431
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 7.01	$ 8.40	$ 7.67	$ 8.12	$ 8.10
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	8.87 ¢	7.86 ¢	7.79 ¢	8.32 ¢	8.13 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 6.81	$ 8.15	$ 7.45	$ 7.89	$ 7.86
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 25.99	$ 23.02	$ 22.82	$ 24.36	$ 23.83
Weighted Average	$/mmBtu	$ 13.86	$ 13.33	$ 13.17	$ 13.64	$ 13.51
Misc Facility Costs						
Water Cost	$	$ 4,356	$ 4,118	$ 4,133	$ 3,690	$ 4,323
Sewage Cost	$	$ 5,916	$ 5,316	$ 5,042	$ 4,941	$ 5,693
Reported Information						
Gross Area	sq-ft	92,373	92,373	92,373	92,373	92,373
Reported Student Population		205	189	169	161	161
Reported Heating Degree Days	degree days	5,731	6,541	6,586	6,235	6,101
Reported Cooling Degree Days	degree days	695	462	547	443	717

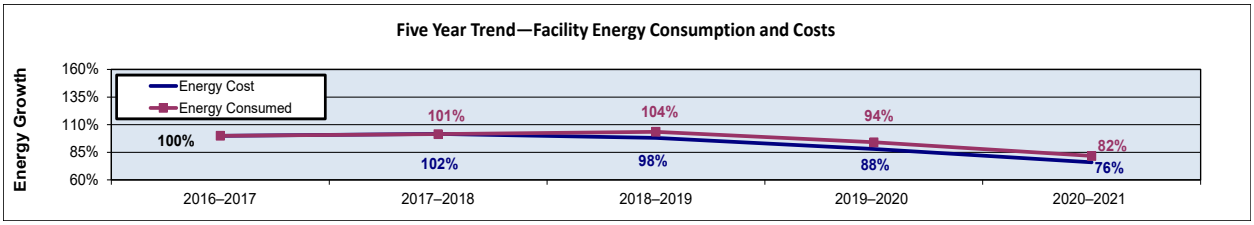
Mansfield University

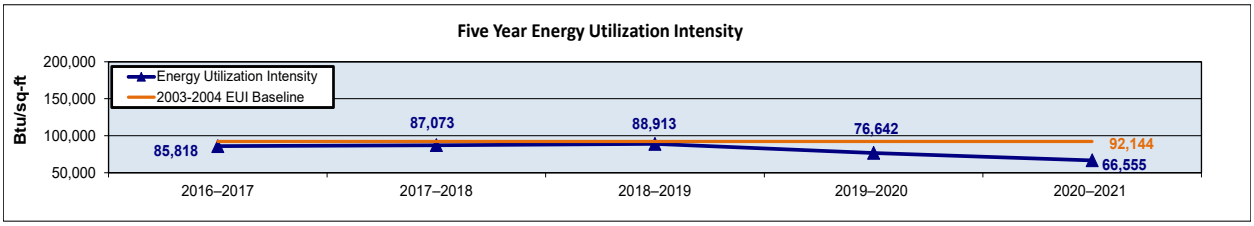




	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	95,228	92,206	97,167	81,053	83,137
Oil	gal	---	---	---	---	---
Electric	kWh	14,641,466	13,833,365	13,867,594	12,792,662	12,021,624
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 474,910	$ 400,355	$ 508,671	$ 463,486	$ 479,830
Oil	$	---	---	---	---	---
Electric	$	$ 1,079,182	$ 1,043,883	$ 1,015,070	$ 908,557	$ 860,025
Total	$	$ 1,554,092	$ 1,444,238	$ 1,523,741	$ 1,372,043	$ 1,339,855
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	98,085	94,972	100,082	83,485	85,631
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	49,971	47,213	47,330	43,661	41,030
Total	mmBtu	148,056	142,185	147,412	127,146	126,661
Energy Utilization Intensity	Btu/sq-ft	96,743	92,907	96,322	83,080	82,763
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 4.99	$ 4.34	$ 5.24	$ 5.72	$ 5.77
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	7.37 ¢	7.55 ¢	7.32 ¢	7.10 ¢	7.15 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 4.84	$ 4.22	$ 5.08	$ 5.55	$ 5.60
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 21.60	$ 22.11	$ 21.45	$ 20.81	$ 20.96
Weighted Average	$/mmBtu	$ 10.50	$ 10.16	$ 10.34	$ 10.79	$ 10.58
Misc Facility Costs						
Water Cost	$	$ 85,362	$ 89,361	$ 92,749	$ 79,743	$ 79,449
Sewage Cost	$	$ 183,000	$ 198,972	$ 183,000	$ 183,000	$ 183,000
Reported Information						
Gross Area	sq-ft	1,530,411	1,530,411	1,530,411	1,530,411	1,530,411
Reported Student Population		1,755	1,407	1,260	1,329	1,329
Reported Heating Degree Days	degree days	5,738	6,385	5,595	6,552	6,012
Reported Cooling Degree Days	degree days	725	512	463	482	554

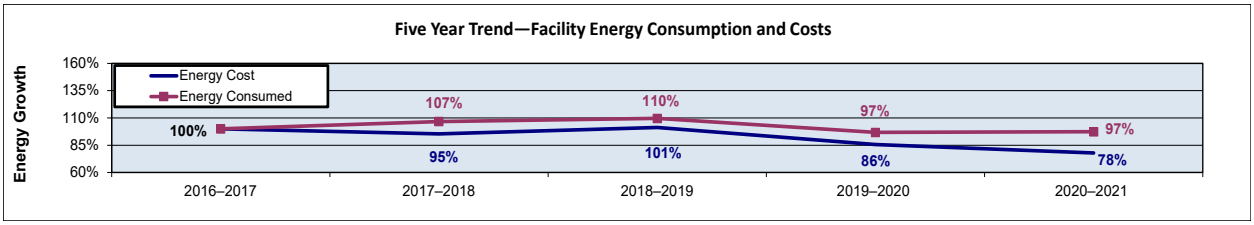
Millersville University

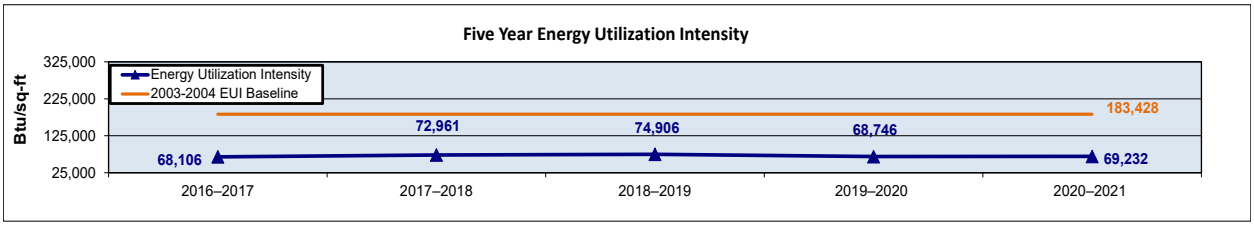




	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	62,439	66,972	67,560	64,070	51,993
Oil	gal	23,731	26,614	27,018	19,275	16,594
Electric	kWh	36,138,385	35,470,390	36,465,356	32,524,063	29,357,479
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 500,969	$ 581,309	$ 523,849	$ 448,589	$ 390,140
Oil	$	$ 43,898	$ 57,922	$ 62,485	$ 59,213	$ 35,982
Electric	$	$ 2,257,427	$ 2,210,262	$ 2,161,951	$ 1,959,967	$ 1,702,880
Total	$	$ 2,802,294	$ 2,849,493	$ 2,748,285	$ 2,467,769	$ 2,129,002
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	64,312	68,981	69,587	65,992	53,553
Oil	mmBtu	3,322	3,726	3,783	2,699	2,323
Electric	mmBtu	123,340	121,060	124,456	111,005	100,197
Total	mmBtu	190,975	193,768	197,826	179,695	156,073
Energy Utilization Intensity	Btu/sq-ft	85,818	87,073	88,913	76,642	66,555
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 8.02	$ 8.68	$ 7.75	$ 7.00	$ 7.50
Oil	$/gal	$ 1.85	$ 2.18	$ 2.31	$ 3.07	$ 2.17
Electric	¢/kWh	6.25 ¢	6.23 ¢	5.93 ¢	6.03 ¢	5.80 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 7.79	$ 8.43	$ 7.53	$ 6.80	$ 7.29
Oil	$/mmBtu	$ 13.21	$ 15.55	$ 16.52	$ 21.94	$ 15.49
Electric	$/mmBtu	$ 18.30	$ 18.26	$ 17.37	$ 17.66	$ 17.00
Weighted Average	$/mmBtu	$ 14.67	$ 14.71	$ 13.89	$ 13.73	$ 13.64
Misc Facility Costs						
Water Cost	$	$ 149,830	$ 141,033	$ 101,560	$ 97,700	$ 103,207
Sewage Cost	$	$ 440,393	$ 433,450	$ 431,392	$ 458,224	$ 650,417
Reported Information						
Gross Area	sq-ft	2,225,354	2,225,354	2,224,939	2,344,620	2,345,035
Reported Student Population		6,130	5,935	5,772	5,673	5,673
Reported Heating Degree Days	degree days	4,836	5,450	5,218	5,047	4,803
Reported Cooling Degree Days	degree days	746	834	1,200	1,124	1,378

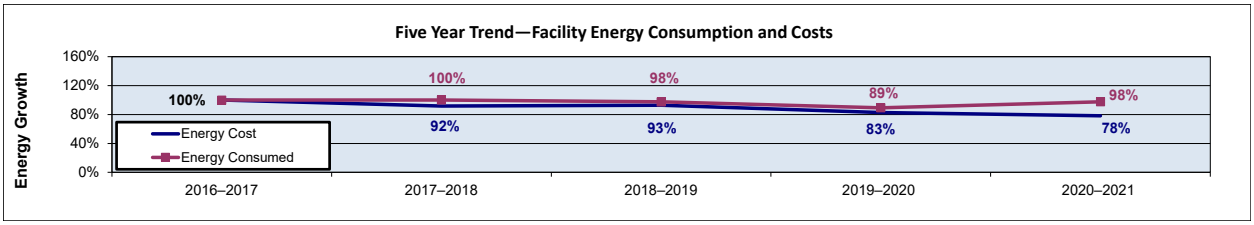
Shippensburg University

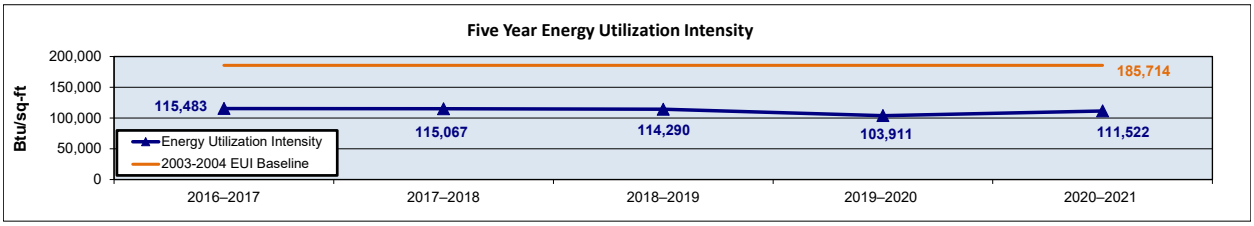




	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	83,978	94,831	97,419	85,716	85,024
Oil	gal	---	---	---	---	---
Electric	kWh	22,542,285	22,484,225	23,064,988	20,449,046	20,985,695
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 552,033	$ 624,125	$ 622,871	$ 523,806	$ 504,339
Oil	$	---	---	---	---	---
Electric	$	$ 1,582,463	$ 1,410,962	$ 1,538,722	$ 1,303,802	$ 1,158,847
Total	$	$ 2,134,496	$ 2,035,087	$ 2,161,593	$ 1,827,608	$ 1,663,186
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	86,497	97,676	100,342	88,287	87,575
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	76,937	76,739	78,721	69,793	71,624
Total	mmBtu	163,434	174,415	179,062	158,080	159,199
Energy Utilization Intensity	Btu/sq-ft	68,106	72,961	74,906	68,746	69,232
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 6.57	$ 6.58	$ 6.39	$ 6.11	$ 5.93
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	7.02 ¢	6.28 ¢	6.67 ¢	6.38 ¢	5.52 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 6.38	$ 6.39	$ 6.21	$ 5.93	$ 5.76
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 20.57	$ 18.39	$ 19.55	$ 18.68	$ 16.18
Weighted Average	$/mmBtu	$ 13.06	$ 11.67	$ 12.07	$ 11.56	$ 10.45
Misc Facility Costs						
Water Cost	$	$ 171,421	$ 160,684	$ 139,481	$ 174,319	$ 130,602
Sewage Cost	$	$ 138,393	$ 182,989	$ 194,435	$ 198,694	$ 183,000
Reported Information						
Gross Area	sq-ft	2,399,700	2,390,502	2,390,502	2,299,487	2,299,487
Reported Student Population		6,011	5,556	5,412	5,091	5,091
Reported Heating Degree Days	degree days	3,363	3,960	3,890	3,589	3,755
Reported Cooling Degree Days	degree days	2,041	1,768	2,045	1,804	1,847

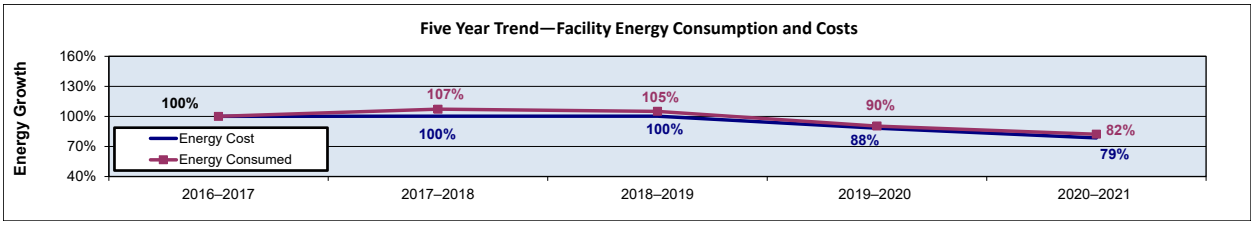
Slippery Rock University

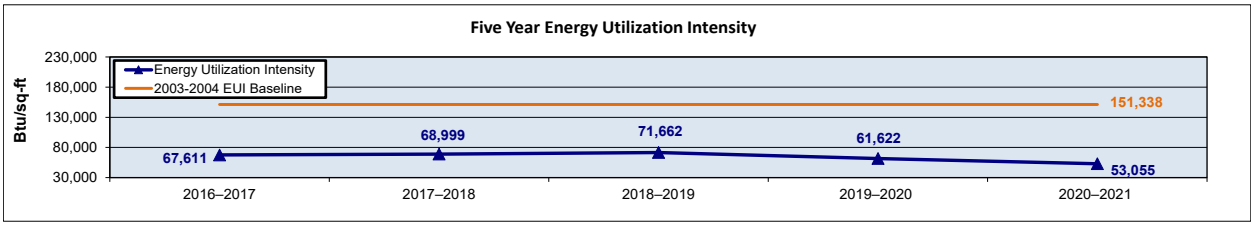




	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	2,698	2,574	1,399	1,217	2,831
Gas	mcf	119,689	128,270	153,902	140,548	123,350
Oil	gal	---	---	---	---	---
Electric	kWh	29,264,497	27,793,971	26,952,194	25,325,790	25,053,916
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	$ 259,366	$ 247,887	$ 131,670	$ 136,848	$ 298,279
Gas	$	$ 779,660	$ 847,147	$ 1,016,461	$ 780,030	$ 625,748
Oil	$	---	---	---	---	---
Electric	$	$ 2,025,151	$ 1,717,551	$ 1,697,773	$ 1,619,695	$ 1,471,867
Total	$	$ 3,064,177	$ 2,812,585	$ 2,845,904	$ 2,536,572	$ 2,395,894
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	71,767	68,468	37,213	32,372	75,305
Gas	mmBtu	123,280	132,118	158,519	144,764	127,051
Oil	mmBtu	---	---	---	---	---
Electric	mmBtu	99,880	94,861	91,988	86,437	85,509
Total	mmBtu	294,926	295,447	287,720	263,573	287,864
Energy Utilization Intensity	Btu/sq-ft	115,483	115,067	114,290	103,911	111,522
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	$ 96.13	$ 96.30	$ 94.12	$ 112.45	$ 105.36
Gas	$/mcf	$ 6.51	$ 6.60	$ 6.60	$ 5.55	$ 5.07
Oil	$/gal	---	---	---	---	---
Electric	¢/kWh	6.92 ¢	6.18 ¢	6.30 ¢	6.40 ¢	5.87 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	$ 3.61	$ 3.62	$ 3.54	$ 4.23	$ 3.96
Gas	$/mmBtu	$ 6.32	$ 6.41	$ 6.41	$ 5.39	$ 4.93
Oil	$/mmBtu	---	---	---	---	---
Electric	$/mmBtu	$ 20.28	$ 18.11	$ 18.46	$ 18.74	$ 17.21
Weighted Average	$/mmBtu	$ 10.39	$ 9.52	$ 9.89	$ 9.62	$ 8.32
Misc Facility Costs						
Water Cost	$	$ 413,059	$ 395,519	$ 346,934	$ 286,274	$ 214,789
Sewage Cost	$	$ 469,850	$ 439,963	$ 400,562	$ 332,774	$ 236,857
Reported Information						
Gross Area	sq-ft	2,553,845	2,567,609	2,517,458	2,536,527	2,581,242
Reported Student Population		7,509	7,478	7,399	7,307	7,307
Reported Heating Degree Days	degree days	5,269	6,221	5,809	5,939	5,515
Reported Cooling Degree Days	degree days	831	500	461	446	830

West Chester University





	Units	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021
Fuel Consumption						
Anthracite Coal	tons	---	---	---	---	---
Bituminous Coal	tons	---	---	---	---	---
Gas	mcf	101,044	112,751	112,072	91,468	85,406
Oil	gal	9,470	10,157	6,580	6,510	7,409
Electric	kWh	44,664,365	46,517,314	45,282,401	40,383,045	36,086,800
Energy Costs						
Anthracite Coal	$	---	---	---	---	---
Bituminous Coal	$	---	---	---	---	---
Gas	$	$ 714,238	$ 848,985	$ 1,001,884	$ 721,202	$ 612,864
Oil	$	$ 18,329	$ 23,014	$ 15,093	$ 15,209	$ 15,286
Electric	$	$ 3,198,058	$ 3,068,609	$ 2,924,913	$ 2,734,546	$ 2,459,531
Total	$	$ 3,930,625	$ 3,940,608	$ 3,941,890	$ 3,470,957	$ 3,087,681
Energy Consumption						
Anthracite Coal	mmBtu	---	---	---	---	---
Bituminous Coal	mmBtu	---	---	---	---	---
Gas	mmBtu	104,075	116,134	115,434	94,212	87,968
Oil	mmBtu	1,326	1,422	921	911	1,037
Electric	mmBtu	152,439	158,764	154,549	137,827	123,164
Total	mmBtu	257,841	276,319	270,904	232,951	212,170
Energy Utilization Intensity	Btu/sq-ft	67,611	68,999	71,662	61,622	53,055
Unit Fuel Costs						
Anthracite Coal	$/ton	---	---	---	---	---
Bituminous Coal	$/ton	---	---	---	---	---
Gas	$/mcf	$ 7.07	$ 7.53	$ 8.94	$ 7.88	$ 7.18
Oil	$/gal	$ 1.94	$ 2.27	$ 2.29	$ 2.34	$ 2.06
Electric	¢/kWh	7.16 ¢	6.60 ¢	6.46 ¢	6.77 ¢	6.82 ¢
Unit Energy Costs						
Anthracite Coal	$/mmBtu	---	---	---	---	---
Bituminous Coal	$/mmBtu	---	---	---	---	---
Gas	$/mmBtu	$ 6.86	$ 7.31	$ 8.68	$ 7.66	$ 6.97
Oil	$/mmBtu	$ 13.82	$ 16.18	$ 16.38	$ 16.69	$ 14.74
Electric	$/mmBtu	$ 20.98	$ 19.33	$ 18.93	$ 19.84	$ 19.97
Weighted Average	$/mmBtu	$ 15.24	$ 14.26	$ 14.55	$ 14.90	$ 14.55
Misc Facility Costs						
Water Cost (1)	$	$ 948,349	$ 930,124	$ 970,188	$ 952,548	$ 646,659
Sewage Cost (1)	$	$ 579,653	$ 553,179	$ 575,674	$ 471,452	$ 229,247
Reported Information						
Gross Area	sq-ft	3,813,580	4,004,701	3,780,311	3,780,311	3,999,041
Reported Student Population		14,192	14,217	14,274	14,364	14,364
Reported Heating Degree Days	degree days	5,041	5,634	5,474	5,458	5,352
Reported Cooling Degree Days	degree days	1,285	988	1,200	1,007	1,106

(1) 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 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
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
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
CHP	Combined heat and power plant
CMMS	Computer maintenance management system
CSP	Curtailment service provider
DGS	Department of General Services
DS	Delivery Service
ECM	Energy Conservation Measure
EDC	Electrical distribution company
EE&C	Energy Efficiency and Conservation
EPA	United States Environmental Protection Agency
ERMA	Energy Risk Management Application
ESCO	Energy Service Company
EUI	Energy Utilization Intensity
FIUP	Foundation of Indiana University of Pennsylvania
GESA	Guaranteed Energy Savings Act
GHG	Greenhouse gas

HDD	Heating degree days
HVAC	Heating, ventilating, and air conditioning
kV	Kilovolt
kW	Kilowatt
kWh	Kilowatt hour
lbs/hr	Pounds per hour
LDC	Local distribution company
mmBtu	One million British thermal units
MS4	Municipal Separate Storm Sewer System
NFPA	National Fire Protection Association
NT	Non-Residential Transportation
OPP	Office of Physical Plant
PADEP	Pennsylvania Department of Environmental Protection
PA PUC	Pennsylvania Public Utility Commission
PASSHE	Pennsylvania's State System of Higher Education
PCID	Pennsylvania Commercial Item Description
PLC	Peak Load Contribution
PPE	Personal protective equipment
PRV	Pressure reducing valves
PSFEI	Penn State Facilities Engineering Institute
PV	Photovoltaic
RFQ	Request for Quote
RTK	Right to Know