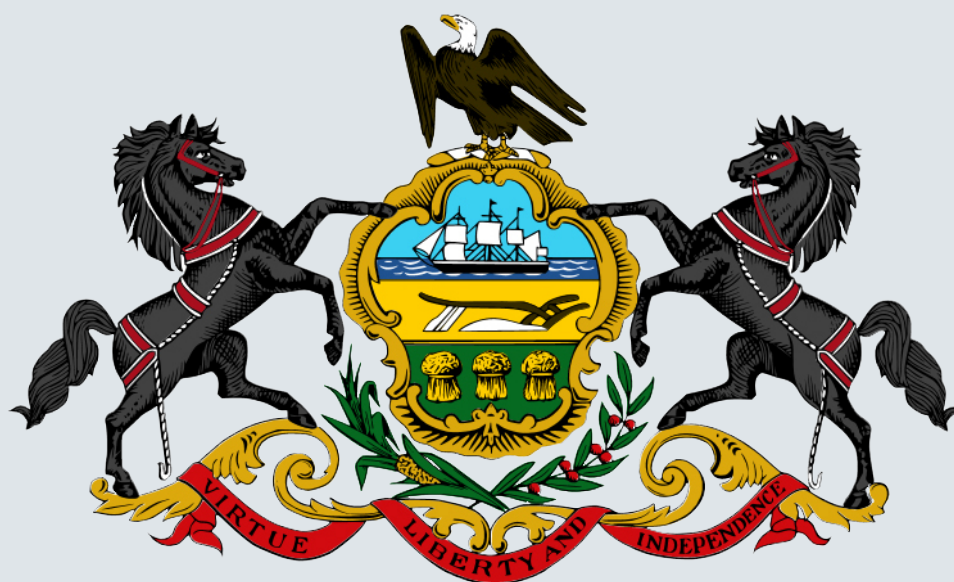


# ENERGY AND UTILITY USAGE REPORT

Fiscal Year 2019–2020

Revision 1



## Commonwealth of Pennsylvania

### Department of General Services



FACILITIES  
ENGINEERING  
INSTITUTE



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The Pennsylvania State University • College of Engineering • Facilities Engineering Institute  
Marion Place, Suite 414 • 135 East Nittany Avenue • State College, PA 16801  
Phone: 814-865-7615 • Fax: 814-863-7835 • [www.psfei.psu.edu](http://www.psfei.psu.edu)

## **PENN STATE FACILITIES ENGINEERING INSTITUTE**

### **Our Vision**

To lead the quest for optimized facilities.

### **Our Mission**

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

### **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 \$248 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 8,372 electric and 926 natural gas accounts. During fiscal year 2019–2020, 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 procurement efforts were directed toward the Commonwealth’s COSTARS partners during the fiscal year due to long-term contracts awarded for Commonwealth accounts. Commonwealth agencies continue to reap the benefits of the strategically procured electricity at a weighted average unit cost of approximately \$0.048 per kilowatt-hour. Contracts were solicited and awarded for COSTARS partners through four bidding events that included 356 accounts resulting in an estimated cost reduction over the prior contract rates of over \$259,000 and \$1.9 million in projected contract avoided costs versus the utility-issued price to compare.

Four natural gas procurement events were held for 28 accounts resulting in an estimated cost reduction of approximately \$241,000 from prior contract rates and projected contract avoided costs of \$1.78 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 PSFEI proprietary Energy Risk Management Application's (ERMA) functionality to improve the Commonwealth’s energy procurement and account management capabilities.
- Assisting the Commonwealth with the proliferation of the EnergyCAP utility bill management software and training of Commonwealth personnel in its use. Efforts included meter and account identification, user permission assignment, resolution and reconciliation of unknown meters, and hosting numerous training sessions across 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, 6,959 total meters have been verified as meeting the requirements for reporting, indicating a 6.2% reduction in energy consumption for the second fiscal year of reporting.
- Assisting the Commonwealth with fulfilling the renewable energy goals and provisions of Executive Order 2019-01 through the procurement of solar energy sourced within Pennsylvania. The Commonwealth currently satisfies this commitment through the purchase of Green-e certified Renewable Energy Certificates (RECs) and holds the number two position for state governments on the U.S. Environmental Protection Agency's (EPA) 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, five projects have been completed, four projects are under construction, and three projects are currently in

the Investment Grade Audit (IGA) solicitation phase. According to DGS, total project investment is projected to be \$150.3 million with projected annual savings of \$6.7 million. This equates to 56,494 trees planted or 5,304 cars mitigated.

- Providing the DGS Capitol Complex with vital engineering services to enhance operation, maintenance, reliability, and safety of its buildings. One electric report; one mechanical report; one heating, ventilating, and air conditioning (HVAC) report; four testing reports; two testing scopes of work; and the *Guidance for Building Operations During COVID-19 Pandemic* were issued to document these efforts.

Energy and utility costs for DGS facilities decreased by \$1,236,413, down 9.3% from the previous fiscal year. Overall energy use decreased by approximately 45,480 million British thermal units (MMBtu), down 7.1%. Continued favorable natural gas market pricing coupled with reduced usage due to the COVID-19 pandemic provided a 15% decrease in natural gas expenditures while electrical energy cost fell by 6.9%. Purchased steam energy decreased by 8,171 thousand pounds (mlb), down 4.8% while the unit cost of steam decreased by roughly \$2.22 per mlb, down 8.5%.

With regards to energy usage during fiscal year 2019–2020 and beyond, it should be noted that building operations continued under the assumption that they would be reoccupied in the relatively near future. As such, significant reductions in heating, cooling, and water would have had a detrimental impact on mechanical systems as well as building structures. Even with decreased full-time employee occupancy in buildings as a result of the COVID-19 pandemic and the emergency telework of many work units, numerous essential employees with vital in-person work remained within Commonwealth workplaces on an intermittent or full-time basis. As a result, many buildings were fully operational in terms of temperature and humidity controls as well as air circulation. Commonwealth facilities also operated in accordance with Centers for Disease Control and Prevention (CDC) recommendations with respect to air filtration, ventilation, and outdoor air exchange, requiring the Commonwealth to continuously operate building systems to reduce the likelihood of COVID-19 spread. Specifics can be found in the Engineering Services section under the *HVAC Steps Taken for Building Occupant Protection During COVID-19* subheading.

PSFEI compared DGS 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 2019–2020, the average DGS building site EUI was 76,153 Btu/sqft, 18.9% below the national average and 7.2% below the previous fiscal year.

The 2019–2020 *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 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 analyses. 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 2019–2020, the Department of General Services (DGS) energy and water/sewer cumulative costs totaled \$14.18 million, a decrease of 9.7% from the previous fiscal year. Electricity use decreased by 8.2%, natural gas use decreased by 7.0%, purchased steam use decreased by 4.8%, and water/sewer use decreased by 18.2%.

Thermal energy unit pricing decreased from the prior fiscal year. Natural gas unit cost per thousand cubic feet (mcf) decreased by 8.7% and purchased steam per one thousand pounds (mlb) by over 8.5%. Electricity cost per kilowatt-hour (kWh) increased by 1.5%.

**Table 1. Consumption and Costs 2019–2020**

Utility	Annual Consumption	Unit Cost	Annual Cost
Electricity	98,350,117 kWh	7.687 ¢/kWh	\$7,560,117
Natural Gas	92,737 mcf	\$6.50 /mcf	\$603,225
Steam	160,819 mlbs	\$23.81 /mlbs	\$3,828,588
Water/Sewer	75,469 mgal	\$29.01 /mgal	\$2,189,025
<b>Total</b>			<b>\$14,180,954</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 \$500,000 compared to current contract rates and avoiding over \$1.5 million in projected annual electricity and natural gas expenditures compared to utility-issued, price-to-compare costs.

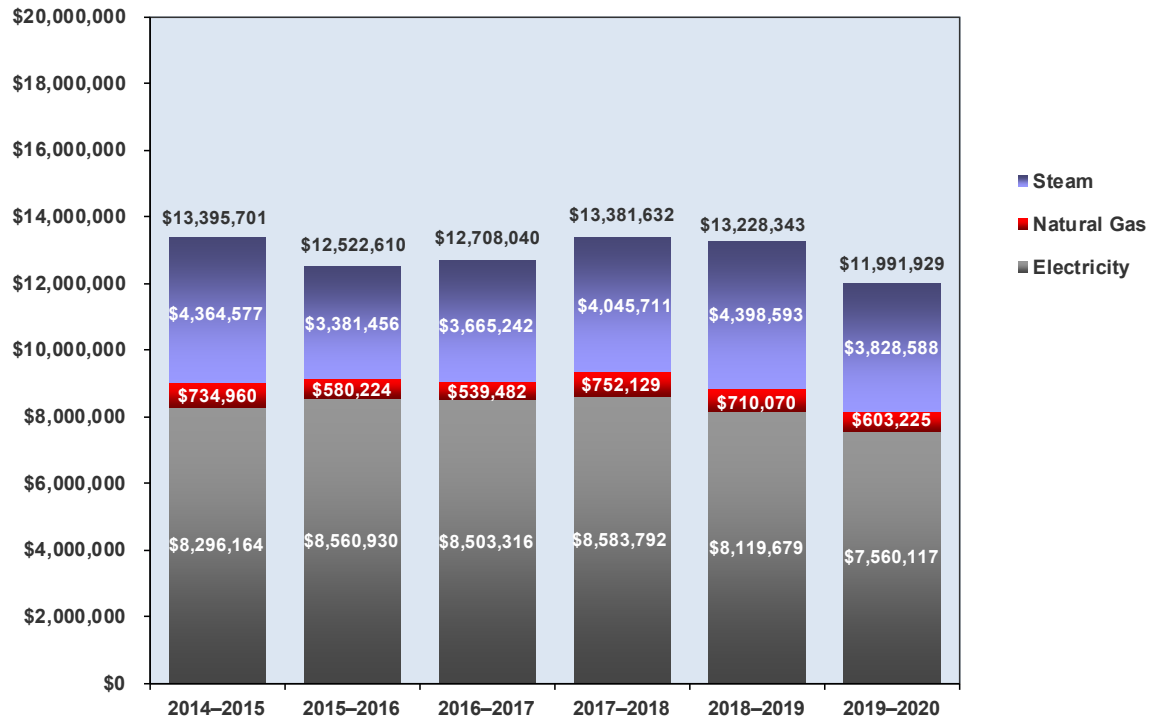
**Table 2. Energy Procurement Results 2019–2020**

Energy Events	Cost Reduction	Cost Avoidance
Electric Procurement	\$259,307	\$638,763
Natural Gas Procurement	\$241,390	\$918,005
<b>Total</b>	<b>\$500,697</b>	<b>\$1,556,768</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 2019–2020, energy costs decreased by \$1,236,413, down 9.3% from the previous year. Overall energy use, measured in one million British thermal units (MMBtu), decreased from the previous year by 45,480 MMBtu, down 7.1%.

**Chart 1. Annual Energy Costs Trend**



**Chart 2. Annual Energy Consumption Trend**

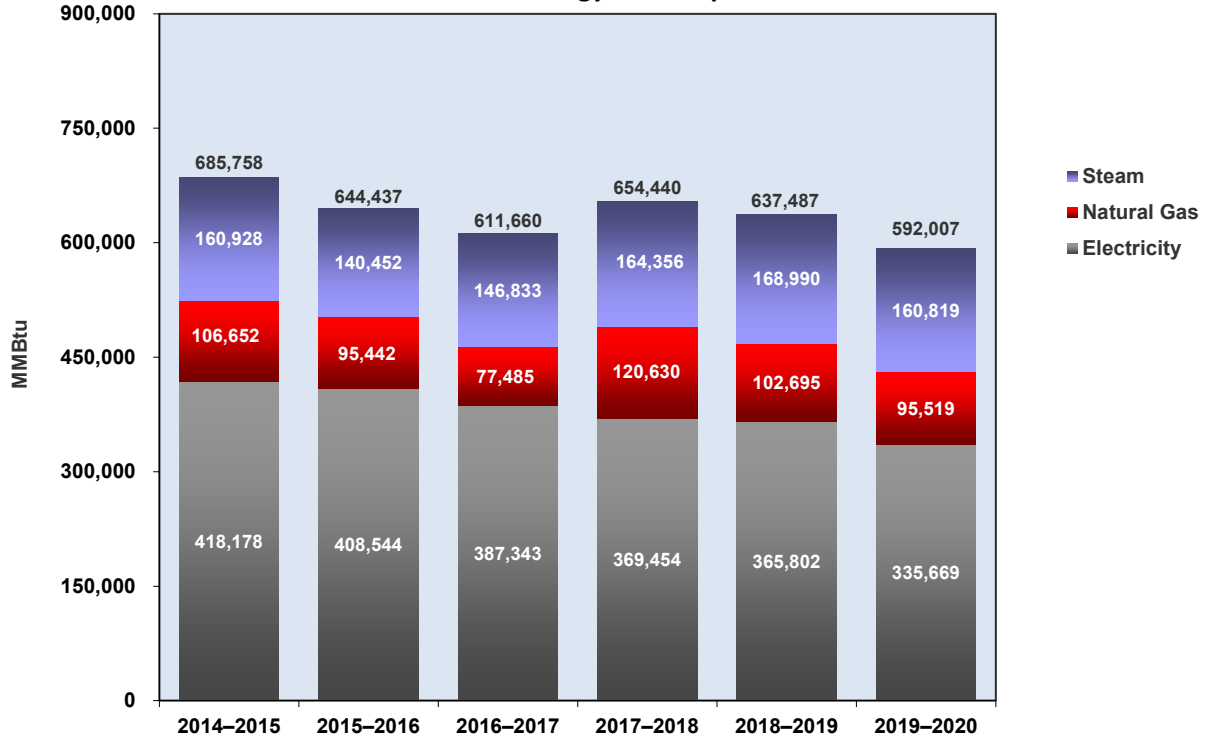


Table 3 provides a detailed DGS agency-level view of energy use and cost information for the past six fiscal years.

DGS facilities experienced an 8.2% decrease in use and a 6.9% decrease in costs for electricity consumed during the fiscal year. This equates to 8,828,910 less kWh and a cost reduction of \$559,563. Due to escalations built into the Lancaster Solid Waste Management Authority (LCSWMA) Power Purchase Agreement (PPA), a decrease in zonal capacity charges, and an increase in transmission pricing, the unit cost per kWh increased by a marginal 1.5%. Additional details about the LCSWMA PPA are provided in the *Intergovernmental Power Purchase Agreement* section under the Summary of Energy and Engineering Services.

Purchased steam consumption decreased by 8,171 mlb, down 4.8% and costs, accordingly, decreased by \$570,005, down 13%. Overall steam unit cost decreased by \$2.22 per mlb, down 8.5%.

Natural gas consumption decreased 6,967 mcf, down 7.0% while costs decreased by \$106,846, down 15%. The average natural gas unit cost decreased by 8.7%, from \$7.12 to \$6.50 per mcf.

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

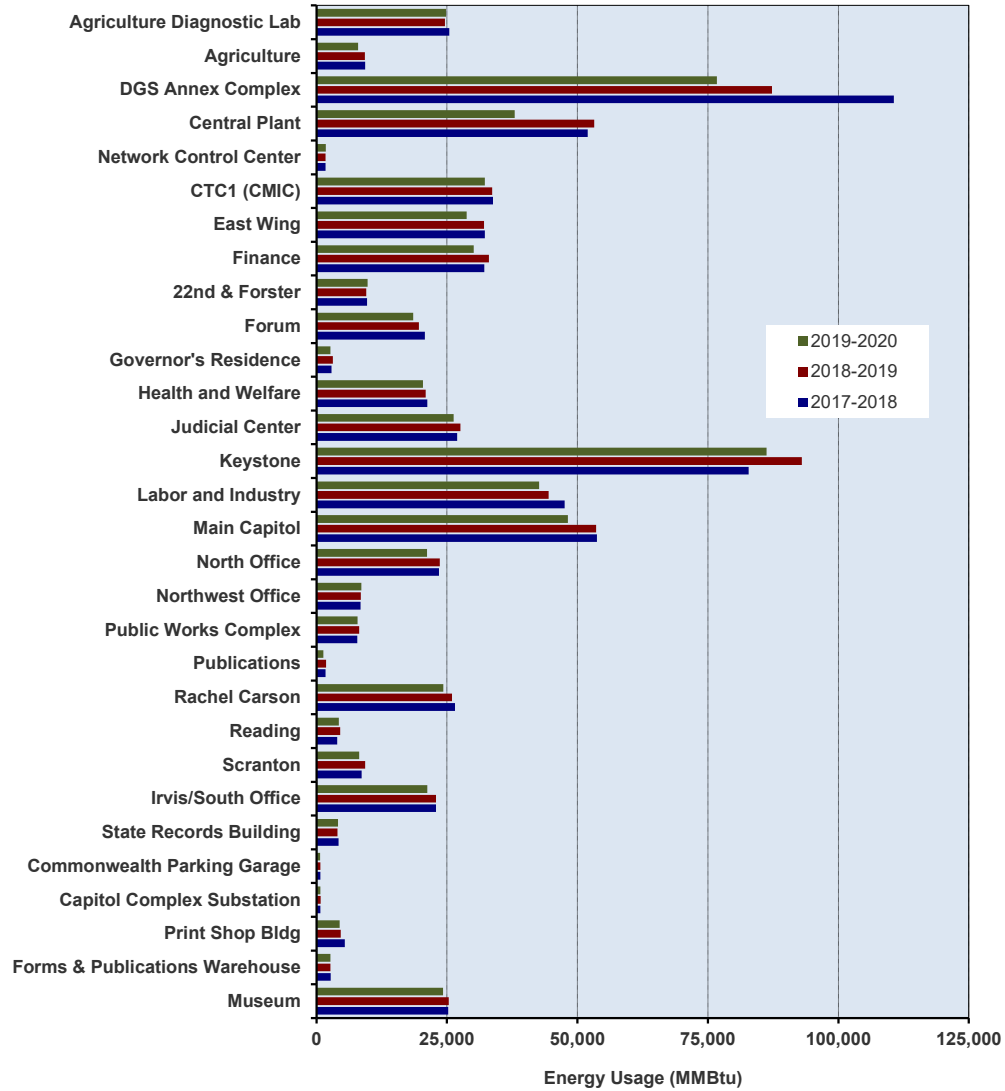
Energy Cost	Units	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020
Electricity	\$	\$8,296,164	\$8,560,930	\$8,503,316	\$8,583,792	\$8,119,679	\$7,560,117
Natural Gas	\$	\$734,960	\$580,224	\$539,482	\$752,129	\$710,070	\$603,225
Steam	\$	\$4,364,577	\$3,381,456	\$3,665,242	\$4,045,711	\$4,398,593	\$3,828,588
Total	\$	\$13,395,701	\$12,522,610	\$12,708,040	\$13,381,632	\$13,228,343	\$11,991,929
<b>Unit Energy Cost/MMBtu</b>							
Electricity	\$/MMBtu	\$19.84	\$20.95	\$21.95	\$21.95	\$22.20	\$22.52
Natural Gas	\$/MMBtu	\$6.89	\$6.08	\$6.96	\$6.23	\$6.91	\$6.32
Steam	\$/MMBtu	\$27.12	\$24.08	\$24.96	\$24.62	\$26.03	\$23.81
Weighted Average	\$/MMBtu	\$19.53	\$19.43	\$20.78	\$20.45	\$20.75	\$20.26
<b>Energy Consumption</b>							
Electricity	MMBtu	418,178	408,544	387,343	369,454	365,802	335,669
Natural Gas	MMBtu	106,652	95,442	77,485	120,630	102,695	95,519
Steam	MMBtu	160,928	140,452	146,833	164,356	168,990	160,819
Total	MMBtu	685,758	644,437	611,660	654,440	637,487	592,007
<b>Unit Fuel Cost</b>							
Electricity	\$/kWh	\$0.0677	\$0.0715	\$0.0749	\$0.0793	\$0.0758	\$0.0769
Natural Gas	\$/mcf	\$7.10	\$6.26	\$7.17	\$6.42	\$7.12	\$6.50
Steam	\$/mlb	\$27.12	\$24.08	\$24.96	\$24.62	\$26.03	\$23.81
<b>Fuel Consumption</b>							
Electricity	kWh	122,525,079	119,702,221	113,490,410	108,249,179	107,179,027	98,350,117
Natural Gas	mcf	103,545	92,662	75,228	117,117	99,704	92,737
Steam	mlbs	160,928	140,452	146,833	164,356	168,990	160,819

Note: The historical data for fiscal years 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 MMBtu for each DGS facility for the past three fiscal years. The largest users continue to be the DGS Annex Complex (despite a natural gas billing error in fiscal year 2017–2018) and the Keystone Building. Energy consumption decreased from the previous year at a vast majority of DGS facilities.

**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 British thermal units per square foot per year (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 per unit area. 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 the CTC1 (CMIC) building decreased from prior year usage, while energy usage at the Agriculture Diagnostic Lab increased slightly.

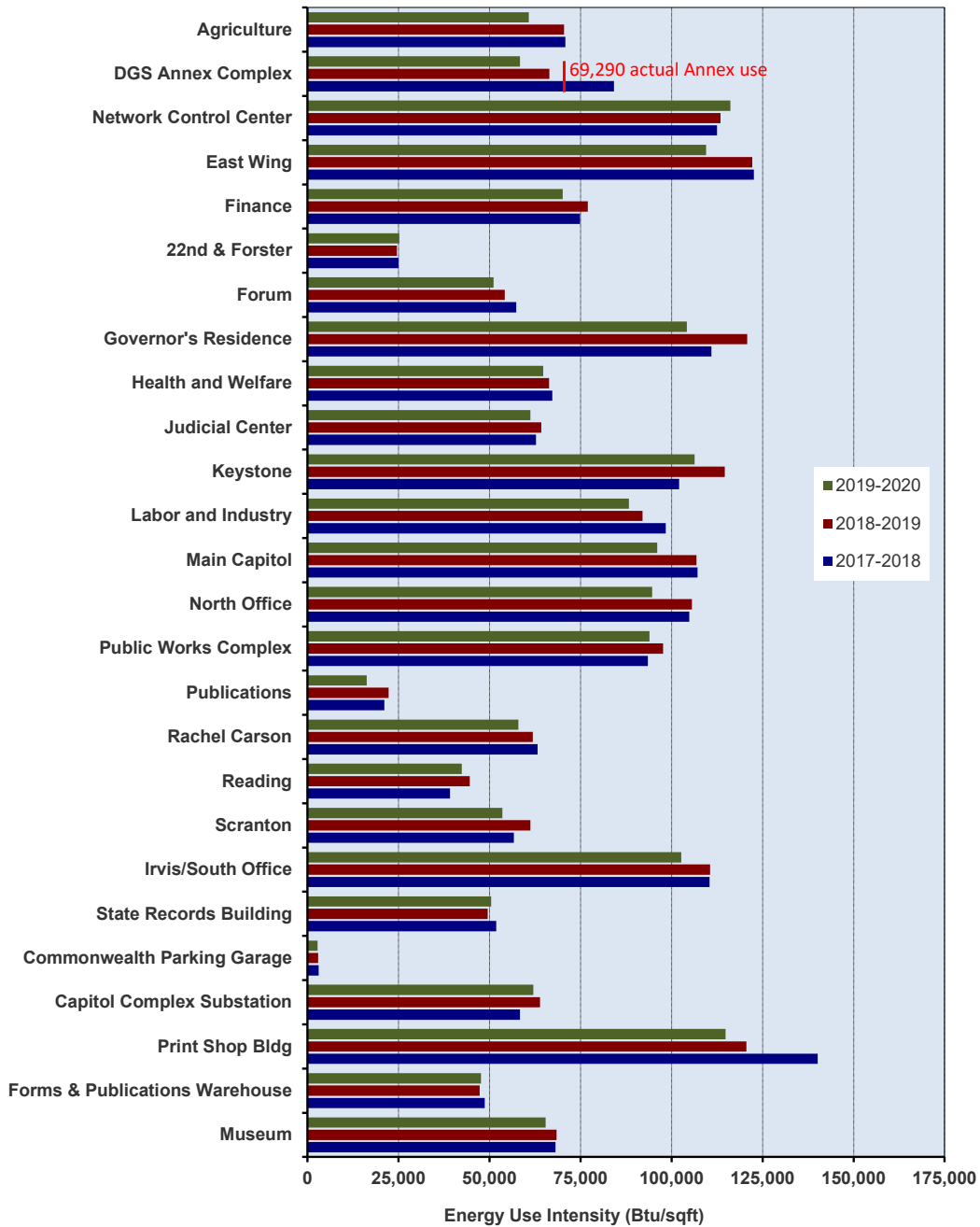
During fiscal year 2019–2020, total EUI decreased by 7.2% to 76,162 Btu/sqft. The most significant changes in the EUI occurred at the Publications Building (due to the closure and decommissioning of the building) and the Agriculture Building.

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

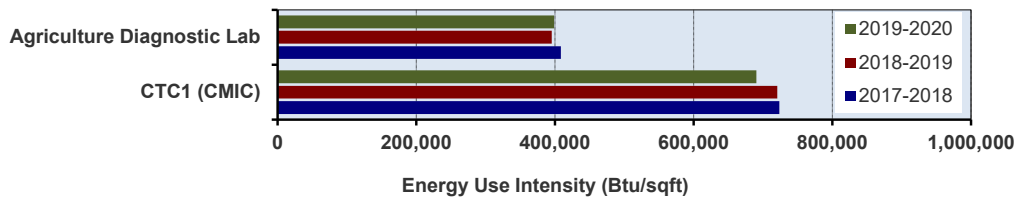
Facility	Total Space (sqft)	2017–2018		2018–2019		2019–2020	
		Btu Usage (MMBtu)	Energy Use Intensity (Btu/sqft)	Btu Usage (MMBtu)	Energy Use Intensity (Btu/sqft)	Btu Usage (MMBtu)	Energy Use Intensity (Btu/sqft)
Publications	81,948	1,733	21,143	1,827	22,292	1,334	16,275
22nd & Forster	388,544	9,708	24,985	9,553	24,586	9,806	25,238
Agriculture	131,391	9,305	70,818	9,260	70,479	7,991	60,815
Agriculture Diagnostic Lab	62,230	25,429	408,635	24,619	395,608	24,832	399,035
CTC1 (CMIC)	46,736	33,825	723,736	33,671	720,450	32,271	690,491
DGS Annex Complex	1,313,571	110,623	84,215	87,251	66,422	76,696	58,387
Fisher Plaza	---	554	---	474	---	456	---
Forms & Publications Warehouse	56,560	2,753	48,669	2,677	47,325	2,696	47,660
Governor's Residence	25,878	2,871	110,935	3,125	120,741	2,697	104,221
Network Control Center	15,400	1,732	112,452	1,747	113,427	1,789	116,175
Print Shop Bldg	38,688	5,421	140,134	4,664	120,551	4,443	114,849
Public Works Complex	83,670	7,824	93,513	8,171	97,663	7,858	93,916
Rachel Carson	420,125	26,542	63,175	25,987	61,854	24,327	57,903
Reading	101,626	3,980	39,161	4,533	44,603	4,311	42,418
Scranton	152,800	8,659	56,669	9,351	61,199	8,184	53,562
State Records Building	81,565	4,227	51,826	4,038	49,510	4,112	50,416
<b>Capitol Complex Buildings<sup>1</sup></b>							
Capitol Complex Substation	12,500	730	58,390	799	63,903	776	62,041
Commonwealth Parking Garage	248,188	772	3,113	728	2,933	694	2,796
East Wing	262,950	32,239	122,606	32,115	122,134	28,783	109,461
Finance	429,521	32,173	74,904	33,066	76,983	30,123	70,133
Forum	362,395	20,776	57,330	19,625	54,154	18,529	51,128
Health and Welfare	315,462	21,215	67,251	20,934	66,360	20,421	64,735
Ivis/South Office	207,138	22,878	110,446	22,911	110,606	21,261	102,640
Judicial Center	429,355	26,960	62,792	27,572	64,217	26,296	61,245
Keystone	811,147	82,782	102,056	92,984	114,633	86,219	106,292
Labor and Industry	483,161	47,532	98,376	44,480	92,060	42,674	88,323
Main Capitol	501,543	53,736	107,142	53,570	106,811	48,195	96,094
Museum	370,442	25,241	68,137	25,343	68,412	24,238	65,430
North Office	223,946	23,489	104,888	23,652	105,613	21,207	94,697
<b>Complex Buildings Total</b>	<b>4,657,748</b>	<b>390,524</b>		<b>397,778</b>		<b>369,415</b>	
<b>Total</b>	<b>7,658,480</b>	<b>645,709</b>		<b>628,724</b>		<b>583,217</b>	
<b>Weighted Average</b>			<b>84,313</b>		<b>82,095</b>		<b>76,153</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, Ivis/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 average utility cost per square foot for DGS buildings fell by 9.8%, with the most significant reductions occurring at the Publications Building and DGS Annex Complex.

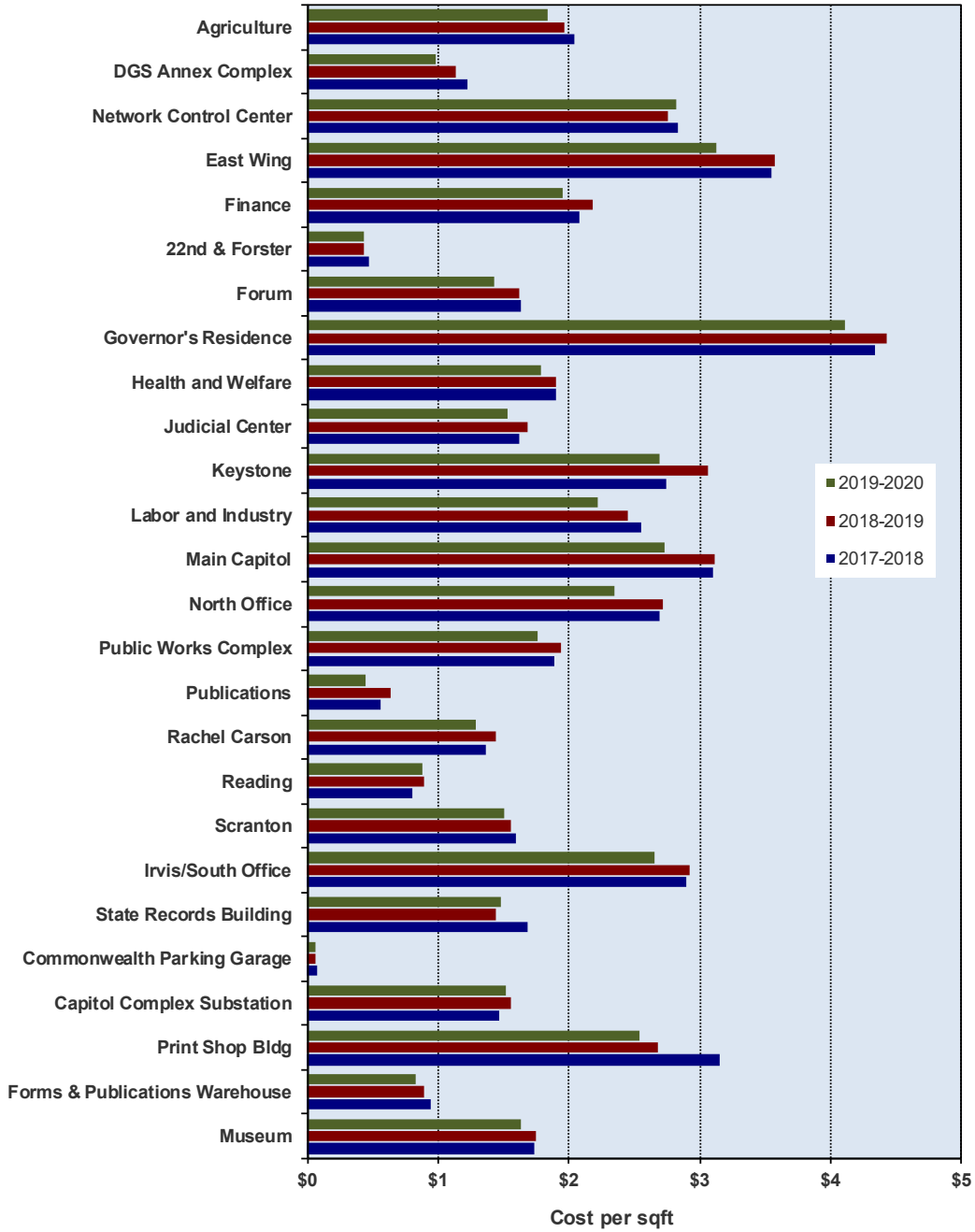
**Table 5. Annual Utility Cost per Square Foot Trend**

Facility	Total Space (sqft)	2017–2018		2018–2019		2019–2020	
		Cost	\$/sqft	Cost	\$/sqft	Cost	\$/sqft
Publications	81,948	\$46,464	\$0.57	\$52,248	\$0.64	\$36,810	\$0.45
22nd & Forster	388,544	\$183,438	\$0.47	\$170,135	\$0.44	\$170,098	\$0.44
Agriculture	131,391	\$267,941	\$2.04	\$258,276	\$1.97	\$241,220	\$1.84
Agriculture Diagnostic Lab	62,230	\$368,123	\$5.92	\$352,817	\$5.67	\$353,115	\$5.67
CTC1 (CMIC)	46,736	\$740,334	\$15.84	\$721,270	\$15.43	\$710,054	\$15.19
DGS Annex Complex	1,313,571	\$1,616,883	\$1.23	\$1,489,050	\$1.13	\$1,287,495	\$0.98
Fisher Plaza	---	\$35,282	---	\$28,861	---	\$26,866	---
Forms & Publications Warehouse	56,560	\$53,109	\$0.94	\$50,765	\$0.90	\$47,245	\$0.84
Governor's Residence	25,878	\$112,225	\$4.34	\$114,516	\$4.43	\$106,330	\$4.11
Network Control Center	15,400	\$43,678	\$2.84	\$42,398	\$2.75	\$43,532	\$2.83
Print Shop Bldg	38,688	\$121,881	\$3.15	\$103,590	\$2.68	\$98,228	\$2.54
Public Works Complex	83,670	\$158,307	\$1.89	\$162,348	\$1.94	\$147,125	\$1.76
Rachel Carson	420,125	\$573,112	\$1.36	\$603,829	\$1.44	\$541,710	\$1.29
Reading	101,626	\$82,185	\$0.81	\$90,972	\$0.90	\$90,078	\$0.89
Scranton	152,800	\$243,878	\$1.60	\$238,761	\$1.56	\$230,595	\$1.51
State Records Building	81,565	\$137,496	\$1.69	\$117,461	\$1.44	\$120,348	\$1.48
<b>Capitol Complex Buildings<sup>1</sup></b>							
Capitol Complex Substation	12,500	\$18,382	\$1.47	\$19,481	\$1.56	\$18,972	\$1.52
Commonwealth Parking Garage	248,188	\$17,500	\$0.07	\$15,832	\$0.06	\$15,166	\$0.06
East Wing	262,950	\$933,368	\$3.55	\$938,612	\$3.57	\$822,204	\$3.13
Finance	429,521	\$894,120	\$2.08	\$939,749	\$2.19	\$841,081	\$1.96
Forum	362,395	\$592,068	\$1.63	\$587,917	\$1.62	\$516,753	\$1.43
Health and Welfare	315,462	\$601,660	\$1.91	\$600,827	\$1.90	\$563,517	\$1.79
Iris/South Office	207,138	\$599,768	\$2.90	\$606,083	\$2.93	\$549,872	\$2.65
Judicial Center	429,355	\$694,366	\$1.62	\$724,755	\$1.69	\$659,918	\$1.54
Keystone	811,147	\$2,227,279	\$2.75	\$2,486,066	\$3.06	\$2,184,284	\$2.69
Labor and Industry	483,161	\$1,235,627	\$2.56	\$1,183,987	\$2.45	\$1,074,194	\$2.22
Main Capitol	501,543	\$1,553,811	\$3.10	\$1,562,105	\$3.11	\$1,368,773	\$2.73
Museum	370,442	\$640,772	\$1.73	\$647,081	\$1.75	\$606,577	\$1.64
North Office	223,946	\$602,968	\$2.69	\$608,403	\$2.72	\$525,021	\$2.34
<b>Complex Buildings Total<sup>2</sup></b>	<b>4,657,748</b>	<b>\$10,611,687</b>		<b>\$10,920,897</b>		<b>\$9,746,332</b>	
<b>Total</b>	<b>7,658,480</b>	<b>\$15,396,022</b>		<b>\$15,518,194</b>		<b>\$13,997,180</b>	
<b>Weighted Average</b>			<b>\$2.01</b>		<b>\$2.03</b>		<b>\$1.83</b>

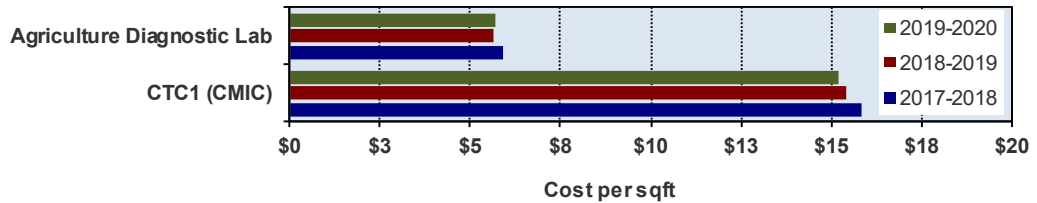
<sup>1</sup>PPL serves the Capitol Complex with one main account. DGS submeters the individual buildings. Central plant electric energy is distributed to the Capitol Complex buildings served by central chilled water on a per square foot basis. The Main Capitol steam metered use and cost is distributed to the Capitol, East Wing, Iris/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 2019–2020, DGS facilities consumed 98,350,117 kWh of electricity at a cost of \$7,560,679, with an average unit cost of \$0.07687 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 2019–2020**

Facility	Account	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	1326068018	PPL Utilities	81,948	78,084	1.0	32.0	0.39	0.40	\$7,567	9.691	\$0.09
22nd & Forster	6392068009	PPL Utilities	388,544	1,185,600	3.1	294.0	0.76	0.57	\$92,886	7.835	\$0.24
Agriculture	7499086008	PPL Utilities	131,391	2,288,000	17.4	890.0	6.77	0.41	\$208,951	9.132	\$1.59
Agriculture Diagnostic Lab	4559086014	PPL Utilities	62,230	2,548,800	41.0	679.0	10.91	0.65	\$200,448	7.864	\$3.22
CTC1 (CMIC)	5149982011	PPL Utilities	46,736	9,455,250	202.3	1,264.0	27.05	0.89	\$710,054	7.510	\$15.19
DGS Annex Complex	3690471029	PPL Utilities	---	3,006	---	1.0	---	0.57	\$538	17.906	---
DGS Annex Complex	7459086015	PPL Utilities	1,313,571	7,002,000	5.3	1,541.0	1.17	0.77	\$563,778	8.052	\$0.43
DGS Annex Complex	9949200005	PPL Utilities	---	0	---	---	---	---	\$70,812	---	---
Fisher Plaza	0540120009	PPL Utilities	---	133,673	---	---	---	---	\$26,866	20.098	---
Forms & Publications Warehouse	0442069007	PPL Utilities	56,560	97,040	1.7	50.0	0.88	0.35	\$10,225	10.537	\$0.18
Governor's Residence	7819078000	PPL Utilities	25,878	732,400	28.3	---	---	---	\$82,583	11.276	\$3.19
Network Control Center	7479086002	PPL Utilities	15,400	524,200	34.0	125.0	8.12	0.56	\$43,532	8.304	\$2.83
Print Shop Bldg	7791062048	PPL Utilities	38,688	1,107,040	28.6	233.0	6.02	0.59	\$92,662	8.370	\$2.40
Public Works Complex	6372068003	PPL Utilities	83,670	806,100	9.6	267.0	3.19	0.50	\$73,024	9.059	\$0.87
Public Works Complex	8860119006	PPL Utilities	---	0	---	---	---	---	\$309	---	---
Rachel Carson	6088070004	PPL Utilities	420,125	4,266,000	10.2	1,548.0	3.68	0.48	\$371,956	8.719	\$0.89
Reading	100013480650	MetEd	101,626	855,951	8.4	240.1	2.36	10.34	\$58,583	6.844	\$0.58
Scranton	7299129004	PPL Utilities	152,800	2,374,500	15.5	710.0	4.65	0.49	\$206,436	8.694	\$1.35
Scranton	7319129002	PPL Utilities	---	4,555	---	1.0	---	0.53	\$718	15.769	---
Scranton	8863773002	PPL Utilities	---	11,017	---	2.0	---	0.63	\$1,110	10.079	---
State Records Center	7235127006	PPL Utilities	81,565	461,400	5.7	146.0	1.79	0.45	\$40,927	8.870	\$0.50
<b>Capitol Complex Buildings<sup>1</sup></b>	<b>4484815085</b>	<b>PPL Utilities</b>									
Capitol Complex Substation	4484815085355	---	12,500	227,224	18.2	---	---	---	\$17,081	7.517	\$1.37
Central Plant	4484815085320	---	3,664,223	11,133,264	3.0	---	---	---	\$786,742	7.067	\$0.21
Commonwealth Parking Garage	4484815085352	---	248,188	203,295	0.8	---	---	---	\$15,166	7.460	\$0.06
East Wing	4484815085312	---	262,950	4,441,276	16.9	---	---	---	\$325,928	7.339	\$1.24
Finance	4484815085307	---	429,521	3,260,140	7.6	---	---	---	\$239,193	7.337	\$0.56
Forum	4484815085305	---	362,395	1,798,214	5.0	---	---	---	\$131,173	7.295	\$0.36
Health and Welfare	4484815085308	---	315,462	2,364,924	7.5	---	---	---	\$174,621	7.384	\$0.55
Ivis/South Office	4484815085304	---	207,138	3,084,592	14.9	---	---	---	\$226,599	7.346	\$1.09
Judicial Center	4484815085000	---	429,355	3,785,354	8.8	---	---	---	\$278,845	7.366	\$0.65
Keystone	4484815085337	---	811,147	12,013,818	14.8	---	---	---	\$882,174	7.343	\$1.09
Labor and Industry	4484815085309	---	483,161	7,314,053	15.1	---	---	---	\$537,864	7.354	\$1.11
Main Capitol	4484815085301	---	501,543	6,506,730	13.0	---	---	---	\$478,862	7.359	\$0.95
Museum	4484815085311	---	370,442	2,947,832	8.0	---	---	---	\$214,274	7.269	\$0.58
North Office	4484815085303	---	223,946	2,813,717	12.6	---	---	---	\$204,756	7.277	\$0.91
Northwest Office	4484815085101	---	188,819	2,521,068	13.4	---	---	---	\$182,876	7.254	\$0.97
<b>Complex Buildings Total</b>			<b>4,846,567</b>	<b>64,415,501</b>	<b>13.3</b>	<b>13,522</b>	<b>2.79</b>	<b>0.54</b>	<b>\$4,696,153</b>	<b>7.290</b>	<b>\$0.97</b>
<b>Total</b>			<b>7,847,299</b>	<b>98,350,117</b>					<b>\$7,560,117</b>		
<b>Weighted Average</b>					<b>12.5</b>			<b>0.55</b>		<b>7.687</b>	<b>\$0.96</b>

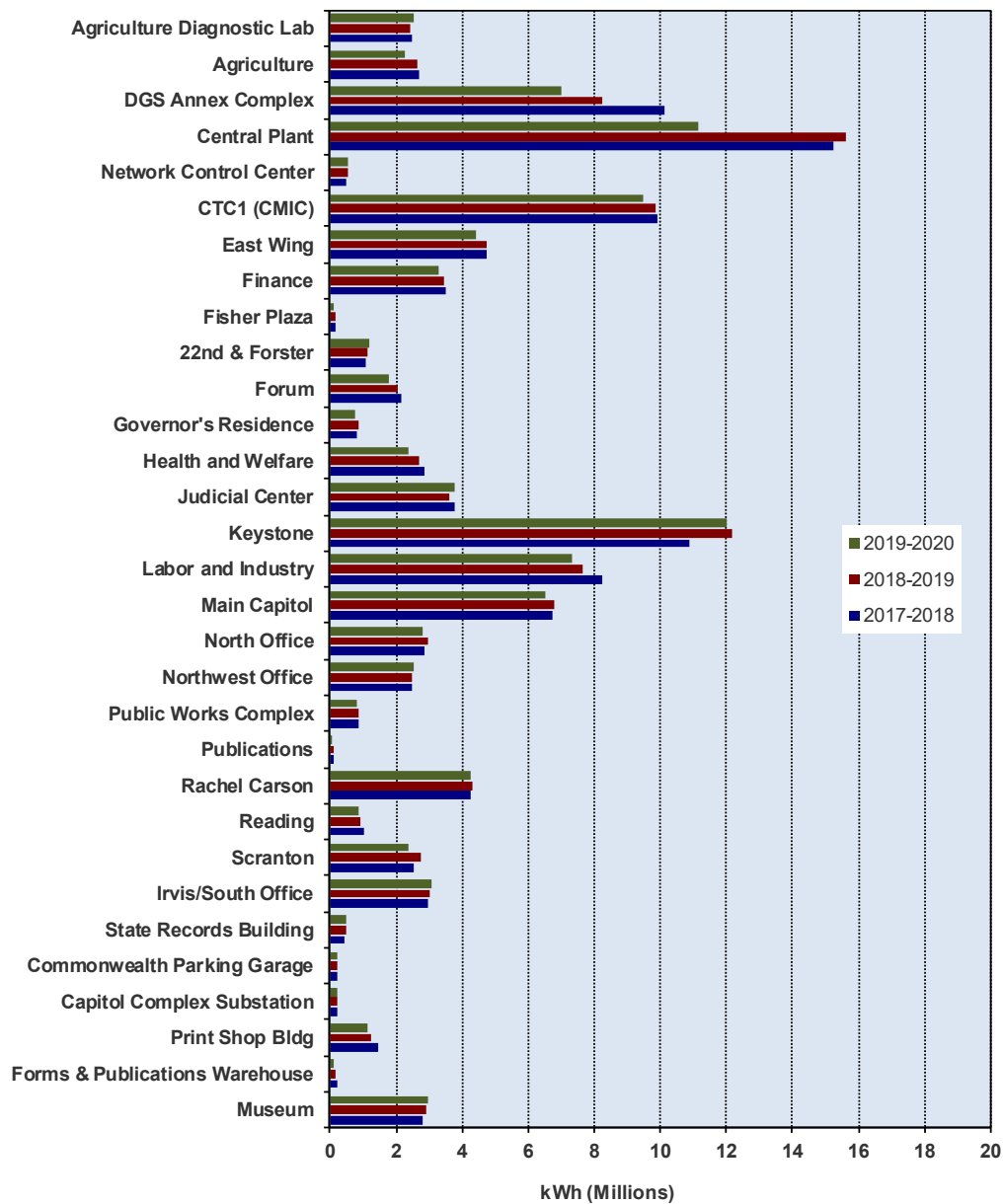
<sup>1</sup>PPL serves the Capitol Complex with one main account. DGS submeters the individual buildings.

Note that in Table 6, the Reading Office Building’s load factor is 10.34. Load factor is equal to kWh use divided by the product of peak demand multiplied by hours of use, thus a load factor greater than 1 is not possible. A metering error was corrected beginning with the February 2020 invoice and since then, the Average Monthly Load Factor for the Reading Office Building has been 0.40.

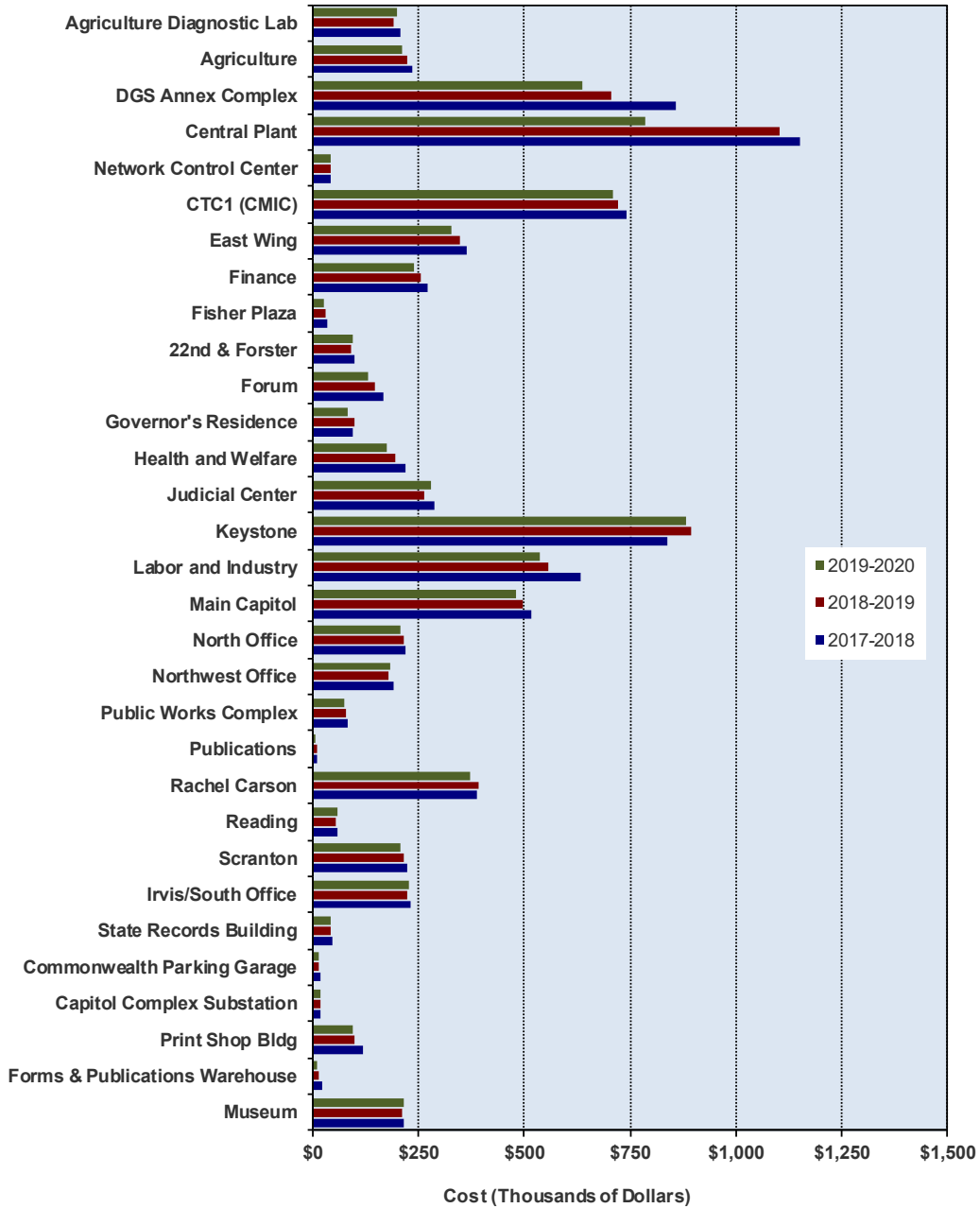
Compared to the previous fiscal year, electricity consumption remained relatively consistent except for notable reductions at the Forms & Publications Warehouse, down 34.1%, and the Capitol Complex Central Plant, down 28.6%. Peak demand changes ranged from a decrease of 41.2% at the Forms & Publications Building to an increase of 24.8% at the Agriculture 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 2019–2020, DGS facilities consumed 92,737 mcf of natural gas, 7.0% less than the previous year. The DGS Annex Complex, at 55.2% of the overall agency usage, remains the largest consumer of natural gas of all DGS buildings. Table 7 provides a breakdown of natural gas consumption by facility.

**Table 7. Natural Gas Consumption and Costs 2019–2020**

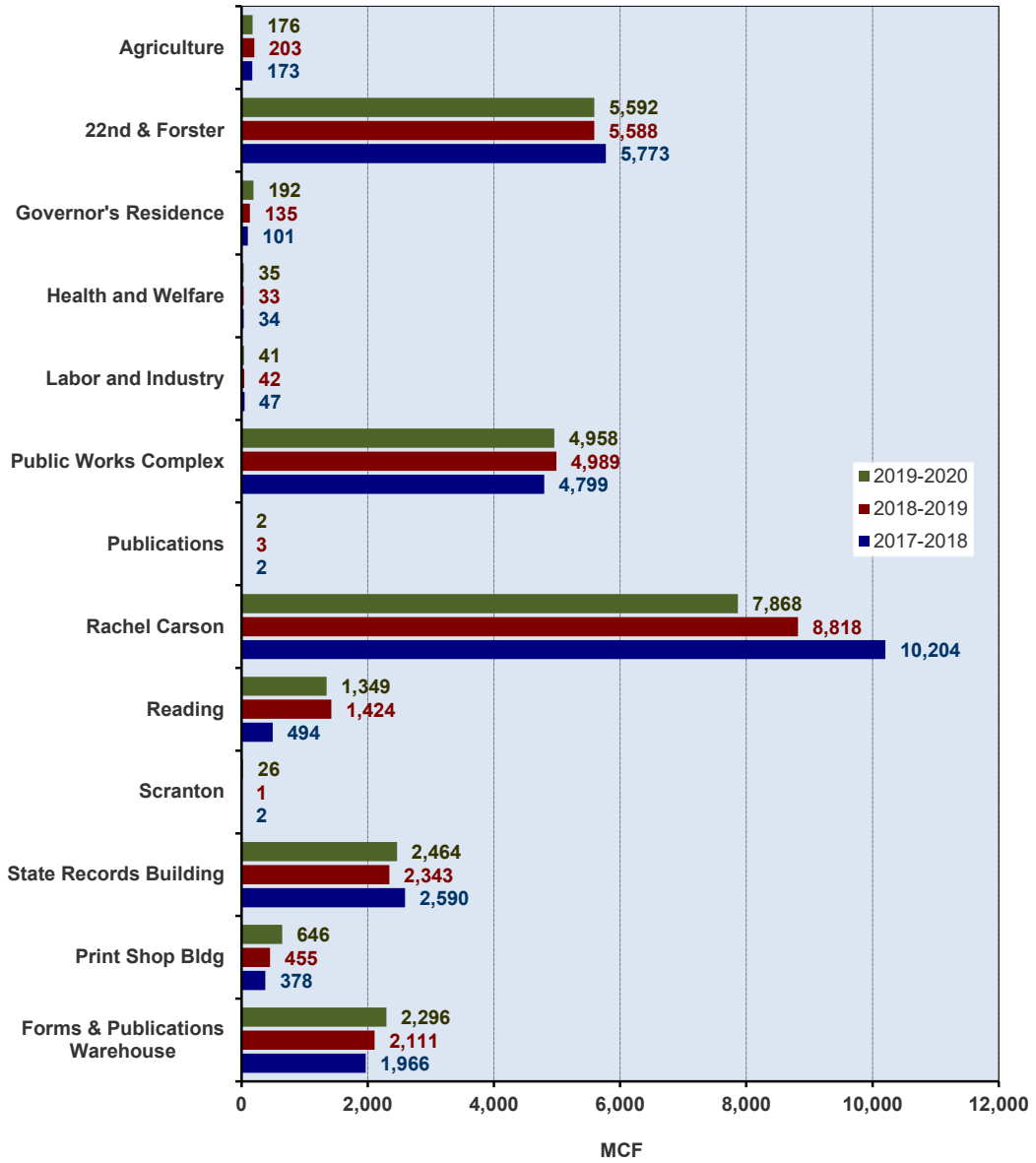
Facility	Utility	mcf	Cost	\$/mcf
Ag Diagnostic Lab	UGI South	7,027	\$52,327	\$7.45
	UGI South	8,636	\$63,411	\$7.34
Agriculture	UGI South	176	\$1,747	\$9.91
DGS Annex Complex	UGI South	51,220	\$272,591	\$5.32
22nd & Forster	UGI South	2,575	\$21,355	\$8.29
	UGI South	3,017	\$25,090	\$8.32
Governor's Residence	UGI South	192	\$1,887	\$9.85
Lt. Governor's Residence	UGI South	210	\$1,950	\$9.27
Public Works Complex	UGI South	4,958	\$40,943	\$8.26
Publications	UGI South	2	\$232	\$110.34
Rachel Carson	UGI South	7,868	\$63,372	\$8.05
Reading	UGI South	1,349	\$11,457	\$8.49
Scranton	UGI PNG	26	\$310	\$11.90
State Records Center	UGI South	2,464	\$20,744	\$8.42
Forms & Publications Warehouse	UGI South	2,296	\$19,094	\$8.32
Print Shop Bldg	UGI South	646	\$5,566	\$8.62
<b>Capitol Complex Buildings</b>				
Health and Welfare	UGI South	35	\$554	\$15.83
Labor and Industry	UGI South	41	\$596	\$14.54
<b>Complex Buildings Total</b>		<b>76</b>	<b>\$1,150</b>	<b>\$15.14</b>
<b>Total</b>		<b>92,737</b>	<b>\$603,225</b>	
<b>Weighted Average</b>				<b>\$6.50</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 2019–2020:

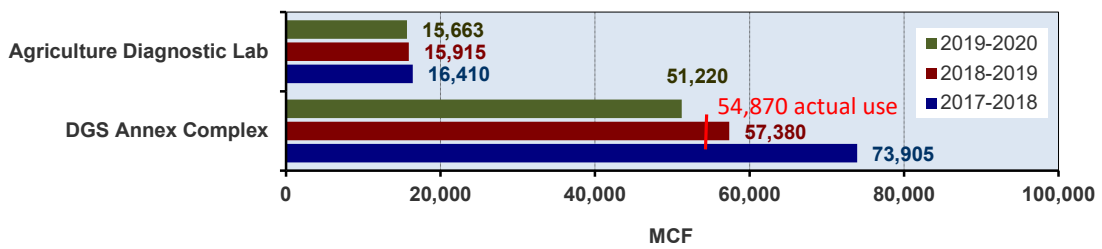
- The Rachel Carson State Office Building consumption decreased by 950 mcf, down 10.8%.
- The DGS Annex Complex use of 51,220 mcf was 10.7% lower than fiscal year 2018–2019, representing a decrease of 6,160 mcf.

Overall, natural gas cost for DGS facilities decreased by \$106,846, down 15%, as a result of lower consumption toward the end of the heating season coupled with excellent natural gas pricing from price risk management decisions resulting from natural gas procurement activities.

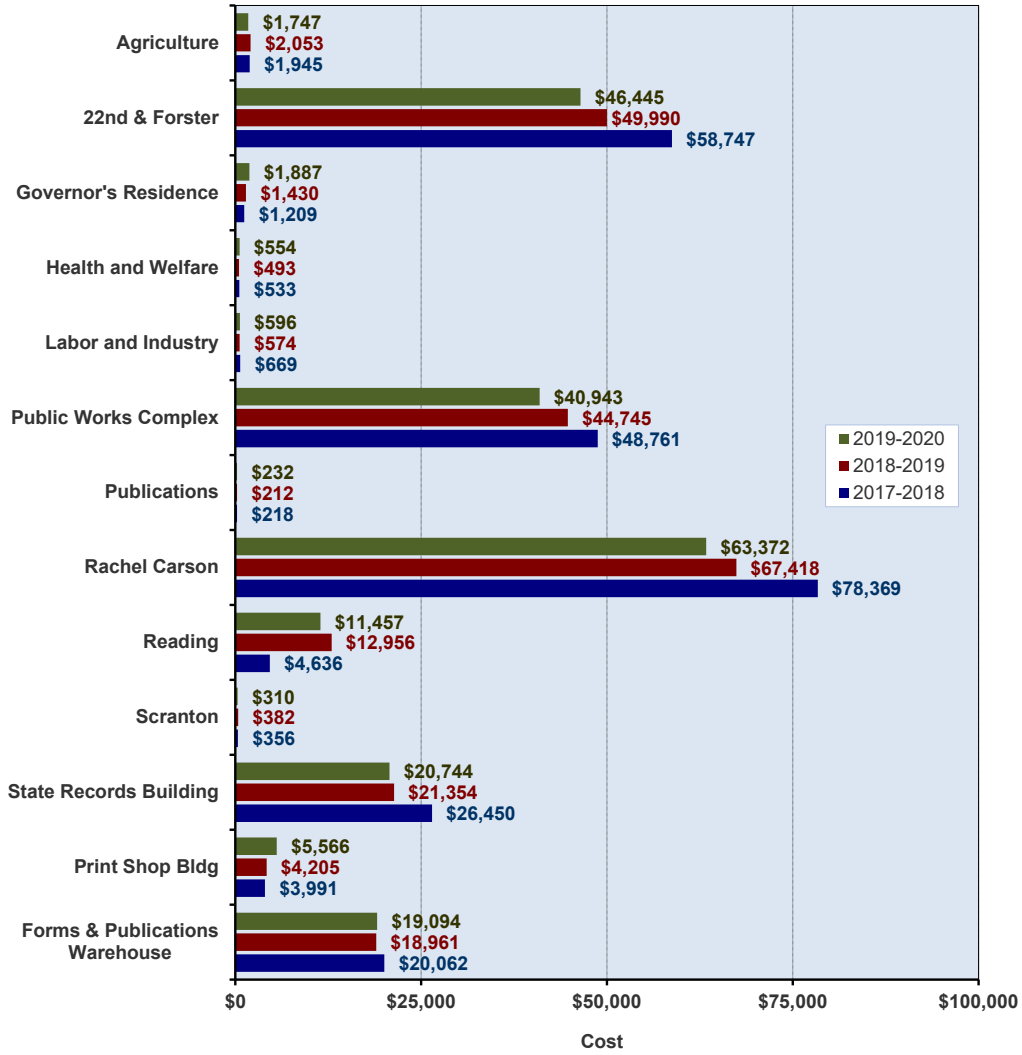
**Chart 8A. Annual Natural Gas Consumption Trend**



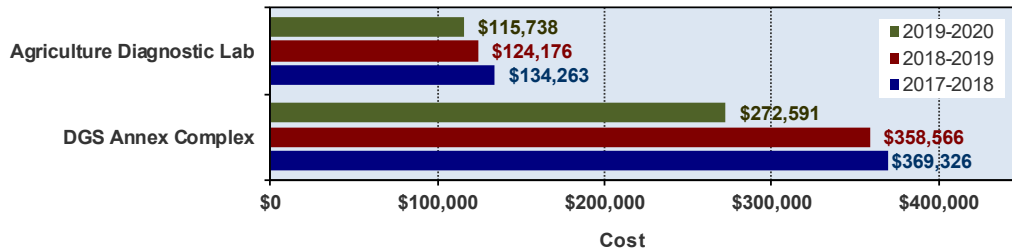
**Chart 8B. Annual Natural Gas Consumption Trend  
Agriculture Diagnostic Lab and DGS Annex Complex**



**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 decreased by 8,171 mlb, down 2.8% from the previous fiscal year while costs decreased by \$570,005, down 13%. The unit cost of purchased steam decreased 8.5%, from \$26.03 to \$23.81 per mlb.

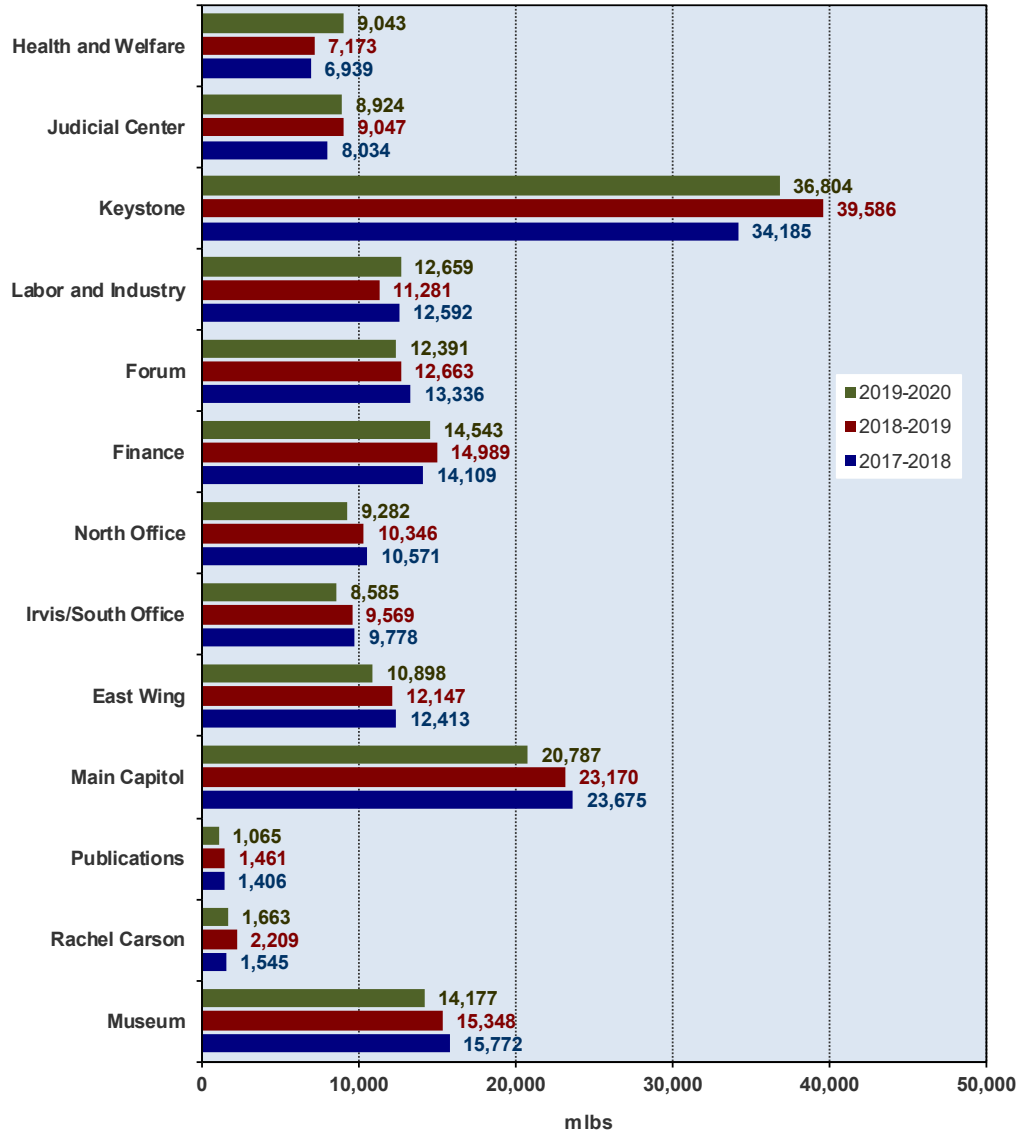
**Table 8. Steam Consumption and Costs 2019–2020**

Facility	Utility	mlbs	Cost	\$/mlb
Publications	NRG	1,065	\$25,649	\$24.08
Rachel Carson	NRG	1,663	\$40,240	\$24.20
<b>Capitol Complex Buildings</b>				
Forum	NRG	12,391	\$293,550	\$23.69
Finance	NRG	14,543	\$345,026	\$23.73
Health and Welfare	NRG	9,043	\$215,119	\$23.79
Judicial Center	NRG	8,924	\$211,353	\$23.68
Keystone	NRG	36,804	\$877,104	\$23.83
Labor and Industry	NRG	12,659	\$300,273	\$23.72
Main Capitol <sup>1</sup>	NRG	49,551	\$1,181,822	\$23.85
Museum	NRG	14,177	\$338,453	\$23.87
<b>Complex Buildings Total</b>		<b>158,092</b>	<b>\$3,762,700</b>	<b>\$23.80</b>
<b>Total</b>		<b>160,819</b>	<b>\$3,828,588</b>	
<b>Weighted Average</b>				<b>\$23.81</b>

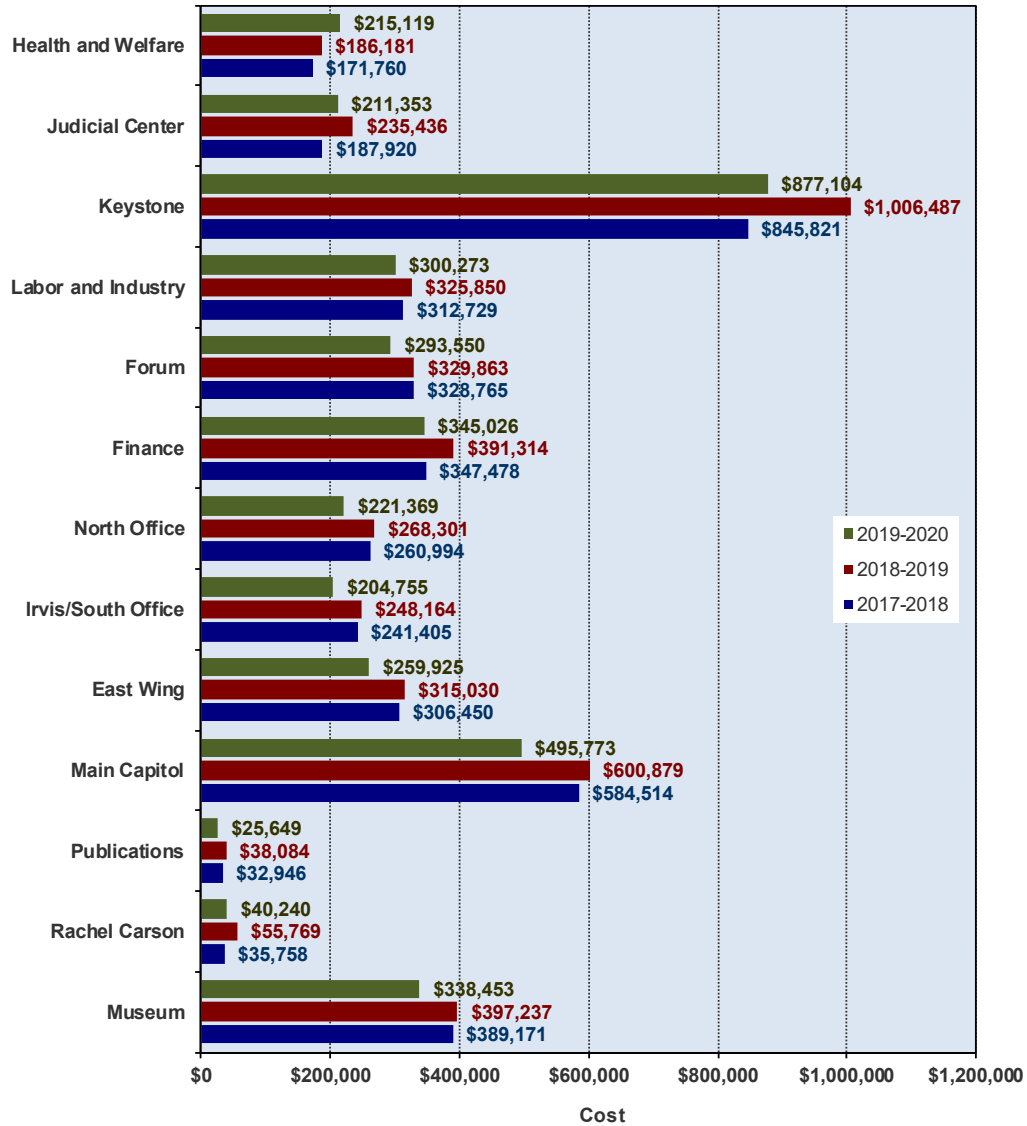
<sup>1</sup>Includes Main Capitol, East Wing, Irvis/South Office, and North Office Buildings.

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 2019–2020 was 3% less severe than the previous winter heating season. Steam use across DGS buildings remained relatively consistent when compared to the previous fiscal year except for a 26.1% increase at the Health and Welfare Building and a 24.7% decrease at the Rachel Carson Office Building. The Publications Building also experienced a 27.1% decrease in steam consumption largely due to building decommissioning and closure.

**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 75,469 mgal at a cost of \$2,189,025. Compared to the previous fiscal year, consumption decreased by 16,747 mgal, down 18.2% while costs decreased by \$282,761, down 11.4%. Unit cost, at \$29.01 per mgal, was higher by 8.2% 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 the Table 9 “\$/mgal” column

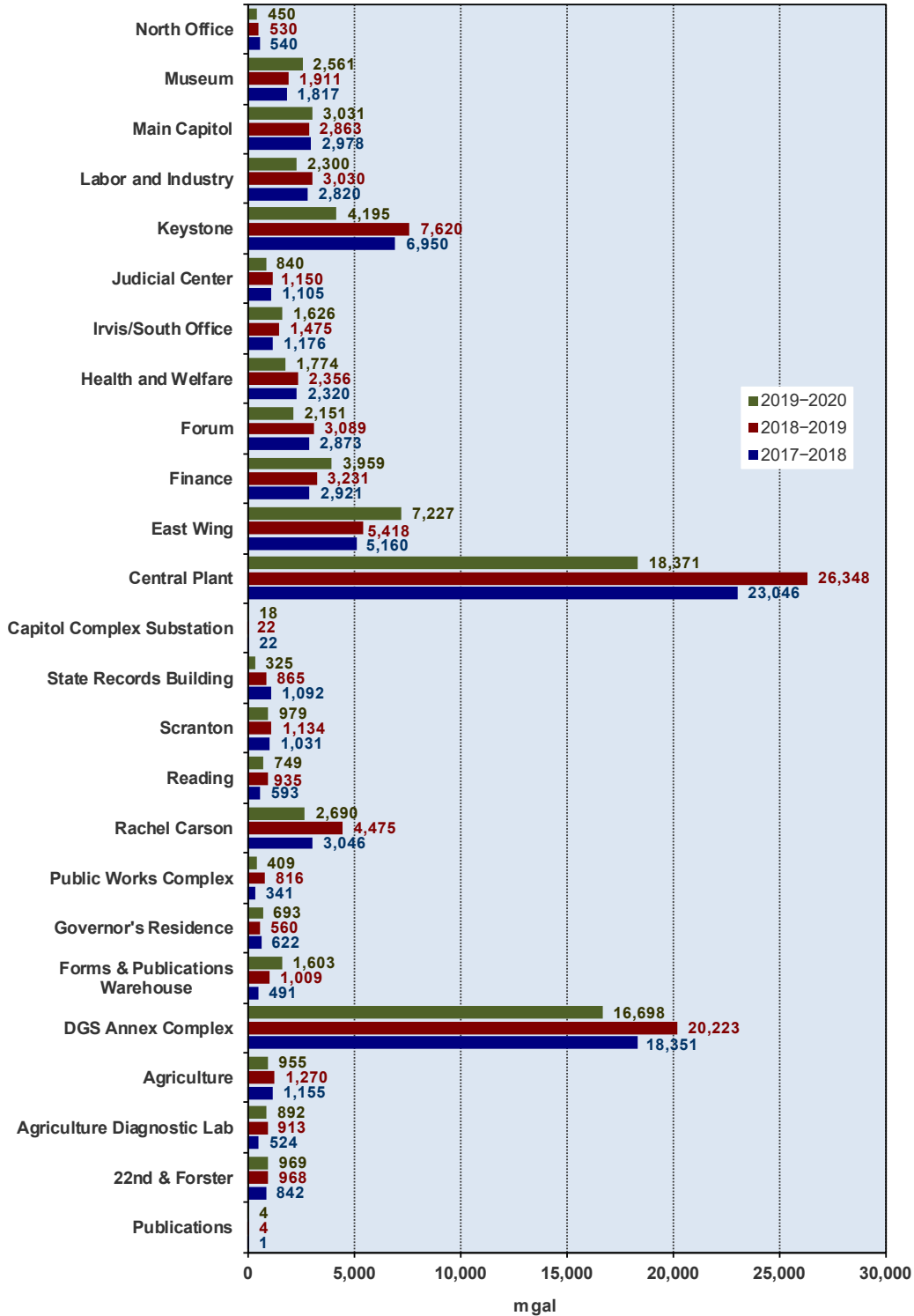
**Table 9. Water/Sewer Consumption and Costs 2019–2020**

Facility	Account	Utility	mgal	Cost	\$/mgal
Publications	0900302100005	Capital Region Water	4	\$3,363	\$840.67
22nd & Forster	6204113200002	Capital Region Water	969	\$30,767	\$31.74
Agriculture	6202602200004	Capital Region Water	955	\$30,522	\$31.96
Agriculture Diagnostic Lab	1590031700009	Capital Region Water	892	\$36,929	\$41.41
DGS Annex Complex	1570002200006	Capital Region Water	5,945	\$188,991	\$31.79
DGS Annex Complex	1570202200004	Capital Region Water	10,753	\$189,733	\$17.64
Forms & Publications Warehouse	1601105300003	Capital Region Water	1,603	\$17,927	\$11.18
Governor's Residence	1100103400005	Capital Region Water	693	\$21,861	\$31.55
Public Works Complex	0708600200000	Capital Region Water	----	\$21,258	----
Public Works Complex	0709000300002	Capital Region Water	409	\$11,591	\$28.33
Rachel Carson	0900105000006	Capital Region Water	2,690	\$66,142	\$24.59
Reading	1250301	Reading Area Water Authority	749	\$20,039	\$26.75
Scranton	2405407533	Pennsylvania-American Water Company	979	\$22,020	\$22.50
State Records Building	1590017400003	Capital Region Water	320	\$5,216	\$16.31
State Records Building	6202603300001	Capital Region Water	5	\$53,460	\$10,692.05
<b>Capitol Complex Buildings</b>					
Capitol Complex Substation	1570050900004	Capital Region Water	18	\$1,892	\$105.10
Central Plant	1570002900002	Capital Region Water	18,371	\$354,622	\$19.30
East Wing	1570003800003	Capital Region Water	2,277	\$77,257	\$33.93
East Wing	1570003900001	Capital Region Water	4,950	\$77,189	\$15.59
Finance	0803600200008	Capital Region Water	30	\$53,947	\$1,798.23
Finance	0803610200006	Capital Region Water	3,929	\$69,124	\$17.59
Forum	0803600300006	Capital Region Water	6	\$54,657	\$8,721.75
Forum	0803610300004	Capital Region Water	2,145	\$37,373	\$17.42
Health and Welfare	1570002600008	Capital Region Water	1,159	\$42,962	\$37.07
Health and Welfare	1570002700006	Capital Region Water	615	\$31,998	\$52.03
Irvs/South Office	0404200700008	Capital Region Water	1,626	\$53,998	\$33.20
Judicial Center	1600060100000	Capital Region Water	840	\$35,981	\$42.83
Keystone	1570003000009	Capital Region Water	----	\$37,800	----
Keystone	1570003100007	Capital Region Water	----	\$21,258	----
Keystone	1570028800004	Capital Region Water	4,195	\$113,284	\$27.00
Labor and Industry	0710202500001	Capital Region Water	1,215	\$44,724	\$36.81
Labor and Industry	1570002400002	Capital Region Water	1,085	\$40,238	\$37.09
Main Capitol	0404200200008	Capital Region Water	1,016	\$19,994	\$19.68
Main Capitol	0803600100000	Capital Region Water	----	\$21,258	----
Main Capitol	1570002300004	Capital Region Water	78	\$49,765	\$638.01
Main Capitol	1570002800004	Capital Region Water	5	\$53,498	\$10,699.70
Main Capitol	1570004000008	Capital Region Water	29	\$53,930	\$1,846.03
Main Capitol	1570004100006	Capital Region Water	1,664	\$35,281	\$21.20
Main Capitol	1570102800000	Capital Region Water	239	\$4,187	\$17.52
Museum	0404201100009	Capital Region Water	2,435	\$50,290	\$20.65
Museum	1570102300000	Capital Region Water	126	\$3,561	\$28.29
North Office	0404200600000	Capital Region Water	450	\$29,138	\$64.80
<b>Complex Buildings Total</b>			<b>48,503</b>	<b>\$1,469,206</b>	<b>\$30.29</b>
<b>Total</b>			<b>75,469</b>	<b>\$2,189,025</b>	
<b>Weighted Average</b>					<b>\$29.01</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 changes occurred at the Keystone Building, down 44.9%; Rachel Carson Office Building, down 39.9%; Forum Building, down 30.4%; Central Plant, down 30.3%, and East Wing, up 33.4%.

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



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

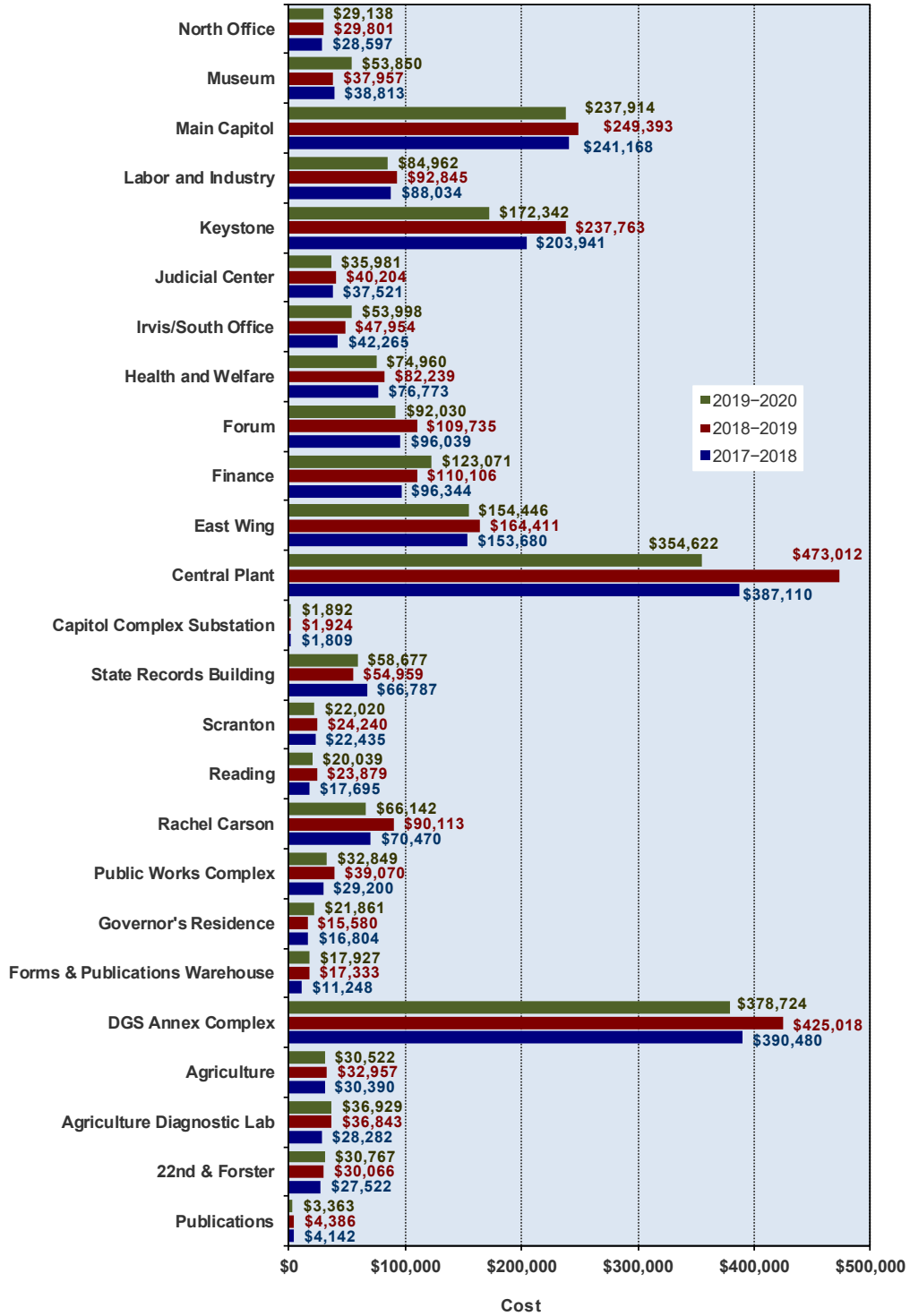


Table 10 shows a four-year history of water/sewer use and cost for each facility. Fiscal year 2019–2020 usage and cost reflect 32.2% and 8.6% decreases, respectively, from fiscal year 2016–2017. In general, a relatively stable usage trend can be observed for most facilities across the four-year period. Notable deviations are the East Wing, where usage decreased 54.5% and the Main Capitol, where usage has decreased 84.1% from fiscal year 2016–2017. The average unit cost of water/sewer increased from \$21.49 to \$29.01 per mgal, resulting in a 35% increase over the four-year period.

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

Facility	2016–2017		2017–2018		2018–2019		2019–2020	
	Cost	mgal	Cost	mgal	Cost	mgal	Cost	mgal
Publications	\$3,874	7	\$4,142	1	\$4,386	4	\$3,363	4
22nd & Forster	\$25,262	809	\$27,522	842	\$30,066	968	\$30,767	969
Agriculture Diagnostic Lab	\$24,386	421	\$28,282	524	\$36,843	913	\$36,929	892
Agriculture	\$28,444	1,240	\$30,390	1,155	\$32,957	1,270	\$30,522	955
DGS Annex Complex	\$354,610	22,857	\$390,480	18,351	\$425,018	20,223	\$378,724	16,698
Forms & Publications Warehouse	\$8,532	335	\$11,248	491	\$17,333	1,009	\$17,927	1,603
Governor's Residence	\$19,485	1,250	\$16,804	622	\$15,580	560	\$21,861	693
Public Works Complex	\$26,732	324	\$29,200	341	\$39,070	816	\$32,849	409
Rachel Carson	\$67,904	3,570	\$70,470	3,046	\$90,113	4,475	\$66,142	2,690
Reading	\$17,763	793	\$17,695	593	\$23,879	935	\$20,039	749
Scranton	\$25,204	1,266	\$22,435	1,031	\$24,240	1,134	\$22,020	979
State Records Building	\$58,752	743	\$66,787	1,092	\$54,959	865	\$58,677	325
<b>Capitol Complex Buildings</b>								
Capitol Complex Substation	\$1,641	20	\$1,809	22	\$1,924	22	\$1,892	18
Central Plant	\$336,882	19,833	\$387,110	23,046	\$473,012	26,348	\$354,622	18,371
East Wing	\$280,984	15,875	\$153,680	5,160	\$164,411	5,418	\$154,446	7,227
Finance	\$98,462	3,557	\$96,344	2,921	\$110,106	3,231	\$123,071	3,959
Forum	\$100,802	3,793	\$96,039	2,873	\$109,735	3,089	\$92,030	2,151
Health and Welfare	\$70,587	2,335	\$76,773	2,320	\$82,239	2,356	\$74,960	1,774
Irvis/South Office	\$39,541	1,315	\$42,265	1,176	\$47,954	1,475	\$53,998	1,626
Judicial Center	\$33,517	1,045	\$37,521	1,105	\$40,204	1,150	\$35,981	840
Keystone	\$170,763	5,830	\$203,941	6,950	\$237,763	7,620	\$172,342	4,195
Labor and Industry	\$74,118	2,585	\$88,034	2,820	\$92,845	3,030	\$84,962	2,300
Main Capitol	\$459,665	19,100	\$241,168	2,978	\$249,393	2,863	\$237,914	3,031
Museum	\$39,264	1,885	\$38,813	1,817	\$37,957	1,911	\$53,850	2,561
North Office	\$27,059	605	\$28,597	540	\$29,801	530	\$29,138	450
<b>Complex Buildings Total</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>\$1,469,206</b>	<b>48,503</b>
<b>Total</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>\$2,189,025</b>	<b>75,469</b>
<b>Percent Change</b>			<b>-7.8%</b>	<b>-26.6%</b>	<b>12.0%</b>	<b>12.7%</b>	<b>-11.4%</b>	<b>-18.2%</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 energy sector economic, legislative, and regulatory developments. PSFEI uses this information and knowledge to 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 2019–2020, 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

Due to the long-term contracts secured in fiscal year 2018–2019, PSFEI and the DGS Bureau of Procurement refocused Commonwealth electricity procurement efforts during fiscal year 2019–2020. Emphasis during fiscal year 2019–2020 was placed on the development of an Invitation to Qualify (ITQ) and associated Request for Quote (RFQ) for retail solar electricity supply with the intent to award a long-term contract to a qualified energy supplier to provide solar energy sourced in Pennsylvania sufficient to fulfill approximately 50% of the Commonwealth’s electricity consumption. Major milestones during the fiscal year included the release of Request for Information (RFI) 19-01 on November 8, 2019, and incorporation of supplier feedback into the final version of *ITQ 4400022400 – Retail Solar Electricity Supply Services*, released on January 15, 2020. Paralleling the qualification efforts, PSFEI and the DGS Bureau of Procurement collaboratively developed and assembled the RFQ documents and appendices, which were officially released to the qualified suppliers on June 5, 2020. Quotes from the qualified suppliers were due in early August 2020. Details regarding the solar RFQ will be provided in the *2020–2021 Energy & Utility Usage Report*.

Under the direction of the DGS Bureau of Procurement, PSFEI administered five procurement events during fiscal year 2019–2020 and awarded 356 COSTARS electricity accounts using ERMA, PSFEI’s web-based procurement platform. The net result was over \$638,000 in projected annual avoided costs versus utility-issued price to compare (where available) and over \$259,000 in cost reduction from previous contracts.

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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.

## NATURAL GAS

### NATURAL GAS PROCUREMENT

Four 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. Twenty-eight contracts were awarded resulting in a projected annual avoided cost of \$918,005 when compared to utility retail tariff rates. Anticipated price reductions in comparison to previous contracts are estimated to be over \$241,000 annually. Projected avoided costs by agency are shown in Table 11.

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 11. Avoided Costs for Natural Gas Procurement 2019–2020**

Agency	Number of Accounts	Cost Reduction (Annual)	Cost Avoidance (Annual)	Cost Avoidance (Total) <sup>1</sup>
Department of Conservation and Natural Resources	1	\$1,158	\$4,278	\$8,555
Department of Corrections	4	\$122,672	\$369,532	\$427,848
Department of General Services	1	\$30,617	\$137,353	\$217,475
Department of Human Services	1	\$29,886	\$70,121	\$169,460
Department of Military and Veterans Affairs	1	\$21,923	\$46,862	\$94,015
PennState Health	3	\$34,950	\$253,245	\$759,736
Pennsylvania Historical Museum Commission	1	\$184	\$515	\$1,374
Pennsylvania State Police	16	— <sup>2</sup>	\$36,099	\$108,296
<b>Total</b>	<b>28</b>	<b>\$241,390</b>	<b>\$918,005</b>	<b>\$1,786,759</b>

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

<sup>2</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 2021, the Commonwealth continued to offset approximately 40% of its electricity load via the purchase of Green-e certified Renewable Energy Certificates (RECs).

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.

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, 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 2019, 2020, and 2021 is shown in Table 12.

**Table 12. REC Apportionment by Agency**

Agency	CY 2019 Total		CY 2020 Total		CY 2021 Total	
	MWh Credits	Annual Cost	MWh Credits	Annual Cost	MWh Credits	Annual Cost
Department of Agriculture	3,194	\$2,591	3,194	\$2,591	3,194	\$2,364
Department of Conservation and Natural Resources	8,750	\$7,098	8,750	\$7,098	8,750	\$6,475
Department of Corrections	99,297	\$80,555	99,297	\$80,555	99,297	\$73,480
Department of Education	158	\$128	158	\$128	158	\$117
Department of Environmental Protection	2,749	\$2,230	2,749	\$2,230	2,749	\$2,034
Department of General Services	49,514	\$40,169	49,514	\$40,169	49,514	\$36,641
Department of Health	913	\$741	913	\$741	913	\$676
Department of Human Services	27,716	\$22,485	27,716	\$22,485	27,716	\$20,510
Department of Labor and Industry	2,003	\$1,625	2,003	\$1,625	2,003	\$1,482
Department of Military and Veterans Affairs	38,702	\$31,397	38,702	\$31,397	38,702	\$28,639
Department of Revenue	1,768	\$1,434	1,768	\$1,434	1,768	\$1,308
Department of Transportation	36,047	\$29,243	36,047	\$29,243	36,047	\$26,674
Pennsylvania Fish and Boat Commission	3,529	\$2,863	3,529	\$2,863	3,529	\$2,612
Pennsylvania Game Commission	1,275	\$1,034	1,275	\$1,034	1,275	\$944
Pennsylvania Historical and Museum Commission	3,019	\$2,449	3,019	\$2,449	3,019	\$2,234
Pennsylvania Liquor Control Board	15,971	\$12,957	15,971	\$12,957	15,971	\$11,819
Pennsylvania State Police	13,352	\$10,832	13,352	\$10,832	13,352	\$9,880
Pennsylvania Emergency Management Agency	1,021	\$828	1,021	\$828	1,021	\$755
<b>Total</b>	<b>308,978</b>	<b>\$250,658</b>	<b>308,978</b>	<b>\$228,644</b>	<b>308,978</b>	<b>\$228,644</b>

The Commonwealth’s annual REC purchase places Pennsylvania in the number two position for state governments (behind California) on the U.S. Environmental Protection Agency’s (EPA) Green Power Partnership National Top 100 list. At the time of report publication, the Commonwealth ranked 44th among the Top 100.

According to the EPA’s Greenhouse Gas Equivalencies Calculator, the Commonwealth’s purchase led to an annual offset of approximately 218,460 metric tons of carbon dioxide or the electricity use of roughly 36,987 average American homes for one year. The annual carbon sequestered by this purchase is approximately equivalent to 285,298 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 2 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.

The Year 2 report of energy savings includes only those meters where a fair comparison of baseline fiscal year 2018–2019 usage with fiscal year 2019–2020 usage is possible. A “precinct reporting” methodology was chosen, defined as only those metered accounts that have two bills or less missing in the 24-month evaluation period. Year 2 details by agency are provided Table 13.

The result of the analysis for Year 2 indicates a combined 6.2% decrease in energy consumption from Commonwealth agencies. A total of 6,959, or 84%, of the 8,283 known meters passed the validation criteria previously mentioned to produce these results. From those 6,959 meters, normalized energy consumption for the 2018–2019 baseline fiscal year was calculated to be 4,890,370 MMBtu. Actual energy consumption for fiscal year 2019–2020 was down 304,889 MMBtu, or 6.2%, exceeding 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 13. Year 2 Report of Energy Savings**

Known Electric Meters	Known N. Gas & Steam Meters	State Reporting Agency	Normalized Use (MMBtu)	FY 2018 Baseline MMBtus	FY 2019 Current MMBtus	Percent Change	Metric Tons CO2 Reduction	Number of Known Meters	% of Meters Reported
203	70	Dept of Corrections		1,939,596	1,783,745	-8.0%	12,971	273	87%
64	14	Dept of Human Services		775,220	716,738	-7.5%	4,715	78	81%
46	32	Dept of General Services		672,511	602,995	-10.3%	6,534	78	91%
169	621	Dept of Military and Veterans Affairs		634,146	704,713	11.1%	3,513	790	93%
3,245	137	Dept of Transportation		366,759	334,103	-8.9%	2,762	3,382	82%
1,047	77	PA State Police		134,491	132,848	-1.2%	113	1,124	87%
1,880	45	Dept of Conservation and Natural Resources		103,807	89,691	-13.6%	1,418	1,925	82%
7	4	Dept of Labor and Industry		63,864	47,772	-25.2%	858	11	91%
7	4	Dept of Agriculture		48,345	32,739	-32.3%	1,033	11	73%
77	16	PA Fish and Boat Commission		44,525	41,886	-5.9%	235	93	85%
6	6	PA Emergency Management Agency		26,131	20,109	-23.0%	592	12	50%
113	8	Dept of Environmental Protection		24,017	22,887	-4.7%	95	121	78%
134	13	PA Historical and Museum Commission		23,515	21,601	-8.1%	170	147	92%
217	11	PA Game Commission		12,911	12,681	-1.8%	52	228	79%
5	2	Dept of Revenue		10,845	11,170	3.0%	8	7	29%
2	1	Dept of Health		9,688	9,803	1.2%	(3)	3	100%
<b>7,222</b>	<b>1,061</b>			<b>4,890,370</b>	<b>4,585,481</b>	<b>-6.2%</b>	<b>35,067</b>	<b>8,283</b>	<b>84%</b>

## ENERGY SERVICES

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### GENERAL

Since 1998, PSFEI has helped Commonwealth facilities avoid over \$248 million in energy expenditures via competitive bidding in the electricity and natural gas commodity markets. During fiscal year 2019–2020, avoided contract costs totaled over \$1.5 million.

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### ENERGY RISK MANAGEMENT APPLICATION

PSFEI continued development efforts to improve 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 85% of the entire electric load for these accounts was provided by the Borough in fiscal year 2019–2020. The remaining power was purchased from the market via competitively procured blocks or the day-ahead energy market.

Table 14 includes the total electric usage and cost in fiscal year 2019–2020 for the Commonwealth accounts assigned to this contract.

**Table 14. Purchased LCSWMA Electricity Summary 2019–2020**

Month	Usage (kWh)	Cost (excluding GRT <sup>1</sup> )	Unit Cost (\$/kWh) (excluding GRT)	Cost (including GRT)	Unit Cost (\$/kWh) (including GRT)
July 2019	12,962,208	\$746,455	\$0.05759	\$792,798	\$0.06116
August 2019	10,942,349	\$734,298	\$0.06711	\$779,839	\$0.07127
September 2019	11,073,440	\$631,629	\$0.05704	\$670,333	\$0.06054
October 2019	9,583,693	\$604,465	\$0.06307	\$641,781	\$0.06697
November 2019	9,468,153	\$670,108	\$0.07077	\$710,754	\$0.07507
December 2019	9,717,433	\$687,167	\$0.07071	\$729,793	\$0.07510
January 2020	8,510,589	\$623,791	\$0.07330	\$667,868	\$0.07847
February 2020	8,876,911	\$570,237	\$0.06424	\$605,465	\$0.06821
March 2020	8,045,804	\$598,908	\$0.07444	\$635,928	\$0.07904
April 2020	7,654,422	\$573,224	\$0.07489	\$608,732	\$0.07953
May 2020	8,932,929	\$614,789	\$0.06882	\$652,901	\$0.07309
June 2020	9,528,151	\$575,310	\$0.06038	\$610,817	\$0.06411
<b>Total/Average</b>	<b>115,296,082</b>	<b>\$7,630,380</b>	<b>\$0.06618</b>	<b>\$8,107,009</b>	<b>\$0.07031</b>

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

The unit cost for electricity, excluding utility distribution charges, averaged 6.618 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 2019–2020, 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 15 lists the reports issued during the fiscal year that documented this effort.

**Table 15. Engineering Services Reports 2019–2020**

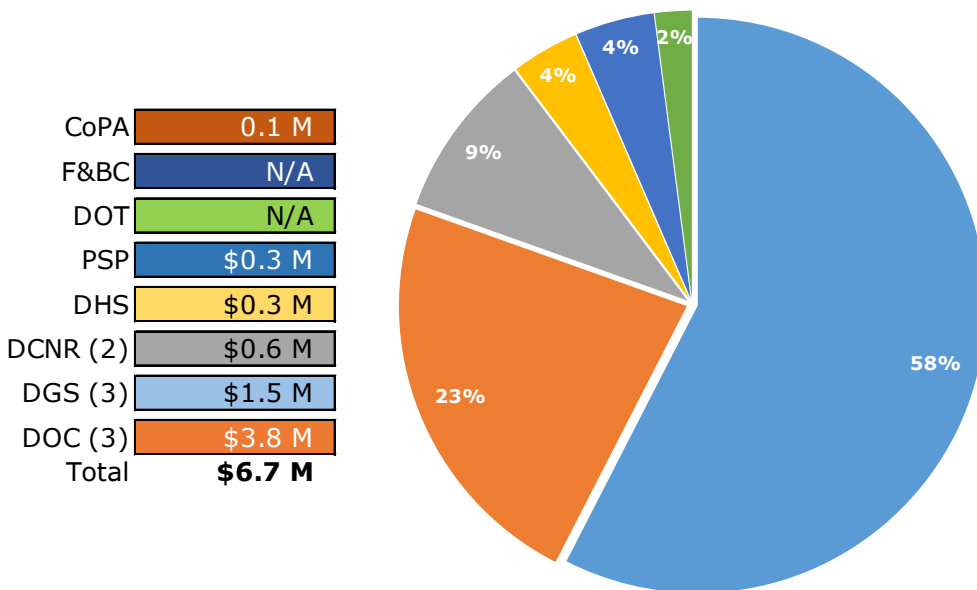
Report No.	Report Date	Location	Comments or Noted Deficiencies
HR 19/20–1	07/10/19	PA State Archives Building	Corridor Condensation Issues
MR 19/20–1	07/29/19	18TH AND Herr	Cast Iron Sectional Boiler Carryover
TR 19/20–1	09/05/19	Health and Welfare Building	Electrical Maintenance and Testing
TR 19/20–4	10/21/19	Health and Welfare Building	Sub 1B Bussduct Riser 1 Circuit Breaker Testing
TR 19/20–7	02/25/20	Capital Complex	Central Plant Electrical Maintenance and Testing
TR 19/20–8	02/25/20	Capital Complex	Fan Room Electrical Maintenance and Testing
N/A	04/02/20	All DGS Buildings	Guidance for Building Operations During COVID-19 Pandemic
ER-F-1920–8	06/03/20	Forum Building	Circuit No. 5 Electrical Fault

Note: ER-F = Electric Field Report, HR = HVAC Report, MR = Mechanical Report, TR = Testing Report

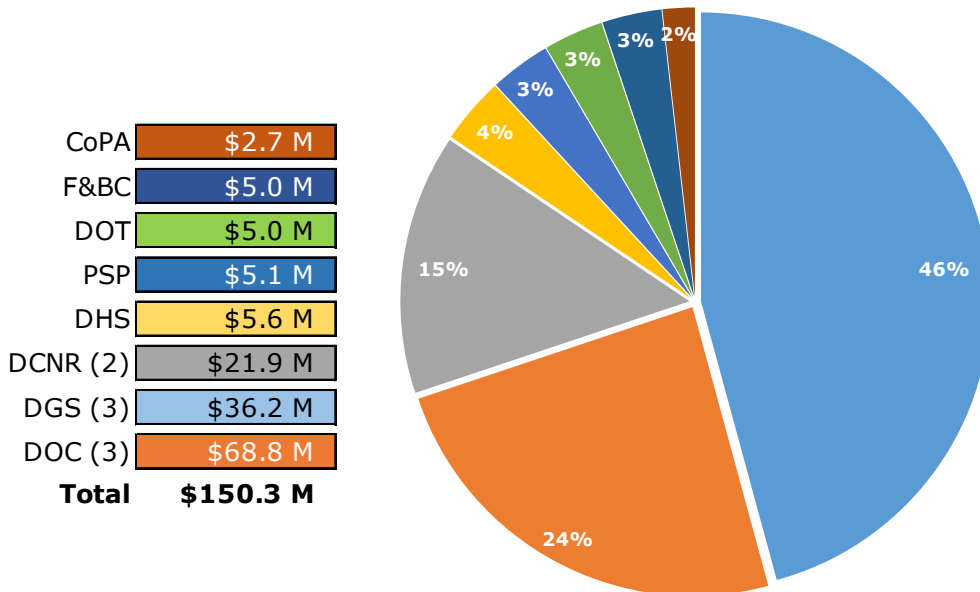
### GUARANTEED ENERGY SAVINGS ACT PROGRAM

Over the past several years, the Commonwealth’s Guaranteed Energy Savings Act (GESAs) program has grown in the quantity of projects and the quality of services. Fourteen projects totaling over \$150 million have resulted in nearly \$6.7 million in annual energy savings. Charts 14 and 15 show breakouts of GESAs project annual savings and investments by Commonwealth agency.

**Chart 14. GESA Project Annual Savings**



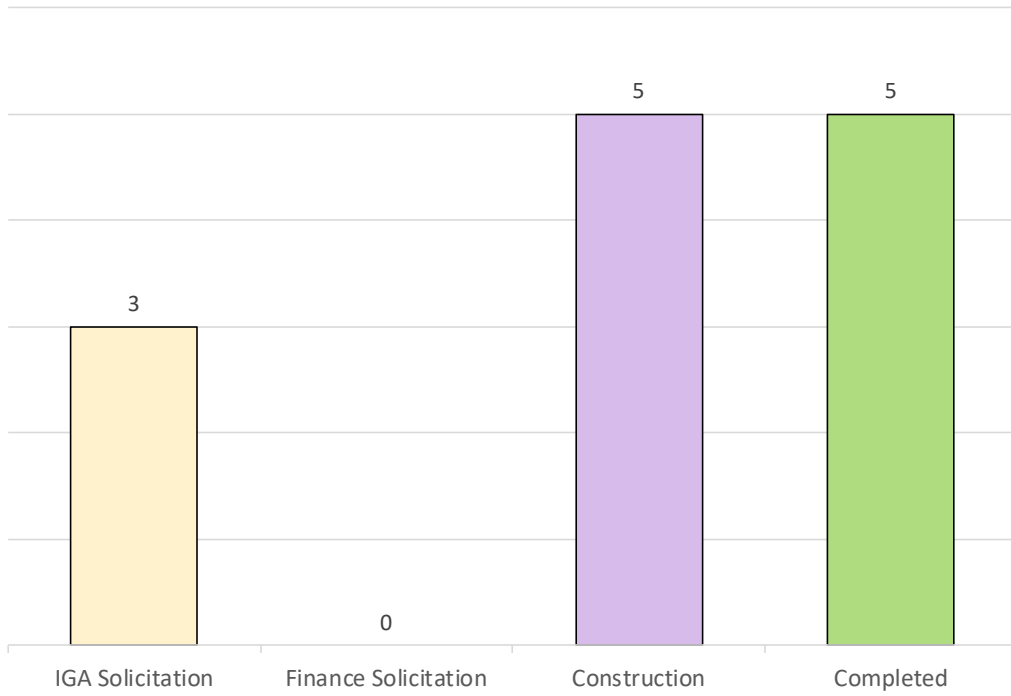
**Chart 15. GESA Project Investment**



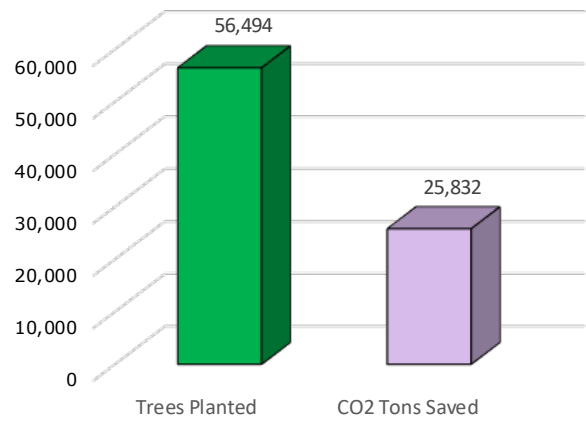
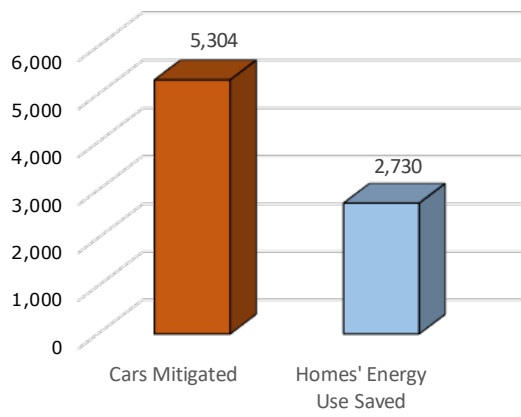
As shown in Chart 16, the fourteen GESA projects are in various stages of development. In addition to creating Pennsylvania jobs supporting the economy, there are resulting environmental benefits from GESA project implementation. Using the total estimated project savings, Chart 17 shows examples of the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

*Note: Charts 14 through 17 and the information in Table 16 were provided by DGS.*

**Chart 16. GESA Project Development Status**



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



**Table 16. GESA Projects—Delivery and Savings Summary**

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	Measurement & Verification	\$3.0	\$329,677	383	4,635	193	1,789
CoPA	Thaddeus Stevens College	Lighting, controls, steam	Measurement & Verification	\$2.7	\$137,305	190	2,301	96	979
DCNR	West Region, Parks & Forests	Lighting and HVAC systems, building envelope	Measurement & Verification	\$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, chillers	Construction	\$18.2	\$1,200,000	1,390	16,826	701	6,368
DOC	SCI Muncy	Lighting, solar, steam traps, windows, AC, EMSs	Construction	\$18.3	\$469,904	424	3,242	226	2,162
DOC	SCI Houtzdale	Lighting, water, HVAC	Construction	\$30.5	\$1,170,814	970	7,427	518	4,492
DCNR	Central Region, Parks & Forests	Lighting, solar, sludge, BMS, electric to gas, geothermal	Construction	\$16.4	\$243,361	321	2,496	181	1,664
DOT	District 8 Facility	Lighting, weatherization, water conservation, BAS upgrades, fuel switches on HWH, steam traps	IGA	\$5.0	TBD	TBD	TBD	TBD	TBD
DGS	DGS Capitol Complex 2	Lighting, weatherization, BAS upgrades, HVAC upgrades/fuel switches, geothermal	IGA	\$15.0	TBD	TBD	TBD	TBD	TBD
FBC	Hatchery Facilities State-Wide	Lighting, weatherization, HVAC upgrades/fuel switches, water filtration and recovery	IGA	\$5.0	TBD	TBD	TBD	TBD	TBD
DOC	SCI Fayette	TBD	RFQ	TBD	TBD	TBD	TBD	TBD	TBD
<b>Total</b>				<b>\$150.3</b>	<b>6,674,755</b>	<b>5,304</b>	<b>56,494</b>	<b>2,730</b>	<b>25,832</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 and reviewing design submissions and product submittals 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 eight active GESA projects:

- Capitol Complex 2
- Department of Conservation and Natural Resources (DCNR) Central Region
- Pennsylvania Department of Transportation (PennDOT)—District 8
- Pennsylvania Fish and Boat Commission (PFBC)—hatchery facilities statewide
- State Correctional Institute (SCI) Fayette
- SCI Houtzdale
- SCI Muncy
- Selinsgrove Center

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.

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## HVAC STEPS TAKEN FOR BUILDING OCCUPANT PROTECTION DURING COVID-19

DGS implemented important procedures within the buildings that comprise the Capitol Complex to increase building occupant protection during the COVID-19 pandemic.

*Note: The following information was provided by DGS.*

#### *Ensured Availability of Supplies and Services*

- Established relationships with vendors that supplied products such as coil cleaners, air filters, and other HVAC maintenance materials.
- Ensured there were multiple vendors of each of these items to account for supply chain disruptions.
- Reviewed service contracts to ensure suppliers adhered to safety protocols and identified any impact the COVID-19 pandemic had on the service level provided by the supplier.

#### *Increased Ventilation and Maintained Exhaust Fan Operations*

- Increased ventilation duration and airflow percentage to effectively aid in the dilution of organisms within a given space.
- Increased ventilation in many cases to replace the air within a space with outdoor air quicker and reduce the amount of recirculation of space air.
- Focused on not sacrificing indoor air quality specifically related to temperature and humidity. Sacrificing indoor temperature and humidity can result in many other health risks.

#### *Improved Central Air Filtration to Minimum Efficiency Reporting Value (MERV) 13 or Highest Compatible Filter*

- Considered the use of high-efficiency particulate air (HEPA) filters; however, these filters are intended for use in a health care atmosphere and require equipment specifically designed to handle the added pressure drop and filter frame thickness associated with the increased MERV filter rating.
- Used MERV 13 bag filters in the primary air handlers across the entire Capital Complex campus and MERV 13 pleated filters in many other units.

#### *Reduced Bypass Around Filter Racks (this effort is ongoing)*

- Purchased bag filters for equipment with gaskets located on the filter frame to eliminate or decrease the amount of air that could bypass the filter media.
- Installed gasketed material on the filter rack or frame for units that use pleated filters; gasketing will be inspected each time the filters are replaced.

#### *Increased Run Hours of Equipment to 24/5*

- Extended the operation time of equipment from 10 hours to 24 hours per day, 5 days per week to aid in diluting contagions in the space by extending increased filtered ventilation air after individuals leave at the end of the day and before they arrive the following day.

#### *Explored Ultraviolet Germicidal Irradiation (UVGI) Technology*

- Committed to exploring UVGI technology for use in equipment. UVGI systems have proven effective to sanitize stationary surfaces such as the coils within an air handler. Further consideration for applications to address moving air are being studied for effectiveness, cost, and installation feasibility for new and existing equipment or distribution systems. This emerging technology application is being carefully watched.

## 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

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#### PROCUREMENT

Assembled and prepared a solicitation for thirty-one Commonwealth natural gas accounts. Bids were evaluated on August 27, 2019, and ten of the twelve bid packages were awarded. Twenty-four accounts were awarded contracts, resulting in anticipated total contract savings versus prior contract rates of over \$249,000. Avoided costs in comparison to current utility rates resulted in over \$603,000 during the awarded term.

Attended and presented electricity procurement strategies at the COSTARS Expo on September 4 and 5, 2019.

Assembled and prepared COSTARS solicitation number RFQ DGS 19-02, which included 203 accounts. The solicitation was released and awarded in October 2019.

Addressed a supplier inquiry regarding the status of the Allentown State Hospital.

Responded to a request to evaluate costs for CNG versus oil at SCI Frackville.

Assisted DGS with preparation of a submission to the National Association of State Chief Administrators in the area of Innovations in State Government regarding the Commonwealth's procurement process and strategy.

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.

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 identifying over \$500,000 in refundable charges to COSTARS members.

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#### FACILITIES

Provided clarification of the buildings served by the existing Main Capital steam condensate meter on July 9, 2019.

Prepared and submitted a PA State Archives building report concerning corridor condensation issues on July 10, 2019.

Provided follow-up guidance and discussion regarding structural concerns noted at the PA State Archives building.

Gathered information on Penn State's maintenance shop organization, which was provided to DGS staff on July 19, 2019. Provided follow-up discussions to support the DGS education initiative.

Finalized and submitted PSFEI Report MR 19/20-1 regarding boiler plant water carryover issues for the Arsenal and TENT Buildings at 18th and Herr Streets on July 29, 2019.

Prepared and submitted the quarterly report for PSFEI services provided from April through June 2019 on August 6, 2019.

Reviewed and provided comments on the GESA Measurement and Verification (M&V) report for the Keystone Building and Judicial Center project; submitted comments on August 20, 2019.

Prepared for and supported DGS in performing electrical maintenance and testing of equipment located in the Health and Welfare Building from mid-August 2019 until the actual testing event that occurred on August 24, 2019. Submitted the final testing report, PSFEI Report TR 19/20-1, on September 5, 2019.

Collected data and compiled a report indicating the amount of energy consumed by the exhaust fans serving the East Wing Garage and submitted a report via e-mail to DGS on September 15, 2019; conducted follow-up discussions with DGS on September 17, 2019.

Sent PLC management advance notices to DGS personnel on likely days where future capacity tags could be set.

Responded to a request from DGS regarding the fiscal year 2020-2021 utility budget by providing anticipated utility usage and costs for DGS facilities via email on September 27, 2019.

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

Hosted the DGS-PSFEI bi-monthly meeting in State College on July 11, 2019.

Attended a working session with EnergyCAP and Department of Military and Veterans Affairs (DMVA) personnel on July 17, 2019, to assist with meter and account setup.

Scheduled a meeting for October 2019 with the GreenGov Council in Harrisburg on July 17, 2019.

Attended a GreenGov Council meeting at the North Office Building on July 23, 2019.

Attended a PA Department of Treasury (Treasury) and PA Sustainable Energy Financing (PennSEF) meeting on July 23, 2019, regarding a solar proposal for the Treasury Building. Provided follow-up utility information for the FREE Group on July 24 and August 27, 2019.

Coordinated a meeting on July 30, 2019, between Pennsylvania's State System of Higher Education (PASSHE) and DGS personnel to discuss solar energy procurement strategies.

Attended a meeting on August 29, 2019, with DGS and Constellation Energy personnel regarding a solar solicitation development.

Coordinated a meeting on September 23, 2019, with DGS and PRX Energy regarding a solar solicitation development.



Supported the DGS GESA project at SCI Houtzdale by attending bi-weekly project meetings via conference calls and providing advice during the feasibility assessment part of the IGA. Support focused on mechanical, HVAC, electrical and lighting, and water and wastewater systems.

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## ENERGYCAP SUPPORT

Provided the following extensive support to the Commonwealth for EnergyCAP implementation and training:

### *July*

- Attended three Go-to-Meetings and participated in five conference calls to discuss project status and work through meter issues.
- Conducted EnergyCAP training for the Pennsylvania Farm Show Complex and Expo Center (Farm Show), Pennsylvania State Police (PSP) Radio Project Manager, and DMVA personnel.
- Visited the PSP to complete the work with the radio towers.
- Visited Fort Indiantown Gap several times to assist DVMA personnel with data preparation for chargebacks and splits setup.
- Continued to work on kickouts and updating information in EnergyCAP; meter and account creation for new accounts is ongoing.

### *August*

- Met with the GreenGov Council to provide an overview training of EnergyCAP.
- Traveled to DMVA on August 12 and 27, 2019, to work with the Energy Manager to create the Army Energy and Water Reporting System (AEWRS) report for the federal government.
- Visited Torrance State Hospital to train the facility manager and financial group on EnergyCAP.
- Attended EnergyCAP training at the Keystone Building in Harrisburg.
- Continued to work on kickouts, run missing bill reports, and void duplicate bills.

### *September*

- Attended three DMVA meetings and continued to work on meter splits and chargebacks.
- Conducted training for personnel at the Department of Human Services' (DHS) Loysville Youth Development Center and PennDOT's Hollidaysburg facility.
- Assisted the DOC Central Office personnel (Mechanicsburg) with data clean up, entry of new accounts, and reports review.
- Updated accounts, meters, and buildings, and resolved kickouts.

Reviewed the GreenGov Council checklist and provided comments on August 6 and September 13, 2019

Attended EnergyCAP super-user training hosted by EnergyCAP personnel on August 26, 2019.

Continued to address various day-to-day aspects of the EnergyCAP implementation process by resolving Bill CAPture kickouts, meter placement, account placement, and system configuration.

Attended an EnergyCAP training session hosted by EnergyCAP personnel on September 25, 2019.

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## OTHER

Developed and submitted WebiFM deficiency reports on July 9, 2019, for fourteen PennDOT facilities being included in the GESA pilot initiative.

Researched PFBC utility accounts in ERMA as requested and provided results on July 9, 2019.

Prepared and submitted a marketing communications flyer on July 22, 2019, for the SCI Dallas GESA project showing actual Year 2 savings.

Attended a building walk-through at the PFBC headquarters building in Harrisburg on September 19, 2019, specifically to identify GESA project opportunities.

## SECOND QUARTER

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### PROCUREMENT

Assembled and prepared COSTARS solicitation number RFQ DGS 19-02, which included 230 accounts. Bids were evaluated on October 22, 2019, and 118 accounts were awarded, resulting in anticipated total contract savings versus prior contract rates of approximately \$127,000. Avoided costs in comparison to current utility rates resulted in over \$111,000 during the awarded term.

Assembled and prepared a solicitation for three natural gas accounts. Bids were evaluated on October 30, 2019, and all accounts were awarded, resulting in anticipated total contract savings versus prior contract rates of over \$104,000. Avoided costs in comparison to current utility rates resulted in over \$750,000 during the awarded term.

Assembled and prepared COSTARS solicitation number RFQ DGS 19-04, which included 109 accounts. Bids were evaluated on November 18, 2019, and 79 accounts were awarded, resulting in anticipated total contract increase versus prior contract rates of approximately \$600. Avoided costs in comparison to current utility rates resulted in over \$13,000 during the awarded term.

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.

Supported DGS with an ongoing electricity contract adjustment requests from Direct Energy.

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

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 identifying over \$520,000 in refundable charges to COSTARS members.

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### FACILITIES

Prepared and submitted the *DGS Energy & Utility Usage Report 2018-2019* on December 19, 2019.

Prepared for and supported DGS in performing electrical maintenance and testing of equipment at Capitol Complex buildings:

- Submitted PSFEI Report TR 19/20–1 on September 5, 2019, to document results of the Health and Welfare Building electrical maintenance and testing conducted in the previous quarter.
- Prepared and submitted via email a testing scope of work for the Keystone Building on October 16, 2019.
- Performed acceptance testing on October 16, 2019, for a new circuit breaker installed in the Health and Welfare Building; the testing results were provided in PSFEI Report TR 19/20–4 issued October 21, 2019.
- Prepared and submitted via email a testing scope of work for the Central Plant on November 21, 2019.

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 the GreenGov Council and the Penn State Sustainability Institute at the Penn State University Park Campus on October 2, 2019, to help build a constructive business relationship.

Attended the DGS-PSFEI bi-monthly meeting in Harrisburg on October 2, 2019.

Met with the GreenGov team in Harrisburg on October 4, 2019 to develop a reporting format for the Year 1 results of the Governor's mandated 3% energy reduction.

Attended a meeting in Harrisburg on October 8, 2019, with DGS and Constellation Energy regarding renewable energy procurement.

Attended a meeting in Harrisburg on November 14, 2019, with DGS and Constellation Energy regarding RFI responses.

Attended and presented at a GreenGov-hosted agency meeting in Harrisburg on November 22, 2019.

Hosted and attended the DGS-PSFEI bi-monthly meeting in State College on December 4, 2019, which included an expanded discussion on DGS training needs. A follow-up meeting regarding training needs was scheduled for early 2020.

Hosted a procurement planning meeting in State College on December 11, 2019, to develop specific requirements surrounding long-term renewable energy procurement.

Participated in a conference call with DGS and Direct Energy on December 12, 2019, regarding transmission rate increases.

Attended two ESCO interviews for the PennDOT District 8 GESA project in Harrisburg on December 17, 2019.

Participated in a conference call with DGS and Direct Energy on December 17, 2019, regarding renewable energy procurement.

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## ENERGYCAP SUPPORT

Communicated with the Pennsylvania Turnpike Commission (PTC) and DGS on November 25, 2019, regarding the transferring of EnergyCAP contract responsibilities from PSFEI to DGS.

Provided the following extensive support to the Commonwealth for EnergyCAP implementation and ongoing monthly training:

### *October*

- Attended four Go-to-Meetings and conducted four EnergyCAP Trainings.
- Worked with DMVA and EnergyCAP to verify use and cost splits for federal and state funded meters.
- Visited Fort Indiantown Gap several times to assist DVMA personnel with data preparation for quarterly reporting.
- Continued to work on kickouts and updating information in EnergyCAP including ongoing meter and account creation for new accounts.

### *November*

- Worked with DGS to correct the Capitol Complex sub meter data to accurately reflect building electric usage.
- Prepared Setup Reports for the GreenGov Council to be used as a training document for their December meeting.
- Scheduled eight additional trainings for DCNR and PennDOT.
- Assisted in creating accounts and processing bills for the Pennsylvania Liquor Control Board (PLCB).
- Continued to research duplicate bills and correct billing period dates.

### *December*

- Developed the final Year 1 report indicating the normalized energy use reductions and corresponding environmental benefits for Year 1.
- Reviewed and verified electric meters for the GreenGov Council.
- Participated five conference calls regarding verification of meters.
- Ran missing bill reports for each agency.
- Updated accounts, meters, and buildings, and resolved kickouts.
- Processed electronic data interchange (EDI) kickouts.

Continued to address various day-to-day aspects of the EnergyCAP implementation process by resolving Bill CAPture kickouts, meter placement, account placement, and system configuration.

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## OTHER

Visited the PFBC Pleasant Mount site to conduct an initial GESA project scoping visit on October 15, 2019.

Visited the PFBC Oswayo, Tionesta, Corry, and Union City sites to conduct initial GESA project scoping visits on October 21 and 22, 2019.

Provided clarification via email on October 31, 2019, regarding PSFEI's concerns with the GESA project scope of work specifically related to the fire alarm system tie-in.

Worked with DGS legal counsel to develop a method to establish GESA project confidentiality using Penn State approved documents on November 6, 2019.

Visited the PFBC Huntsdale site to conduct an initial GESA project scoping visit on November 8, 2019.

Visited the PFBC Taylorsville site to conduct an initial GESA project scoping visit on November 13, 2019.

Prepared and submitted a list via email of PFBC GESA project opportunities to DGS on November 14, 2019.

Visited the Farm Show to conduct an initial GESA project scoping visit on December 11, 2019. Met with Farm Show executives and discussed opportunities for coordinating a GESA project with existing and ongoing capital projects.

Reviewed and developed comments for the cost submissions for four PennDOT District 8 GESA proposals and submitted the comments to DGS on December 13, 2019.

Continued to support the GESA project at SCI Houtzdale by attending bi-weekly project meetings via conference calls, providing advice on completing the feasibility assessment, completing the IGA review, and submitting comments on December 20, 2019.

## THIRD QUARTER

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### PROCUREMENT

Administered natural gas RFQ DGS 19-05 for the DGS Annex Complex on February 26, 2020. A 19-month contract was awarded, resulting in a projected annual savings of \$30,616 when compared to the previous contract.

Administered natural gas RFQ DGS 19-06 for SCIs Benner Township and Rockview on March 25, 2020. A 12-month replacement contract was awarded with a projected savings of \$34,143 over the previous contract.

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.

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### FACILITIES

Provided a corrected copy of the *DGS 2018–2019 Energy & Utility Usage Report* on January 7, 2020.

Provided NRG Harrisburg steam tariff information to the Energy and Resource Management Office on January 7, 2020

Prepared and submitted the Q2 DGS Quarterly Report on January 23, 2020.

Provided an alternate contact at the Penn State Office of Physical Plant on March 25, 2020, who could provide information on how Penn State creates advancement opportunities for their technician staff positions.

Developed an HVAC Technician Training Proposal and submitted the proposal to the DGS Director of Energy and Resource Management on April 1, 2020.

Prepared for and supported DGS in performing electrical maintenance and testing of equipment at Capitol Complex buildings:

- Conducted on-site electrical testing at the Capitol Complex Central Plant January 13–16 and February 8 and 9, 2020.
- Prepared and submitted a testing report for the Capitol Complex Central Plant on February 25, 2020.

Continued tracking LCSWMA's monthly electricity generation and the Commonwealth accounts' electricity consumption to help ensure contract compliance. No notable errors were observed in the billings received during this quarter. Analyses and potential resolutions were provided to address the contract volume shortfall for the 2019–2020 contract year.

Supported DGS with an ongoing electricity contract adjustment requests from Direct Energy.

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

Continued supporting the growth of the COSTARS electric procurement program 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 identifying over \$520,000 in refundable charges to COSTARS members.

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## MEETINGS

Met with DGS Bureau of Procurement personnel and WGL Energy Services representatives on January 9, 2020, regarding solar energy procurement.

Met with the DGS HVAC Chief at the PSFEI State College office on January 17, 2020, to review projects and discuss HVAC technician training needs.

Met with DGS Bureau of Procurement personnel and Dynege Energy Services representatives on January 21, 2020, regarding solar energy procurement.

Participated in a conference call with DGS Bureau of Procurement personnel and WGL Energy Services representatives on January 28, 2020, regarding solar energy procurement.

Participated in a conference call with Stand Energy on February 5, 2020, regarding overbilling and reconciliation of Commonwealth natural gas accounts.

Attended the DGS-PSFEI bi-monthly meeting in Harrisburg on February 6, 2020.

Participated in a conference call with DGS regarding solar energy procurement on February 18, 2020.

Participated in a conference call on February 25, 2020, with DGS and the LSWMA regarding DGS electricity consumption under the PPA.

Participated in a conference call with DGS personnel and GreenGov Council members on February 25, 2020, to discuss PSFEI's EnergyCAP work plan efforts and task prioritization. Work plan updates and edits were subsequently sent to conference call participants on February 26, 2020.

Attended a meeting on February 27, 2020, with DGS, GreenGov Council, DCNR, and Nature Conservancy representatives regarding best practices for solar energy generation siting.

Participated in a conference call on March 4, 2020, with WGL Energy Services regarding natural gas billing irregularities for the Rachel Carson Office Building.

Participated in a conference call with DGS and EnergyCAP on March 5, 2020, to discuss bridging efforts to develop custom energy reports.

Met with DGS on March 6, 2020, to discuss solar energy procurement.

Met with DGS on March 11, 2020, to introduce PSFEI's new Energy Management Consultant for natural gas and discuss current work efforts.

Participated in a conference call on March 12, 2020, with DGS to discuss Peak Load Management strategies.

Participated in a conference call on March 19, 2020, with DGS personnel and GreenGov Council representatives to discuss EnergyCAP efforts and identify agency liaison candidates prior to the Utility Management Focus Group meeting on April 9, 2020.

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## ENERGYCAP SUPPORT

Attended a Phase 2 planning meeting at the EnergyCAP State College office with DGS and EnergyCAP personnel on January 30, 2020.

Developed an EnergyCAP proposed work plan for 2020 and submitted the plan to DGS for review on February 5, 2020.

Participated in a conference call on March 20, 2020, with DGS regarding EnergyCAP data cleanup efforts.

Participated in a conference call on March 25, 2020, with DGS and EnergyCAP to determine requirements for custom report development.

Provided the following extensive support to the Commonwealth for EnergyCAP implementation and ongoing monthly training:

### *January*

- Participated in four conference calls and conducted four EnergyCAP training sessions.
- Assisted DMVA and EnergyCAP with verifying meter and funding splits between federal and state allocations.
- Continued to work on kickouts and updating information in EnergyCAP including ongoing meter and account creation for new accounts.

### *February*

- Prepared training material for DCNR training scheduled for March 2020.
- Attended multiple conference calls with EnergyCAP and DMVA to review bills splits.

- Assisted the GreenGov Council by providing reports and required energy data for monthly agency meeting.

#### *March*

- Uploaded 739 problem bills to EnergyCAP for processing.
- Conducted five EnergyCAP training sessions for DCNR personnel.
- Ran missing bill reports for each agency.
- Updated accounts, meters, and buildings, and resolved Bill CAPture kickouts.
- Processed EDI kickouts as needed.

Continued to address various day-to-day aspects of the EnergyCAP implementation process by resolving Bill CAPture kickouts, meter placement, account placement, and system configuration.

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#### OTHER

Attended Wernersville State Hospital GESA project site visits on February 27 and March 11, 2020. Conducted follow-up work with the facility to verify total heated building square feet and current steam distribution system layout and configuration.

Distributed Wernersville State Hospital utility information to the GESA scoping team on February 26, 2020.

Continued to support the GESA project at SCI Houtzdale by attending bi-weekly project meetings via conference calls.

Continued to support the GESA project at Selinsgrove Center by attending bi-weekly project meetings via conference calls, assisting in resolving boiler equipment questions, and helping to bring the project to final completion.

#### FOURTH QUARTER

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#### PROCUREMENT

Administered RFQ DGS 19-07 for COSTARS electricity on April 16, 2020. A total of sixty-eight accounts were awarded totaling \$36,470 in savings over previous contract rates and \$151,959 in savings over the projected utility price.

Administered RFQ DGS 19-08 for COSTARS electricity on May 14, 2020. A total of sixty-two accounts were awarded totaling \$234,456 in savings over previous contract rates and \$1,630,017 in savings over the projected utility price.

Participated in a webinar on June 2, 2020, hosted by COSTARS to present electricity procurement services.

Supported the Commonwealth's solar energy RFQ through the following:

- Developing and revising RFQ documents and appendices
- Responding to supplier inquiries



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 Commonwealth facilities.

Continued supporting the growth of the COSTARS electric procurement program 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 identifying over \$520,000 in refundable charges to COSTARS members.

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## FACILITIES

Developed a proposal for HVAC training for technicians and submitted the proposal to the DGS Director of Energy and Resource Management on April 1, 2020.

Reviewed published American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) HVAC system suggestions for COVID-19 in collaboration with Dr. William Bahnfleth (Penn State Architectural Engineering professor) and provided a summary of impacts and cautions for implementation for DGS facilities on April 2 and May 28, 2020.

Prepared and submitted the Q3 DGS Quarterly Report on April 17, 2020.

Reviewed and evaluated HVAC training survey results submitted by DGS on April 15, 2020.

Reviewed Capitol Complex SKM power system study files provided by the original power systems study engineer. Provided feedback to ensure files were complete. A follow-up meeting with the engineer will be scheduled for the end of July 2020.

Conducted the Boiler Operations and Maintenance short course via Zoom May 6–8, 2020. The course was attended by three DGS staff.

Conducted research, evaluated vendor submittals, and reviewed literature to provide recommendations for various technologies to combat COVID-19, which included:

- Ultra-violet C (UVC) efficacy on human contact and UVGI Health Cleanse products; review comments provided via email on May 14, 2020
- General research on bipolar ionization and room air quality sensors; review comments provided via email on May 21 and June 17, 2020
- Researched the Global Plasma Solutions (GPS) Needlepoint Ionization website and literature, and challenged lab report testing method in the chamber for simulating aircraft efficacy to specific facility HVAC implementation expectations; review comments provided via email on June 17, 2020

Conducted the Electrical Generation and Microgrids short course via Zoom May 20–22, 2020. The course was attended by three DGS staff.

Responded to an emergency electrical fault in Forum Building's main medium voltage switchgear and assisted with the restoration of power to the building. Attended a debrief meeting, researched possible

causes of the failure, and provided recommendations to repair the faulted switchgear on June 2, 2020. PSFEI Report ER-F 19/20–8 issued June 4, 2020, documented these efforts.

Conducted the HVAC Technical Conference—Chiller Fundamentals and Central Plant Application short course via Zoom June 10–12, 2020. The course was attended by eleven DGS staff.

Provided copies of PSFEI’s *Fieldwork COVID-19 Safety Guide*, to DGS personnel detailing staff procedures during site visits on June 11 and June 24, 2020.

Provided review and commentary input on May 28, 2020, for DGS to release back-to-work HVAC guidance documents.

Continued tracking LCSWMA monthly electricity generation and the Commonwealth accounts’ electricity consumption to help ensure contract compliance. No notable errors were observed in the billings received during this quarter. Analyses and potential resolutions were provided to address the contract volume shortfall for the 2019–2020 contract year.

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## MEETINGS

Attended virtual meetings with DGS Bureau of Procurement on April 2, April 16, April 28, April 29, May 4, May 5, May 6, May 11, May 14, May 15, May 18, May 19, May 20, June 17, June 22, and June 29, 2020 regarding solar energy procurement.

Hosted a virtual DGS-PSFEI bi-monthly meeting on April 7, 2020.

Attended a virtual meeting with EnergyCAP and DGS on April 8, 2020, to discuss the proposed Phase 2 implementation plan.

Attended a GreenGov Focus Group virtual meeting on April 9, 2020, regarding Utility Management in the Commonwealth.

Attended a virtual meeting with EnergyCAP and DGS on April 22, 2020, regarding the Commonwealth’s Verification Report.

Hosted a virtual meeting with EnergyCAP, DGS and GreenGov Council on April 23, 2020, regarding baseline criteria for the GreenGov Annual Report.

Attended virtual meetings with DGS Bureau of Procurement and a supplier on May 5 and May 12, 2020, regarding solar energy procurement.

Attended a virtual meeting with DGS Bureau of Procurement, GreenGov Council, and the PUC on May 12, 2020, regarding solar energy procurement.

Attended a virtual meeting with GreenGov Council and Commonwealth agency representatives on May 18, 2020, regarding solar energy procurement.

Attended a virtual meeting with EnergyCAP and DGS on May 27, 2020, regarding data validation criteria.

Attended a virtual meeting with DGS Bureau of Procurement on May 28, 2020, regarding data validation criteria in the EnergyCAP platform.

Attended a virtual GESA planning meeting on May 28, 2020.

Attended a virtual meeting with DGS Bureau of Procurement and the qualified supplier community on June 17, 2020, regarding solar energy procurement.

Hosted a virtual DGS-PSFEI bi-monthly meeting on June 24, 2020.

Traveled to SCI Fayette on June 25, 2020, to participate in an introductory GESA meeting with DOC staff and SCI Fayette leadership. Conducted a walk-through of the central utility plant.

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## ENERGYCAP SUPPORT

Provided the following extensive support to Commonwealth for EnergyCAP implementation and ongoing monthly training:

### *April*

- Participated in three conference calls with the GreenGov Council.
- Assisted DMVA and EnergyCAP with moving meters into the correct cost center.
- Continued to work on kickouts and updating information in EnergyCAP including ongoing meter and account creation for new accounts.

### *May*

- Continued to process kickouts, both problem scans and EDI errors.
- Uploaded three months of water and sewer bills for DMVA.
- Assisted the GreenGov Council by providing reports and required energy data for monthly agency meetings.
- Participated in five conference calls with EnergyCAP and DMVA to test the chargeback billing process.

### *June*

- Conducted online EnergyCAP training for DMVA Veterans Homes, DCNR, and the PADEP.
- Participated in three conference calls with the GreenGov Council; upon consensus, modified the training schedule and began to offer refresher training.
- Developed and released a Dashboard Training module for all users.
- Ran missing bill reports for each agency.
- Updated accounts, meters, and buildings, and resolved Bill CAPture kickouts.
- Processed EDI kickouts as needed.

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## OTHER

Reviewed and submitted comments for the DCNR Central Region IGA prepared and submitted by McClure on April 1, 2020.

Continued supporting the PennDOT GESA project. Queried utility use and cost data from EnergyCAP and created utility data reports. Uploaded the data to the PennDOT SharePoint project site on April 15, 2020. Provided thirty-five site deficiency reports to support the GESA project as requested by the PennDOT Facilities Management Division (FMD) Chief on May 28, 2020. Participated in bi-weekly project meetings with McClure, PennDOT, and DGS.

Reviewed the M&V report for the Thaddeus Stevens GESA project and submitted comments via email on May 11, June 2, and June 16, 2020.

Supported the PFBC GESA project. Reviewed the IGA submitted by Energy System's Group (ESG), the sole proposing GESA contractor, and submitted comments to DGS via email on May 14, 2020. Attended a virtual interview meeting on May 22, 2020.

Performed a detailed review and submitted comments for five preliminary GESA proposals for the Capitol Complex *Phase 2 Rebid Project GESA 2019-2* via email on June 5, 2020.

Participated in virtual interviews for all five ESCO firms for the Capitol Complex *Phase 2 Rebid Project GESA 2019-2* from June 23 to July 1, 2020.

Continued to support the GESA project at Selinsgrove Center by attending bi-weekly project meetings via conference calls, assisting in resolving boiler equipment questions, and helping to bring the project to final completion.

Continued to support the SCI Houtzdale GESA project by attending bi-weekly project meetings via conference calls. Reviewed final IGA submission dated May 20, 2020.

## 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 throughout the fiscal year. However, due to travel and gathering restrictions imposed by the COVID-19 pandemic beginning March 2020, education offerings were limited. All four short courses were provided, but special trainings were not offered. One short course was held in person in State College, PA; all others were successfully transitioned to a virtual platform and presented via Zoom. During the fiscal year, twenty-two DGS personnel improved their engineering, maintenance, and operational skills through PSFEI short courses.

The following PSFEI short course opportunities were provided in fiscal year 2019–2020:

- Effective Facility Management—Year 2, July 10–12, 2019. Topics of instruction focused on supervision and leadership, how to motivate today’s worker, workplace conflicts, customer focus, and the art of listening and being heard. Three people received their three-year award plaque, which is presented to participants who complete the three-year Effective Facility Management Program.
- Boiler Plant Operations and Maintenance Training, May 6–8, 2020. This course was presented via Zoom and provided instruction on the importance of engineering units; basic thermodynamics; fundamentals of steam and hot water boilers; fuels, fuel combustion, and furnace design; steam and hot water systems; pumps; plant safety, boiler operations, and system maintenance; boiler control systems; water treatment; and closed loop systems and Legionella.
- Electrical Generation and Microgrids, May 20–22, 2010. This course was presented via Zoom. Sessions taught during this course included the future of electrical grids; emergency and standby generators—what, where, why, and how; principals of microgrid systems and designs; harnessing the sun with solar photovoltaic; combined heat and power plants; electricity bill fundamentals; distributed generation; SCI Laurel Highlands cogeneration discussion; and Penn State Health Milton S. Hershey Medical Center cogeneration and energy analysis.
- HVAC Technical Conference—Chiller Fundamentals and Central Plant Application, June 10–12, 2020. This course was presented via Zoom and provided instruction on the thermodynamics of heat at work; refrigeration cycle; chiller system components; chilled water pumping configurations; controls; maintenance; water treatment, scale effects, and Legionella; and low global warming potential refrigerant.

DGS attendance at PSFEI educational training events is detailed in Table 17 on the following page.

**Table 17. DGS Attendance at Short Courses and Workshops 2019–2020**

<b>Education Event</b>	<b>DGS Attendance</b>
<b>Short Courses</b>	
Boiler Plant Operations and Maintenance Training	3
Effective Facility Management—Year 2	5
Electrical Generation and Microgrids	3
HVAC Technical Conference	11
<b>Total</b>	<b>22</b>