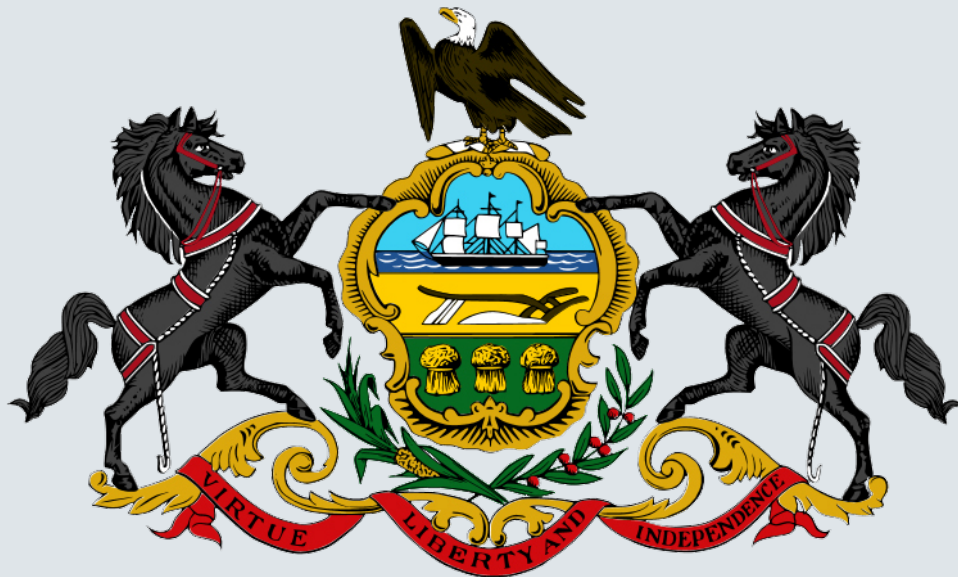


# ENERGY AND UTILITY USAGE REPORT

Fiscal Year 2018–2019



## Commonwealth of Pennsylvania

### Department of General Services



FACILITIES  
ENGINEERING  
INSTITUTE



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## **PENN STATE FACILITIES ENGINEERING INSTITUTE**

### **Our Mission**

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

### **Our Vision**

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

### **Our Services to the Department of General Services**

The Penn State Facilities Engineering Institute provides the Pennsylvania Department of General Services with essential energy and engineering services. Energy services include electricity and natural gas procurement and demand-side energy management. In support of these services, the Institute performs database development and management, and marketplace research and tracking. We educate consumers and assist with virtually all energy and utility issues. Since 1998, our energy procurement services have saved the Commonwealth of Pennsylvania over \$242 million in energy costs compared to utility rates. The Institute's engineering services cover surveys, studies, testing, and investigations at the Capitol Complex.

### **Director**

Mark A. Bodenschatz, PE, ProFM



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## EXECUTIVE SUMMARY

The Penn State Facilities Engineering Institute (PSFEI) supports a Commonwealth of Pennsylvania (Commonwealth) energy portfolio that covers 8,370 electric and 926 natural gas accounts. During fiscal year 2018–2019, PSFEI supported the Commonwealth’s web-based, energy procurement activities by conducting electricity and natural gas commodity procurement events under the direction of the Department of General Services (DGS) Bureau of Procurement.

Electricity supply contracts were solicited and awarded through four bidding events that included 3,366 accounts resulting in an estimated cost reduction over the prior contract rates of \$1.2 million and \$958,000 in projected contract avoided costs versus the utility-issued price to compare. The result of these awarded contracts continued to drive down the average unit cost of electricity supply across all Commonwealth agencies to approximately \$0.048 per kilowatt-hour.

Two natural gas procurement events were held for 62 accounts resulting in an estimated cost reduction of approximately \$370,000 from prior contract rates and projected contract avoided costs of \$4.2 million when compared to natural gas utility sales service tariff rates.

In addition to the energy procurement services provided by PSFEI, other notable accomplishments during the fiscal year included:

- Enhancing the Energy Risk Management Application's (ERMA) functional capabilities to improve the Commonwealth’s energy procurement and account management capabilities.
- Assisting the Commonwealth with the implementation of the EnergyCAP utility bill management software and the training of Commonwealth personnel in its use. Efforts included meter identification, account identification, user permission assignment, resolution and reconciliation of unknown meters, and hosting various training sessions across the Commonwealth agencies.
- Supporting the reporting requirements of Executive Order 2019-01 whereby Commonwealth executive agencies are required to reduce energy consumption by 3% per year and by 21% in totality by 2025 from 2017 levels. Through the analytics available in the EnergyCAP software, 5,170 total meters have been verified as meeting the requirements for reporting, resulting in a 2.9% reduction in energy consumption for the first fiscal year of reporting.
- Assisting with the Commonwealth’s total annual purchase of 308,978 Megawatt hours (MWh) of Green-e certified Renewable Energy Credits (RECs) for 2019 and 2020, initially satisfying the 40% renewable electricity requirement contained within Executive Order 2019-01 and placing Pennsylvania in the number one position for state governments on the U.S. Environmental Protection Agency's Green Power Partnership National Top 100 list.
- Supporting the DGS Guaranteed Energy Savings Act (GESA) program by participating in scoping site visits; preparing reports identifying energy-saving project opportunities; and providing review and comment regarding proposed energy conservation measures. To date, four projects have been completed, three projects are under construction, one project is in the finance solicitation phase, and five projects are currently in the Investment Grade Audit (IGA) solicitation phase. According to DGS, total project investment is projected to be \$124.1 million

with projected annual savings of \$6.8 million. This equates to 54,137 trees planted or 4,977 cars mitigated.

- Providing the DGS Capitol Complex with vital engineering services to enhance operation, maintenance, reliability, and safety of its buildings. Two electric reports, one HVAC report, and six testing reports were issued to document these efforts.

Energy and utility costs for DGS facilities increased by \$110,947, up 0.7% from the previous fiscal year. Overall energy use decreased by approximately 16,953 million British thermal units (MMBtu), down 2.6%. Continued favorable natural gas market pricing coupled with the resolution of a prior billing error at the DGS Annex Complex provided a 5.6% decrease in natural gas expenditures while electrical energy cost fell by 5.4%. Purchased steam energy increased by 4,634 thousand pounds (mlbs), up 2.8% while the unit cost of steam increased by roughly \$1.41/mlb, up 5.7%.

PSFEI conducted a comparison of Commonwealth buildings to industry averages using the Commercial Buildings Energy Consumption Survey (revised in December 2012). The average site Energy Use Intensity (EUI) for an office building in the U.S. Northeast region was 93,900 British thermal units per square foot (Btu/sqft). For fiscal year 2018–2019, the average Commonwealth building site EUI was 82,095 Btu/sqft, 12.4% below the national average and 2.6% below the previous fiscal year.

The Energy and Utility Usage Report is divided into five sections. The *Utility Summary* section provides summary information about utility usage and costs. Detailed utility usage and cost information by building is presented in the *DGS Energy and Utility Usage* section. Both of these sections have graphical and tabular comparisons of facilities and narrative descriptions. The *Energy Procurement* section presents electricity and natural gas procurement activities and market commentaries and analysis. The *Summary of Energy and Engineering Services* section provides information about Executive Order 2019–01, ERMA, Act 129, PSFEI engineering and electrical testing services, and the GESA program. The *Summary of Education Services* section presents the educational opportunities offered by PSFEI and attendance by DGS personnel.

## UTILITY SUMMARY

The Utility Summary section presents utility usage by fuel, provides six-year historical information (unless otherwise stated), compares overall use by building using a site-based Energy Use Intensity (EUI) indicator, and benchmarks buildings by their utility cost per square foot.

## CONSUMPTION AND COSTS

In fiscal year 2018–2019, the Department of General Services (DGS) energy and water/sewer cumulative costs totaled \$15.7 million, an increase of only 0.7% from the previous fiscal year. Electricity use decreased by 1.1%, natural gas use decreased by 14.9% (primarily due to the resolution of a natural gas billing error), purchased steam use increased by 2.8%, and water/sewer use increased by 12.7%.

Thermal energy unit pricing increased from the prior fiscal year. Natural gas unit cost per thousand cubic feet (mcf) increased by 10.9% and purchased steam per one thousand pounds (mlbs) by over 5.7%. Electricity cost per kilowatt-hour (kWh) decreased by 4.5%.

**Table 1. Consumption and Costs 2018–2019**

Utility	Annual Consumption	Unit Cost	Annual Cost
Electricity	107,179,027 kWh	7.576 ¢/kWh	\$8,119,679
Natural Gas	99,704 mcf	\$7.12 /mcf	\$710,070
Steam	168,990 mlbs	\$26.03 /mlbs	\$4,398,593
Water/Sewer	92,216 mgal	\$26.80 /mgal	\$2,471,786
<b>Total</b>			<b>\$15,700,129</b>

## AVOIDED COSTS

During the fiscal year, the Penn State Facilities Engineering Institute (PSFEI) assisted DGS and other Commonwealth of Pennsylvania (Commonwealth) agencies with reducing future energy supply costs by over \$1.6 million compared to current contract rates and avoiding over \$5.1 million in projected annual electricity and natural gas expenditures compared to utility-issued, price-to-compare costs.

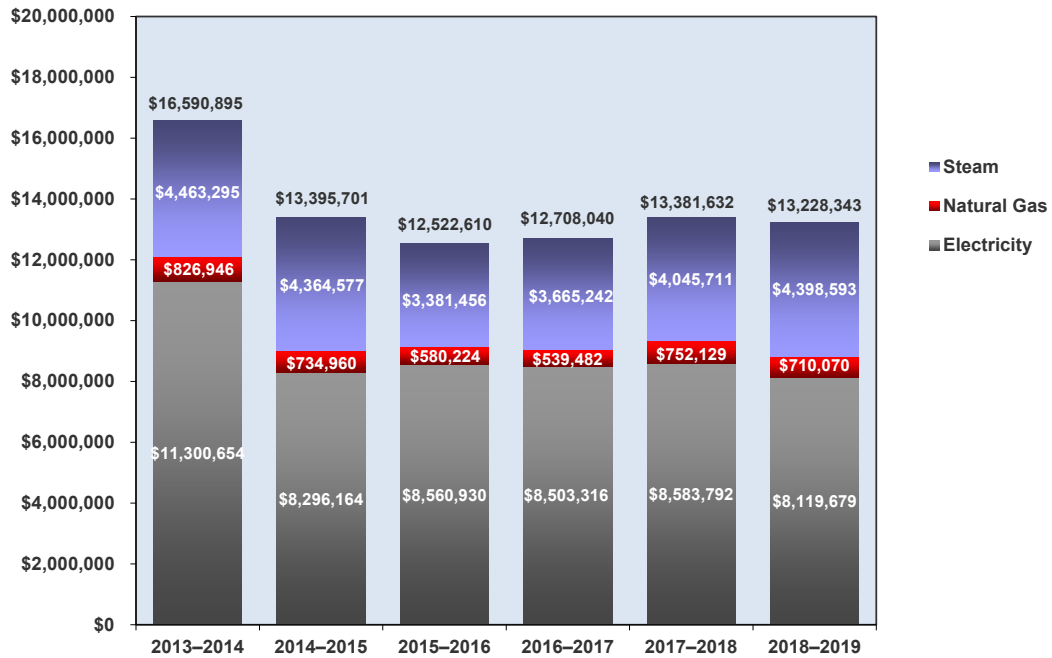
**Table 2. Energy Procurement Results 2018–2019**

Energy Events	Cost Reduction	Cost Avoidance
Electric Procurement	\$1,274,873	\$958,320
Natural Gas Procurement	\$370,706	\$4,215,956
<b>Total</b>	<b>\$1,645,579</b>	<b>\$5,174,276</b>

## DGS SIX-YEAR ENERGY CONSUMPTION AND COSTS

Charts 1 and 2 illustrate energy costs and consumption trends for electricity, steam, and natural gas for DGS facilities over the past six fiscal years. During fiscal year 2018–2019, energy costs decreased by \$153,289, down 1.1% from the previous year. Overall energy use, measured in one million British thermal units (MMBtu), decreased from the previous year by 16,953 MMBtus, down 2.6%.

**Chart 1. Annual Energy Costs Trend**



**Chart 2. Annual Consumption Trend**

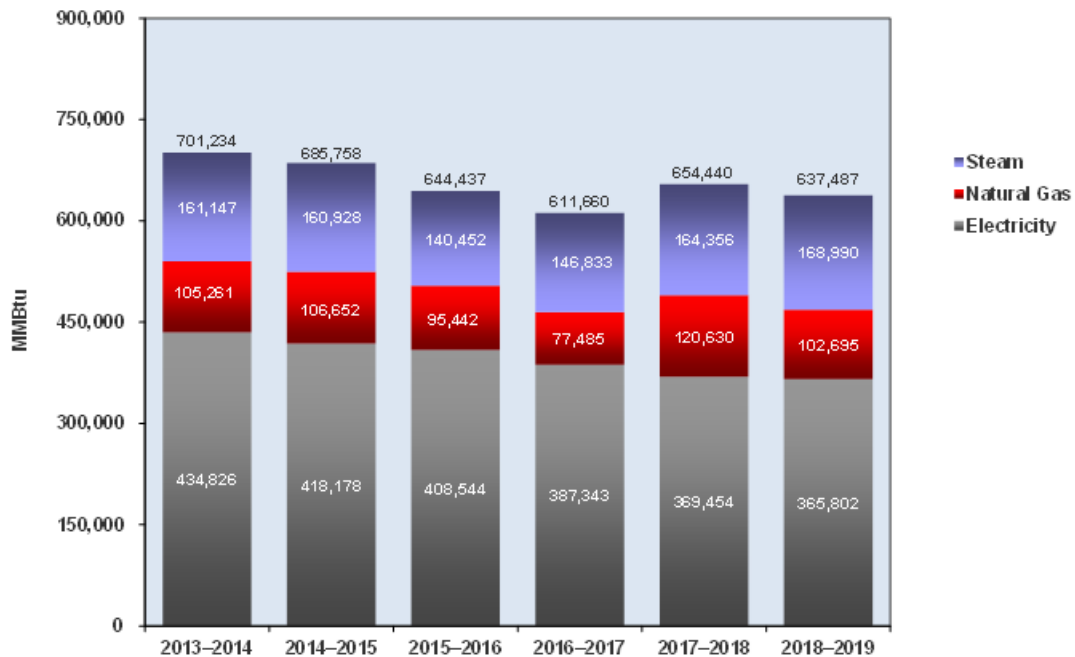


Table 3 provides a detailed DGS agency-level view of energy use and cost information for the past six fiscal years.

DGS facilities experienced a 1% decrease in use and a 5.4% decrease in costs for electricity consumed during the fiscal year. This equates to 1,070,152 less kWh and a cost reduction of \$464,113. Despite escalations built into the Lancaster Solid Waste Management Authority (LCSWMA) Power Purchase Agreement (PPA), an increase in zonal capacity charges, and stable transmission pricing, the unit cost per kWh fell by nearly 4.5% due to risk management efforts to limit exposure to volatile hourly market-based electricity pricing. Additional details about the LCSWMA PPA are provided in the Intergovernmental Power Purchase Agreement section under Summary of Energy and Engineering Services.

Purchased steam consumption increased by 4,634 mlbs, up 2.8% and costs increased by \$352,882, up 8.7%. Although the winter was 0.4% less severe than the previous year, overall steam unit cost increased by 5.7% to \$1.41 per mlb.

Natural gas consumption decreased 17,413 mcf, down 14.9% while costs decreased by \$42,059, down 5.6%. A billing error in fiscal year 2016–2017 resulted in 19,035 mcf of that year's consumption being reported in fiscal year 2017–2018, accounting for the significant increase reported last year (roughly half of the usage increase). The average natural gas unit cost increased by 10.9%, from \$6.42 to \$7.12 per mcf.

**Table 3. Annual Energy Consumption and Costs Trend**

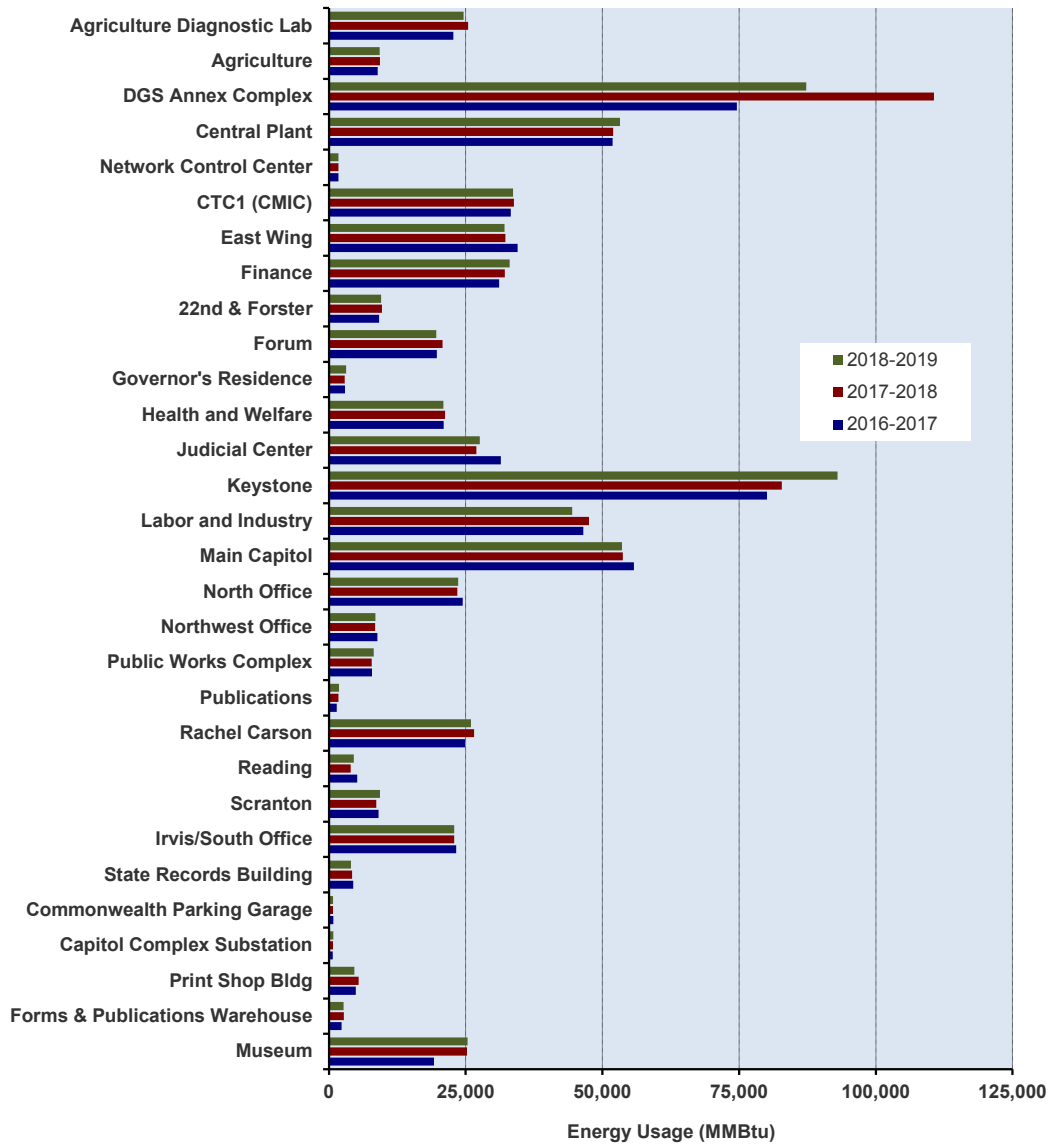
Energy Cost	Units	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019
Electricity	\$	\$11,300,654	\$8,296,164	\$8,560,930	\$8,503,316	\$8,583,792	\$8,119,679
Natural Gas	\$	\$826,946	\$734,960	\$580,224	\$539,482	\$752,129	\$710,070
Steam	\$	\$4,463,295	\$4,364,577	\$3,381,456	\$3,665,242	\$4,045,711	\$4,398,593
Total	\$	\$16,590,895	\$13,395,701	\$12,522,610	\$12,708,040	\$13,381,632	\$13,228,343
<b>Unit Energy Cost/MMBtu</b>							
Electricity	\$/MMBtu	\$25.99	\$19.84	\$20.95	\$21.95	\$21.95	\$22.20
Natural Gas	\$/MMBtu	\$7.86	\$6.89	\$6.08	\$6.96	\$6.23	\$6.91
Steam	\$/MMBtu	\$27.70	\$27.12	\$24.08	\$24.96	\$24.62	\$26.03
Weighted Average	\$/MMBtu	\$23.66	\$19.53	\$19.43	\$20.78	\$20.45	\$20.75
<b>Energy Consumption</b>							
Electricity	MMBtu	434,826	418,178	408,544	387,343	369,454	365,802
Natural Gas	MMBtu	105,261	106,652	95,442	77,485	120,630	102,695
Steam	MMBtu	161,147	160,928	140,452	146,833	164,356	168,990
Total	MMBtu	701,234	685,758	644,437	611,660	654,440	637,487
<b>Unit Fuel Cost</b>							
Electricity	\$/kWh	\$0.0887	\$0.0677	\$0.0715	\$0.0749	\$0.0793	\$0.0758
Natural Gas	\$/mcf	\$8.09	\$7.10	\$6.26	\$7.17	\$6.42	\$7.12
Steam	\$/mlb	\$27.70	\$27.12	\$24.08	\$24.96	\$24.62	\$26.03
<b>Fuel Consumption</b>							
Electricity	kWh	127,402,938	122,525,079	119,702,221	113,490,410	108,249,179	107,179,027
Natural Gas	mcf	102,195	103,545	92,662	75,228	117,117	99,704
Steam	mlbs	161,147	160,928	140,452	146,833	164,356	168,990

Note: The historical data for fiscal years 2013–2014, 2014–2015, 2015–2016, and 2016–2017 was updated to reflect the removal of the Altoona Office Building.

## ENERGY USAGE

Chart 3 shows the total energy usage in MMBtus for each DGS facility for the past three fiscal years. The largest users continue to be the DGS Annex Complex (despite the prior year natural gas billing error increase) and the Keystone Building. At most facilities, energy consumption changed slightly or remained the same from the previous year.

**Chart 3. Annual Energy Usage Trend**



## ENERGY USE INTENSITY

Table 4 and Charts 4A and 4B show the EUI for each building for the past three fiscal years. The EUI is measured in annual British thermal units per square feet (Btu/sqft); this provides a normalized method to compare building energy use. The EUI is used throughout the energy industry to portray a facility's energy use intensity. Chart 4B shows that the Agriculture Diagnostic Lab and CTC1 (CMIC) exhibited the highest energy use intensities because of their concentrated end-use equipment and heating, ventilating, and air conditioning (HVAC) loads dictated by building operations. The energy use for these buildings has slightly decreased over the past year.

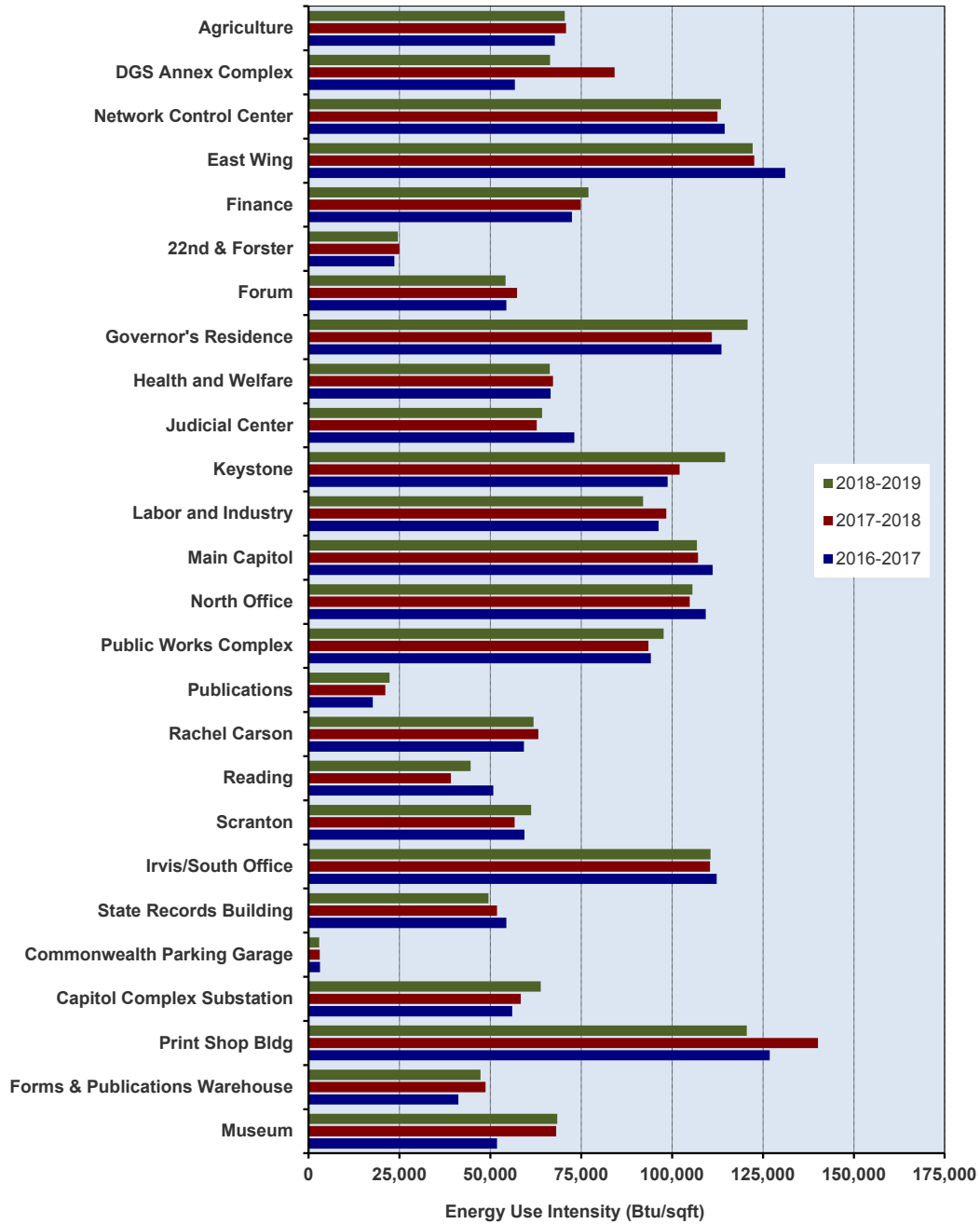
During fiscal year 2018–2019, total EUI decreased by 2.6% to 82,095 Btu/sqft. The most significant changes in energy use intensity occurred at the DGS Annex Complex (due to the natural gas billing error), the Print Shop Building, and the Keystone Building.

**Table 4. Annual Usage and Energy Use Intensity Trend**

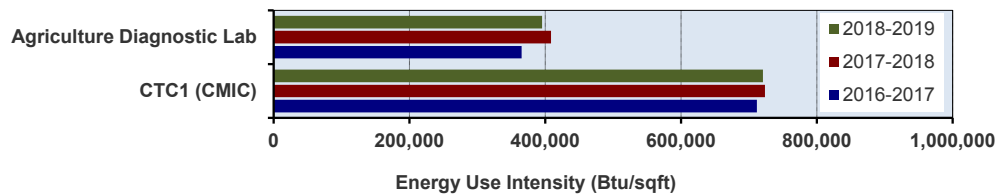
Facility	Total Space (sqft)	2016–2017		2017–2018		2018–2019	
		Btu Usage (MMBtu)	Energy Use Intensity (Btu/sqft)	Btu Usage (MMBtu)	Energy Use Intensity (Btu/sqft)	Btu Usage (MMBtu)	Energy Use Intensity (Btu/sqft)
Publications	81,948	1,447	17,660	1,733	21,143	1,827	22,292
22nd & Forster	388,544	9,186	23,641	9,708	24,985	9,553	24,586
Agriculture	131,391	8,900	67,738	9,305	70,818	9,260	70,479
Agriculture Diagnostic Lab	62,230	22,742	365,448	25,429	408,635	24,619	395,608
CTC1 (CMIC)	46,736	33,261	711,687	33,825	723,736	33,671	720,450
DGS Annex Complex	1,313,571	74,581	56,777	110,623	84,215	87,251	66,422
Fisher Plaza	---	552	---	554	---	474	---
Forms & Publications Warehouse	56,560	2,332	41,234	2,753	48,669	2,677	47,325
Governor's Residence	25,878	2,939	113,590	2,871	110,935	3,125	120,741
Network Control Center	15,400	1,762	114,446	1,732	112,452	1,747	113,427
Print Shop Bldg	38,688	4,909	126,884	5,421	140,134	4,664	120,551
Public Works Complex	83,670	7,876	94,127	7,824	93,513	8,171	97,663
Rachel Carson	420,125	24,877	59,212	26,542	63,175	25,987	61,854
Reading	101,626	5,166	50,829	3,980	39,161	4,533	44,603
Scranton	152,800	9,079	59,417	8,659	56,669	9,351	61,199
State Records Building	81,565	4,439	54,417	4,227	51,826	4,038	49,510
<b>Capitol Complex Buildings<sup>1</sup></b>							
Capitol Complex Substation	12,500	700	56,007	730	58,390	799	63,903
Commonwealth Parking Garage	248,188	778	3,136	772	3,113	728	2,933
East Wing	262,950	34,483	131,140	32,239	122,606	32,115	122,134
Finance	429,521	31,131	72,478	32,173	74,904	33,066	76,983
Forum	362,395	19,724	54,427	20,776	57,330	19,625	54,154
Health and Welfare	315,462	20,996	66,557	21,215	67,251	20,934	66,360
Irvis/South Office	207,138	23,257	112,279	22,878	110,446	22,911	110,606
Judicial Center	429,355	31,405	73,144	26,960	62,792	27,572	64,217
Keystone	811,147	80,104	98,754	82,782	102,056	92,984	114,633
Labor and Industry	483,161	46,526	96,294	47,532	98,376	44,480	92,060
Main Capitol	501,543	55,746	111,149	53,736	107,142	53,570	106,811
Museum	370,442	19,192	51,808	25,241	68,137	25,343	68,412
North Office	223,946	24,462	109,230	23,489	104,888	23,652	105,613
<b>Complex Buildings Total</b>	<b>4,657,748</b>	<b>388,504</b>		<b>390,524</b>		<b>397,778</b>	
<b>Total</b>	<b>7,658,480</b>	<b>602,551</b>		<b>645,709</b>		<b>628,724</b>	
<b>Weighted Average</b>			<b>78,678</b>		<b>84,313</b>		<b>82,095</b>

<sup>1</sup>PPL serves the Capitol Complex with one main account. DGS submeters the individual buildings. Central plant electric energy is distributed to Capitol Complex buildings served by central chilled water on a per square-foot basis. The Main Capitol steam metered use and cost is distributed to the Main Capitol, East Wing, Irvis/South Office, and North Office Buildings on a per square-foot basis.

**Chart 4A. Annual Energy Use Intensity Trend**



**Chart 4B. Annual Energy Use Intensity Trend  
Agriculture Diagnostic Lab and CTCI (CMIC)**





## UTILITY COST PER SQUARE FOOT

Employing a utility cost per square foot metric provides an additional benchmark to compare energy cost for buildings of varying sizes and purposes. Components of the total cost include electricity, natural gas, steam, and water/sewer. Compared to the previous fiscal year, the utility cost per square foot values varied from a 15% reduction at the Print Shop to a 12% increase at the Publications Building.

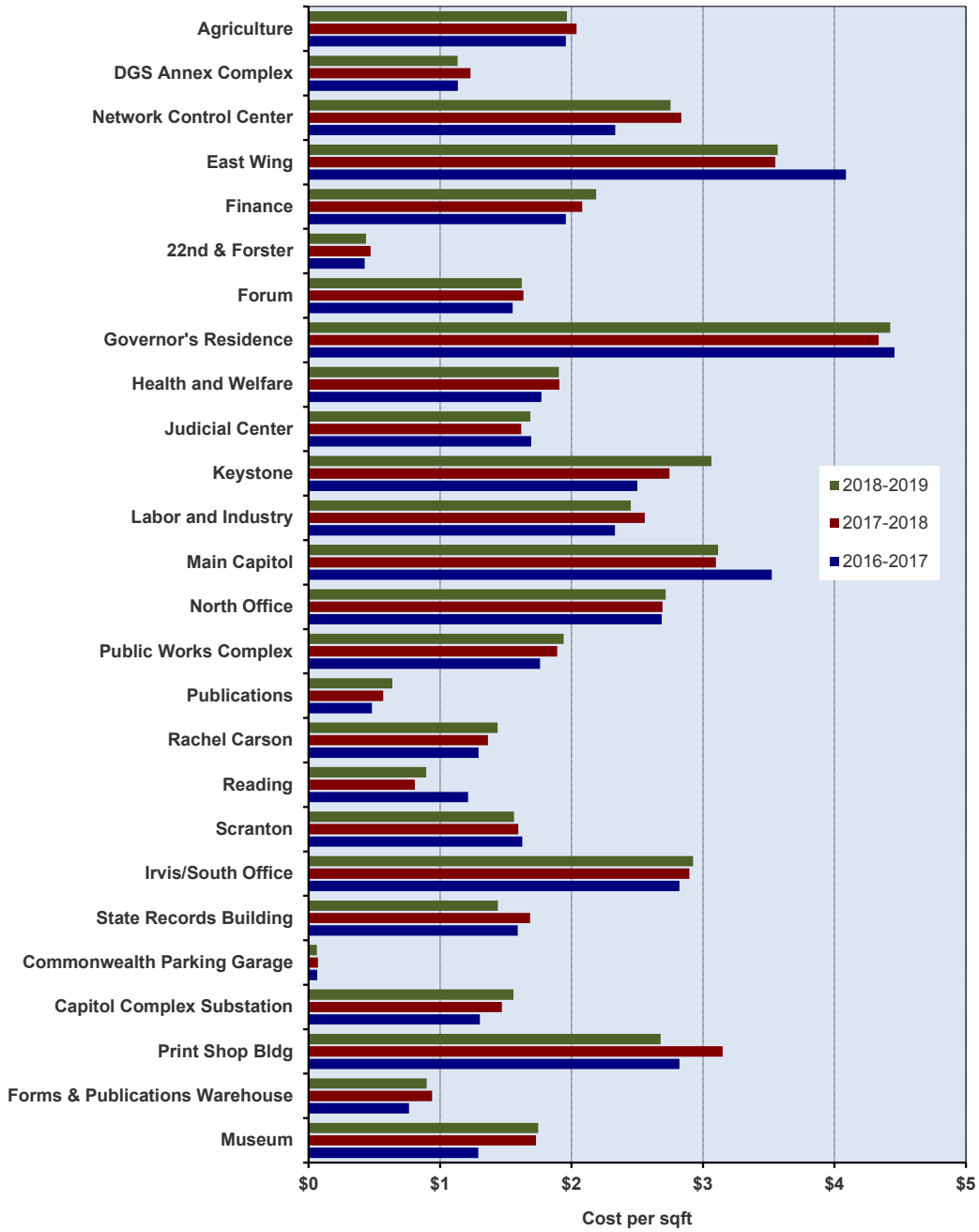
**Table 5. Annual Utility Cost per Square Foot Trend**

Facility	Total Space (sqft)	2016–2017		2017–2018		2018–2019	
		Cost	\$/sqft	Cost	\$/sqft	Cost	\$/sqft
Publications	81,948	\$39,553	\$0.48	\$46,464	\$0.57	\$52,248	\$0.64
22nd & Forster	388,544	\$165,933	\$0.43	\$183,438	\$0.47	\$170,135	\$0.44
Agriculture	131,391	\$257,111	\$1.96	\$267,941	\$2.04	\$258,276	\$1.97
Agriculture Diagnostic Lab	62,230	\$322,878	\$5.19	\$368,123	\$5.92	\$352,817	\$5.67
CTC1 (CMIC)	46,736	\$725,110	\$15.52	\$740,334	\$15.84	\$721,270	\$15.43
DGS Annex Complex	1,313,571	\$1,492,825	\$1.14	\$1,616,883	\$1.23	\$1,489,050	\$1.13
Fisher Plaza	---	\$36,080	---	\$35,282	---	\$28,861	---
Forms & Publications Warehouse	56,560	\$43,182	\$0.76	\$53,109	\$0.94	\$50,765	\$0.90
Governor's Residence	25,878	\$115,357	\$4.46	\$112,225	\$4.34	\$114,516	\$4.43
Network Control Center	15,400	\$35,925	\$2.33	\$43,678	\$2.84	\$42,398	\$2.75
Print Shop Bldg	38,688	\$109,126	\$2.82	\$121,881	\$3.15	\$103,590	\$2.68
Public Works Complex	83,670	\$147,263	\$1.76	\$158,307	\$1.89	\$162,348	\$1.94
Rachel Carson	420,125	\$543,264	\$1.29	\$573,112	\$1.36	\$603,829	\$1.44
Reading	101,626	\$123,253	\$1.21	\$82,185	\$0.81	\$90,972	\$0.90
Scranton	152,800	\$248,283	\$1.62	\$243,878	\$1.60	\$238,761	\$1.56
State Records Building	81,565	\$129,720	\$1.59	\$137,496	\$1.69	\$117,461	\$1.44
<b>Capitol Complex Buildings<sup>1</sup></b>							
Capitol Complex Substation	12,500	\$16,294	\$1.30	\$18,382	\$1.47	\$19,481	\$1.56
Commonwealth Parking Garage	248,188	\$16,215	\$0.07	\$17,500	\$0.07	\$15,832	\$0.06
East Wing	262,950	\$1,074,887	\$4.09	\$933,368	\$3.55	\$938,612	\$3.57
Finance	429,521	\$840,300	\$1.96	\$894,120	\$2.08	\$939,749	\$2.19
Forum	362,395	\$562,593	\$1.55	\$592,068	\$1.63	\$587,917	\$1.62
Health and Welfare	315,462	\$558,552	\$1.77	\$601,660	\$1.91	\$600,827	\$1.90
Irvs/South Office	207,138	\$584,217	\$2.82	\$599,768	\$2.90	\$606,083	\$2.93
Judicial Center	429,355	\$727,244	\$1.69	\$694,366	\$1.62	\$724,755	\$1.69
Keystone	811,147	\$2,027,867	\$2.50	\$2,227,279	\$2.75	\$2,486,066	\$3.06
Labor and Industry	483,161	\$1,126,073	\$2.33	\$1,235,627	\$2.56	\$1,183,987	\$2.45
Main Capitol	501,543	\$1,767,580	\$3.52	\$1,553,811	\$3.10	\$1,562,105	\$3.11
Museum	370,442	\$477,903	\$1.29	\$640,772	\$1.73	\$647,081	\$1.75
North Office	223,946	\$601,531	\$2.69	\$602,968	\$2.69	\$608,403	\$2.72
<b>Complex Buildings Total <sup>2</sup></b>	<b>4,657,748</b>	<b>\$10,381,256</b>		<b>\$10,611,687</b>		<b>\$10,920,897</b>	
<b>Total</b>	<b>7,658,480</b>	<b>\$14,916,120</b>		<b>\$15,396,022</b>		<b>\$15,518,194</b>	
<b>Weighted Average</b>			<b>\$1.95</b>		<b>\$2.01</b>		<b>\$2.03</b>

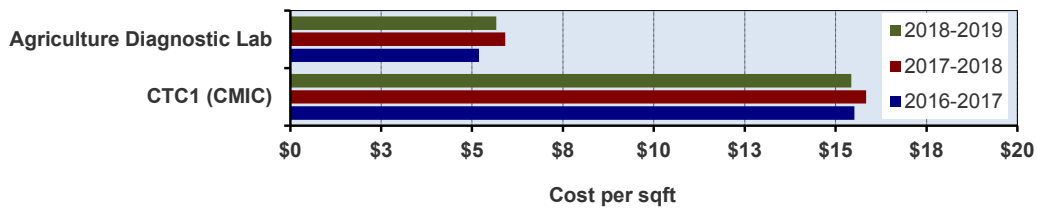
<sup>1</sup>PPL serves the Capitol Complex with one main account. DGS submeters the individual buildings. Central plant electric energy is distributed to the Capitol Complex buildings served by central chilled water on a per square foot basis. The Main Capitol steam metered use and cost is distributed to the Capitol, East Wing, Irvs/South Office, and North Office Buildings on a per square foot basis.

<sup>2</sup>The Northwest Office Building is not included in this table because only electricity costs are known. The difference between the total fiscal year 2018–2019 costs shown in this table and in Table 1 represents the Northwest Office Building's annual electric cost.

**Chart 5A. Annual Utility Cost per Square Foot Trend**



**Chart 5B. Annual Utility Cost per Square Foot Trend  
Agriculture Diagnostic Lab and CTCI (CMIC)**



## DGS ENERGY AND UTILITY USAGE

Detailed energy consumption information by building for DGS facilities is presented in this section.

### ELECTRICITY USAGE

During fiscal year 2018–2019, DGS facilities consumed 107,179,027 kWh of electricity at a cost of \$8,119,679, with an average unit cost of \$0.0758 per kWh. This represented a usage decrease of 1,070,152 kWh, down 1% from the previous fiscal year, and a cost reduction of 4.5%.

**Table 6. Electricity Usage and Costs 2018–2019**

Facility	Utility	Total Space (sqft)	Annual Electricity Consumption					Annual Electricity Costs		
			kWh	kWh/sqft	Peak Demand KW	Peak Demand W/sqft	Average Monthly Load Factor	Cost	c/kWh	\$/sqft
Publications	PPL Utilities	81,948	106,240	1.3	57.0	0.70	0.42	\$9,565	9.003	\$0.12
22nd & Forster	PPL Utilities	388,544	1,112,400	2.9	276.0	0.71	0.54	\$90,079	8.098	\$0.23
Agriculture	PPL Utilities	131,391	2,652,000	20.2	713.0	5.43	0.48	\$223,265	8.419	\$1.70
Agriculture Diagnostic Lab	PPL Utilities	62,230	2,410,200	38.7	550.0	8.84	0.66	\$191,798	7.958	\$3.08
CTC1 (CMIC)	PPL Utilities	46,736	9,865,500	211.1	1,288.0	27.56	0.98	\$721,270	7.311	\$15.43
DGS Annex Complex	PPL Utilities	---	2,085	---	1.0	---	0.26	\$476	22.820	---
DGS Annex Complex	PPL Utilities	1,313,571	8,013,600	6.1	1,578.0	1.20	0.78	\$630,644	7.870	\$0.48
DGS Annex Complex	PPL Utilities	---	223,606	---	---	---	---	\$73,369	32.812	---
Fisher Plaza	PPL Utilities	---	138,846	---	---	---	---	\$28,861	20.786	---
Forms & Publications Warehouse	PPL Utilities	56,560	147,200	2.6	85.0	1.50	0.35	\$14,471	9.831	\$0.26
Governor's Residence	PPL Utilities	25,878	874,800	33.8	---	---	---	\$97,506	11.146	\$3.77
Network Control Center	PPL Utilities	15,400	511,800	33.2	130.0	8.44	0.53	\$42,398	8.284	\$2.75
Print Shop Bldg	PPL Utilities	38,688	1,229,280	31.8	296.0	7.65	0.59	\$99,385	8.085	\$2.57
Public Works Complex	PPL Utilities	83,670	888,600	10.6	287.0	3.43	0.48	\$78,218	8.802	\$0.93
Public Works Complex	PPL Utilities	---	0	---	---	---	---	\$315	---	---
Rachel Carson	PPL Utilities	420,125	4,305,600	10.2	1,627.0	3.87	0.41	\$390,529	9.070	\$0.93
Reading	MetEd	101,626	898,291	8.8	18.4	0.18	9.10	\$54,137	6.027	\$0.53
Scranton	PPL Utilities	152,800	2,721,000	17.8	810.0	5.30	0.60	\$212,181	7.798	\$1.39
Scranton	PPL Utilities	---	7,553	---	2.0	---	0.62	\$854	11.303	---
Scranton	PPL Utilities	---	10,953	---	2.0	---	0.62	\$1,105	10.091	---
State Records Center	PPL Utilities	81,565	476,100	5.8	142.0	1.74	0.45	\$41,148	8.643	\$0.50
<b>Capitol Complex Buildings<sup>1</sup></b>	<b>PPL Utilities</b>									
Capitol Complex Substation	---	12,500	234,043	18.7	---	---	---	\$17,557	7.502	\$1.40
Central Plant	---	3,664,223	15,600,085	4.3	---	---	---	\$1,102,242	7.066	\$0.30
Commonwealth Parking Garage	---	248,188	213,299	0.9	---	---	---	\$15,832	7.422	\$0.06
East Wing	---	262,950	4,731,013	18.0	---	---	---	\$346,128	7.316	\$1.32
Finance	---	429,521	3,467,703	8.1	---	---	---	\$253,677	7.315	\$0.59
Forum	---	362,395	2,039,802	5.6	---	---	---	\$148,319	7.271	\$0.41
Health and Welfare	---	315,462	2,678,963	8.5	---	---	---	\$196,297	7.327	\$0.62
Invis/South Office	---	207,138	3,027,174	14.6	---	---	---	\$220,915	7.298	\$1.07
Judicial Center	---	429,355	3,599,847	8.4	---	---	---	\$264,535	7.349	\$0.62
Keystone	---	811,147	12,192,159	15.0	---	---	---	\$893,104	7.325	\$1.10
Labor and Industry	---	483,161	7,657,370	15.8	---	---	---	\$557,007	7.274	\$1.15
Main Capitol	---	501,543	6,771,958	13.5	---	---	---	\$496,218	7.328	\$0.99
Museum	---	370,442	2,928,364	7.9	---	---	---	\$211,887	7.236	\$0.57
North Office	---	223,946	2,945,160	13.2	---	---	---	\$214,027	7.267	\$0.96
Northwest Office	---	188,819	2,496,433	13.2	---	---	---	\$180,357	7.225	\$0.96
<b>Complex Buildings Total</b>		<b>4,846,567</b>	<b>70,583,373</b>	<b>14.6</b>	<b>15,379</b>	<b>3.17</b>	<b>0.52</b>	<b>\$5,118,104</b>	<b>7.251</b>	<b>\$1.06</b>
<b>Total</b>		<b>7,847,299</b>	<b>107,179,027</b>					<b>\$8,119,679</b>		
<b>Weighted Average</b>				<b>13.7</b>			<b>0.55</b>		<b>7.576</b>	<b>\$1.03</b>

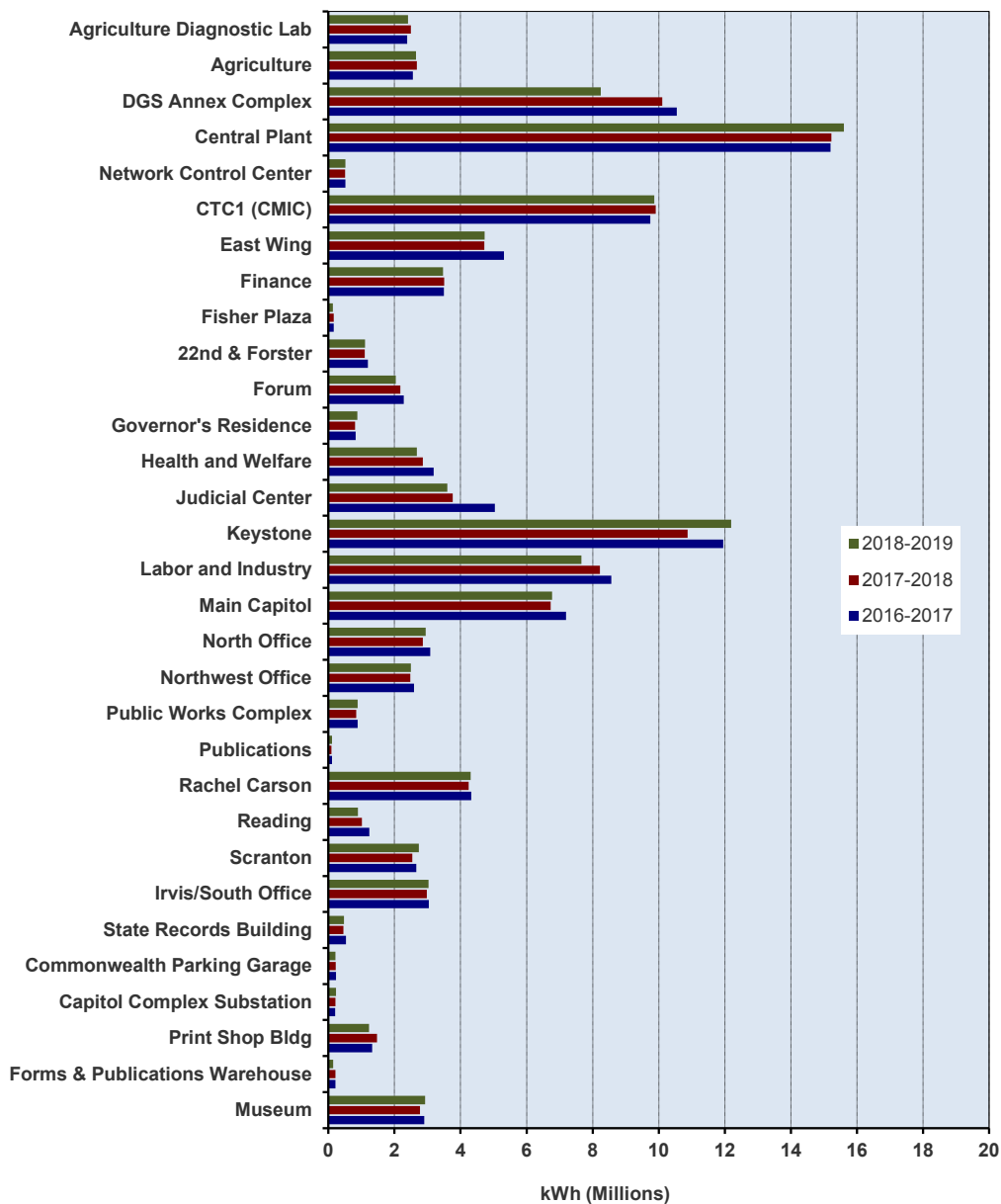
<sup>1</sup>PPL serves the Capitol Complex with one main account. DGS submeters the individual buildings.

Note that in Table 6, the Reading Office Building’s load factor is 9.10. Load factor is equal to kWh use divided by the product of peak demand multiplied by hours of use. A load factor greater than 1 is not possible (the load factor was 4.55 for fiscal year 2017–2018, 2.67 for 2016–2017, and 1.21 for 2015–2016). PSFEI recommends that DGS contact the serving utility to investigate this issue.

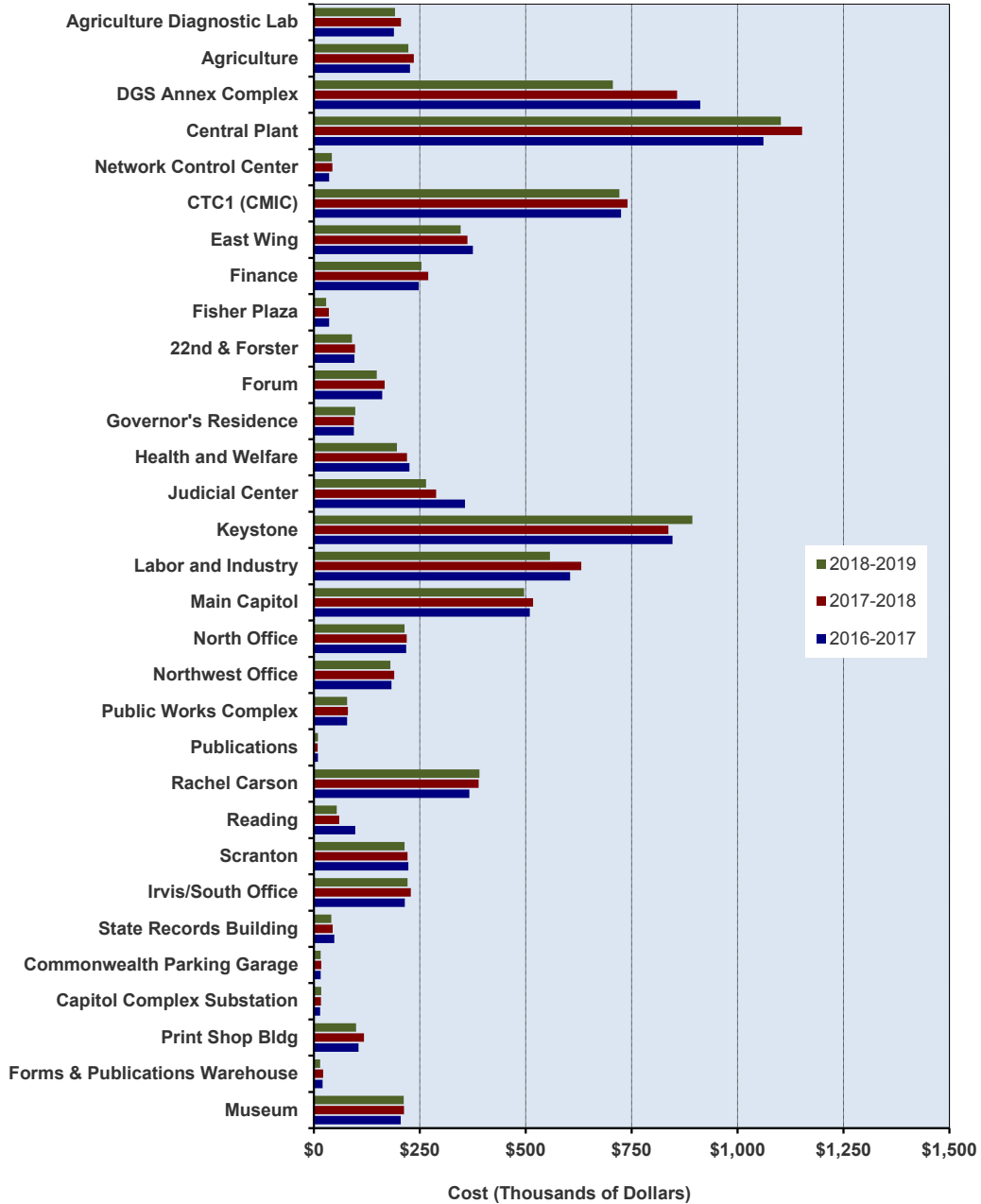
Compared to the previous fiscal year, consumption remained relatively the same except for notable reductions at the Forms and Publications Warehouse, down 30.9% and the main service account at the DGS Annex Complex, down 18.9%. Peak demand changes ranged from a decrease of 16.8% at the Agriculture Building to an increase of 12.4% at the Rachel Carson State Office Building.

Charts 6 and 7 compare electricity consumption and cost for the previous three fiscal years.

**Chart 6. Annual Electricity Consumption Trend**



**Chart 7. Annual Electricity Costs Trend**



**NATURAL GAS USAGE**

In fiscal year 2018–2019, DGS facilities consumed 99,704 mcf of natural gas, 14.8% less than the previous year, primarily due to the resolution of a billing error at the DGS Annex Complex from 2016–2017 that displayed in the fiscal year 2017–2018 data. The DGS Annex Complex remains the largest consumer of natural gas of all DGS buildings with 57.6% of the total share of natural gas use. Table 7 provides a breakdown of natural gas consumption by facility.

**Table 7. Natural Gas Consumption and Costs 2018–2019**

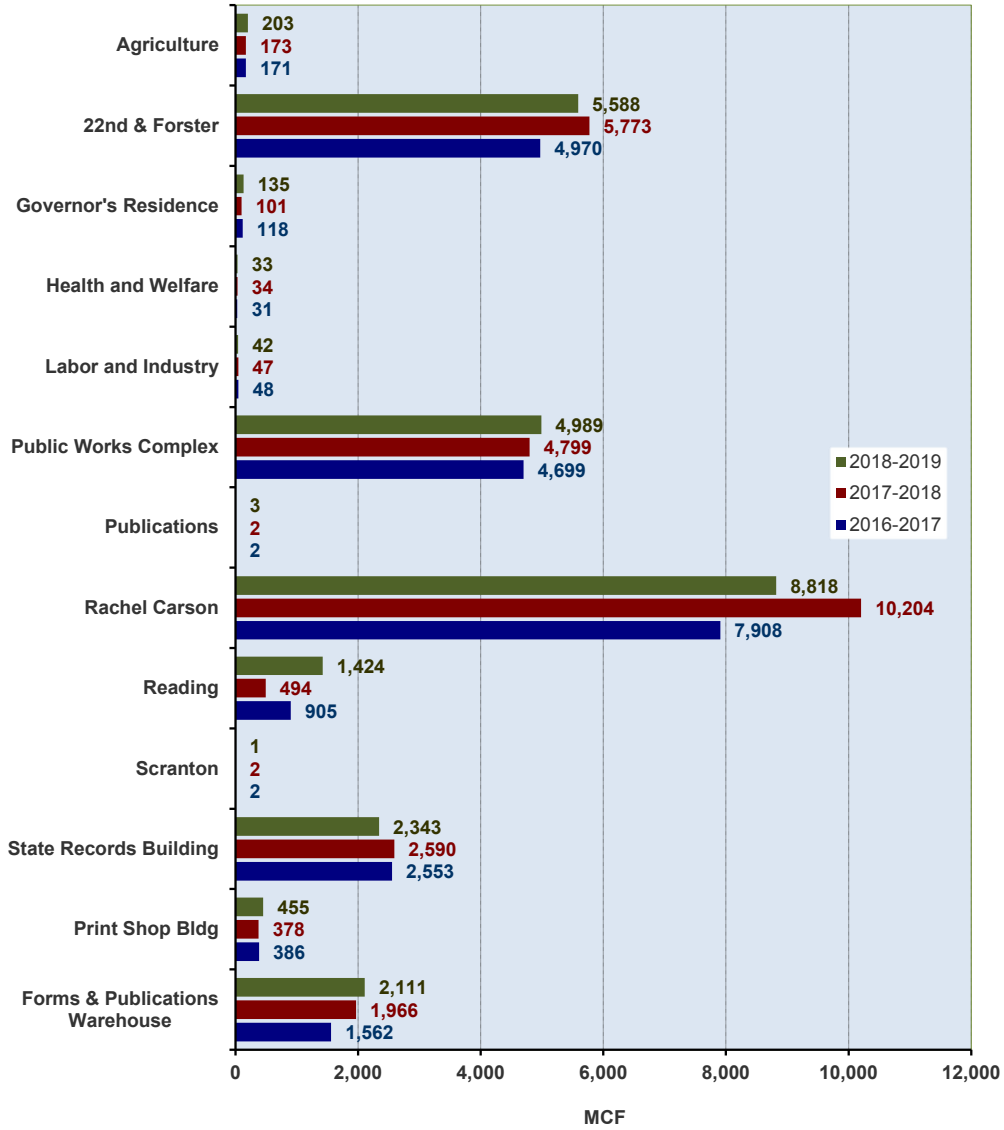
Facility	Utility	mcf	Cost	\$/mcf
Ag Diagnostic Lab	UGI South	7,036	\$55,523	\$7.89
	UGI South	8,879	\$68,652	\$7.73
Agriculture	UGI South	203	\$2,053	\$10.11
DGS Annex Complex	UGI South	57,380	\$358,566	\$6.25
22nd & Forster	UGI South	2,712	\$24,349	\$8.98
	UGI South	2,876	\$25,642	\$8.91
Governor's Residence	UGI South	135	\$1,430	\$10.61
Lt. Governor's Residence	UGI South	264	\$2,554	\$9.68
Public Works Complex	UGI South	4,989	\$44,745	\$8.97
Publications	UGI South	3	\$212	\$75.83
Rachel Carson	UGI South	8,818	\$67,418	\$7.65
Reading	UGI South	1,424	\$12,956	\$9.10
Scranton	UGI PNG	1	\$382	\$318.03
State Records Center	UGI South	2,343	\$21,354	\$9.11
Forms & Publications Warehouse	UGI South	2,111	\$18,961	\$8.98
Print Shop Bldg	UGI South	455	\$4,205	\$9.25
<b>Capitol Complex Buildings</b>				
Health and Welfare	UGI South	33	\$493	\$14.94
Labor and Industry	UGI South	42	\$574	\$13.66
<b>Complex Buildings Total</b>		<b>75</b>	<b>\$1,067</b>	<b>\$14.22</b>
<b>Total</b>		<b>99,704</b>	<b>\$710,070</b>	
<b>Weighted Average</b>				<b>\$7.12</b>

Charts 8A, 8B, 9A, and 9B compare the previous three fiscal years of annual natural gas consumption and cost. Following are notable changes observed during fiscal year 2018–2019:

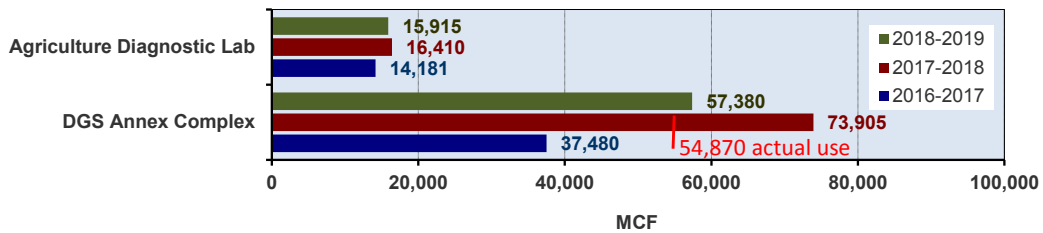
- The Rachel Carson State Office Building consumption decreased by 1,386 mcf, down 14%.
- The Reading Office Building consumption increased by 930 mcf, up 188%.
- The DGS Annex Complex use of 57,380 mcf was 4.6% higher than the actual use of 54,870 mcf noted in Chart 8B for fiscal year 2017–2018, an increase of 2,510 mcf. The differential use for 2017–2018 resulted from a meter issue in the previous fiscal year.
- Use by the other facilities remained relatively the same due to a 2018–2019 winter that was just 0.4% less severe than previous winter heating season.

Overall natural gas cost for DGS facilities decreased by \$42,059, down 5.6% as a result of slightly decreased heating loads and resolution of the DGS Annex Complex billing error.

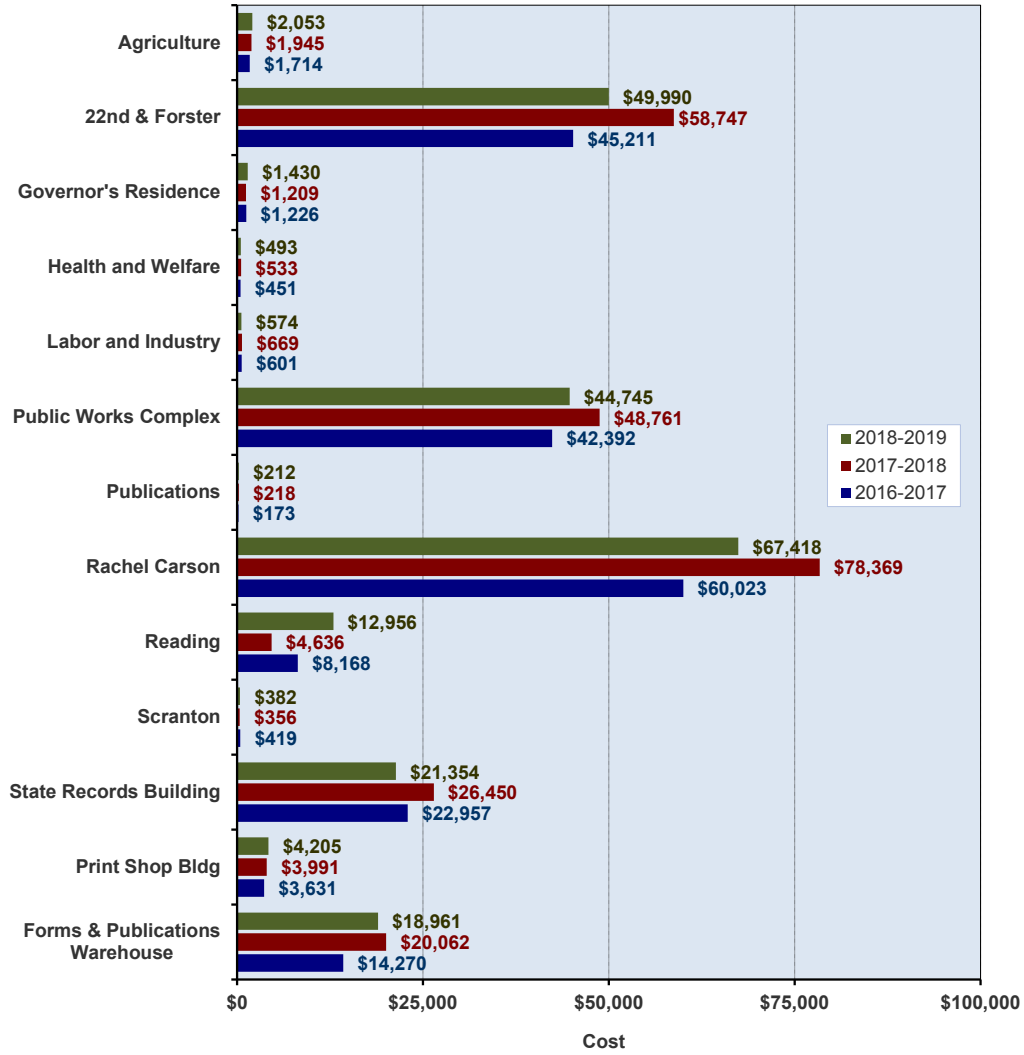
**Chart 8A. Annual Natural Gas Consumption Trend**



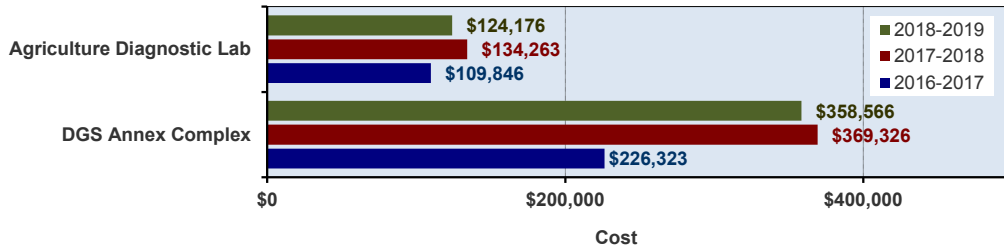
**Chart 8B. Annual Natural Gas Consumption Trend  
Agriculture Diagnostic Lab and DGS Annex Complex**



**Chart 9A. Annual Natural Gas Costs Trend**



**Chart 9B. Annual Natural Gas Costs Trend  
Agriculture Diagnostic Lab and DGS Annex Complex**





## STEAM USAGE

Table 8 details steam usage by facility. The Main Capitol remains the largest purchased steam load. This account serves the Main Capitol, East Wing, Irvis/South Office Building, and North Office Building. The Keystone Building is the second largest user of purchased steam.

Overall steam use increased by 4,634 mlbs, up 2.8% from the previous fiscal year and costs increased by \$352,882, up 8.7%. The unit cost of purchased steam increased 5.7%, from \$24.62 to \$26.03 per mlb.

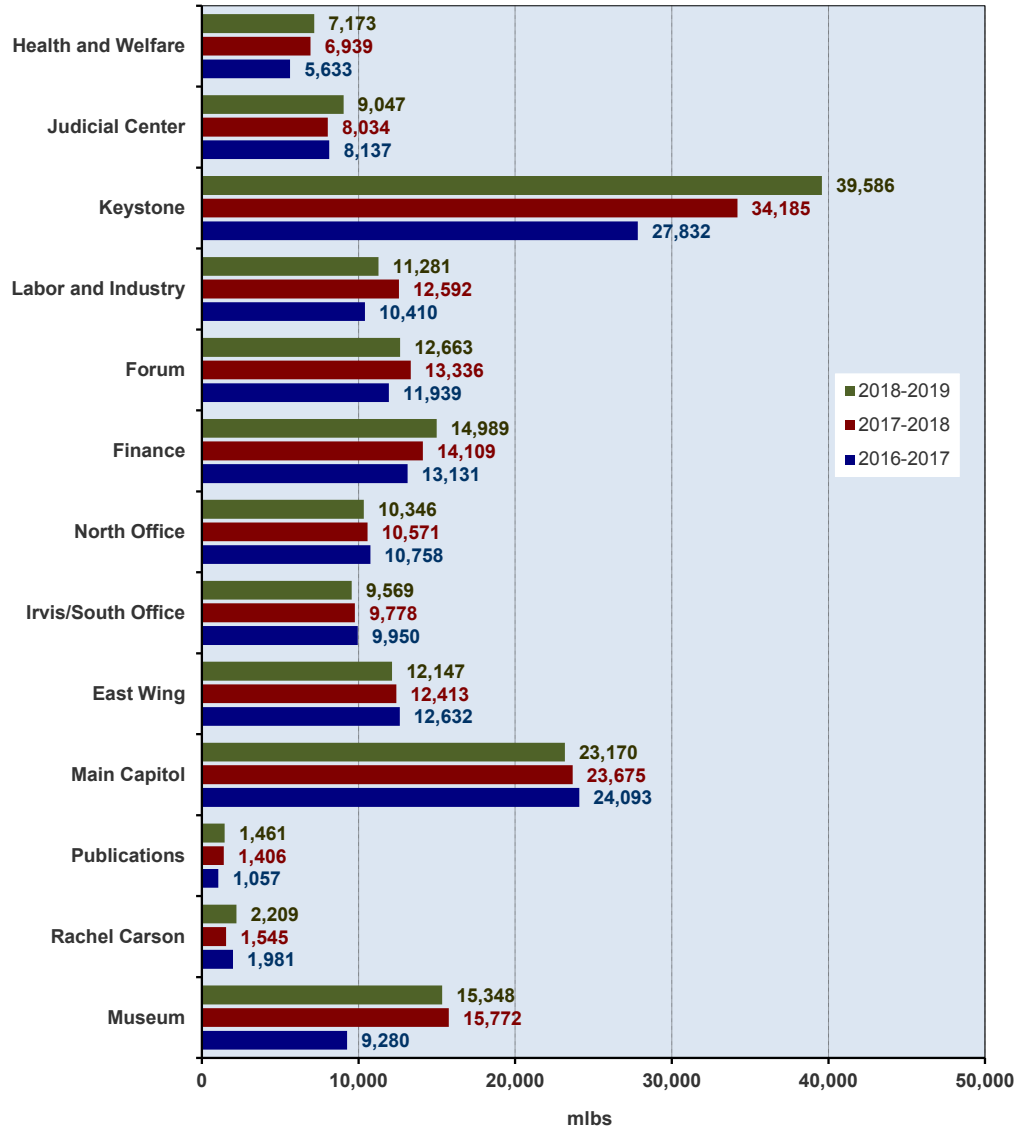
**Table 8. Steam Consumption and Costs 2018–2019**

Facility	Utility	mlbs	Cost	\$/mlb
Publications	NRG	1,461	\$38,084	\$26.06
Rachel Carson	NRG	2,209	\$55,769	\$25.25
<b>Capitol Complex Buildings</b>				
Forum	NRG	12,663	\$329,863	\$26.05
Finance	NRG	14,989	\$391,314	\$26.11
Health and Welfare	NRG	7,173	\$186,181	\$25.96
Judicial Center	NRG	9,047	\$235,436	\$26.02
Keystone	NRG	39,586	\$1,006,487	\$25.43
Labor and Industry	NRG	11,281	\$325,850	\$28.88
Main Capitol <sup>1</sup>	NRG	55,232	\$1,432,375	\$25.93
Museum	NRG	15,348	\$397,237	\$25.88
<b>Complex Buildings Total</b>		<b>165,320</b>	<b>\$4,304,740</b>	<b>\$26.04</b>
<b>Total</b>		<b>168,990</b>	<b>\$4,398,593</b>	
<b>Weighted Average</b>				<b>\$26.03</b>

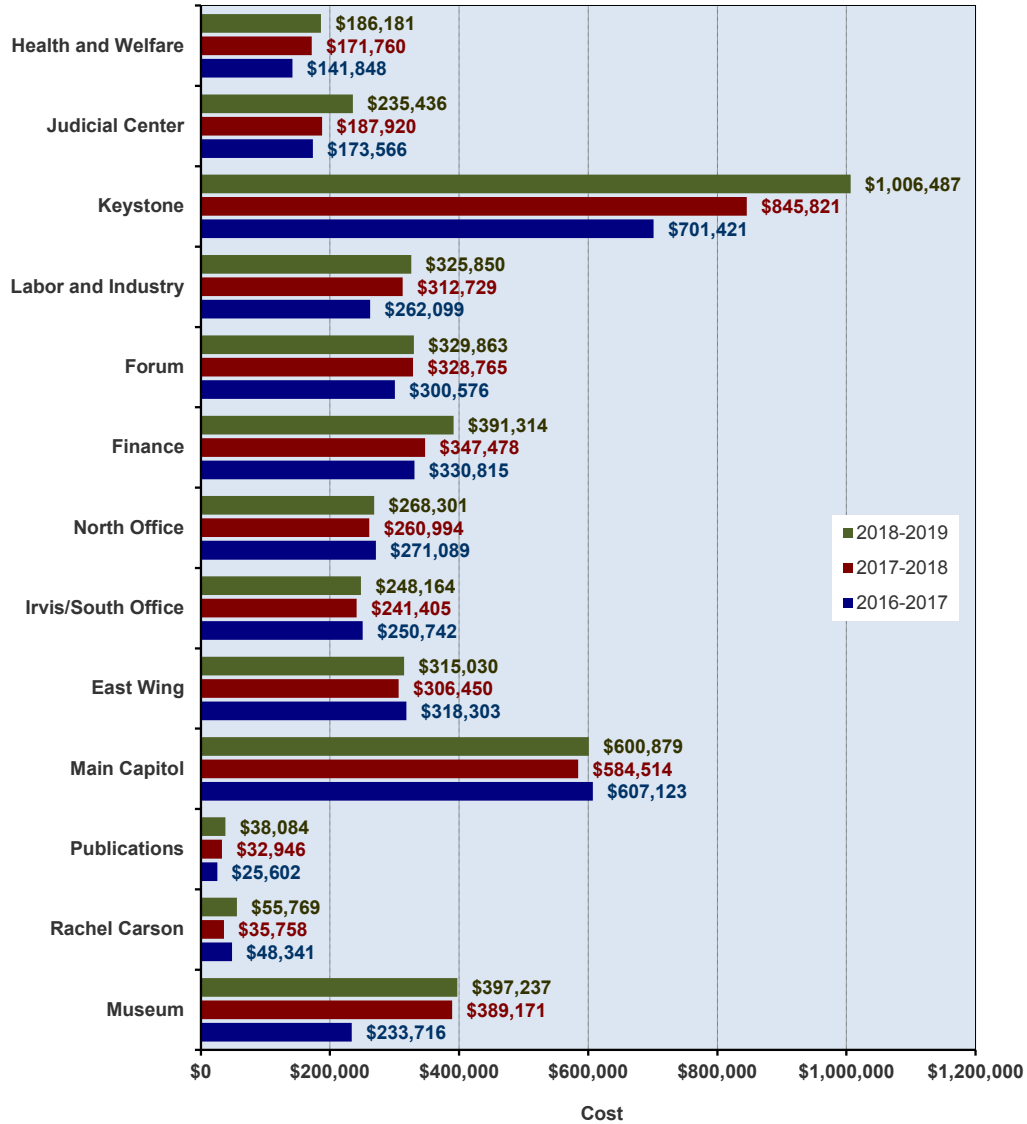
<sup>1</sup>Includes Main Capitol, East Wing, Irvis/South Office, and North Office Buildings.

Charts 10 and 11 show annual steam consumption and cost for each applicable DGS facility for the past three fiscal years. The winter of fiscal year 2018–2019 was 0.4% less severe than the previous winter heating season. Steam use across DGS buildings remained similar to the previous fiscal year except for a 43% increase at the Rachel Carson State Office Building and a 16% increase at the Keystone Building. Unless known operational issues occurred in these buildings, a follow-up investigation should be considered.

**Chart 10. Annual Steam Consumption Trend**



**Chart 11. Annual Steam Costs Trend**



**WATER/SEWER USAGE**

Water/sewer consumption, measured in thousand gallon units (mgal), for DGS facilities during fiscal year was 92,216 mgal at a cost of \$2,471,786. Compared to the previous fiscal year, consumption increased by 10,400 mgal, up 12.7% and costs increased by \$264,236, up 12%. Unit cost, at \$26.80 per mgal, was lower by 0.7% than the previous year. Thirteen accounts serve fire suppression systems, which are classified as ready-to-serve accounts; they have little or no usage, but have very high unit costs as shown in Table 9, column “\$/mgal”.

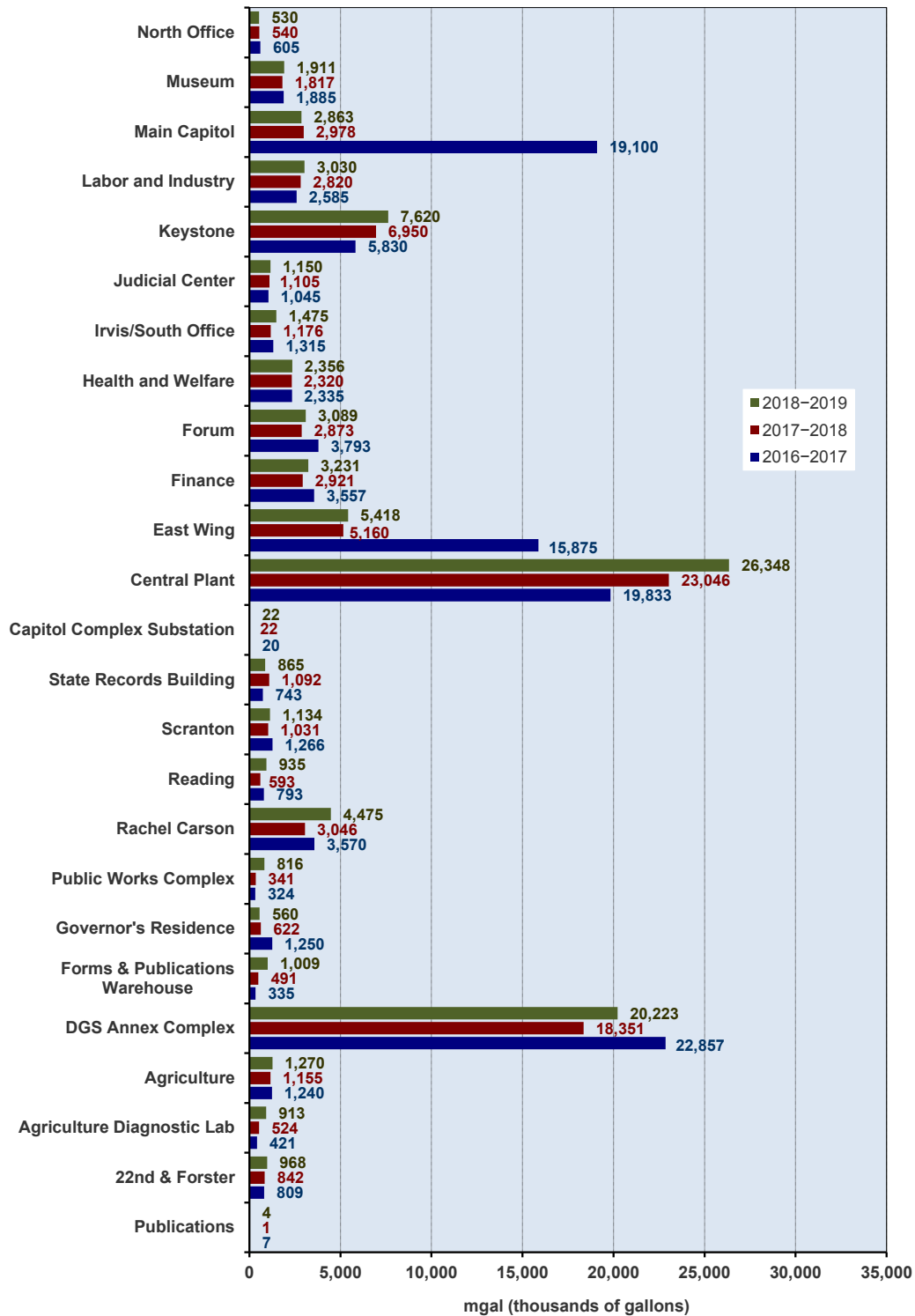
**Table 9. Water/Sewer Consumption and Costs 2018–2019**

Facility	Account	Utility	mgal	Cost	\$/mgal
Publications	0900302100005	Capital Region Water	4	\$4,386	\$1,096.59
22nd & Forster	6204113200002	Capital Region Water	968	\$30,066	\$31.06
Agriculture	6202602200004	Capital Region Water	1,270	\$32,957	\$25.95
Agriculture Diagnostic Lab	1590031700009	Capital Region Water	913	\$36,843	\$40.35
DGS Annex Complex	1570002200006	Capital Region Water	9,525	\$243,582	\$25.57
DGS Annex Complex	1570202200004	Capital Region Water	10,698	\$181,436	\$16.96
Forms & Publications Warehouse	C0431600	Susquehanna Township Authority	636	\$5,122	\$8.05
Forms & Publications Warehouse	1601105300003	Capital Region Water	1,009	\$12,212	\$12.10
Governor's Residence	1100103400005	Capital Region Water	560	\$15,580	\$27.82
Public Works Complex	0708600200000	Capital Region Water	----	\$20,844	----
Public Works Complex	0709000300002	Capital Region Water	816	\$18,226	\$22.34
Rachel Carson	0900105000006	Capital Region Water	4,475	\$90,113	\$20.14
Reading	1250301	Reading Area Water Authority	935	\$23,879	\$25.53
Scranton	2405407533	Pennsylvania-American Water Company	1,134	\$24,240	\$21.38
State Records Building	1590017400003	Capital Region Water	865	\$2,591	\$2.99
State Records Building	6202603300001	Capital Region Water	----	\$52,368	----
<b>Capitol Complex Buildings</b>					
Capitol Complex Substation	1570050900004	Capital Region Water	22	\$1,924	\$87.45
Central Plant	1570002900002	Capital Region Water	26,348	\$473,012	\$17.95
East Wing	1570003800003	Capital Region Water	2,118	\$72,375	\$34.17
East Wing	1570003900001	Capital Region Water	3,300	\$92,036	\$27.89
Finance	0803600200008	Capital Region Water	10	\$52,541	\$5,254.10
Finance	0803610200006	Capital Region Water	3,221	\$57,565	\$17.87
Forum	0803600300006	Capital Region Water	5	\$52,450	\$10,490.05
Forum	0803610300004	Capital Region Water	3,084	\$57,285	\$18.57
Health and Welfare	1570002600008	Capital Region Water	1,525	\$46,615	\$30.57
Health and Welfare	1570002700006	Capital Region Water	831	\$35,625	\$42.88
Irvs/South Office	0404200700008	Capital Region Water	1,475	\$47,954	\$32.51
Judicial Center	1600060100000	Capital Region Water	1,150	\$40,204	\$34.96
Keystone	1570003000009	Capital Region Water	----	\$37,062	----
Keystone	1570003100007	Capital Region Water	----	\$20,844	----
Keystone	1570028800004	Capital Region Water	7,620	\$179,857	\$23.60
Labor and Industry	0710202500001	Capital Region Water	1,680	\$49,203	\$29.29
Labor and Industry	1570002400002	Capital Region Water	1,350	\$43,642	\$32.33
Main Capitol	0404200200008	Capital Region Water	2,115	\$37,708	\$17.83
Main Capitol	0803600100000	Capital Region Water	----	\$20,844	----
Main Capitol	1570002300004	Capital Region Water	8	\$52,497	\$6,713.98
Main Capitol	1570002800004	Capital Region Water	10	\$52,537	\$5,253.68
Main Capitol	1570004000008	Capital Region Water	95	\$53,964	\$568.05
Main Capitol	1570004100006	Capital Region Water	565	\$30,653	\$54.25
Main Capitol	1570102800000	Capital Region Water	70	\$1,191	\$17.03
Museum	0404201100009	Capital Region Water	1,791	\$35,932	\$20.06
Museum	1570102300000	Capital Region Water	120	\$2,026	\$16.92
North Office	0404200600000	Capital Region Water	530	\$29,801	\$56.23
<b>Complex Buildings Total</b>			<b>59,044</b>	<b>\$1,677,343</b>	<b>\$28.41</b>
<b>Total</b>			<b>92,216</b>	<b>\$2,471,786</b>	
<b>Weighted Average</b>					<b>\$26.80</b>

Note: No water/sewer consumption or costs reported for Northwest Office Building, Communications Network, or CTC1 (CMIC).

Charts 12 and 13 depict a three-year trend of water/sewer consumption and costs for each facility. Consumption for most facilities remained generally similar to the previous fiscal year; however, notable usage increases occurred at the Public Works Complex, up 139%; Forms & Publications Warehouse, up 105%; Agriculture Diagnostic Lab, up 74%, and Central Plant, up 14%.

**Chart 12. Annual Water/Sewer Consumption Trend**



**Chart 13. Annual Water/Sewer Costs Trend**

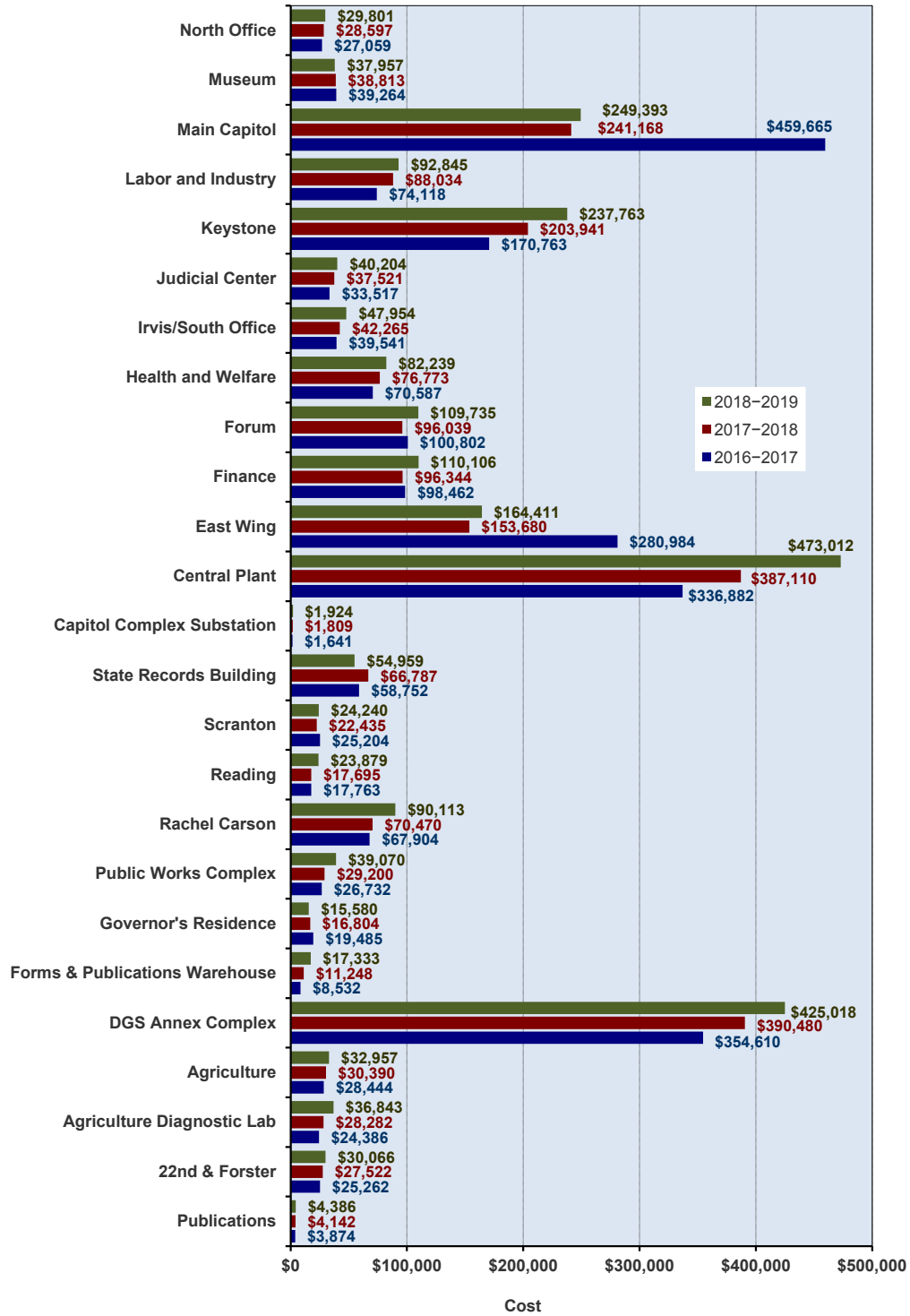


Table 10 shows a four-year history of water/sewer use and cost for each facility. Fiscal year 2018–2019 usage and cost reflect 12.7% and 12% increases. In general, a relatively stable usage trend can be observed for most facilities across the four-year period. Notable deviations are the Central Plant, where usage increased 39% and the Main Capitol, where usage has decreased 60% from fiscal year 2015–2016 consumption. The average unit cost of water/sewer increased from \$21.80 to \$26.80 per mgal, resulting in a 23% increase over the four-year period.

**Table 10. Annual Water/Sewer Consumption and Costs Trend**

Facility	2015–2016		2016–2017		2017–2018		2018–2019	
	Cost	mgal	Cost	mgal	Cost	mgal	Cost	mgal
Publications	\$3,554	11	\$3,874	7	\$4,142	1	\$4,386	4
22nd & Forster	\$22,963	878	\$25,262	809	\$27,522	842	\$30,066	968
Agriculture Diagnostic Lab	\$22,064	370	\$24,386	421	\$28,282	524	\$36,843	913
Agriculture	\$25,019	1,145	\$28,444	1,240	\$30,390	1,155	\$32,957	1,270
DGS Annex Complex	\$297,602	20,169	\$354,610	22,857	\$390,480	18,351	\$425,018	20,223
Forms & Publications Warehouse	\$6,261	249	\$8,532	335	\$11,248	491	\$17,333	1,009
Governor's Residence	\$10,204	695	\$19,485	1,250	\$16,804	622	\$15,580	560
Public Works Complex	\$26,124	414	\$26,732	324	\$29,200	341	\$39,070	816
Rachel Carson	\$69,005	3,760	\$67,904	3,570	\$70,470	3,046	\$90,113	4,475
Reading	\$21,261	901	\$17,763	793	\$17,695	593	\$23,879	935
Scranton	\$26,021	1,281	\$25,204	1,266	\$22,435	1,031	\$24,240	1,134
State Records Building	\$49,462	226	\$58,752	743	\$66,787	1,092	\$54,959	865
<b>Capitol Complex Buildings</b>								
Capitol Complex Substation	\$1,503	21	\$1,641	20	\$1,809	22	\$1,924	22
Central Plant	\$263,656	19,005	\$336,882	19,833	\$387,110	23,046	\$473,012	26,348
East Wing	\$147,495	6,356	\$280,984	15,875	\$153,680	5,160	\$164,411	5,418
Finance	\$92,785	3,486	\$98,462	3,557	\$96,344	2,921	\$110,106	3,231
Forum	\$85,093	2,928	\$100,802	3,793	\$96,039	2,873	\$109,735	3,089
Health and Welfare	\$64,976	2,362	\$70,587	2,335	\$76,773	2,320	\$82,239	2,356
Irvis/South Office	\$35,763	1,230	\$39,541	1,315	\$42,265	1,176	\$47,954	1,475
Judicial Center	\$29,826	985	\$33,517	1,045	\$37,521	1,105	\$40,204	1,150
Keystone	\$180,700	7,600	\$170,763	5,830	\$203,941	6,950	\$237,763	7,620
Labor and Industry	\$74,273	3,049	\$74,118	2,585	\$88,034	2,820	\$92,845	3,030
Main Capitol	\$252,090	5,804	\$459,665	19,100	\$241,168	2,978	\$249,393	2,863
Museum	\$35,995	2,206	\$39,264	1,885	\$38,813	1,817	\$37,957	1,911
North Office	\$23,433	510	\$27,059	605	\$28,597	540	\$29,801	530
<b>Complex Buildings Total</b>	<b>\$1,287,588</b>	<b>55,542</b>	<b>\$1,733,283</b>	<b>77,779</b>	<b>\$1,492,095</b>	<b>53,728</b>	<b>\$1,677,343</b>	<b>59,044</b>
<b>Total</b>	<b>\$1,867,129</b>	<b>85,641</b>	<b>\$2,394,229</b>	<b>111,393</b>	<b>\$2,207,550</b>	<b>81,816</b>	<b>\$2,471,786</b>	<b>92,216</b>
<b>Percent Change</b>			<b>28.2%</b>	<b>30.1%</b>	<b>-7.8%</b>	<b>-26.6%</b>	<b>12.0%</b>	<b>12.7%</b>





## ENERGY PROCUREMENT

PSFEI is the primary technical adviser to the Commonwealth for the procurement of electricity, natural gas, and coal. The Energy Procurement section provides information about PSFEI's activities and its partnership with the DGS Bureau of Procurement.

### KEEPING PACE WITH THE ENERGY MARKETS

PSFEI keeps abreast of energy market trends through research and regular interactions and meetings with Pennsylvania utilities and national energy suppliers. PSFEI monitors regulatory developments at state, regional, and federal levels via Pennsylvania Public Utility Commission (PUC) rulings, PJM Interconnection policies, and Federal Energy Regulatory Commission (FERC) rulings. PSFEI continually monitors various energy markets to identify trends and opportunities for market-based savings.

Trends and developments that affected Commonwealth budgets and energy planning were reported to the DGS Bureau of Procurement at regularly scheduled meetings to establish energy and procurement policies and direction. These trends, combined with existing and future supply contracts, were considered when preparing and submitting requested utility budget projections to the DGS Bureau of Financial and Management Services.

The DGS Bureau of Procurement and PSFEI used the following energy price risk-management strategies to extend flexibility and ensure maximum cost avoidance in volatile energy markets:

- Employed an array of electricity and natural gas procurement product types to balance price stability with cost reduction opportunities while retaining a measure of flexibility.
- Strategically balanced the Commonwealth standard 10% swing with a new full-plant-requirements solicitation type for natural gas accounts. A swing tolerance requires suppliers to apply the contract price to a specified percentage (typically 10%) above or below the monthly contract quantities. For accounts with unpredictable future usage, a full-plant-requirements solicitation type offers price protection for all volumes consumed and eliminates the risk of market exposure due to large variations in expected monthly contract quantities.
- Examined electricity and natural gas bills for proper utility rate classification, energy consumption, demand charges, taxes, and opportunities for tariff savings.
- Monitored the energy sector economic, legislative, and regulatory developments. This information and knowledge helps PSFEI advise the Commonwealth about legislative actions, utility rate increases or decreases, market movements, and emerging technologies.
- Advised applicable Commonwealth agencies regarding potential economic impacts as central heating plants transitioned from coal to utility pipeline natural gas or mobile compressed natural gas (CNG) as a primary fuel.

## ELECTRICITY

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### TAKING ADVANTAGE OF CURRENT ENERGY MARKETS

During fiscal year 2018–2019, PSFEI and the DGS Bureau of Procurement continued to engage a balanced strategy to maximize overall savings potential while providing budget certainty through stable, long-term energy pricing.

Throughout the year, the electricity futures market continued to exhibit a backwardated<sup>1</sup> pattern, where the market prices for each successive year in the future are progressively lower than the year before. In a backwardated market, the lower-priced future years have a positive effect for the consumer by lowering the overall average price. In order to take advantage of this market condition, 36- and 48-month contract terms were solicited by the Commonwealth in addition to 12- and 24-month terms.

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### ELECTRICITY PROCUREMENT

Under the direction of the DGS Bureau of Procurement, PSFEI held six procurement events during fiscal year 2018–2019 and awarded 3,908 Commonwealth, Pennsylvania’s State System of Higher Education (PASSHE), and COSTARS electricity accounts using the Energy Risk Management Application (ERMA), PSFEI’s web-based procurement platform. The net result was approximately \$958,000 in projected annual avoided costs versus utility-issued price to compare (where available) and over \$1.2 million in cost reduction from previous contracts. A breakdown of agency cost reductions is provided in Table 11.

Fully bundled fixed-price, fixed with pass-through, and block and index bids were solicited for accounts based on metered demand. During the fiscal year, 1,921 accounts were awarded a fully bundled fixed-price contract, 1,986 accounts were awarded a fixed with pass-through contract, and 1 account was awarded a block and index contract. Armed with this array of contract award types, DGS Bureau of Procurement personnel possessed the ability to diversify the Commonwealth, COSTARS, and PASSHE procurement portfolios to achieve maximum avoided cost savings while maintaining the flexibility to secure additional future savings through demand-side energy reductions, where applicable.

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<sup>1</sup> When a near-month futures contract is trading at a premium to more distant contracts, that commodity’s futures curve is in “backwardation” or the commodity is “backwardated.” This occurs when inventories of commodities are tight, so market participants are willing to pay a premium to buy the immediate deliverable commodity. Theoretically, there is no value to carrying costs such as storage, insurance and interest costs since there is a scarcity of the commodities.

**Table 11. Avoided Costs for Electricity Procurement 2018–2019**

<b>Agency</b>	<b>Number of Accounts</b>	<b>Cost Reduction (Annual)</b>	<b>Cost Avoidance (Annual)</b>	<b>Cost Avoidance (Total)<sup>1</sup></b>
COSTARS	543	\$42,451	\$47,039	\$127,733
Department of Agriculture	4	\$7,296	\$25,123	\$25,551
Department of Conservation and Natural Resources	488	\$45,825	\$63,464	\$132,434
Department of Corrections <sup>2</sup>	51	\$184,715	(\$522,552)	(\$509,814)
Department of Environmental Protection	74	\$19,189	\$27,564	\$55,215
Department of General Services	3	\$76	\$1,140	\$1,162
Department of Human Services	27	(\$53,547)	\$54,333	\$54,204
Department of Labor and Industry <sup>2</sup>	4	\$50,290	(\$4,968)	(\$3,742)
Department of Military and Veterans Affairs	79	\$315,178	\$622,774	\$1,467,090
Other Agencies <sup>2,3</sup>	74	\$260,963	\$31,921	(\$63,303)
Pennsylvania Department of Transportation	1,517	\$261,528	\$366,974	\$650,307
Pennsylvania Emergency Management Agency	3	\$743	\$1,498	\$2,996
Pennsylvania Fish and Boat Commission	17	\$1,865	\$14,061	\$24,138
Pennsylvania Game Commission	73	\$3,561	\$8,937	\$14,614
Pennsylvania Historical and Museum Commission	65	\$10,901	\$33,814	\$54,620
Pennsylvania Liquor Control Board	437	(\$54,399)	\$26,120	\$32,489
Pennsylvania State Police	239	\$62,249	\$89,934	\$161,307
Pennsylvania Turnpike Commission	142	\$106,261	\$64,828	\$207,307
Pennsylvania's State System of Higher Education	68	\$9,726	\$6,315	\$19,020
<b>Total</b>	<b>3908</b>	<b>\$1,274,873</b>	<b>\$958,320</b>	<b>\$2,453,327</b>

<sup>1</sup>Some contracts awarded were less than or greater than one year.

<sup>2</sup>To eliminate price risk from hourly default pricing, fixed-price contracts were awarded resulting in a projected negative contract avoided cost versus the retail tariff hourly pricing.

<sup>3</sup>Other Agencies include the Department of Health, Department of Revenue, Pennsylvania State Senate offices, and various other small accounts.

## NATURAL GAS

### NATURAL GAS PROCUREMENT

Two natural gas commodity procurement events were held during the fiscal year for Commonwealth accounts. PSFEI collected billing data, developed and confirmed monthly contract quantities with facility managers, analyzed utility rate class structures, facilitated rate class changes where economically advantageous, and conducted competitive bidding events with prequalified suppliers for each of the accounts. Sixty-two contracts were awarded resulting in a projected annual avoided cost of \$4,215,956 as compared to utility retail tariff rates. Anticipated price reductions in comparison to previous contracts are estimated to be over \$370,000 annually. Projected avoided costs by agency are shown in Table 12.

Both fixed-price and index price (basis price plus variable New York Mercantile Exchange [NYMEX] natural gas commodity price) supply contracts were solicited, allowing the DGS Bureau of Procurement to manage price risk and maximize cost-avoidance opportunities.

**Table 12. Avoided Costs for Natural Gas Procurement 2018–2019**

Agency	Number of Accounts	Cost Reduction (Annual)	Cost Avoidance (Annual)	Cost Avoidance (Total) <sup>1</sup>
Department of Agriculture	5	(\$41,614)	\$57,827	\$94,404
Department of Corrections	10	\$294,811	\$1,809,078	\$4,470,498
Department of General Services	3	\$6,248	\$303,796	\$458,355
Department of Human Services	8	\$75,449	\$1,722,103	\$3,593,554
Department of Labor and Industry <sup>2</sup>	1	(\$5,736)	(\$4,931)	(\$14,794)
Department of Military and Veterans Affairs	26	\$41,756	\$323,767	\$851,696
Department of Transportation	1	(\$210)	\$1,063	\$3,188
Pennsylvania Higher Education Assistance Agency	8	— <sup>3</sup>	\$3,255	\$4,611
<b>Total</b>	<b>62</b>	<b>\$370,706</b>	<b>\$4,215,956</b>	<b>\$9,461,511</b>

<sup>1</sup>Accounts for multi-year contracts.

<sup>2</sup>Due to utility rate classification requiring an alternate supplier, a contract was awarded at a projected negative cost avoidance.

<sup>3</sup>Accounts were on tariff and not previously shopped; there are no contracts for comparison.

## RENEWABLE ENERGY CREDITS

### RENEWABLE ENERGY CREDIT PROCUREMENT

Through calendar year 2018, the Commonwealth continued to offset approximately 30% of its electricity load via the purchase of Green-e certified Renewable Energy Certificates (RECs). That quantity for calendar years 2019 through 2021 increases to 40%.

To qualify as a Green-e certified resource, providers must meet criteria set forth by the Center for Resource Solutions in the Green-e National Standard document.

In July 2018, a collaborative effort between the DGS Bureau of Procurement and West Chester University resulted in an award of 276,734 megawatt hours (MWh) of Green-e certified RECs to 3Degrees Group, Inc. The awarded volume comprised approximately 30% of the Commonwealth electricity load and 45,000 MWh of RECs for West Chester University.

The collaborative effort was renewed again in January 2019 with a focus on bolstering the Commonwealth's existing purchase by layering an additional 10% (77,244 MWh) of RECs for calendar year 2019 while also fulfilling the 40% renewable energy mandate in Executive Order 2019-01, Commonwealth Leadership in Addressing Climate Change and Promoting Energy Conservation and Sustainable Governance, for calendar years 2020 and 2021. West Chester University bundled its requested 13,955 MWh of RECs with the Commonwealth's purchase for 2020 and 2021 accordingly. The result was a subsequent award to 3Degrees Group, Inc. for 77,244 MWh for 2019 and 322,933 MWh for 2020 and 2021.

The total annual quantity of RECs was distributed to each agency by weighting that agency's electricity usage in proportion to the Commonwealth's overall usage. Information by agency for calendar years 2018, 2019, and 2020 is shown in Table 13.

**Table 13. REC Apportionment by Agency**

Agency	CY 2018 Total		CY 2019 Total		CY 2020 Total	
	MWh Credits	Annual Cost	MWh Credits	Annual Cost	MWh Credits	Annual Cost
Department of Agriculture	2,396	\$1,243	3,194	\$2,591	3,194	\$2,364
Department of Conservation and Natural Resources	6,562	\$3,406	8,750	\$7,098	8,750	\$6,475
Department of Corrections	74,473	\$38,651	99,297	\$80,555	99,297	\$73,480
Department of Education	119	\$62	158	\$128	158	\$117
Department of Environmental Protection	2,062	\$1,070	2,749	\$2,230	2,749	\$2,034
Department of General Services	37,136	\$19,273	49,514	\$40,169	49,514	\$36,641
Department of Health	685	\$355	913	\$741	913	\$676
Department of Human Services	20,787	\$10,788	27,716	\$22,485	27,716	\$20,510
Department of Labor and Industry	1,502	\$780	2,003	\$1,625	2,003	\$1,482
Department of Military and Veterans Affairs	29,026	\$15,065	38,702	\$31,397	38,702	\$28,639
Department of Revenue	1,326	\$688	1,768	\$1,434	1,768	\$1,308
Department of Transportation	27,035	\$14,031	36,047	\$29,243	36,047	\$26,674
Pennsylvania Fish and Boat Commission	2,647	\$1,374	3,529	\$2,863	3,529	\$2,612
Pennsylvania Game Commission	956	\$496	1,275	\$1,034	1,275	\$944
Pennsylvania Historical and Museum Commission	2,264	\$1,175	3,019	\$2,449	3,019	\$2,234
Pennsylvania Liquor Control Board	11,978	\$6,217	15,971	\$12,957	15,971	\$11,819
Pennsylvania State Police	10,014	\$5,197	13,352	\$10,832	13,352	\$9,880
Pennsylvania Emergency Management Agency	766	\$397	1,021	\$828	1,021	\$755
<b>Total</b>	<b>231,733</b>	<b>\$120,270</b>	<b>308,978</b>	<b>\$250,658</b>	<b>308,978</b>	<b>\$228,644</b>

The Commonwealth's annual REC purchase places Pennsylvania in the number one position for state governments on the U.S. Environmental Protection Agency's (EPA's) Green Power Partnership National Top 100 list. At the time of report publication, the Commonwealth ranked 35th among the Top 100.

According to the EPA's Greenhouse Gas Equivalencies Calculator, the Commonwealth's purchase led to an annual offset of approximately 228,362 metric tons of carbon dioxide or the electricity use of roughly 39,823 average American homes for one year. The annual carbon sequestered by this purchase is approximately equivalent to 268,765 acres of U.S. forestland, i.e., a parcel of forested land slightly larger than Mifflin County or approximately 1% of the land area of the Commonwealth.



## SUMMARY OF ENERGY AND ENGINEERING SERVICES

### GENERAL

With a sharp focus on operational efficiency and cost-control objectives, PSFEI assisted DGS and DGS-supported agencies with the following services:

- Energy information updates
- Energy market trends and regulatory policy updates
- Energy procurement services
- Energy and utility database development and support
- Review and resolution of utility billing, rates, and service issues
- Engineering advisory services
- Research and education

PSFEI conducted meetings with DGS to ensure proper communication and project prioritization. The meetings included topics such as energy-data management, energy procurement, facility systems issues, regulatory issues, and strategic planning.

### EXECUTIVE ORDER 2019-01 UPDATE

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#### YEAR 1 REPORT OF ENERGY SAVINGS

On January 8, 2019, Pennsylvania Governor Tom Wolf issued Executive Order 2019-01, Commonwealth Leadership in Addressing Climate Change and Promoting Energy Conservation and Sustainable Governance. A primary goal of the executive order is to reduce overall Commonwealth energy consumption by 3% per year and 21% by 2025 from 2017 levels.

After several years of agency-wide meetings, planning sessions, and retreats hosted by the National Governors Association, DGS secured an agreement in fiscal year 2017–2018 to purchase and implement EnergyCAP, an enterprise, web-based energy and utility bill software solution. This major undertaking was a first step toward enabling the Commonwealth to measure and manage their facility-based energy use and cost using powerful analytic tools available to any authorized Commonwealth personnel. Collection of electricity and natural gas bill data will occur during Phase 1. During Phase 2 (expected to begin in fiscal year 2019–2020) all remaining utility bill data (water, sewer, oil, propane, etc.) will be collected.

Collecting the data has proven challenging. Submission and payment of invoices across the Commonwealth is inconsistent. Some facilities pay their utility bills with Commonwealth purchase cards instead of sending them to the Comptroller's Office in Harrisburg. Utility invoices were submitted as either paper, electronic images, or electronic data interchange (EDI) files all of which had to be formatted and processed in order to capture the data in a usable dataset. Fortunately, EnergyCAP has the capability and services to make data collection an automated process.

In spite of the challenges, DGS experienced significant progress. Support from all agencies in helping to collect facility information, locate missing utility bills, identify meters, and transfer accounts to a central bill payment repository has resulted in a dataset of 8,415 known meters. While missing bills remain and make it challenging to report energy savings, DGS expects to retrieve the missing data to enable reporting on all existing metered accounts.







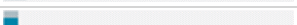




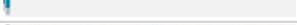
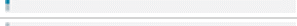
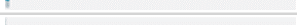
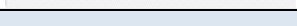

This first-year report of energy savings includes only those accounts where a fair comparison of baseline fiscal year 2017–2018 use with fiscal year 2018–2019 use is possible. A “precinct reporting” methodology was chosen, defined as only those metered accounts that have either all twenty-four months of bills that average greater than \$1,000 per month or metered accounts that include twenty-three months of bills that are less than \$1,000 per month. Year 1 details by agency are provided Table 14.

The result of the analysis for Year 1 indicates a combined 2.9% decrease in energy consumption from Commonwealth agencies. A total of 5,170, of the known meters passed the validation criteria previously mentioned to produce these results, which is approximately 61%. From those 5,170 meters, normalized energy consumption for the 2017–2018 baseline fiscal year was calculated to be 2,655,761 MMBtus. Actual energy consumption for fiscal year 2018–2019 was down 76,207 MMBtu, or 2.9%, just short of the 3% yearly reduction goal.

Weather normalization measures the impact of weather on energy consumption. The process of normalization incorporates weather sensitivity and calculated heating and cooling degree days to provide a year-over-year, commensurable comparison of utility consumption. Weather normalization adjusts energy usage so it can be compared to energy usage in other years over a longer period, eliminating weather as a factor in energy consumption to present a fair comparison.



**Table 14. Year 1 Report of Energy Savings**

Known Electric Meters	Known N. Gas & Steam Meters	State Reporting Agency	Normalized Use (MMBtu)	FY 2017 Baseline MMBtus	FY 2018 Current MMBtus	% Change	Metric Tons CO2 Reduction	Number of Known Meters	% of Meters Reported
220	70	Dept of Corrections		669,213	655,073	-2.1%	1,352	290	58%
47	29	Dept of General Services		598,249	588,601	-1.6%	1,082	76	75%
191	657	Dept of Military and Veterans Affairs		446,876	434,087	-2.9%	530	848	82%
71	17	Dept of Human Services		346,091	318,019	-8.1%	1,558	88	63%
3,245	141	Dept of Transportation		269,549	260,334	-3.4%	619	3,386	75%
1,876	45	Dept of Conservation and Natural Resources		80,593	80,108	-0.6%	84	1,921	62%
7	3	Dept of Labor and Industry		65,085	64,572	-0.8%	65	10	80%
1,051	79	PA State Police		42,364	41,164	-2.8%	100	1,130	5%
80	18	PA Fish and Boat Commission		31,110	30,847	-0.8%	(53)	98	68%
145	12	PA Historical and Museum Commission		28,147	27,506	-2.3%	106	157	64%
7	5	PA Emergency Management Agency		25,026	25,320	1.2%	(65)	12	50%
113	7	Dept of Environmental Protection		20,362	21,228	4.3%	(77)	120	71%
5	2	Dept of Revenue		12,340	11,547	-6.4%	64	7	71%
224	10	PA Game Commission		10,139	10,279	1.4%	(42)	234	58%
22	1	Dept of Health		9,475	9,778	3.2%	(88)	23	30%
10	5	Dept of Agriculture		1,141	1,092	-4.3%	7	15	40%
<b>7,314</b>	<b>1,101</b>			<b>2,655,761</b>	<b>2,579,554</b>	<b>-2.9%</b>	<b>5,242</b>	<b>8,415</b>	<b>61%</b>

## ENERGY SERVICES

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### GENERAL

Since 1998, PSFEI has helped Commonwealth facilities avoid over \$242 million in energy expenditures via competitive bidding in the electricity and natural gas commodity markets. During fiscal year 2018–2019, avoided contract costs totaled nearly \$5.2 million.

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### ENERGY RISK MANAGEMENT APPLICATION

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

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### ACT 129 SUMMARY REPORT

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 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 the consumers fund the cost of this program, it is advantageous to participate in the program.

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

The DGS Energy and Resource Management Office plays an active role in assisting the Commonwealth with taking advantage of the Act 129 program. PSFEI continues to serve in a supporting role to DGS and any agency who requests program information.

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### PJM DEMAND RESPONSE PROGRAM AND PLC MANAGEMENT SERVICES

PSFEI supported Commonwealth agencies with the PJM Emergency Demand Response program by soliciting Curtailment Service Providers (CSP) for new and expiring contracts, facilitating communication during scheduled test events, and collecting and reporting facility-specific program information.

Instead of participating in the Demand Response program, DGS facilities opted to focus resources on a Peak Load Contribution (PLC) management strategy. Because the LCSWMA agreement utilizes a pass-through structure with regard to capacity costs, any PLC reductions that DGS facilities can obtain will

result in avoided capacity costs in the subsequent energy year. Reductions in usage at DGS facilities on potential coincident peak days are achieved using building automation control systems.

## INTERGOVERNMENTAL POWER PURCHASE AGREEMENT

In late 2013, a twenty-year Power Purchase Agreement (PPA) was executed between the Commonwealth and the Borough of Columbia (Borough) in Pennsylvania. The PPA enabled the sale of the Harrisburg incinerator to the Lancaster County Solid Waste Management Authority (LCSWMA). The incinerator generates steam that is used to generate electricity. The LCSWMA leases the electric generation plant to the Borough. The Borough sells electricity to the Commonwealth under specific contract terms and pricing that includes annual escalation factors and discounts. The PPA contains a clawback provision to protect the Commonwealth from making electricity payments in excess of market rates during the PPA's final ten years.

There are nineteen electric accounts assigned to the PPA; seventeen accounts are DGS-operated facilities, one account is a Department of Corrections (DOC) facility, and one account is a Pennsylvania Emergency Management Agency (PEMA) facility. Approximately 77% of the entire electric load for these accounts was provided by the Borough in fiscal year 2018–2019. The remaining power was purchased from the market via competitively procured blocks or the day-ahead energy market.

Table 15 includes the total electric usage and cost in fiscal year 2018–2019 for the Commonwealth accounts assigned to this contract.

**Table 15. Purchased LCSWMA Electricity Summary 2018–2019**

Month	Usage (kWh)	Cost (excluding GRT <sup>1</sup> )	Unit Cost (\$/kWh) (excluding GRT)	Cost (including GRT)	Unit Cost (\$/kWh) (including GRT)
July 2018	13,263,099	\$804,806	\$0.06068	\$854,507	\$0.06443
August 2018	12,175,020	\$762,186	\$0.06260	\$809,465	\$0.06649
September 2018	11,078,680	\$760,590	\$0.06865	\$806,094	\$0.07276
October 2018	10,054,794	\$693,061	\$0.06893	\$736,011	\$0.07320
November 2018	9,755,562	\$670,268	\$0.06871	\$711,118	\$0.07289
December 2018	9,891,802	\$711,718	\$0.07195	\$752,978	\$0.07612
January 2019	9,193,546	\$673,973	\$0.07331	\$726,018	\$0.07897
February 2019	8,874,497	\$638,028	\$0.07189	\$677,586	\$0.07635
March 2019	9,079,459	\$644,359	\$0.07097	\$683,730	\$0.07531
April 2019	9,751,559	\$615,239	\$0.06309	\$653,376	\$0.06700
May 2019	9,520,288	\$676,456	\$0.07105	\$718,423	\$0.07546
June 2019	11,077,359	\$648,828	\$0.05857	\$688,944	\$0.06219
<b>Total/Average</b>	<b>123,715,665</b>	<b>\$8,299,511</b>	<b>\$0.06709</b>	<b>\$8,818,252</b>	<b>\$0.07128</b>

<sup>1</sup>Gross receipts tax.

The unit cost for electricity, excluding utility distribution charges, averaged 6.709 cents per kWh. For comparative purposes, a procurement event held in June 2019 for large accounts in the PPL territory

secured a rate of 4.972 cents per kWh for a term beginning January 2021 through December 2022. The divergence in pricing between competitively procured PPL accounts and PPL accounts served under the PPA is primarily the result of escalating PPA pricing significantly outpacing actual electricity futures prices, which have been declining and setting historic lows.

## ENGINEERING SERVICES

### ELECTRICAL TESTING

During fiscal year 2018–2019, PSFEI staff continued to support DGS with the operation and maintenance of the electrical systems at the Capitol Complex. The support included testing for medium voltage relays, medium-voltage air and vacuum circuit breakers, low- and medium-voltage cables, and low-voltage circuit breakers. PSFEI supplied DGS with resulting testing reports; calibration and inspection stickers for installation on equipment; and infrared scanning of circuit breakers, bus ducts, distribution panels, and similar power system equipment. Table 16 lists the reports issued during the fiscal year that documented this effort.

**Table 16. Engineering Services Reports 2018–2019**

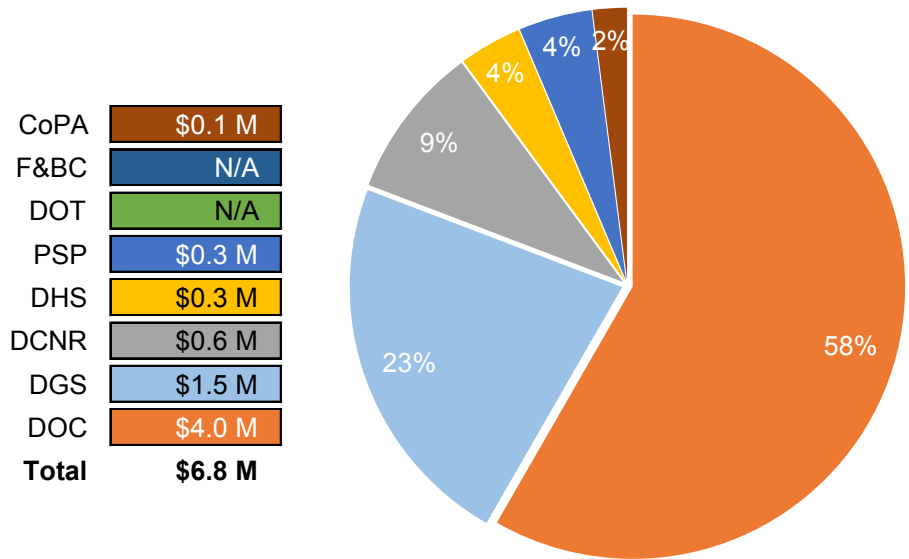
Report No.	Report Date	Location	Comments or Noted Deficiencies
TR 18/19-1	07/31/18	Keystone Building	Charging handle latching issue and loose fuse connection identified and repaired.
ER 18/19-2	08/07/18	DGS Annex	Troubleshooting efforts resulted in recommending replacing UPS.
TR 18/19-3	09/04/18	DGS Main Capital and East Wing	Identified faulty equipment, incorrect trip settings, and inability to conduct transformer turns rotation tests.
TR 18/19-6	11/01/18	Judicial Building	Protective relay upgrades and performed testing.
ER 18/19-6	11/14/18	DGS Capital Complex	Investigated power quality abnormalities in the Central Plant Fan Room and the Keystone Building.
HR 18/19-7	12/07/19	DGS Capital Complex	Investigated high humidity issues in perimeter spaces.
TR 18/19-8	12/13/18	DGS Substation No. 2	Completed electrical maintenance and testing at Substation Unit No. 2.
TR 18/19-9	02/21/19	North Office Building	Conducted electrical acceptance testing.
TR 18/19-10	02/21/19	Keystone Building	Completed electrical maintenance and testing.

Note: ER = Electric Report, HR = HVAC Report, TR = Testing Report

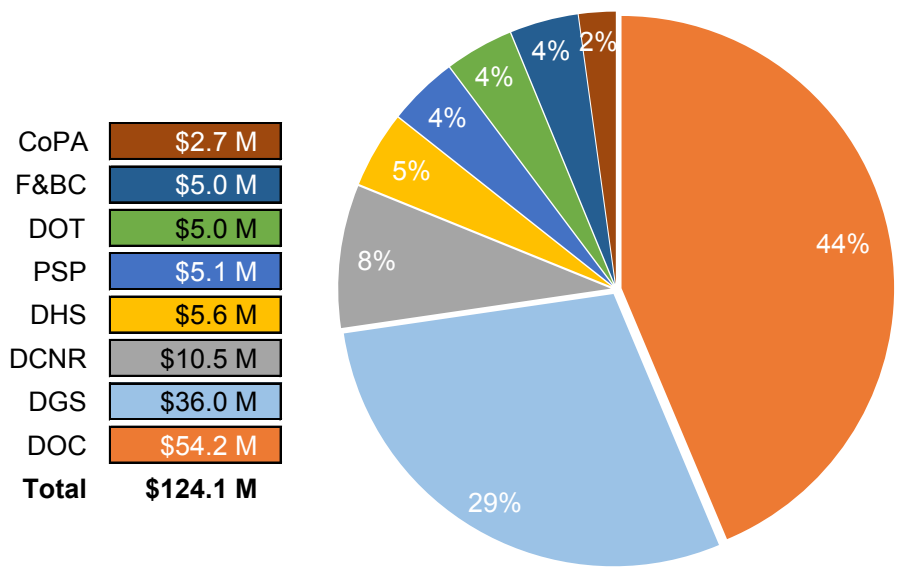
### GUARANTEED ENERGY SAVINGS ACT PROGRAM

Over the past several years, the Commonwealth’s Guaranteed Energy Savings Act (GESA) program has grown in the quantity of projects and the quality of services. Thirteen projects totaling over \$124 million have resulted in nearly \$6.8 million in annual energy savings. Charts 14 and 15 show breakouts of GESA project annual savings and investments by Commonwealth agency.

**Chart 14. GESA Project Annual Savings**



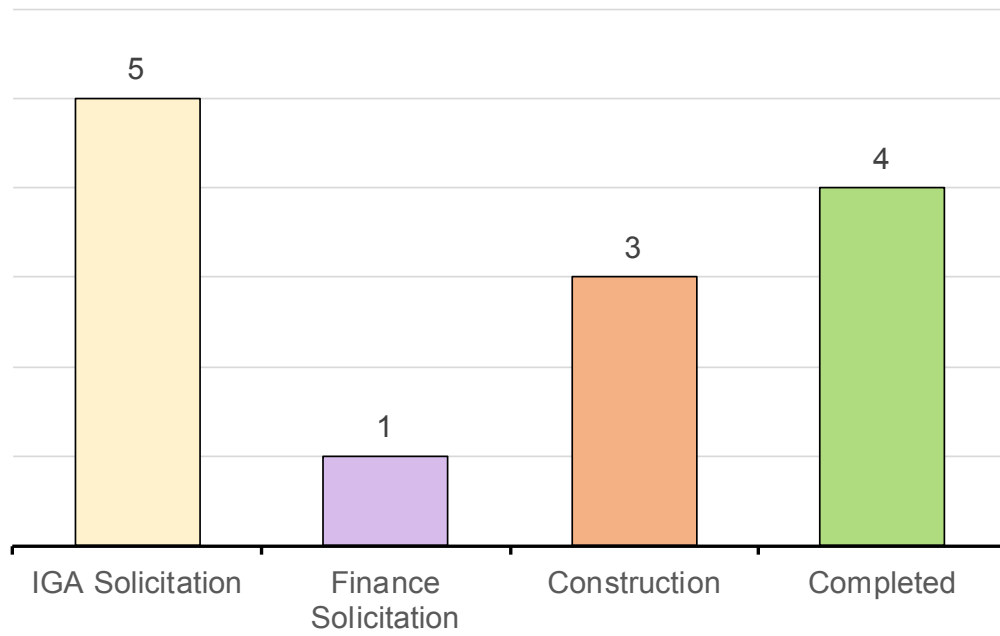
**Chart 15. GESA Project Investment**



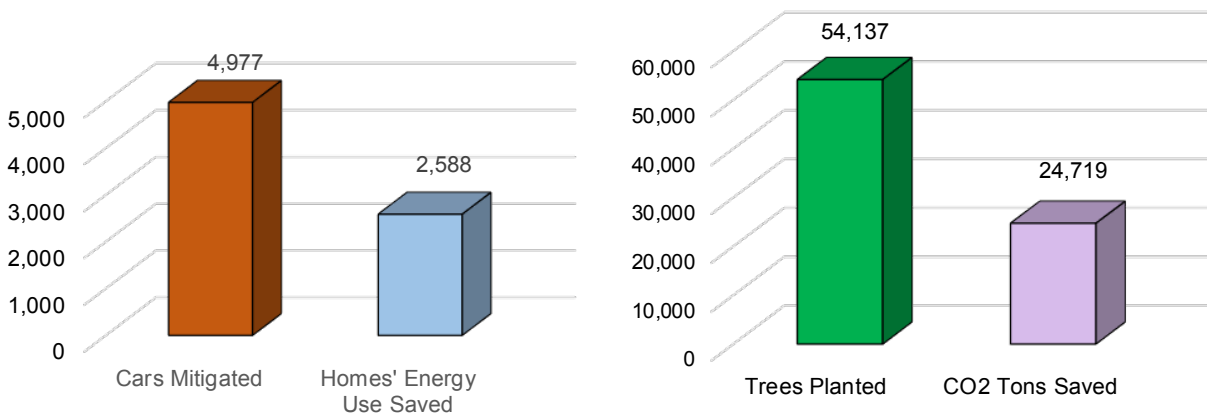
As shown in Chart 16 the thirteen GESA projects are in various stages of development. In addition to creating Pennsylvania jobs supporting the economy, there are resulting environmental benefits from GESA project implementation. Using the total estimated project savings, Chart 17 shows examples of the environmental impact using total emissions reductions. Table 17 provides an overview of the thirteen GESA projects used to develop Charts 14 through 17.

*Note: Charts 14 through 17 and the information in Table 17 was provided by DGS.*

**Chart 16. GESA Project Development Status**



**Chart 17. GESA Project Environmental Benefit Examples**



**Table 17. GESA Projects—Delivery and Savings Summary**

Project Description						Annual Environmental Benefit Examples <sup>1, 2</sup>			
Agency	Location	Energy Conservation Measures (ECMs)	Status	Value (M)	Annual Energy Cost Savings <sup>1</sup>	Cars Mitigated	Trees Planted	Homes Energy Use Saved	CO2 Tons Saved
DOC	SCI Dallas	Lighting, water, boiler, sewage	Completed	\$20.0	\$2,200,000	341	4,123	172	1,757
PSP	Harrisburg Headquarters	Lighting, water, boiler	Completed	\$5.1	\$295,097	454	5,378	224	2,339
DGS	Keystone Building	Lighting, controls	Completed	\$3.0	\$329,677	383	4,635	193	1,789
CoPA	Thaddeus Stevens College	Lighting, controls, steam	Completed	\$2.7	\$137,305	190	2,301	96	979
DCNR	Western Region Parks and Forests	Lighting, HVAC systems, building envelope	Construction	\$5.5	\$375,182	436	5,282	220	2,247
DHS	Selinsgrove Center	Lighting, water, boilers, weatherization	Construction	\$5.6	\$253,415	395	4,784	199	2,035
DGS	Capitol Complex	Lighting, window film, water systems, and chillers	Construction	\$18.0	\$1,200,000	1,390	16,826	701	6,368
DOC	SCI Muncy	Lighting, solar, steam traps, windows, AC, EMSs	Finance Solicitation	\$16.2	\$622,333	426	3,321	241	2,214
DOC	SCI Houtzdale	Lighting, water, HVAC	IGA Solicitation	\$18.0	\$1,140,145	641	4,991	361	3,327
DCNR	Central Region Parks and Forests	Lighting, solar, sludge, BMS, electric to gas, geothermal	IGA Solicitation	\$5.0	\$243,361	321	2,496	181	1,664
DOT	District 8 Facility		IGA Solicitation	\$5.0					
DGS	DGS Capitol Complex 2		IGA Solicitation	\$15.0					
FBC	Hatchery Facilities Statewide		IGA Solicitation	\$5.0					
<b>Total</b>				<b>\$124.1</b>	<b>\$6,796,515</b>	<b>4,977</b>	<b>54,137</b>	<b>2,588</b>	<b>24,719</b>

<sup>1</sup>Annual Energy Cost Savings and Environmental Benefits are estimated.

<sup>2</sup>Listed annual environmental benefits are examples, each using total energy savings.

In concert with the DGS Energy Resource Management Office and Pennsylvania Department of Environmental Protection's (PADEP) Energy Programs Office, PSFEI participated on numerous GESA projects; efforts included the following services:

- Participating in scoping site visits to determine if project opportunities exist.
- Assisting with preparation of initial lists of core energy conservation measures (ECMs).
- Providing utility data, and reviewing and providing comments on preliminary proposals submitted by competing energy service companies (ESCOs).
- Participating in formal in-person interviews of the firms submitting proposals.
- Supporting the Investment Grade Audit (IGA) process by attending meetings, answering questions, and providing advisory services.
- Performing detailed, in-depth reviews of IGAs and submitting questions and comments to DGS and the participating agency.
- Attending project implementation job conferences as needed throughout construction.
- Providing review and comment on post-construction energy savings reports submitted by the ESCO.

PSFEI services are provided to support DGS and the participating agency to ensure there is a clear understanding of the project opportunities, the impact on a facility's operations and maintenance requirements, and the risk of actual energy and cost savings that will result from the project.

During the fiscal year, PSFEI provided support services for the following six active GESA projects:

- Capitol Complex
- Department of Conservation and Natural Resources (DCNR) Central Region
- Pennsylvania Department of Transportation (PennDOT)—multiple facilities
- SCI Houtzdale
- SCI Muncy
- Selinsgrove Center

To track review comments and ESCO responses, PSFEI developed a traceability matrix to ensure that the many details included in a project review are memorialized for future reference. This is particularly important on projects where the decision to commit finances to a project implementation are made without detailed drawings and specifications.

PSFEI supported DGS with continuous program improvements through meetings and discussions to evaluate the program's effectiveness and make adjustments that better serve the participating Commonwealth agencies. Specific project activities for the referenced GESA projects are listed throughout the Summary of Services by Quarter section.



## SUMMARY OF SERVICES BY QUARTER

This section summarizes the services provided by PSFEI throughout the fiscal year; it is organized by quarter and type of service: procurement efforts, facility operation and maintenance services, meeting attendance, EnergyCAP support, and other miscellaneous services.

### FIRST QUARTER

#### PROCUREMENT

Provided purchased electricity versus contracted obligation comparisons for the LCSWMA.

Evaluated the Tax Cuts and Jobs Act (TCJA) and provided a summary overview to the DGS Bureau of Procurement on July 6, 2018. Submitted a follow-up email report on July 9, 2018, addressing some of the details regarding the TCJA and the specific affected utilities.

Developed CNG equipment requirements for the foundation and site work that needs to be provided by the successful SCI Houtzdale GESA contractor; transmitted this information via email on July 12, 2018, to DGS for inclusion in the Request for Proposal (RFP).

Signed UGI Energy Services as an additional electric supplier for the COSTARS program on July 12, 2018.

Worked with the DGS Bureau of Procurement to develop a CNG product, including development of conceptual site specifications and commodity pricing stipulations. Attended a CNG supplier forum in Harrisburg on September 5, 2018. Initial project locations included SCI Houtzdale, SCI Huntingdon/Smithfield, and White Haven Center. SCI Houtzdale will be implemented through the GESA project.

Provided current Pennsylvania REC market pricing, as requested, to DGS on September 14, 2018.

Supported the DGS Bureau of Procurement with ongoing, day-to-day account management services for Commonwealth agencies including fuel-price risk management, tariff rate change issues, and billing and metering discrepancies.

Conducted one natural gas Request for Quote (RFQ) procurement event, DGS 18-02, for 41 Commonwealth accounts on September 18, 2018. The event resulted in an annual savings versus current contracts of \$294,484, a combined total of \$1,915,758 in annual avoided costs versus the utilities price to compare, and \$4,422,758 in total avoided costs versus the utilities price to compare.

Supported growth of the COSTARS Electric Procurement service through participation in targeted events, individual one-to-one consultations, and utility bill reviews. Participated in the annual County Commissioners Association of Pennsylvania (CCAP) conference in Gettysburg with an information table highlighting COSTARS-sponsored services in coordination with a COSTARS marketing manager. Reviewed utility bills for incorrect charges, which to-date has resulted in the identification of over \$360,000 in refundable charges to COSTARS members. Prepared for the issuance of a COSTARS electric supply RFQ targeted for release in fall 2018. The RFQ will be soliciting bids for nearly 550 electric accounts with an estimated annual consumption of 20 to 25 million kWh.

Assisted with the revision of the Invitation to Qualify (ITQ) Statement of Work by providing comments on the proposed language.

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## FACILITIES

Provided GESA project support for the DCNR Central Region and SCIs Houtzdale and Muncy.

Submitted June 2018 engineering services planning meeting notes to DGS on July 2, 2018.

Evaluated transformer reports provided by the DGS High Voltage Foreman on July 2, 2018. Reports indicated a possible issue with the harmonics in the Keystone Building. PSFEI visited the Capitol Complex site and installed metering to evaluate the problem. It was determined that a majority of the electrical system harmonic sources were from variable frequency drives (VFDs) and uninterruptable power supply (UPS) systems serving the various agencies. Technical specification information was collected for lighting installed during the recent GESA project. While the recently installed light-emitting diode (LED) lighting available harmonic information was limited, the lighting was not the primary contributor to electrical system harmonics. A report will be issued in a future reporting period.

Requested permission on July 3, 2018, and gained approval on July 5, 2018, to evaluate and provide input on the Capitol Complex substation transformer fire protection system replacement project. Researched fire protection standards and code requirements and offered an alternative approach, which was provided to DGS via email on July 17, 2018.

Evaluated the Capitol Complex central plant electric power distribution system and the GESA contractor renovation plans to accommodate the new chillers and pumping systems. It was determined that the 4,160 volt switchgear was beyond the end of its service life and in need of replacement. Developed and submitted upgrade options to the GESA contractor and DGS staff on July 6, 2018. Participated in follow-up telephone discussions with DGS staff and the GESA contractor.

Submitted SCI Muncy interview notes for the competing GESA contractor candidates to DOC and DGS on July 6, 2018.

Responded to eleven different information requests between July 25 and September 26, 2018, from CJL Engineering for system information and drawings for SCI Houtzdale.

Submitted Selinsgrove Center IGA review comments on August 3, 2018, to the Department of Human Services (DHS), DGS, and the GESA contractor. Followed up on various replies to comments through written email and telephone conference calls. Confirmed the boiler plant as proposed by the GESA contractor provides N+1 redundancy and meets health care facility design requirements. Worked with DHS and Selinsgrove Center to develop a boiler controls scope of work that will meet the facility's operating requirements.

Provided updated utility use and cost information for SCI Muncy to the GESA consultant on September 26, 2018, as requested by DGS.

Provided the following operation and maintenance engineering services to DGS maintenance management personnel:

- Completed troubleshooting of the transfer scheme issue on the DGS Annex Complex switchgear. Submitted a report detailing the findings and recommendations on August 7, 2018.
- Completed initial maintenance and testing on the East Wing and Capitol Building. Submitted maintenance and testing reports on September 4, 2018.
- Completed initial maintenance and testing on the Judicial Building, including testing and commissioning of relay upgrades. Submitted a report November 1, 2018, to document this effort.

Continued providing PLC management services in which high-probability coincident peak days were identified and alerts were provided to DGS. DGS could take proactive steps to reduce their electricity use during these times thereby lowering their PLC value. Lower PLC values lead to reductions in capacity costs and certain utility costs the following energy year.

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## MEETINGS

Hosted the Effective Facility Management class at the Penn Stater Conference Center July 16–18, 2018, which was attended by four DGS staff.

Attended the Selinsgrove Center GESA project IGA review meeting in Harrisburg on July 16, 2018.

Attended the SCI Houtzdale pre-quote conference at the Keystone Building in Harrisburg on August 31, 2018.

Attended the DGS-PSFEI bi-monthly meeting in Harrisburg on September 6, 2018.

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## ENERGYCAP SUPPORT

Supported DGS with EnergyCAP implementation; PSFEI efforts included drafting a letter to utility companies regarding redirection of invoicing to the central billing mailbox and late fee forgiveness through February 2019, reviewing batch uploads to Bill CAPture, and assisting with matching supply and utility accounts.

Provided slides for DGS to use at the EnergyCAP kickoff meeting on September 12, 2018.

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## OTHER

Collected Harrisburg weather data for summer 2018 and historical norms as requested. Produced and submitted a graphical report via email to DGS on September 27, 2018.

## SECOND QUARTER

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### PROCUREMENT

Supported development of a CNG energy product for Commonwealth facilities including researching potential suppliers, identifying required decompression station infrastructure, and estimating delivered commodity costs. Assisted DGS in developing RFQs and evaluating submitted quotes.

Participated in the Centre County Township Supervisors conference in Pleasant Gap on October 22, 2018, to support and market the COSTARS electric procurement program.

Attended the DGS Energy Supplier forum in Harrisburg on October 25, 2018. Documented supplier comments and provided follow-up comments to DGS for further discussion.

Developed and submitted a COSTARS electricity-shopping announcement to DGS on November 5, 2018, for inclusion in the DGS COSTARS newsletter.

Reviewed a Philadelphia Inquirer article regarding a 70-megawatt (MW) solar farm providing power to the City of Philadelphia. Discussed the article and the opportunity for the Commonwealth to secure a similar agreement.

Supported the DGS Bureau of Procurement initiative to provide CNG delivery to SCI Huntingdon and White Haven Center. Assisted in preparing an RFP, reviewed proposals, and provided recommendations to DGS and the using agency.

Supported the DGS Bureau of Procurement with ongoing, day-to-day account management services for Commonwealth agencies including fuel-price risk management, tariff rate change issues, and billing and metering discrepancies

Conducted three electricity RFQ procurement events:

- DGS 18-03 for 525 COSTARS accounts on October 20, 2018. The event resulted in \$24,304 in annual savings versus current contracts, \$36,572 in annual avoided costs versus the utilities price to compare, and \$99,555 in total avoided costs versus the utilities price to compare.
- DGS 18-04 for 146 Commonwealth accounts on November 20, 2018. The event resulted in \$108,693 in annual savings versus current contracts, \$381,958 in annual avoided costs versus the utilities price to compare, and \$1,169,500 in total avoided costs versus the utilities price to compare.
- DGS 18-05 for 1 account at the Pennsylvania Higher Education Association Headquarters Building on December 19, 2018. The event resulted in \$74,415 in annual savings versus current contracts, (\$34,256) in annual avoided costs versus the utilities price to compare, and (\$105,623) in total avoided costs versus the utilities price to compare. To eliminate price risk from hourly default pricing, fixed-price contracts were awarded resulting in a projected negative contract avoided cost versus the retail tariff hourly pricing.

Supported growth of the COSTARS electric procurement service through participation in targeted events, individual one-to-one consultations, and utility bill reviews with prospective clients. Reviewed utility bills for incorrect charges, which to-date has resulted in the identification of over \$369,000 in refundable charges to COSTARS members.

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## FACILITIES

Provided responses to ESCO questions on SCI Houtzdale's GESA project RFP on October 9, 2018.

Researched and identified the appropriate Penn State resource to provide consulting/advisory services with respect to Capitol Complex tree planting activities, as requested by DGS. Visited and surveyed the

Capitol Complex landscape on October 19, 2018, with Dr. William Elmendorf, Penn State Extension Specialist, Community and Urban Forestry. Dr. Elmendorf prepared and submitted a report to DGS on November 12, 2018.

Requested an update on the status of final engineering for the Capitol Complex GESA project on October 17, 2018. Received engineering design documents from DGS on October 30, 2018. Reviewed the mechanical, electrical, structural, and civil documents, provided comments to DGS on November 9, 2018, and requested return responses from the GESA contractor.

Continued to assist DOC with resolving legacy GESA project contract disputes for SCIs Huntingdon/Smithfield and Laurel Highlands. Participated in discussions with facilities staff and DOC Legal Counsel and Central Office personnel; provided copies of project documentation that included formal reports and relevant email communications.

Provided electricity billing history for Bald Eagle and Black Moshannon State Parks to DGS on November 15, 2018, as requested in support of the DCNR Central Region GESA project initiative.

Supported the Selinsgrove Center GESA project. Reviewed the IGA document provided through a web-link on November 28, 2018. Assisted in finalizing the document through discussions with the using agency and ESCO representatives to clarify the boiler plant controls and metering requirements.

Provided the following operation and maintenance engineering services to DGS maintenance management personnel:

- Visited the Main Capitol on October 12, 2018, to investigate the humidity problems experienced during summer 2018. Documented findings and recommendations in PSFEI Report HR 18/19–7 issued December 7, 2018.
- Issued PSFEI Report TR 18/19–6 on November 1, 2018, to document electrical maintenance and testing results for the Judicial Building.
- Collected and evaluated recorded meter data and prepared a report addressing the Capitol Complex, Central Plant Fan Room, and Keystone Buildings power system harmonic distortion issues. Issued PSFEI Report ER 18/19–6 on November 14, 2018, to document findings and recommendations.
- Completed electrical maintenance and testing on DGS Substation Unit No. 2 and provided results in PSFEI Report TR 18/19–8 issued December 13, 2018.

Collected, organized, and processed utility and market data and supporting activities to produce the annual report of PSFEI services, *Energy & Utility Usage Report 2017–2018*, issued to DGS electronically December 14, 2018.

Responded to a request for information and utility data, and answered questions in support of the SCI Houtzdale GESA project RFQ. Received and started the proposal review process on December 14, 2018.

Continued tracking the LCSWMA monthly electricity generation and the electricity consumption for Commonwealth accounts to help ensure contract compliance. Performed analysis to determine optimal January 2019 block and assisted with the solicitation and execution of a 2-MW on-peak block on December 21, 2018.

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## MEETINGS

Attended a meeting On October 12, 2018, with various DGS departments on facilities management planning. Discussed various software tools used by each department and encouraged DGS to select a common system that includes real estate, maintenance management, procurement, and financial management capabilities.

Participated in and contributed to bi-weekly SCI Muncy GESA IGA progress meetings. Reviewed and provided comments on meeting minutes and GESA contractor submissions.

Hosted and participated in the DGS-PSFEI bi-monthly meeting at PSFEI on November 14, 2018.

Supported the SCI Muncy GESA project IGA by attending progress meetings, responding to questions, and evaluating technical and financial material provided by the Energy Systems Group (ESG), the GESA contractor. Provided review comments to facility, DOC Central Office, and DGS personnel.

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## ENERGYCAP SUPPORT

Continued supporting DGS with EnergyCAP implementation. PSFEI activities included assisting DGS in communicating with municipal authorities regarding redirection of invoicing to the central billing mailbox and late fee forgiveness through February 2019. Reviewed batch uploads to Bill CAPture and assisted with matching supply and utility accounts.

Created and hired a data analyst position to support the Commonwealth's EnergyCAP initiative. The new Data Analyst started January 2, 2019.

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## OTHER

Prepared and submitted a utilities budget projection for fiscal year 2019–2020 on October 5, 2018, in response to a request from the Director of the DGS Bureau of Financial Services on October 1, 2018.

Provided a link to Penn State's Office of Physical Plant steam distribution piping standards as requested on November 28, 2018.

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## THIRD QUARTER

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### PROCUREMENT

Supported the Commonwealth's initiative to obtain an additional 10% of RECs in January 2019 to comply with Executive Order 2019-01, which requires 40% in energy purchases from renewable resources.

Supported DGS in developing a methodology that the Commonwealth can use to procure a solar PPA.

Supported the DGS Bureau of Procurement with ongoing, day-to-day account management services for Commonwealth agencies including fuel-price risk management, tariff rate change issues, and billing and metering discrepancies.

Prepared for a natural gas supply bidding event that occurred in April 2019 by collecting billing data for twenty-one accounts, reviewing utility tariff rate changes, setting up bidding accounts in ERMA, corresponding with facility managers to ascertain current and future operations, developing monthly gas contract quantities, and requesting review and approval of the contract quantities from facility managers.

Continued supporting the growth of the COSTARS electric procurement service through participation in targeted events, individual one-to-one consultations, and utility bill reviews with prospective clients. Continued to review utility bills for incorrect charges, which to-date has resulted in the identification of over \$380,000 in refundable charges to COSTARS members. Prepared for a procurement event that will occur in the 2018–2019 fiscal year fourth quarter.

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## FACILITIES

Received a request to investigate two items for the DGS HVAC Systems Chief on January 15, 2019. One of the requested items was scheduled for spring 2019 and the other request, a boiler water issue at the 18th and Herr Building, was investigated during a site visit on February 15, 2019. The investigation will continue into the next reporting quarter.

Developed an outline specification for DGS to use in hiring a company to preform backflow preventer testing servers as requested by the DGS HVAC Systems Chief on January 22, 2019. The requested information was submitted on January 24, 2019.

Responded to a request on March 13, 2019, from the DGS HVAC Systems Chief to provide direction regarding a request from the DGS Bureau of Risk and Insurance Management regarding equipment values under the purview of DGS facilities. Advised that the type of information being requested is typically retained by finance and accounting.

Provided the following operation and maintenance engineering services to DGS maintenance management personnel:

- Performed acceptance testing for the new 850 relays installed in the North Office Building and tested the generator breakers in the Keystone Building. Reports documenting these efforts were issued in February 2019.
- Based on discussions during the DGS-PSFEI bi-monthly meeting on March 14, 2019, a decision was made to develop an assessment of all Capitol Complex building electric service equipment for age, known maintenance records, trouble issues, and potential risks. Also agreed to evaluate building servers, determine if they are provided with emergency power, and if they are backed-up by a Commonwealth off-site server. Will communicate and coordinate efforts and results with the DGS Emergency Preparedness Liaison Officer (EPLO).

Continued tracking the LCSWMA monthly electricity generation and Commonwealth accounts electricity consumption to help ensure contract compliance. Analyzed the LCSWMA monthly electricity generation and the Commonwealth accounts electricity consumption in order to track contract compliance. Performed an analysis on January 25, 2019, to determine optimal February and March 2019 blocks and assisted with the solicitation and execution of 2-MW, on-peak blocks for both months.

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## MEETINGS

Attended and participated in the SCI Houtzdale GESA proposal interviews in Harrisburg on January 10 and 11, 2019. Asked questions to all presenters based on a detailed IGA review provided in the previous quarter.

Attended the DGS-PSFEI bi-monthly meeting in Harrisburg on January 17, 2019.

Attended and participated in a GESA meeting on January 17, 2019, in Harrisburg with DGS to discuss goals, resources, timelines, and agency communications.

Attended and participated in a meeting on February 22, 2019, with the selected contractor for the SCI Houtzdale GESA project. The meeting included a discussion of the contractor's plans and qualifications and a tour of the Capitol Complex central cooling plant renovation project.

Conducted a detailed review of three IGAs that were prepared and submitted for the DCNR Central Region GESA project. Attended and participated in proposal interviews in Harrisburg on February 28, 2019. Questioned presenters based on the detailed IGA reviews provided in the previous quarter.

Participated in numerous SCI Muncy GESA project meetings and discussions during the IGA project development phase. Reviewed preliminary project scopes of work and energy savings calculations and provided review comments on March 1, 2019. Prepared, shared, and submitted alternate energy savings calculations as a comparison to those of the GESA contractor. Conducted a detailed review of the IGA submitted by the GESA contractor. The review comments will be submitted in the next quarter.

Hosted and participated in the DGS-PSFEI bi-monthly meeting at PSFEI on March 14, 2019.

Attended and participated in a solar PPA informational meeting in Harrisburg on March 19, 2019.

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## ENERGYCAP SUPPORT

Continued providing extensive support for the Commonwealth's EnergyCAP implementation. Support provided to the Commonwealth and EnergyCAP included electronic data interchange (EDI) reformatter translation and bill data management and verification using PSFEI's ERMA dataset. Conducted daily meetings to ensure proper coordination of all activities and action items for EnergyCAP, the Commonwealth, and PSFEI.

Received, reviewed, and discussed Executive Order 2019-01 with DGS personnel on January 8, 2019.

Met with EnergyCAP representatives to introduce PSFEI's new data analyst, whose focus is to support the Commonwealth's EnergyCAP initiative.

Advised DGS on January 30, 2019, that additional historical data was required in EnergyCAP to fulfill the requirements of Executive Order 2019-01.

Attended EnergyCAP administrative training in Harrisburg on March 11, 2019.



Supported the DGS Deputy Secretary of Property and Asset Management's request to prepare slides that covered the EnergyCAP implementation for the Governor's office and deputy secretaries for the week of March 18, 2019.

Attended and participated in an EnergyCAP agency training planning meeting in Harrisburg on March 19, 2019.

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## OTHER

Created slides depicting energy consumption for PSFEI contract client agencies as requested and submitted to DGS on March 7, 2019.

Broadcasted the open position for a director of the GreenGov Council to multiple facility contacts as requested by DGS.

Shared web links with DGS personnel on March 14, 2019, to the General Services Administration (GSA) Proving Ground for assessing innovative building technologies.

Assisted DGS in establishing points of contact and introductions to personnel involved in developing Penn State's solar PPA. Efforts resulted in inviting the director of Penn State's Sustainability Institute and the sustainability manager for Millersville University's to the DGS solar PPA informational meeting.

## FOURTH QUARTER

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### PROCUREMENT

Coordinated and finalized a COSTARS broker agreement with First Energy Solutions so they can bid on COSTARS procurement events.

Supported the DGS Bureau of Procurement with ongoing, day-to-day account management services for Commonwealth agencies including fuel-price risk management, tariff rate change issues, and billing and metering discrepancies.

Addressed miscellaneous natural gas billing issues between utilities, suppliers, and facilities.

Gathered data, verified monthly contract quantities, and administered a natural gas commodity procurement event for RFQ DGS 18-08. Twenty-three accounts were awarded supply contracts with a projected combined contract savings of \$170,053. Avoided cost in comparison to the utility rates are projected to be \$5.08 million throughout the full term of the contracts awarded.

Provided support for the development, release, and award of RFQ DGS 18-10 PA-Based Solar for Commonwealth Facilities. While few bids were received for the five-year PA-Based Solar product, ultimately, traditional power contracts were awarded for 3,219 Commonwealth accounts resulting in total contract savings of over \$1.6 million in comparison to prior contracted rates as well as a projected \$1.2 million in avoided cost when compared to utility rates. DGS Bureau of Procurement personnel and PSFEI will look to retool the current Commonwealth contracting mechanism to enable more economic solar generation pricing to be submitted in the future.

Continued supporting the growth of the COSTARS electric procurement service through participation in targeted events, individual one-to-one consultations, and utility bill reviews with prospective clients. Reviewed utility bills for incorrect charges, which to-date has resulted in the identification of over \$412,000 in refundable charges to COSTARS members. Started a procurement event containing twelve bid packages and sixty-one accounts on June 26, 2019, with a scheduled bid due date of July 10, 2019. The bidding results will be provided in the next quarterly report.

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## FACILITIES

Communicated with and assisted DGS with enrolling facilities staff in the Building Operator Certification (BOC) training program partially supported through grant funding.

Reviewed ESG's savings calculations for the SCI Muncy decentralization GESA project and developed a separate set of calculations applying defensible assumptions and engineering logic.

Supported DGS in DOC's evaluation of TEN as a GESA contractor for SCI Houtzdale.

Developed an Excel-based traceability matrix to track review comments and issues for GESA, IGA, and engineering review submissions on May 8, 2019.

Submitted FY 2018-19 Q3 quarterly report to DGS on May 14, 2019. Submitted meeting minutes to all attendees on June 7, 2019

Participated in the SCI Houtzdale GESA project information sharing and discovery meeting via conference call on May 15, 2019.

Participated in the SCI Houtzdale GESA project development meeting via conference call on May 28, 2019.

Participated in the SCI Houtzdale GESA project development meeting via conference call on June 11, 2019.

Acquired drawings for the 18th and Herr Building from DGS on June 21, 2019, regarding boiler carryover issues.

Participated in the Selinsgrove Center GESA kickoff meeting via conference call on Jun 7, 2019.

Prepared and submitted SCI Dallas actual GESA project savings information for Year 2 on June 11, 2019, as requested by DGS.

Participated in the SCI Muncy GESA project discussion with DOC personnel via conference call on June 24, 2019. Provided follow-up information to DOC, which was forwarded to DGS.

Provided deficiency reports for all PennDOT pilot project facilities to DGS on June 19, 2019.

Responded to a request from DGS on June 24, 2019, to provide potential training opportunities under the existing contract that focus on HVAC, building automation, and facilities operations. The PSFEI Education Team is working on curriculum topics and will provide follow-up information when available.

Provided the following operation and maintenance engineering services to DGS maintenance management personnel:

- Continued working on the boiler water issue at the 18th and Herr Building; obtained design and equipment documents.
- Developed an electrical testing and maintenance plan for the Health and Welfare Building and submitted to DGS on May 30, 2019.
- Completed an assessment of an HVAC moisture issue at the State Archives Building on June 21, 2019. A report with recommendations will be submitted in the next reporting period.
- Discussed and reached a verbal agreement with DGS regarding how PSFEI can support electrical testing plans that will occur during weekends. Submitted an email to DGS on June 25, 2019, to document the agreement; DGS confirmed the email reflected the verbal agreement.

Continued tracking the LCSWMA monthly electricity generation and Commonwealth accounts electricity consumption to help ensure contract compliance. No notable errors were observed in the billings received during this quarter.

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## MEETINGS

Met with DOC Central Office staff on April 2, 2019, at PSFEI to discuss all IGA review comments for SCI Muncy.

Met with DGS Bureau of Procurement, PADEP, and Slippery Rock University staff at Strishock Coal, and assisted in reaching resolution regarding coal quality for Slippery Rock University.

Attended the GESA IGA kickoff meeting at SCI Houtzdale on May 6, 2019.

Attended the DGS-PSFEI bi-monthly meeting in Harrisburg on May 14, 2019.

Attended a GESA project scoping site visit to the PennDOT Server Farm on June 7, 2019.

Attended GESA project scoping site visits to the PennDOT Eastern Pennsylvania Training Facility and the Lebanon County Office Building on June 13, 2019.

Prepared for and participated in a site visit on June 21, 2019, at the State Archives Building regarding moisture problems. Gathered information and reviewed site visit findings in preparation of issuing a report to document findings and recommendations.

Attended GESA project scoping site visits to the PennDOT county office building in Chambersburg and the I-81 Welcome Center on June 20, 2019.

Organized a site visit to SCI Huntingdon to review the CNG decompression station with DGS representatives on June 20, 2019.

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## ENERGYCAP SUPPORT

Updated accounts, buildings, and meters for various agencies. This required work is extensive and will be ongoing.

Prepared basic training material customized for each agency.

Attended the first training given by the project manager for EnergyCAP on April 30, 2019.

Assisted the Department of Military and Veterans Affairs (DMVA) with account splits, placing accounts with meters and buildings, and moving meters from the "To Be Placed" area into the correct location.

Prepared for training DOC personnel on EnergyCAP.

Met with Pennsylvania State Police (PSP) leadership on May 23, 2019, to discuss EnergyCAP and its functions. Visited the PSP Bureau of Communications and Information Services multiple times during May and June and confirmed all accounts were properly entered.

Provided training to Warren State Hospital personnel.

Supported DGS and EnergyCAP in organizing and conducting the initial Commonwealth training for the EnergyCAP program.

Spoke with various Commonwealth agencies in support of their needs.

Focused on EnergyCAP data cleanup, which has taken a priority over training in order to run reports and view data.

Met with DGS on April 30, 2019, regarding development of an agency-wide EnergyCAP training plan.

Commenced Commonwealth EnergyCAP training on May 7, 2019, through the efforts of the PSFEI Data Analyst.

Participated in the EnergyCAP process flow/business rules planning meeting via conference call.

Began discussing the need to transfer the Pennsylvania Turnpike Commission (PTC) contract for EnergyCAP services from PSFEI to DGS on June 25, 2019. The initial task was to determine existing costs to date and develop a plan to communicate with PTC.

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## OTHER

Evaluated a PADEP request for current energy project information and provided comments via email on April 24, 2019.

Collected DCNR utility information as requested and submitted via email to DGS on June 3, 2019.

## SUMMARY OF EDUCATION SERVICES

### EDUCATION OPPORTUNITIES

PSFEI developed and conducted technical short courses and special trainings to enable Commonwealth personnel to enhance their knowledge and sharpen their job skills. The short courses were held in State College, PA and workshops and seminars were held at convenient locations throughout the state. Four DGS employees enhanced their skills by attending training events in fiscal year 2018–2019.

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

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

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

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

DGS attendance at PSFEI educational training events is detailed in Table 18.

**Table 18. DGS Attendance at Short Courses and Workshops 2018–2019**

Education Event	DGS Attendance
<b>Short Courses</b>	
Boiler Plant Operations and Maintenance Training	
Effective Facility Management	4
Electrical Distribution Systems	
HVAC Technical Conference	
<b>Workshops</b>	
Boiler Workshop	
Electrical Workshop	
HVAC Workshop	
<b>Total</b>	<b>4</b>