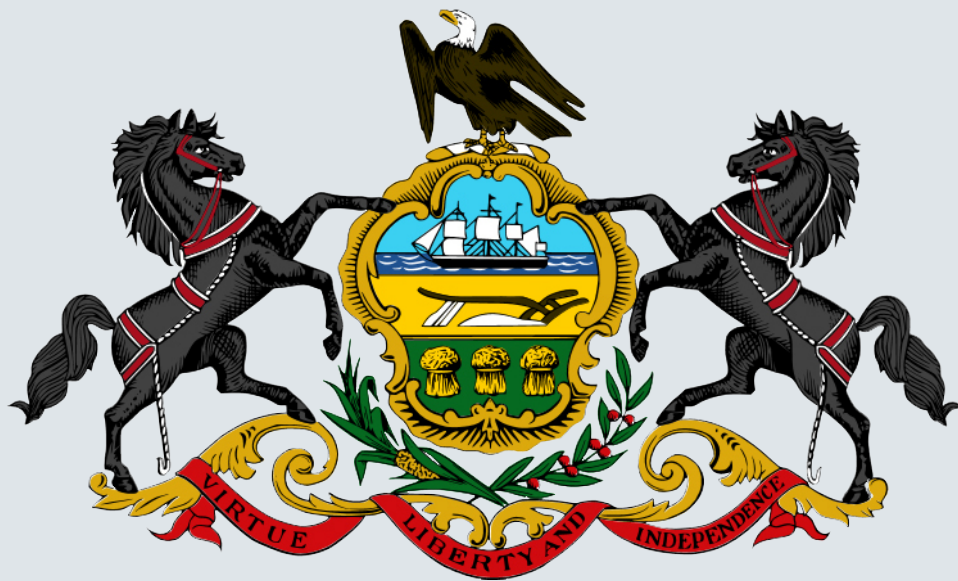


ENERGY AND UTILITY USAGE REPORT

Fiscal Year 2022–2023



Commonwealth of Pennsylvania

Department of General Services

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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 \$286 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 8,607 electric and 1,187 natural gas accounts. During fiscal year 2022–2023 (July 1, 2022 to June 30, 2023), 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.

Traditional electricity procurement and risk management activities for Commonwealth and COSTARS accounts spanned nine electricity bidding events that included 5,558 accounts resulting in an estimated cost increase over the prior contract rates of over \$3.6 million but more than \$5.6 million in projected avoided cost versus the utility-issued price to compare.

Four natural gas procurement events were held for sixty-nine accounts resulting in an estimated cost increase of over \$152,000 from prior contract rates and projected annual avoided costs of over \$482,000 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:

- Maintaining the PSFEI proprietary Energy Risk Management Application's (ERMA) functionality to improve the Commonwealth’s energy procurement and account management capabilities.
- Assisting with the proliferation of the EnergyCAP utility bill management software and the training of Commonwealth personnel in its use. Efforts included meter and account identification, user permission assignments, resolution and reconciliation of unknown meters, and hosting numerous training sessions for Commonwealth agencies.
- Supporting the reporting requirements of Executive Order 2019-01 whereby all 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, 7,974 total meters have been verified as meeting the requirements for reporting, revealing a 1.7% decrease in energy consumption across all agencies for the fifth 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.
- Supporting the DGS Guaranteed Energy Savings Act (GESA) program by participating in scoping site visits, preparing reports identifying energy-saving project opportunities, and reviewing and commenting on proposed energy conservation measures (ECMs). To date, three projects have been completed, seven projects are under construction, and two projects are in the Investment Grade Audit (IGA) solicitation phase. According to DGS, total project investment is projected to be \$255.2 million with projected annual savings of \$12.39 million. The energy savings achieved through these completed GESA projects will reduce carbon emissions equivalent to 59,843 trees planted or 7,799 cars removed from the road for a year.

- Providing DGS facilities with vital engineering services to enhance the operation, maintenance, reliability, and safety of its buildings. Six testing reports and nine additional reports were issued to document these efforts.

Energy and utility costs for DGS facilities decreased by \$875,321 from the previous fiscal year. Overall energy use decreased by 34,686 million British thermal units (MMBtu), down 6.4%. A utility rate change at the Annex Complex coupled with a steady rise in natural gas market pricing produced a 27.7% increase in natural gas expenditures while electrical energy cost decreased by 11.8%. Purchased steam energy consumption decreased by 11,363 thousand pounds (mlb), down 7.2%, while the unit cost of steam increased by roughly \$1.54 per mlb, up 6.1%.

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 2022–2023, the average DGS building site EUI was 65,562 Btu/sqft, 30.1% below the national average and 6.5% below the previous fiscal year.

The *2022–2023 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. The Summary of Energy and Engineering Services section provides information about Executive Order 2019-01, ERMA, PSFEI engineering and electrical testing services, and the GESA program. The Summary of Education Services section presents the education 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 2022–2023, the Department of General Services (DGS) energy and water/sewer cumulative costs totaled \$14.7 million, a decrease of 5.6% from the previous fiscal year. Electricity use decreased by 7.5%, natural gas use decreased by 0.6%, purchased steam use decreased by 7.2%, and water/sewer use decreased by 10.6%.

Thermal energy unit pricing increased from the prior fiscal year. Natural gas unit cost per thousand cubic feet (mcf) increased by 28.6% and purchased steam per one thousand pounds (mlb) by 6.1%. Electricity cost per kilowatt-hour (kWh) decreased by 4.7%.

Table 1. Consumption and Costs 2022–2023

Utility	Annual Consumption	Unit Cost	Annual Cost
Electricity	82,971,741 kWh	9.226 ¢/kWh	\$7,654,651
Natural Gas	77,531 mcf	\$11.43 /mcf	\$886,118
Steam	146,248 mlbs	\$26.68 /mlbs	\$3,902,244
Water/Sewer	70,656 mgal	\$32.38 /mgal	\$2,287,614
Total			\$14,730,627

AVOIDED COSTS

During the fiscal year, the Penn State Facilities Engineering Institute (PSFEI) assisted DGS and other Commonwealth of Pennsylvania (Commonwealth) agencies with managing energy risk. Due to rising energy market pricing, future energy supply costs were projected to increase by over \$3.7 million compared to current contract rates while cost avoidance was estimated to be \$6.1 million lower than utility-issued, price-to-compare costs.

Table 2. Energy Procurement Results 2022–2023

Energy Events	Cost Reduction	Cost Avoidance
Electric Procurement	(\$3,617,652)	\$5,679,411
Natural Gas Procurement	(\$152,782)	\$482,387
Total	(\$3,770,434)	\$6,161,798

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 (July 1, 2017 through June 30, 2023). During fiscal year 2022–2023, energy costs decreased by \$895,760, down 6.7% from the previous year. Overall energy use, measured in million British thermal units (MMBtu), decreased from the previous year by 34,686 MMBtu, down 6.4%.

Chart 1. Annual Energy Costs Trend

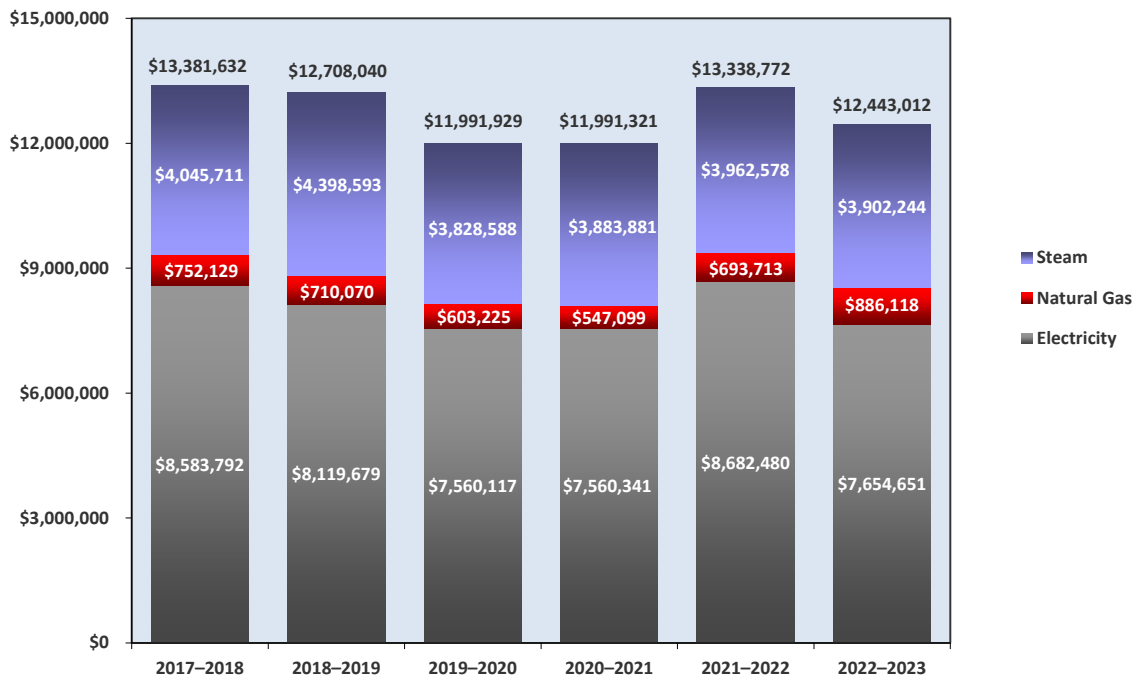


Chart 2. Annual Energy Consumption Trend

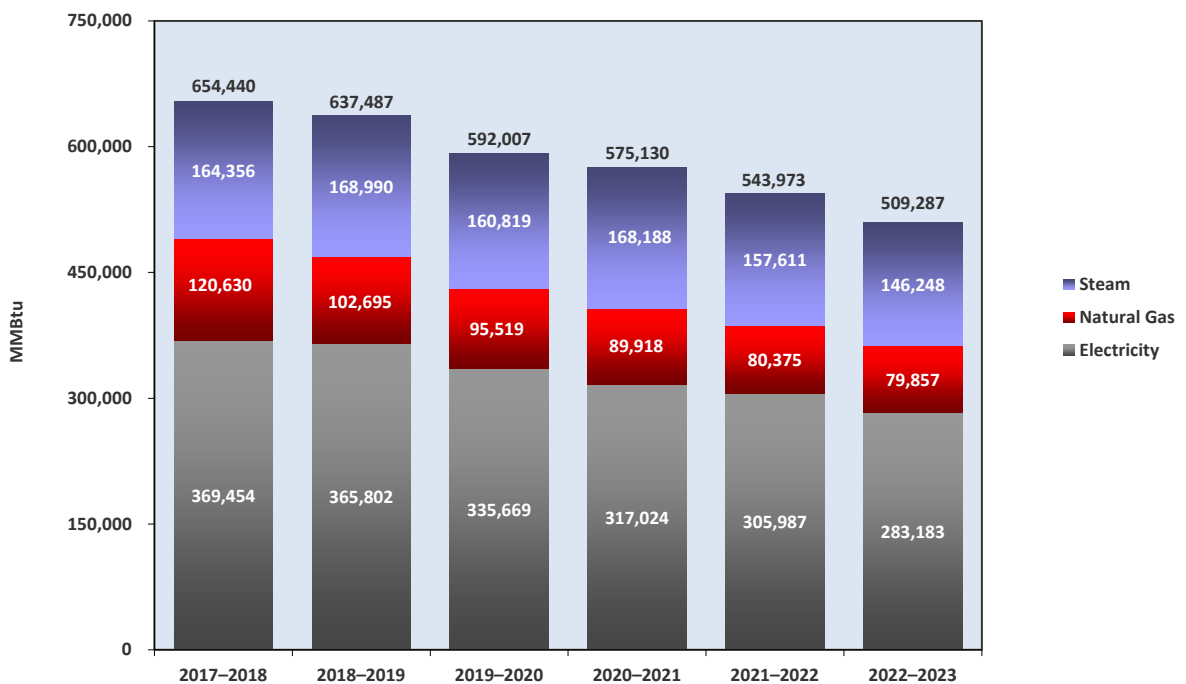


Table 3 provides a detailed view of energy use and cost information for the past six fiscal years. DGS facilities experienced a 7.5% decrease in use and an 11.8% decrease in cost for electricity consumed during fiscal year 2022–2023. This equates to 6,681,627 kWh less electricity consumed at a cost decrease of \$1,027,830. Due to a renegotiation of energy pricing built into the Lancaster County Solid Waste Management Authority (LCSWMA) Power Purchase Agreement (PPA), a decrease in zonal capacity charges, and relatively stable transmission pricing, the unit cost per kWh decreased by 4.7%. Additional details about the LCSWMA PPA are provided in the Summary of Energy and Engineering Services section under the *Intergovernmental Power Purchase Agreement* subheading.

Purchased steam consumption decreased by 11,363 mlb, down 7.2%; costs also decreased by \$60,334, down 1.5%. Overall steam unit cost increased by \$1.54 per mlb, up 6.1%.

Natural gas consumption decreased 503 mcf, down 0.6%, while costs increased by \$192,404, up 27.7%. The average natural gas unit cost increased by 28.6%, from \$8.89 to \$11.43 per mcf.

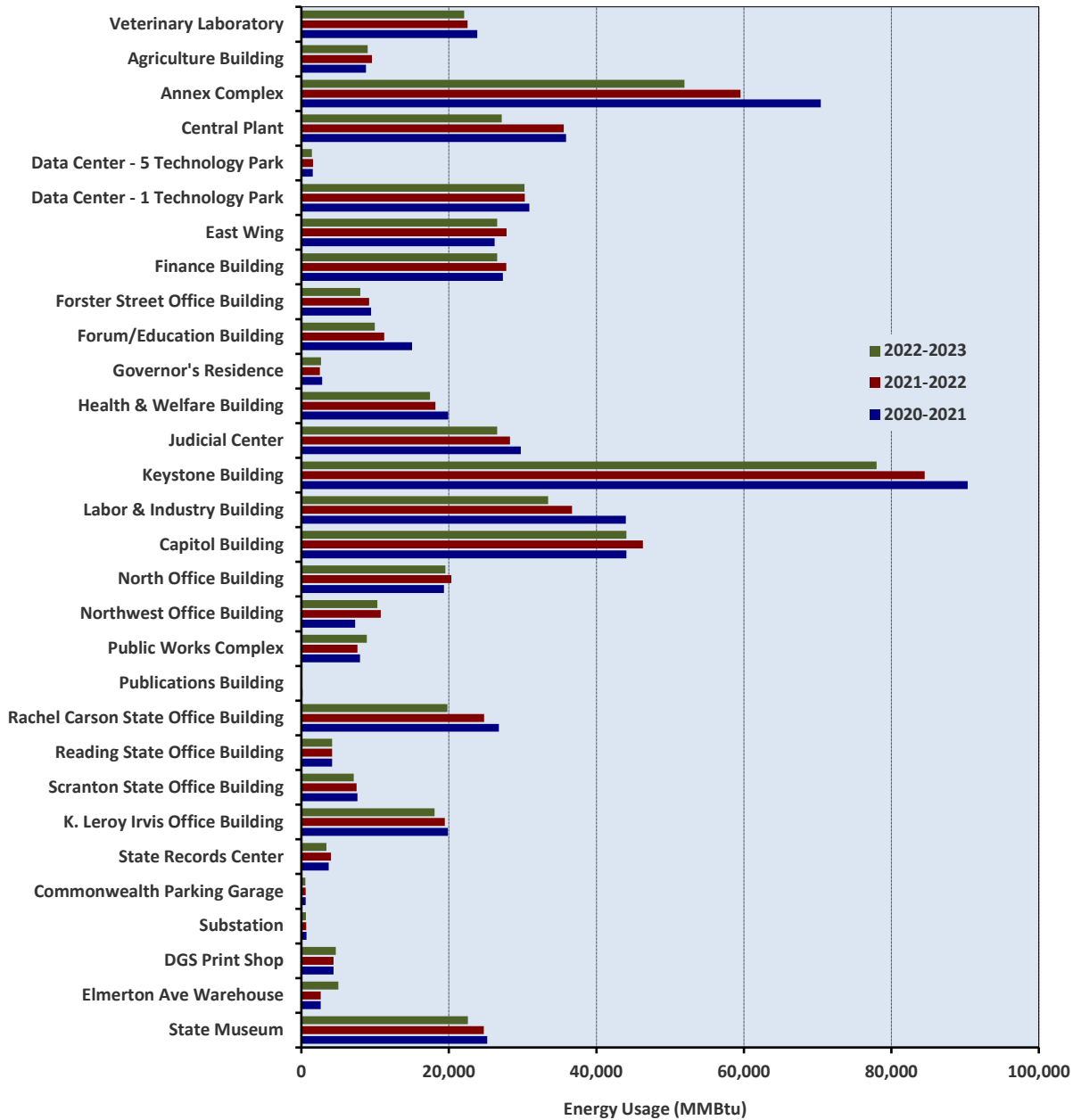
Table 3. Annual Energy Consumption and Costs Trend

Energy Cost	Units	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022	2022–2023
Electricity	\$	\$8,583,792	\$8,119,679	\$7,560,117	\$7,560,341	\$8,682,480	\$7,654,651
Natural Gas	\$	\$752,129	\$710,070	\$603,225	\$547,099	\$693,713	\$886,118
Steam	\$	\$4,045,711	\$4,398,593	\$3,828,588	\$3,883,881	\$3,962,578	\$3,902,244
Total	\$	\$13,381,632	\$13,228,343	\$11,991,929	\$11,991,321	\$13,338,772	\$12,443,012
Unit Energy Cost/MMBtu							
Electricity	\$/MMBtu	\$21.95	\$22.20	\$22.52	\$23.85	\$28.38	\$27.03
Natural Gas	\$/MMBtu	\$6.23	\$6.91	\$6.32	\$6.08	\$8.63	\$11.10
Steam	\$/MMBtu	\$24.62	\$26.03	\$23.81	\$23.09	\$25.14	\$26.68
Weighted Average	\$/MMBtu	\$20.45	\$20.75	\$20.26	\$20.85	\$24.52	\$24.43
Energy Consumption							
Electricity	MMBtu	369,454	365,802	335,669	317,024	305,987	283,183
Natural Gas	MMBtu	120,630	102,695	95,519	89,918	80,375	79,857
Steam	MMBtu	164,356	168,990	160,819	168,188	157,611	146,248
Total	MMBtu	654,440	637,487	592,007	575,130	543,973	509,287
Unit Fuel Cost							
Electricity	\$/kWh	\$0.0793	\$0.0758	\$0.0769	\$0.0814	\$0.0968	\$0.0923
Natural Gas	\$/mcf	\$6.42	\$7.12	\$6.50	\$6.27	\$8.89	\$11.43
Steam	\$/mlb	\$24.62	\$26.03	\$23.81	\$23.09	\$25.14	\$26.68
Fuel Consumption							
Electricity	kWh	108,249,179	107,179,027	98,350,117	92,887,236	89,653,368	82,971,741
Natural Gas	mcf	117,117	99,704	92,737	87,299	78,034	77,531
Steam	mlbs	164,356	168,990	160,819	168,188	157,611	146,248

ENERGY USAGE

Chart 3 shows the total energy usage in MMBtu for each DGS facility for the past three fiscal years (July 1, 2020 through June 30, 2023). The largest users continue to be the DGS Annex Complex and the Keystone Building. Energy consumption varied across the DGS facilities when compared to the previous year, but generally trended lower.

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 the Veterinary Lab and Data Center–1 Technology Park facilities exhibited the highest energy use intensities because of their concentrated end-use equipment and heating, ventilation, and air conditioning (HVAC) loads dictated by building operations. The energy use for both facilities decreased slightly.

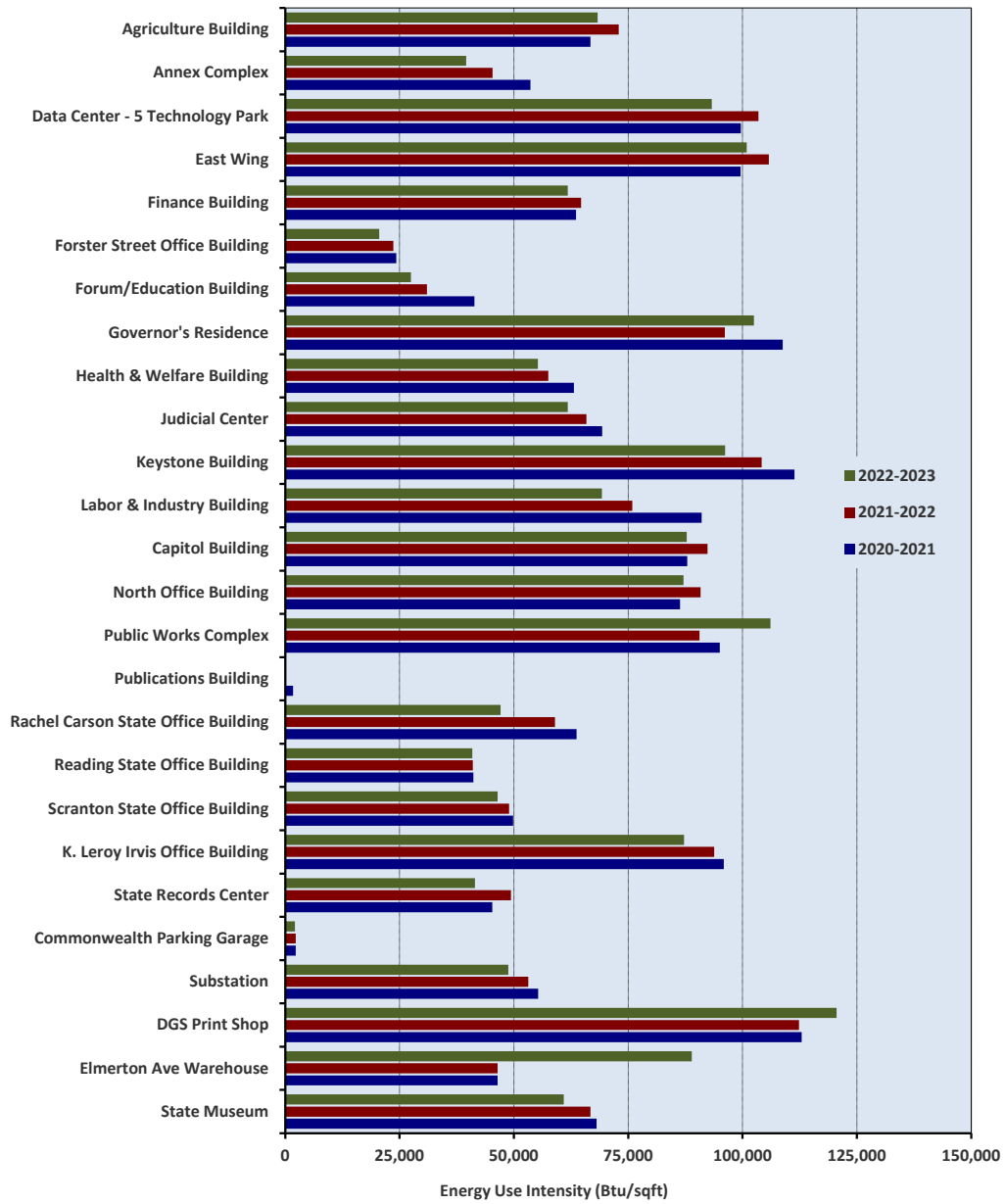
During fiscal year 2022–2023, the total EUI decreased by 6.5% to 65,562 Btu/sqft with the most significant changes occurring at the Forum/Education Building (due to renovation) and the Elmerston Ave Warehouse. The Publications Building was demolished during the 2020–2021 fiscal year and is included solely for historical reference.

Table 4. Annual Usage and Energy Use Intensity Trend

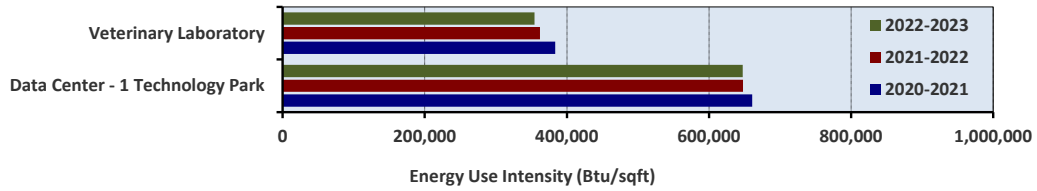
Facility	Total Space (sqft)	2020–2021		2021–2022		2022–2023	
		Btu Usage (MMBtu)	EUI (Btu/sqft)	Btu Usage (MMBtu)	EUI (Btu/sqft)	Btu Usage (MMBtu)	EUI (Btu/sqft)
Agriculture Building	131,391	8,766	66,717	9,578	72,896	8,975	68,309
Annex Complex	1,313,571	70,440	53,625	59,556	45,339	51,939	39,540
DGS Print Shop	38,688	4,370	112,958	4,346	112,328	4,665	120,592
Data Center - 1 Technology Park	46,736	30,891	660,969	30,287	648,044	30,266	647,605
Data Center - 5 Technology Park	15,400	1,534	99,642	1,594	103,498	1,437	93,303
Elmerston Ave Warehouse	56,560	2,627	46,446	2,628	46,461	5,028	88,900
Forster Street Office Building	388,544	9,434	24,281	9,187	23,646	7,993	20,572
Governor's Residence	25,878	2,815	108,765	2,488	96,149	2,652	102,482
Public Works Complex	83,670	7,952	95,046	7,580	90,594	8,879	106,120
Publications Building	81,948	138	1,686	---	---	---	---
Rachel Carson State Office Building	420,125	26,774	63,730	24,777	58,976	19,778	47,077
Reading State Office Building	101,626	4,179	41,122	4,168	41,011	4,158	40,914
Scranton State Office Building	152,800	7,614	49,832	7,476	48,926	7,095	46,431
State Records Center	81,565	3,695	45,300	4,024	49,337	3,382	41,466
State Street Bridge	---	---	---	---	---	---	---
Veterinary Laboratory	62,230	23,863	383,465	22,546	362,293	22,067	354,607
Capitol Complex Buildings¹							
Capitol Building	501,543	44,081	87,890	46,313	92,341	44,049	87,826
Commonwealth Parking Garage	248,188	572	2,306	572	2,305	529	2,130
East Wing	262,950	26,191	99,606	27,817	105,789	26,533	100,905
Finance Building	429,521	27,326	63,620	27,795	64,712	26,531	61,769
Forum/Education Building	362,395	15,003	41,399	11,230	30,988	9,957	27,474
Health & Welfare Building	315,462	19,911	63,116	18,155	57,550	17,432	55,258
Judicial Center	429,355	29,760	69,312	28,273	65,850	26,535	61,802
K. Leroy Irvis Office Building	207,138	19,871	95,931	19,436	93,832	18,070	87,236
Keystone Building	811,147	90,342	111,375	84,521	104,199	78,007	96,169
Labor & Industry Building	483,161	43,985	91,036	36,684	75,924	33,468	69,268
North Office Building	223,946	19,329	86,311	20,340	90,826	19,510	87,120
State Museum	370,442	25,215	68,067	24,723	66,739	22,562	60,906
Substation	12,500	691	55,288	664	53,125	610	48,785
Complex Buildings Total	4,657,748	362,276		346,523		323,792	
Total	7,658,480	567,370		536,758		502,107	
Weighted Average			74,084		70,087		65,562

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

Chart 4A. Annual Energy Use Intensity Trend



**Chart 4B. Annual Energy Use Intensity Trend
Veterinary Laboratory and Data Center–1 Technology Park**



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 increased by 0.9%, with the most significant changes occurring at the Forum/Education Building, Elmerton Ave Warehouse, and Reading State Office Building.

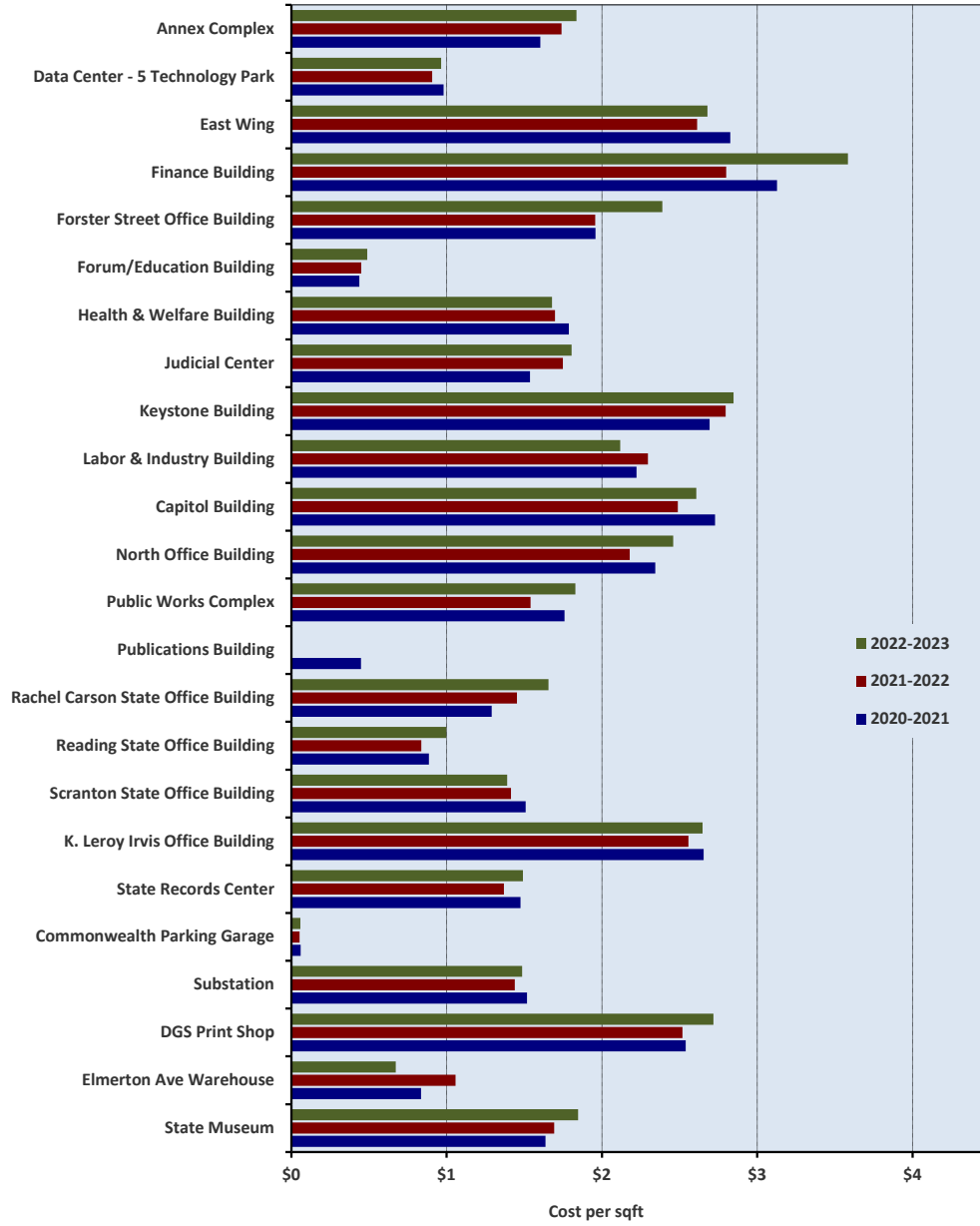
Table 5. Annual Utility Cost per Square Foot Trend

Facility	Total Space (sqft)	2019–2020		2020–2021		2021–2022	
		Cost	\$/sqft	Cost	\$/sqft	Cost	\$/sqft
Agriculture Building	131,391	\$241,220	\$1.84	\$256,787	\$1.95	\$241,247	\$1.84
Annex Complex	1,313,571	\$1,287,495	\$0.98	\$1,190,395	\$0.91	\$1,266,310	\$0.96
Bobali Warehouse	38,688	\$98,228	\$2.54	\$97,424	\$2.52	\$105,142	\$2.72
Data Center - 1 Technology Park	46,736	\$710,054	\$15.19	\$722,374	\$15.46	\$740,752	\$15.85
Data Center - 5 Technology Park	15,400	\$43,532	\$2.83	\$40,242	\$2.61	\$41,278	\$2.68
Elmerton Ave Warehouse	56,560	\$47,245	\$0.84	\$59,782	\$1.06	\$38,078	\$0.67
Forster Street Office Building	388,544	\$170,098	\$0.44	\$175,023	\$0.45	\$189,688	\$0.49
Governor's Residence	25,878	\$106,330	\$4.11	\$130,623	\$5.05	\$104,980	\$4.06
Public Works Complex	83,670	\$147,125	\$1.76	\$128,855	\$1.54	\$153,060	\$1.83
Publications Building	81,948	\$36,810	\$0.45	---	---	---	---
Rachel Carson State Office Building	420,125	\$541,710	\$1.29	\$610,772	\$1.45	\$696,010	\$1.66
Reading State Office Building	101,626	\$90,078	\$0.89	\$85,067	\$0.84	\$101,355	\$1.00
Scranton State Office Building	152,800	\$230,595	\$1.51	\$216,265	\$1.42	\$212,467	\$1.39
State Records Center	81,565	\$120,348	\$1.48	\$111,678	\$1.37	\$121,630	\$1.49
State Street Bridge	---	\$26,866	---	\$26,300	---	\$31,509	---
Veterinary Laboratory	62,230	\$353,115	\$5.67	\$366,829	\$5.89	\$414,085	\$6.65
Capitol Complex Buildings¹							
Capitol Building	501,543	\$1,368,773	\$2.73	\$1,248,135	\$2.49	\$1,307,682	\$2.61
Commonwealth Parking Garage	248,188	\$15,166	\$0.06	\$13,244	\$0.05	\$14,412	\$0.06
East Wing	262,950	\$822,204	\$3.13	\$736,316	\$2.80	\$942,511	\$3.58
Finance Building	429,521	\$841,081	\$1.96	\$840,313	\$1.96	\$1,026,251	\$2.39
Forum/Education Building	362,395	\$516,753	\$1.43	\$442,886	\$1.22	\$390,705	\$1.08
Health & Welfare Building	315,462	\$563,517	\$1.79	\$535,783	\$1.70	\$529,417	\$1.68
Judicial Center	429,355	\$659,918	\$1.54	\$750,464	\$1.75	\$774,806	\$1.80
K. Leroy Irvis Office Building	207,138	\$549,872	\$2.65	\$529,604	\$2.56	\$548,340	\$2.65
Keystone Building	811,147	\$2,184,284	\$2.69	\$2,268,897	\$2.80	\$2,310,095	\$2.85
Labor & Industry Building	483,161	\$1,074,194	\$2.22	\$1,109,502	\$2.30	\$1,023,164	\$2.12
North Office Building	223,946	\$525,021	\$2.34	\$487,889	\$2.18	\$550,579	\$2.46
State Museum	370,442	\$606,577	\$1.64	\$627,089	\$1.69	\$683,886	\$1.85
Substation	12,500	\$18,972	\$1.52	\$17,992	\$1.44	\$18,571	\$1.49
Complex Buildings Total²	4,657,748	\$9,746,332		\$9,608,114		\$10,120,419	
Total	7,658,480	\$13,997,180		\$13,826,530		\$14,578,010	
Weighted Average			\$1.828		\$1.805		\$1.904

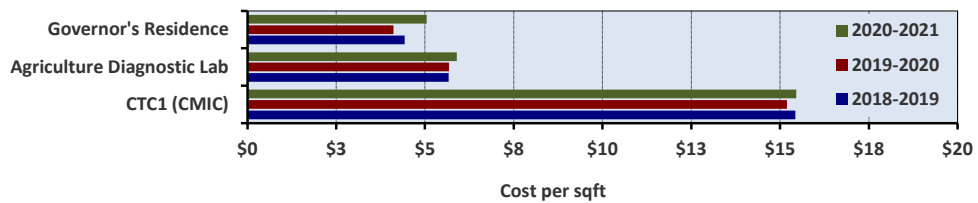
¹PPL serves the Capitol Complex with one main account; DGS submeters the individual buildings. Central plant electric energy is distributed to the Capitol Complex buildings served by central chilled water on a per square foot basis. The Main Capitol steam metered use and cost is distributed to the Capitol,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

²The Northwest Office Building is not included in this table because only electricity costs are known. The difference between the total fiscal year costs shown in this table and in Tables 1 and 3 represent 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
Governor's Residence, Veterinary Laboratory, and Data Center-1 Technology Park**



DGS ENERGY AND UTILITY USAGE

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

ELECTRICITY USAGE

During fiscal year 2022–2023, DGS facilities consumed 82,971,741 kWh of electricity at a cost of \$7,654,651, with an average unit cost of \$0.09226 per kWh. This represented a usage decrease of 6,681,627 kWh, down 7.5% from the previous fiscal year, and a cost decrease of \$1,027,830, or 11.8%.

Table 6. Electricity Usage and Costs 2022–2023

Facility	Total Space (sqft)	Annual Electricity Consumption				Annual Electricity Costs		
		kWh	kWh/sqft	Peak Demand KW	Peak Demand W/sqft	Cost	¢/kWh	\$/sqft
Agriculture Building	131,391	2,578,000	19.6	852.0	6.48	\$253,587	9.837	\$1.93
Annex Complex	1,313,571	3,517,570	2.7	855.0	0.65	\$417,732	11.876	\$0.32
DGS Print Shop	38,688	1,197,760	31.0	256.0	6.62	\$114,133	9.529	\$2.95
Data Center - 1 Technology Park	46,736	8,868,000	189.7	1,175.0	25.14	\$786,247	8.866	\$16.82
Data Center - 5 Technology Park	15,400	421,000	27.3	107.0	6.95	\$39,968	9.494	\$2.60
Elmerton Ave Warehouse	56,560	91,360	1.6	38.0	0.67	\$10,671	11.680	\$0.19
Forster Street Office Building	388,544	962,400	2.5	237.0	0.61	\$92,846	9.647	\$0.24
Governor's Residence	25,878	372,400	14.4	---	---	\$50,593	13.586	\$1.96
Public Works Complex	83,670	737,400	8.8	246.0	2.94	\$77,929	10.568	\$0.93
Rachel Carson State Office Building	420,125	4,127,400	9.8	1,386.0	3.30	\$414,133	10.034	\$0.99
Reading State Office Building	101,626	759,587	7.5	345.6	3.40	\$79,787	10.504	\$0.79
Scranton State Office Building	152,800	2,077,725	13.6	722.0	4.73	\$220,673	10.621	\$1.44
State Records Center	81,565	316,200	3.9	131.0	1.61	\$39,855	12.604	\$0.49
State Street Bridge	---	---	---	---	---	\$15,881	---	---
Veterinary Laboratory	62,230	2,429,400	39.0	575.0	9.24	\$238,712	9.826	\$3.84
Capitol Complex Buildings^{1,2}								
Capitol Building	501,543	6,739,991	13.4	---	---	\$595,648	8.838	\$1.19
Central Plant	3,664,223	7,962,316	2.2	---	---	\$668,188	8.392	\$0.18
Commonwealth Parking Garage	248,188	154,881	0.6	---	---	\$13,932	8.995	\$0.06
East Wing	262,950	4,541,281	17.3	---	---	\$401,673	8.845	\$1.53
Finance Building	429,521	3,564,917	8.3	---	---	\$310,590	8.712	\$0.72
Forum/Education Building	362,395	2,230,339	6.2	---	---	\$200,989	9.012	\$0.55
Health & Welfare Building	315,462	2,392,678	7.6	---	---	\$209,269	8.746	\$0.66
Judicial Center	429,355	4,800,718	11.2	---	---	\$423,443	8.820	\$0.99
K. Leroy Irvis Office Building	207,138	2,747,842	13.3	---	---	\$241,331	8.783	\$1.17
Keystone Building	811,147	12,470,481	15.4	---	---	\$1,101,620	8.834	\$1.36
Labor & Industry Building	483,161	6,897,094	14.3	---	---	\$606,876	8.799	\$1.26
North Office Building	223,946	2,963,159	13.2	---	---	\$259,342	8.752	\$1.16
Northwest Office Building	188,819	2,103,824	11.1	---	---	\$182,777	8.688	\$0.97
State Museum	370,442	2,729,658	7.4	---	---	\$238,376	8.733	\$0.64
Substation	12,500	178,675	14.3	---	---	\$16,039	8.977	\$1.28
Complex Buildings Total	4,846,567	54,515,539	11.2	11,794	2.43	\$4,801,904	8.808	\$0.99
Total	7,765,351	82,971,741				\$7,654,651		
Weighted Average			10.7				9.226	\$0.99

¹PPL serves the Capitol Complex with one main account; DGS submeters the individual buildings and calculates building usage and cost via the EnergyCAP chargeback processor.

²Central Plant energy is shown for reference only. Electrical energy consumed by the Central Plant is apportioned through EnergyCAP's chargeback processor to each building served.

Compared to the previous fiscal year, electricity consumption increases were relatively consistent. Notable reductions were observed at the Governor’s Residence, down 46.2%, the Annex Complex, down 29.1%, and the Central Plant, down 23.6%. Peak demand changes ranged from a decrease of 18.6% at the Forster Street Office Building to an increase of 32.2% at the Scranton State Office Building.

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

Chart 6. Annual Electricity Consumption Trend

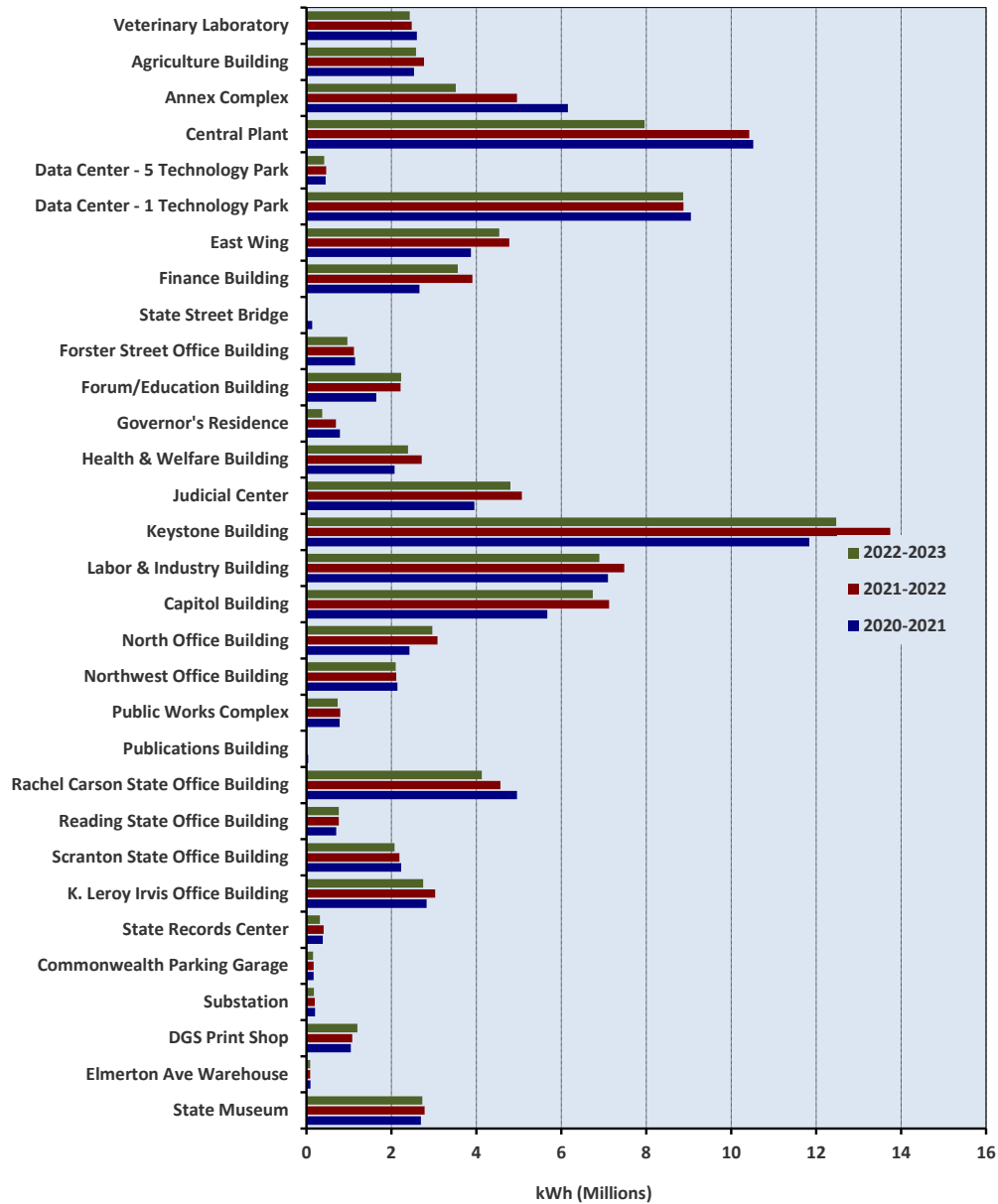
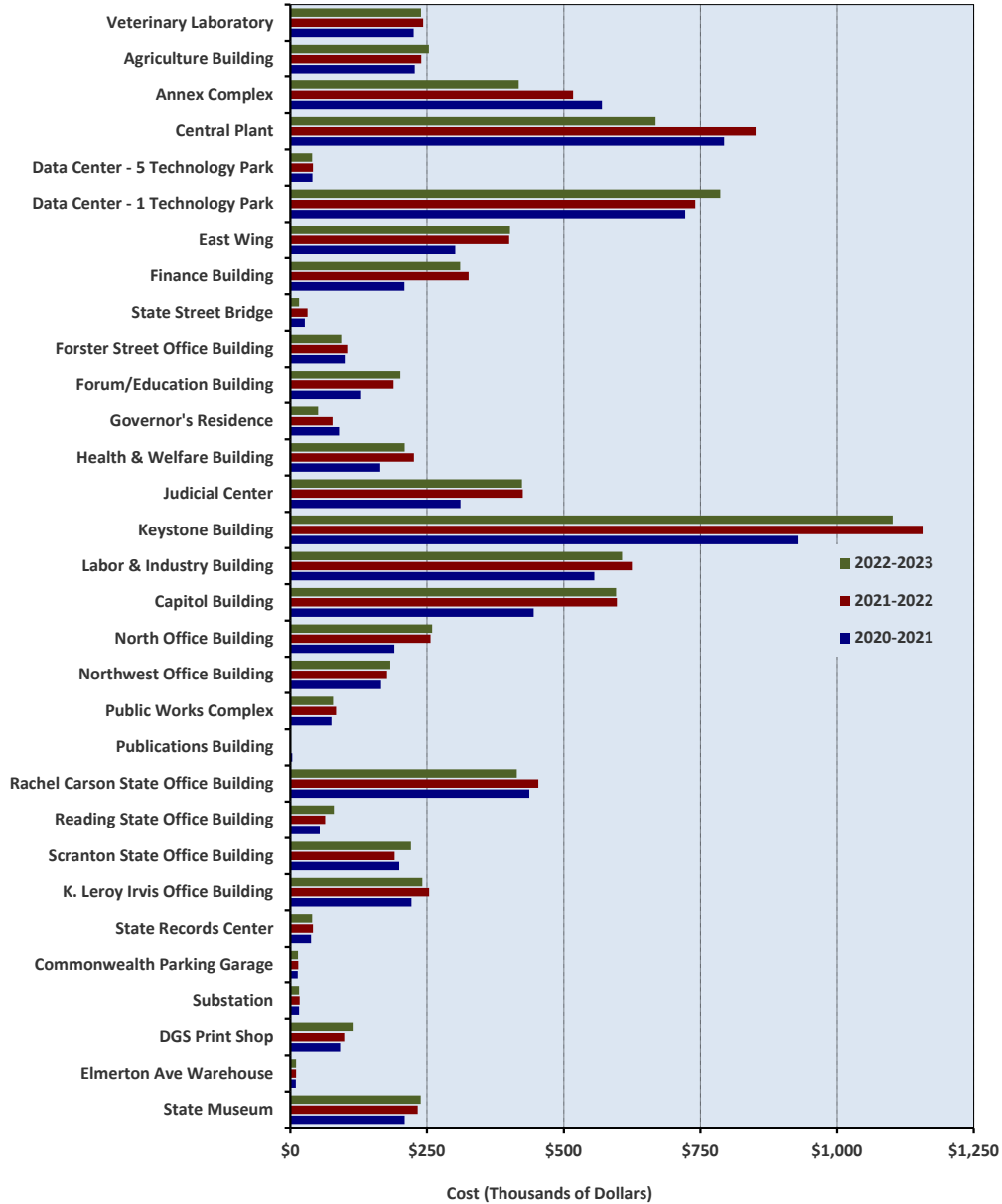


Chart 7. Annual Electricity Costs Trend



NATURAL GAS USAGE

In fiscal year 2022–2023, DGS facilities consumed 77,531 mcf of natural gas, 0.6% less than the previous year. The Annex Complex, at 50% 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 2022–2023

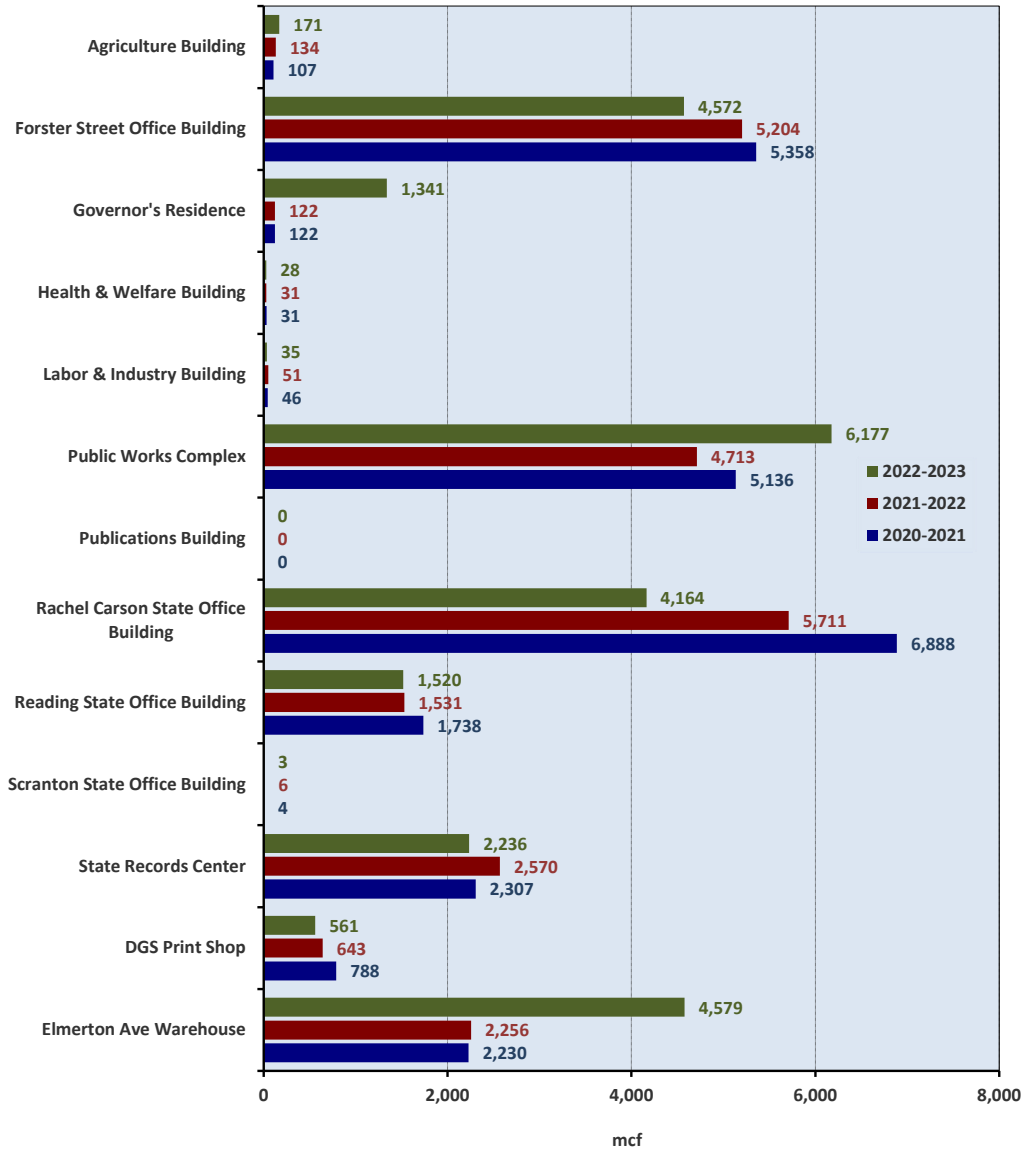
Facility	mcf	Cost	\$/mcf
Agriculture Building	171	\$2,451	\$14.31
Annex Complex	38,770	\$488,250	\$12.59
DGS Print Shop	561	\$7,534	\$13.44
Elmerton Ave Warehouse	4,579	\$52,760	\$11.52
Forster Street Office Building	4,572	\$59,514	\$13.02
Governor's Residence	1,341	\$17,564	\$13.10
Public Works Complex	6,177	\$51,917	\$8.40
Rachel Carson State Office Building	4,164	\$53,405	\$12.83
Reading State Office Building	1,520	\$19,292	\$12.69
Scranton State Office Building	3	\$364	\$110.22
State Records Center	2,236	\$28,381	\$12.69
Veterinary Laboratory	13,374	\$103,265	\$7.72
Capitol Complex Buildings			
Health & Welfare Building	28	\$670	\$23.94
Labor & Industry Building	35	\$751	\$21.38
Complex Buildings Total	63	\$1,421	\$22.52
Total	77,531	\$886,118	
Weighted Average			\$11.43

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 2022–2023:

- The Rachel Carson State Office Building consumption decreased by 1,547 mcf, down 27.1%.
- The Annex Complex gas usage was 6.3% lower than fiscal year 2021–2022; however, costs increased by 38.5%, primarily because of a utility rate change that provided maximum flexibility for operational changes.
- The Governor’s Residence gas consumption increased by 1,219 mcf, up 1,050.8%.

Overall, natural gas cost for DGS facilities increased by \$192,404, up 27.7%, as a result of the utility rate change at the Annex Complex coupled with increases in natural gas market pricing.

Chart 8A. Annual Natural Gas Consumption Trend



**Chart 8B. Annual Natural Gas Consumption Trend
Veterinary Laboratory and Annex Complex**

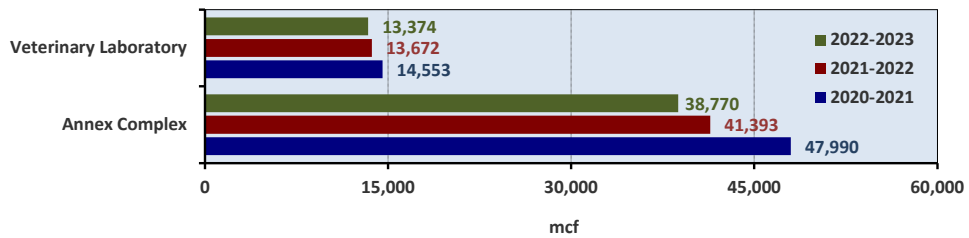
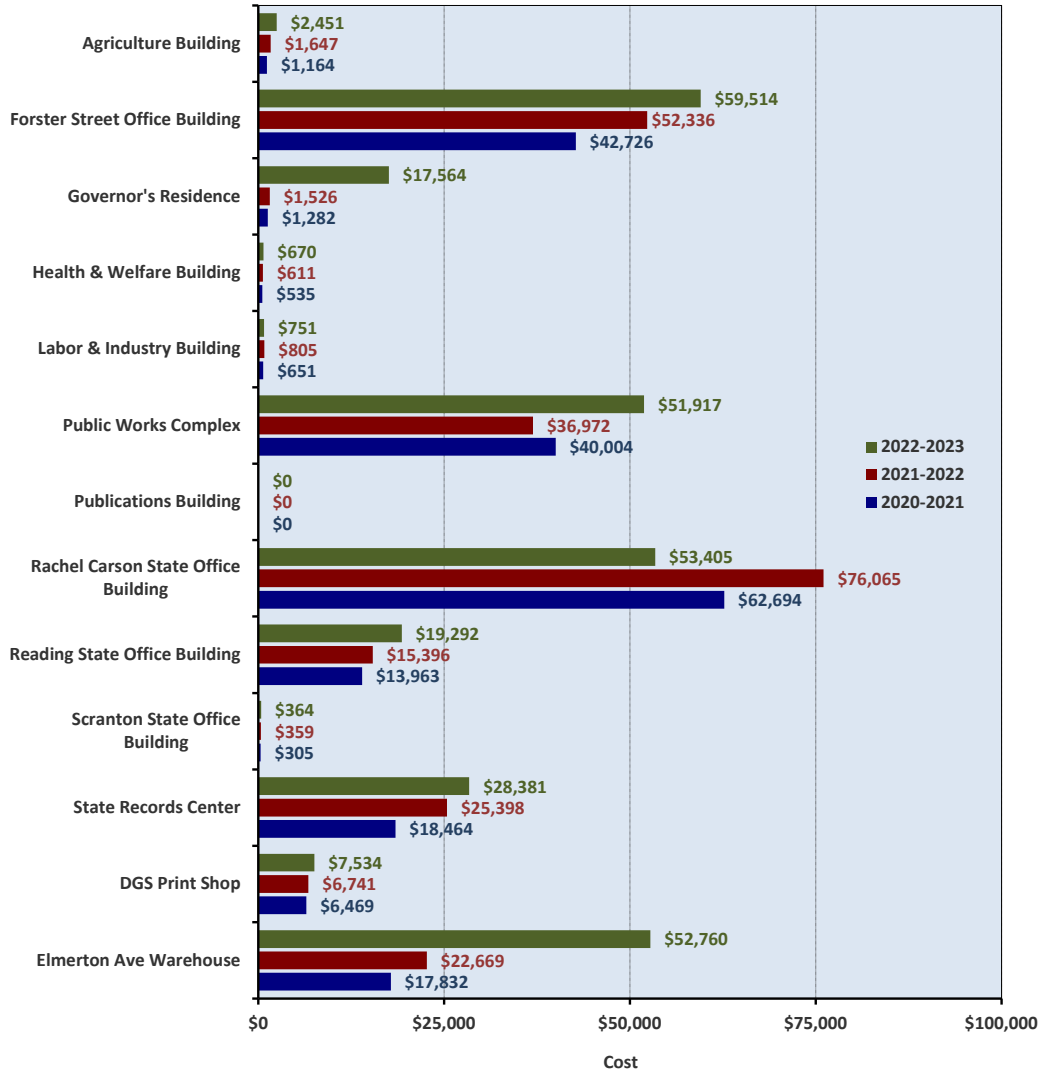
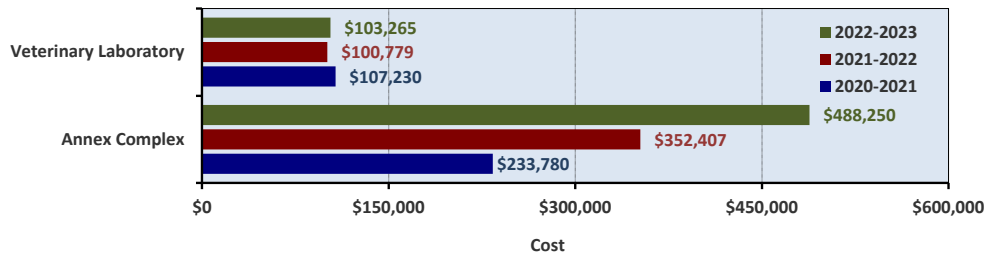


Chart 9A. Annual Natural Gas Costs Trend



**Chart 9B. Annual Natural Gas Costs Trend
Veterinary Laboratory and Annex Complex**



STEAM USAGE

Table 8 details steam usage by facility. The Keystone Building is the largest purchaser of steam, while the Capitol Building is the second largest user of purchased steam.

Overall, steam use decreased by 11,363 mlb, down 7.2% from the previous fiscal year; costs also decreased by \$60,334, down 1.5%. The unit cost of purchased steam increased 6.1%, from \$25.14 to \$26.68 per mlb.

Table 8. Steam Consumption and Costs 2022–2023

Facility ¹	mlbs	Cost	\$/mlb
Rachel Carson State Office Building	1,403	\$35,850	\$25.56
Capitol Complex Buildings²			
Capitol Building	21,045	\$559,928	\$26.61
East Wing	11,033	\$293,558	\$26.61
Finance Building	14,364	\$376,366	\$26.20
Forum/Education Building	2,344	\$61,702	\$26.32
Health & Welfare Building	9,237	\$245,699	\$26.60
Judicial Center	10,150	\$270,535	\$26.65
K. Leroy Irvis Office Building	8,692	\$231,250	\$26.61
Keystone Building	35,446	\$968,543	\$27.32
Labor & Industry Building	9,892	\$260,396	\$26.32
North Office Building	9,397	\$250,015	\$26.61
State Museum	13,246	\$348,404	\$26.30
Complex Buildings Total	144,845	\$3,866,394	\$26.69
Total	146,248	\$3,902,244	
Weighted Average			\$26.68

¹The Publications Building was removed from this table due to closure and demolition.

²Previously, the Capitol Building, East Wing, K. Leroy Irvis Office, and North Office Buildings were reported in this table as a single usage and cost due to the single-service line that feeds all four facilities.

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 2022–2023 was 11.1% less severe than the previous winter heating season. Accordingly, steam use across DGS buildings decreased when compared to the previous fiscal year. Notable use reductions were observed at the Rachel Carson State Office Building at 57.6% and the Forum/Education Building at 35.9%.

Chart 10. Annual Steam Consumption Trend

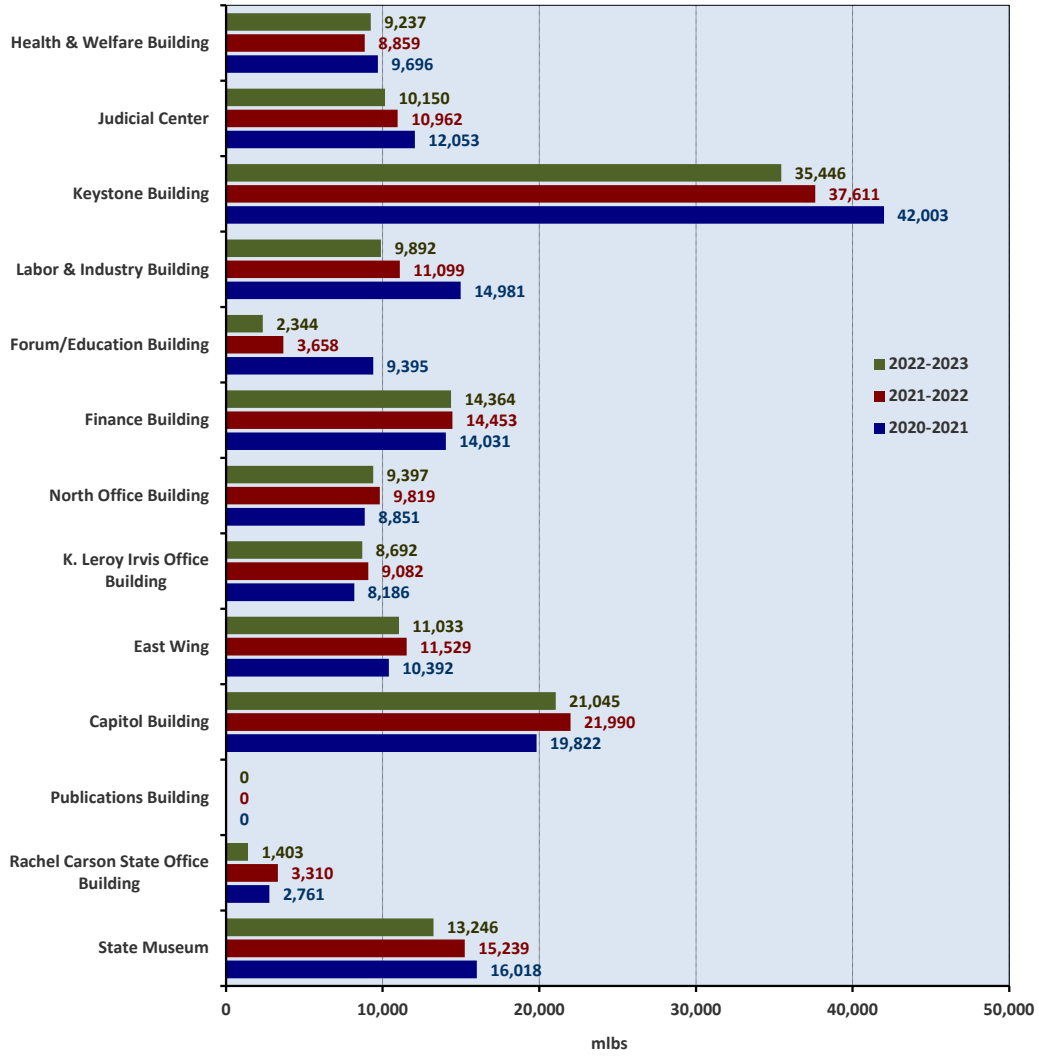
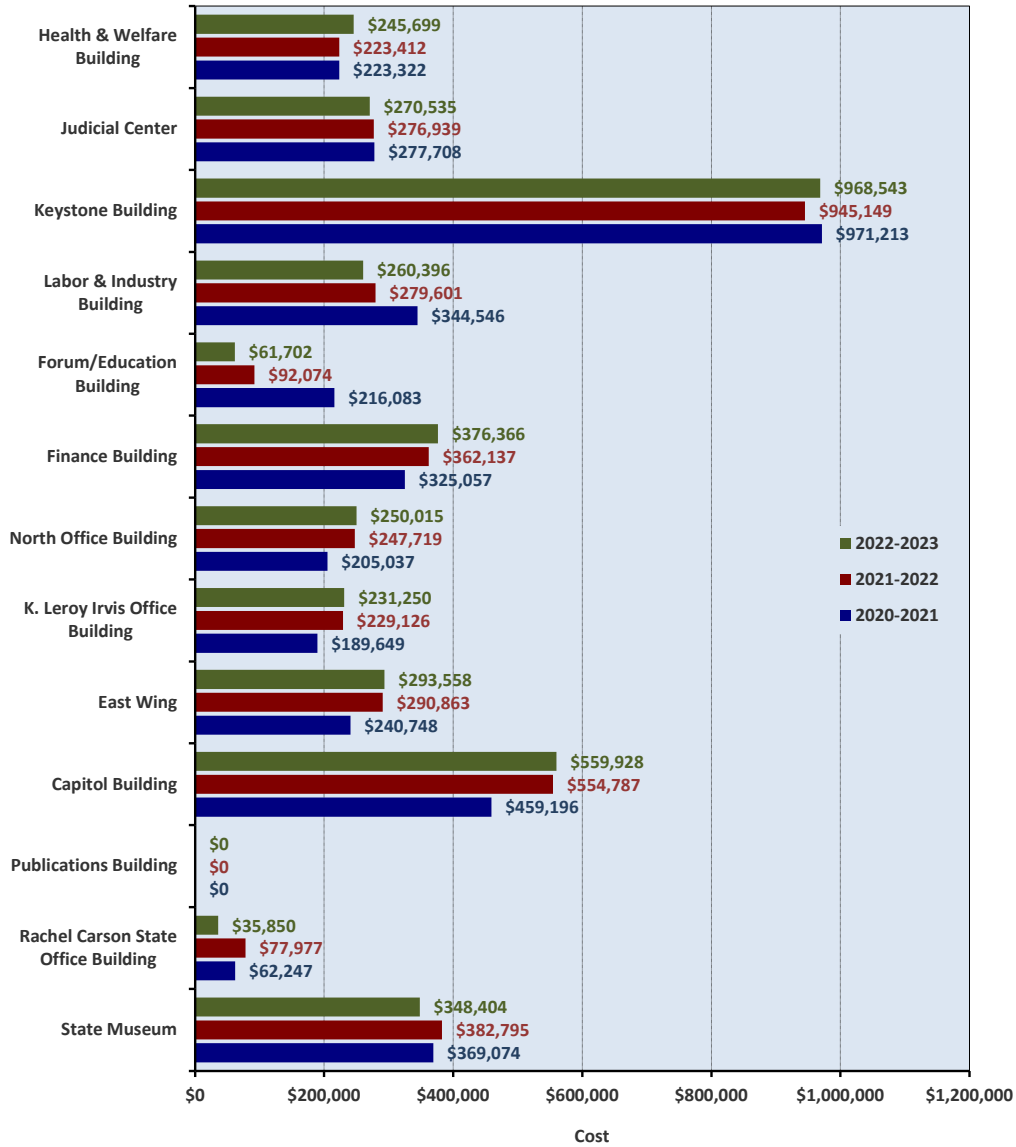


Chart 11. Annual Steam Costs Trend



WATER/SEWER USAGE

Water/sewer consumption, measured in thousand-gallon units (mgal), for DGS facilities during fiscal year was 70,656 mgal at a cost of \$2,287,614. Compared to the previous fiscal year, consumption decreased by 8,382 mgal, down 10.6% while costs increased by \$20,438, up 0.9%. Unit cost, at \$32.38 per mgal, was higher by 12.9% 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 2022–2023

Facility	Utility	mgal	Cost	\$/mgal
Annex Complex	CAPITAL REGION WATER	6,138	\$208,691	\$34.00
Annex Complex	CAPITAL REGION WATER	8,822	\$169,218	\$19.18
Elmerton Ave Warehouse	CAPITAL REGION WATER	37	\$2,987	\$80.73
Forster Street Office Building	CAPITAL REGION WATER	886	\$31,726	\$35.79
Governor's Residence	CAPITAL REGION WATER	---	\$98	---
Governor's Residence	CAPITAL REGION WATER	1,251	\$32,489	\$25.97
Public Works Complex	CAPITAL REGION WATER	210	\$8,732	\$41.59
Public Works Complex	CAPITAL REGION WATER	---	\$22,560	---
Rachel Carson State Office Building	CAPITAL REGION WATER	3,200	\$85,156	\$26.61
Reading State Office Building	READING AREA WATER AUTHORITY	578	\$19,937	\$34.47
Scranton State Office Building	PENNSYLVANIA AMERICAN WATER	745	\$23,736	\$31.84
State Records Center	CAPITAL REGION WATER	273	\$5,252	\$19.24
State Records Center	CAPITAL REGION WATER	---	\$56,688	---
Veterinary Laboratory	CAPITAL REGION WATER	2,625	\$73,172	\$27.87
Veterinary Laboratory	CAPITAL REGION WATER	990	\$33,727	\$34.07
Capitol Complex Buildings				
Capitol Building	CAPITAL REGION WATER	1,075	\$22,897	\$21.30
Capitol Building	CAPITAL REGION WATER	---	\$22,560	---
Capitol Building	CAPITAL REGION WATER	---	\$51	---
Capitol Building	CAPITAL REGION WATER	0	\$56,688	---
Central Plant	CAPITAL REGION WATER	14,209	\$269,968	\$19.00
East Wing	CAPITAL REGION WATER	6	\$56,978	\$9,496.29
East Wing	CAPITAL REGION WATER	1,957	\$77,471	\$39.59
East Wing	CAPITAL REGION WATER	1,097	\$64,810	\$59.11
East Wing	CAPITAL REGION WATER	1,362	\$48,670	\$35.73
East Wing	CAPITAL REGION WATER	81	\$1,545	\$19.07
Finance Building	CAPITAL REGION WATER	328	\$64,349	\$196.23
Finance Building	CAPITAL REGION WATER	14,597	\$280,299	\$19.20
Forum/Education Building	CAPITAL REGION WATER	1,263	\$79,987	\$63.35
Forum/Education Building	CAPITAL REGION WATER	-1,078	-\$20,375	\$18.90
Health & Welfare Building	CAPITAL REGION WATER	175	\$25,929	\$148.16
Health & Welfare Building	CAPITAL REGION WATER	350	\$29,311	\$83.75
Judicial Center	CAPITAL REGION WATER	1,288	\$47,270	\$36.69
K. Leroy Irvis Office Building	CAPITAL REGION WATER	2,232	\$69,978	\$31.35
Keystone Building	CAPITAL REGION WATER	2,060	\$81,944	\$39.78
Keystone Building	CAPITAL REGION WATER	---	\$22,560	---
Keystone Building	CAPITAL REGION WATER	---	\$40,116	---
Labor & Industry Building	CAPITAL REGION WATER	535	\$32,845	\$61.39
Labor & Industry Building	CAPITAL REGION WATER	778	\$37,539	\$48.23
North Office	CAPITAL REGION WATER	343	\$29,160	\$85.01
State Museum	CAPITAL REGION WATER	2,206	\$68,540	\$31.07
State Museum	CAPITAL REGION WATER	23	\$435	\$18.90
Substation	CAPITAL REGION WATER	13	\$1,922	\$147.81
Complex Buildings Total		44,900	\$1,513,445	\$33.71
Total		70,656	\$2,287,614	
Weighted Average				\$32.38

General Note: No water/sewer consumption or costs reported for Northwest Office Building, 1 Technology Park, or 5 Technology Park.

Charts 12 and 13 depict a three-year trend of water/sewer consumption and costs for each facility.

Chart 12. Annual Water/Sewer Consumption Trend

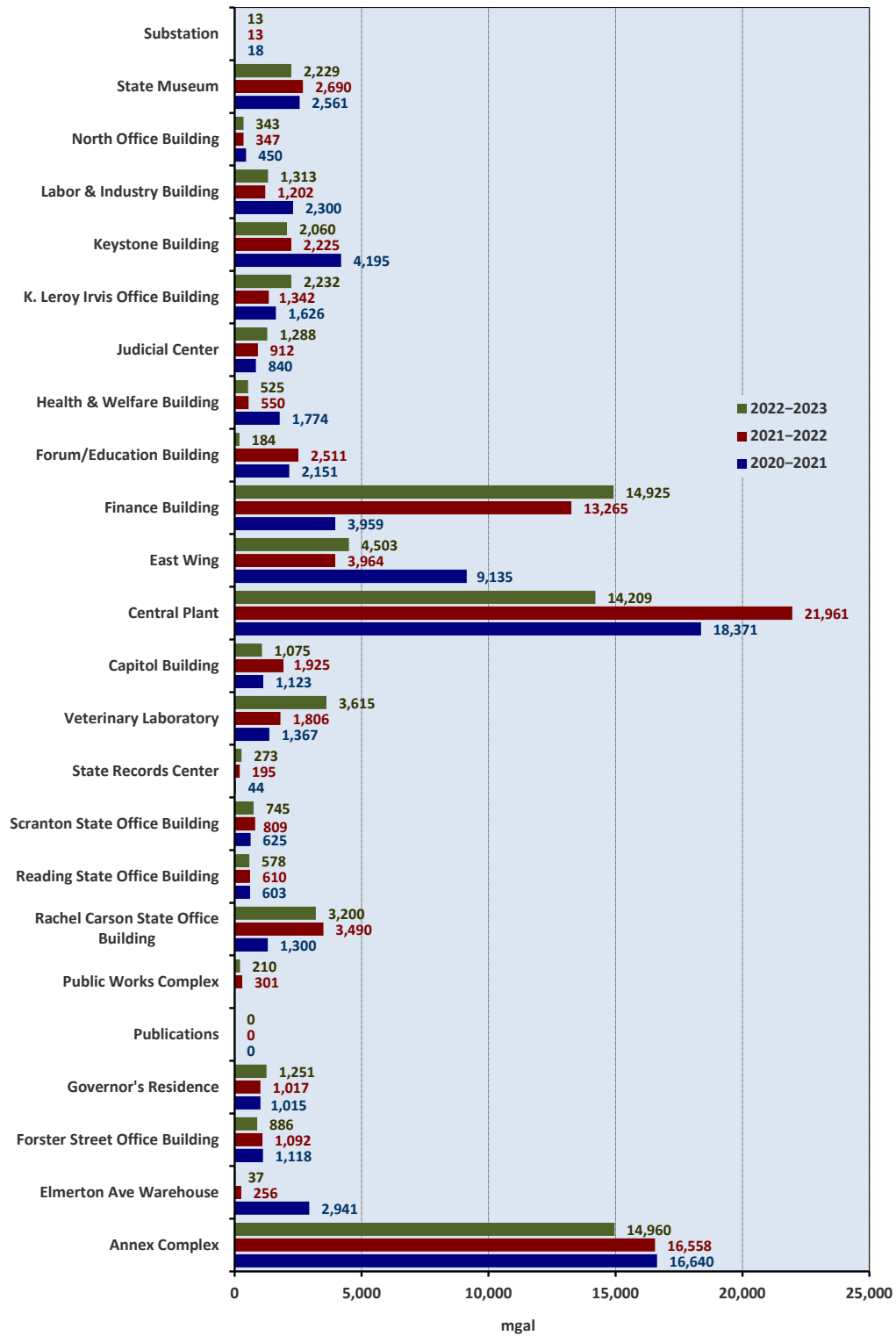


Chart 13. Annual Water/Sewer Costs Trend

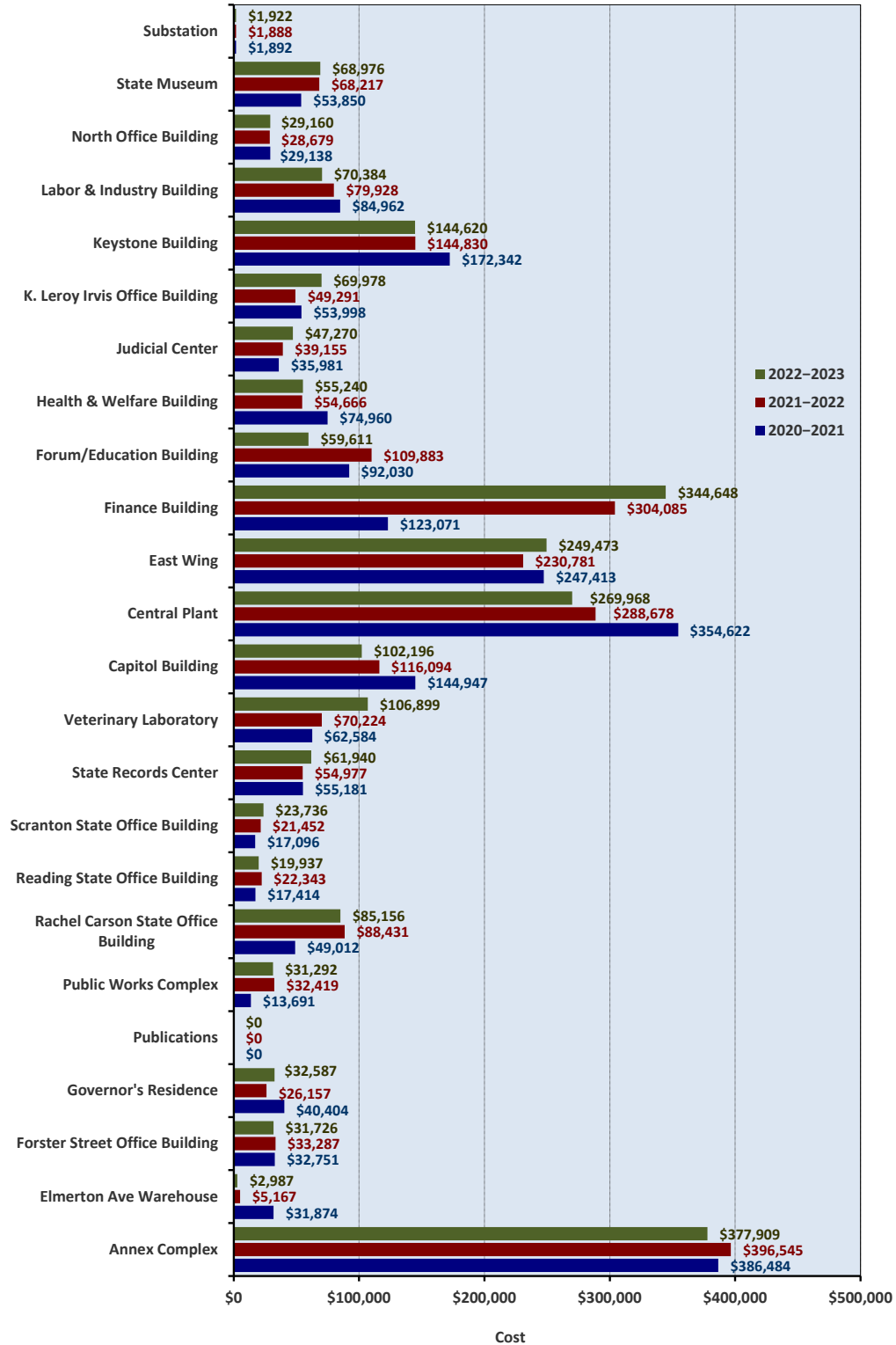


Table 10 shows a four-year history (July 1, 2019 through June 30, 2023) of water/sewer use and cost for each facility.

Consumption for most facilities decreased from the previous fiscal year. Notable usage changes occurred at the Veterinary Laboratory, up 100%, the K. Leroy Irvis Office Building, up 66.4%, the Central Plant, down 35.3%, and the Forum/Education Building, down 92.7%.

Fiscal year 2022–2023 usage and cost reflect 18.6% and 5.7% decreases, respectively, from fiscal year 2019–2020. The average unit cost of water/sewer increased from \$27.95 to \$32.38 per mgal, resulting in a 15.9% increase over the four-year period.

Table 10. Annual Water/Sewer Consumption and Costs Trend

Facility ¹	2019–2020		2020–2021		2021–2022		2022–2023	
	Cost	mgal	Cost	mgal	Cost	mgal	Cost	mgal
Annex Complex	\$378,724	16,698	\$386,484	16,640	\$396,545	16,558	\$377,909	14,960
Elmerton Ave Warehouse	\$17,927	1,603	\$31,874	2,941	\$5,167	256	\$2,987	37
Forster Street Office Building	\$30,767	969	\$32,751	1,118	\$33,287	1,092	\$31,726	886
Governor's Residence	\$21,861	693	\$40,404	1,015	\$26,157	1,017	\$32,587	1,251
Publications	\$3,363	4	---	---	---	---	---	---
Public Works Complex	\$32,849	409	\$13,691	-1,328	\$32,419	301	\$31,292	210
Rachel Carson State Office Building	\$66,142	2,690	\$49,012	1,300	\$88,431	3,490	\$85,156	3,200
Reading State Office Building	\$20,039	749	\$17,414	603	\$22,343	610	\$19,937	578
Scranton State Office Building	\$22,020	979	\$17,096	625	\$21,452	809	\$23,736	745
State Records Center	\$58,677	325	\$55,181	44	\$54,977	195	\$61,940	273
Veterinary Laboratory	\$64,834	1,657	\$62,584	1,367	\$70,224	1,806	\$106,899	3,615
Capitol Complex Buildings²								
Capitol Building	\$165,013	2,218	\$144,947	1,123	\$116,094	1,925	\$102,196	1,075
Central Plant	\$473,012	26,348	\$354,622	18,371	\$288,678	21,961	\$269,968	14,209
East Wing	\$248,791	6,063	\$247,413	9,135	\$230,781	3,964	\$249,473	4,503
Finance Building	\$110,106	3,231	\$123,071	3,959	\$304,085	13,265	\$344,648	14,925
Forum/Education Building	\$109,735	3,089	\$92,030	2,151	\$109,883	2,511	\$59,611	184
Health & Welfare Building	\$82,239	2,356	\$74,960	1,774	\$54,666	550	\$55,240	525
Judicial Center	\$40,204	1,150	\$35,981	840	\$39,155	912	\$47,270	1,288
K. Leroy Irvis Office Building	\$47,954	1,475	\$53,998	1,626	\$49,291	1,342	\$69,978	2,232
Keystone Building	\$237,763	7,620	\$172,342	4,195	\$144,830	2,225	\$144,620	2,060
Labor & Industry Building	\$92,845	3,030	\$84,962	2,300	\$79,928	1,202	\$70,384	1,313
North Office Building	\$29,801	530	\$29,138	450	\$28,679	347	\$29,160	343
State Museum	\$37,957	1,911	\$53,850	2,561	\$68,217	2,690	\$68,976	2,229
Substation	\$1,924	22	\$1,892	18	\$1,888	13	\$1,922	13
Complex Buildings Total	\$1,677,343	59,044	\$1,469,206	48,503	\$1,516,175	52,905	\$1,513,445	44,900
Total	\$2,425,067	86,774	\$2,203,969	73,492	\$2,267,176	79,038	\$2,287,614	70,656
Percent Change			-9.1%	-15.3%	2.9%	7.5%	0.9%	-10.6%

¹ Water usage and cost previously reported for the Agriculture Building has been corrected and incorporated into the Veterinary Laboratory.

² Water usage and cost previously reported for two accounts under the Capitol Building have been transitioned to the East Wing and corrected in the historical data.

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 during a period of historically significant volatility in the energy markets:

- Employed an array of electricity and natural gas procurement product types to balance energy price risk with energy market opportunities while retaining a measure of predictability.
- Strategically balanced the Commonwealth standard 10% swing with full-plant-requirements products for applicable 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 variable gas usage from year to year, 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 adherence to supplier contract term length, 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 transition to utility pipeline natural gas or mobile compressed natural gas (CNG) as a primary fuel.

ELECTRICITY

TAKING ADVANTAGE OF CURRENT ENERGY MARKETS

During fiscal year 2022–2023, 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.

Energy market pricing during the fiscal year encountered a fundamental shift from a backwardated¹ pattern, where the market prices for each successive year in the future are progressively lower than the year before, to a contango pattern, where prices increase for each successive year in the future. Due to the shift, longer-term pricing was higher than shorter-term pricing, making 12- and 24-month prices more attractive than 36- and 48-month prices.

ELECTRICITY PROCUREMENT

Under the direction of the DGS Bureau of Procurement, PSFEI administered nine procurement events during the fiscal year. Contracts were awarded for 5,558 Commonwealth and COSTARS electricity accounts using the Energy Risk Management Application (ERMA), PSFEI’s web-based procurement platform. The net result was an increase in projected electricity expenses of over \$3.6 million when compared to previous contract rates. The awarded contracts were estimated to be over \$16.6 million lower than the utility price. In some cases, fixed-price contracts with a negative avoided cost were awarded for large accounts to reduce the risk associated with unpredictable and volatile hourly pricing. Procurement results are provided in Table 11.

The Pennsylvania Project to Utilize Light and Solar Energy (PA PULSE) contract started on January 1, 2023. Through this contract, Constellation Energy provides 361,000 megawatt-hours (MWh) of Pennsylvania-generated solar electricity that serves 431 accounts that comprise 50% of the Commonwealth’s electricity consumption through June 30, 2039.

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

Table 11. Avoided Cost for Electricity Procurement 2022–2023

Agency	Number of Accounts	Cost Reduction (Annual)	Cost Avoidance (Annual)	Cost Avoidance (Total) ¹
COSTARS	226	(\$258,487)	\$306,101	\$585,950
Department of Agriculture	4	(\$5,676)	\$4,659	\$13,976
Department of Conservation and Natural Resources	563	(\$205,608)	\$314,302	\$1,142,942
Department of Corrections	100	\$363,786	(\$61,199)	(\$39,733)
Department of Environmental Protection	98	(\$80,910)	\$69,188	\$207,513
Department of Human Services	35	\$230,609	(\$24,384)	(\$26,732)
Department of Military and Veterans Affairs	109	(\$531,617)	\$264,888	\$812,536
Department of Revenue	1	\$116,646	(\$4,964)	(\$4,964)
Fish and Boat Commission	39	(\$112,938)	\$72,204	\$198,786
Pennsylvania Historical Museum Commission	91	(\$142,242)	\$169,413	\$565,426
Pennsylvania Department of Transportation	2,657	(\$1,777,677)	\$1,651,903	\$5,448,638
Pennsylvania Emergency Management Agency	4	(\$17,594)	\$12,949	\$38,846
Pennsylvania Game Commission	118	(\$51,424)	\$49,603	\$148,565
Pennsylvania Higher Education Assistance Agency	12	\$304,917	(\$53,730)	(\$187,036)
Pennsylvania House of Representatives	1	\$87,723	(\$29,254)	(\$87,761)
Pennsylvania Housing Finance Agency ²	2	---	---	---
Pennsylvania Liquor Control Board	548	(\$765,307)	\$820,850	\$2,552,782
Pennsylvania State Employees Retirement System	1	(\$4,354)	\$11,016	\$11,016
Pennsylvania State Police	237	(\$540,814)	\$482,241	\$1,470,275
Pennsylvania State Senate	21	\$51,427	(\$12,827)	(\$44,655)
Pennsylvania State System of Higher Education	212	(\$240,803)	\$242,133	\$527,796
Pennsylvania Turnpike Commission	284	\$29,212	\$1,315,809	\$3,120,240
Unidentified Accounts	195	(\$66,520)	\$78,510	\$235,529
Grand Total	5,558	(\$3,617,652)	\$5,679,411	\$16,689,935

¹Some contracts awarded were less than or greater than one year.

²Accounts awarded were unmetered and reported no usage, therefore cost avoidance could not be calculated.

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. Sixty-nine contracts were awarded resulting in a projected annual avoided cost of over \$482,000 when compared to utility retail tariff rates. Anticipated price increases in comparison to previous contracts are estimated to be over \$152,000 annually. Projected cost avoidance by agency is shown in Table 12.

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

Table 12. Avoided Costs for Natural Gas Procurement 2022–2023

Agency	Number of Accounts	Cost Reduction (Annual)	Cost Avoidance (Annual)	Cost Avoidance (Total)¹
Department of Agriculture	4	(\$33,812)	\$31,667	\$63,333
Department of Corrections	2	\$64,152	\$108,549	\$108,549
Department of General Services ²	1	---	\$731	\$1,463
Department of Military and Veterans Affairs	56	(\$177,334)	\$251,745	\$534,877
Pennsylvania Emergency Management Agency	2	(\$4,648)	\$16,689	\$33,378
Pennsylvania Historical Museum Commission ²	1	---	\$70,710	\$106,065
Pennsylvania House of Representatives	1	(\$592)	\$1,485	\$2,970
Pennsylvania State Senate	2	(\$548)	\$812	\$1,624
Total	69	(\$152,782)	\$482,387	\$852,258

¹Accounts for multi-year contracts.

²Accounts were on tariff and not previously shopped; there are no contracts for comparison.

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

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

YEAR 5 REPORT OF ENERGY SAVINGS


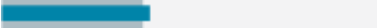
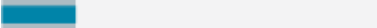
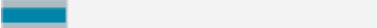
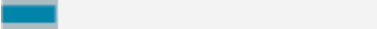
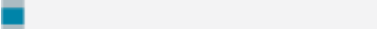
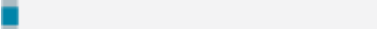
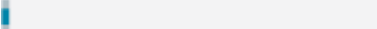
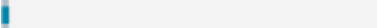
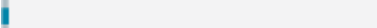
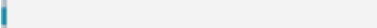
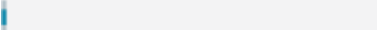
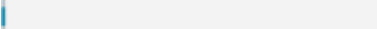
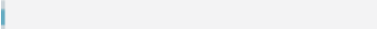
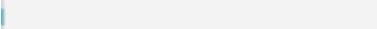
On January 8, 2019, Pennsylvania Governor Tom Wolf issued Executive Order 2019-01, *Commonwealth Leadership in Addressing Climate Change and Promoting Energy Conservation and Sustainable Governance*. A primary goal of the executive order is to reduce overall Commonwealth energy consumption by 3% per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

The Year 5 report of energy savings includes only those meters where a fair comparison of baseline fiscal year 2021–2022 usage with fiscal year 2022–2023 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 5 details by agency are provided in Table 13.

The result of the analysis for Year 5 indicates a combined 1.7% decrease in energy consumption from Commonwealth agencies. A total of 7,974, or 95%, of the 8,329 known meters passed the validation criteria previously mentioned to produce these results. From those 7,974 meters, normalized energy consumption for the 2021–2022 baseline fiscal year was calculated to be 4,821,965 MMBtu. Actual energy consumption for fiscal year 2022–2023 was down 83,581 MMBtu, or 1.7%.

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 5 Report of Energy Savings

State Reporting Agency	Normalized Use (MMBtu)	# Known Meter Count	% of Meters Reported	FY 2022 Baseline MMBtus	FY 2023 Current MMBtus	Change in Energy Usage	Change in CO2 Metric Tons
Dept of Corrections		294	93%	2,035,368	1,931,613	-5.1%	(8,155)
Dept of Health and Human Services		85	100%	959,770	1,009,002	5.1%	1,749
Dept of Military and Veterans Affairs		816	94%	501,197	502,227	0.2%	1,618
Dept of Transportation		3,606	94%	445,245	435,137	-2.3%	(2,994)
Dept of General Services		69	100%	380,604	362,718	-4.7%	(2,057)
PA State Police		547	89%	150,254	146,887	-2.2%	(369)
Dept of Conservation and Natural Resources		1,938	98%	106,437	109,099	2.5%	88
Dept of Labor and Industry		10	70%	50,152	47,767	-4.8%	(796)
Dept of Agriculture		13	100%	45,043	47,397	5.2%	742
PA Fish and Boat Commission		94	99%	43,474	46,643	7.3%	77
Dept of Environmental Protection		124	97%	31,981	27,813	-13.0%	22
PA Historical and Museum Commission		130	96%	27,952	27,813	-0.5%	(509)
PA Emergency Management Agency		14	100%	21,011	21,400	1.9%	(10)
Dept of Revenue		5	100%	13,629	13,133	-3.6%	227
PA Game Commission		229	96%	9,848	9,735	-1.1%	(290)
Total		7,974	95%	4,821,965	4,738,384	-1.7%	(10,657)

ENERGY SERVICES

GENERAL

Since 1998, PSFEI has helped Commonwealth facilities avoid over \$286 million in energy expenditures via competitive bidding in the electricity and natural gas commodity markets. During fiscal year 2022–2023, total contract avoided energy costs were approximately \$6.16 million.

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. Efforts during the fiscal year focused on minor adjustments and bulk change operations.

PJM DEMAND RESPONSE PROGRAM AND PLC MANAGEMENT SERVICES

PSFEI supported Commonwealth agencies with the PJM Emergency Demand Response Program by soliciting Curtailment Service Providers (CSPs) 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 administered by PSFEI. Because the LCSWMA agreement uses 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 PPA was executed between the Commonwealth and the Pennsylvania Borough of Columbia (Borough). The PPA enabled the sale of the Harrisburg incinerator to the 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. During the fiscal year, DGS and LCSWMA negotiated an amendment to the PPA contract that exchanged the removal of the clawback provision for a flat electric energy rate during the PPA's final ten years, providing stability and predictability for both parties.

There are nineteen electric accounts assigned to the PPA; sixteen accounts are DGS-operated facilities, one account is a Department of Corrections (DOC) facility, one account is a Pennsylvania Emergency Management Agency (PEMA) facility, and, as of May 2023, the new State Archives building of the Pennsylvania Historical Museum Commission became the nineteenth account. Over 88% of the entire

electric load for these accounts was provided by the Borough in fiscal year 2022–2023. 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 2022–2023 for the Commonwealth accounts assigned to this contract. The unit cost for electricity, excluding utility distribution charges, averaged 8.608 cents per kWh.

Table 14. Purchased LCSWMA Electricity Summary 2022–2023

Month	Usage (kWh)	Cost (excluding GRT ¹)	Unit Cost (\$/kWh) (excluding GRT)	Cost (including GRT)	Unit Cost (\$/kWh) (including GRT)
July 2022	10,945,440	\$762,383	\$0.06965	\$809,630	\$0.07397
August 2022	9,820,094	\$466,281	\$0.04748	\$494,921	\$0.05040
September 2022	8,993,666	\$771,101	\$0.08574	\$817,739	\$0.09092
October 2022	7,198,581	\$673,157	\$0.09351	\$714,853	\$0.09930
November 2022	7,797,609	\$658,084	\$0.08440	\$698,861	\$0.08963
December 2022	7,664,973	\$616,152	\$0.08039	\$638,012	\$0.08324
January 2023	8,063,338	\$737,364	\$0.09145	\$781,651	\$0.09694
February 2023	7,515,964	\$525,379	\$0.06990	\$557,868	\$0.07422
March 2023	7,175,703	\$668,940	\$0.09322	\$710,335	\$0.09899
April 2023	7,957,082	\$723,456	\$0.09092	\$768,367	\$0.09656
May 2023	7,685,304	\$723,927	\$0.09420	\$768,849	\$0.10004
June 2023	8,358,791	\$730,927	\$0.08744	\$776,202	\$0.09286
Total / Average	99,176,545	\$8,057,151	\$0.08124	\$8,537,287	\$0.08608

ENGINEERING SERVICES

During fiscal year 2022–2023, 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. In addition to electrical services, PSFEI provided review and comments on new building technologies as well as significant support for energy service performance contracts through the Guaranteed Energy Savings Act (GESA) program administered by DGS. A list of reports issued to document these efforts is provided in Table 15 on the following page.

Table 15. Engineering Services Reports 2022–2023

Report No.	Report Date	Location	Comments
GN 2223-1 DGS CEN	07/14/22	Central Plant	Technology Review ACT Heat Pipe Heat Recovery Systems
ME-E 22/23-5 DGS CEN	08/04/22	Central Plant	Fire System Standpipes
22-23.0057.DGS.CEN.01.GS	08/16/22	Reading and Scranton State Office Buildings	GESA Project Scoping Visits
22-23.0056.DGS.CAP.04.ME	08/31/22	Capitol Complex	Cooling Tower Debris Screens
22-23.0057.DGS.CEN.02.GS	09/12/22	Reading and Scranton State Office Buildings	Northwest Office Building Scoping
22-23.0056.DGS.CAP.05.ME	09/27/22	Capitol Complex	Cooling Tower Safety Issue
22-23.0056.DGS.CAP.06.ME	09/27/22	Capitol Complex	Cooling Tower Safety Issue
22-23.0159.DGS.CEN.01.EL	11/01/22	Agriculture Building	Greenhouse 3 Transformer Testing
22-23.0102.DGS.RAC.01.EL	11/01/22	Rachel Carson Building	Switchgear Preventative Maintenance and Testing
22-23.0155.DGS.CP.01.ME	11/09/22	Capitol Complex	Central Plant Modular Chiller Issues
22-23.0055.DGS.CEN.01.GS	11/14/22	DCNR East	GESA DCNR East RFQ Review
22-23.0103.DGS.L&I.01.EL	02/08/23	Labor and Industry Building	Switchgear Preventative Maintenance and Testing
22-23.0056.DGS.CAP.07.ME	03/08/23	Capitol Complex	Cooling Tower Safety Issue
22-23.0199.DGS.CP.01.EL	03/20/23	DGS Central Plant	Switchgear Preventative Maintenance and Testing
22-23.0104.DGS.FIN.01.EL	04/18/23	Finance Building	Switchgear Preventative Maintenance and Testing
22-23.0047.DGS.CAP.01.EL	04/20/23	Capitol Complex	Bus Duct Survey
22-23.0155.DGS.CP.02.ME	05/15/23	Capitol Complex	Modular Chiller Issues Progress Report
22-23.0259.DGS.KEY.01.EN	06/07/23	Keystone Building	Energy Performance Target Setting for Keystone Building
22-23.0106.DGS.H&W.01.EL	06/14/23	Health and Welfare Building	Switchgear Preventative Maintenance and Testing

GUARANTEED ENERGY SAVINGS ACT PROGRAM

Over the past several years, the Commonwealth’s GESA program has grown in the quantity of projects and the quality of services. Seventeen projects totaling over \$255 million have resulted in almost \$12.4 million in annual energy savings. Charts 14 and 15 show breakouts of GESA project annual savings and investments by each Commonwealth agency.

As shown in Chart 16, three GESA projects are complete and fifteen GESA projects are in various stages of development. In addition to creating Pennsylvania jobs that support the economy, there are resulting environmental benefits from GESA project implementation. Using the total estimated project savings, Chart 17 shows examples of the environmental impacts using total emissions reductions. Table 16 provides an overview of the eighteen 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 14. GESA Projects Annual Savings

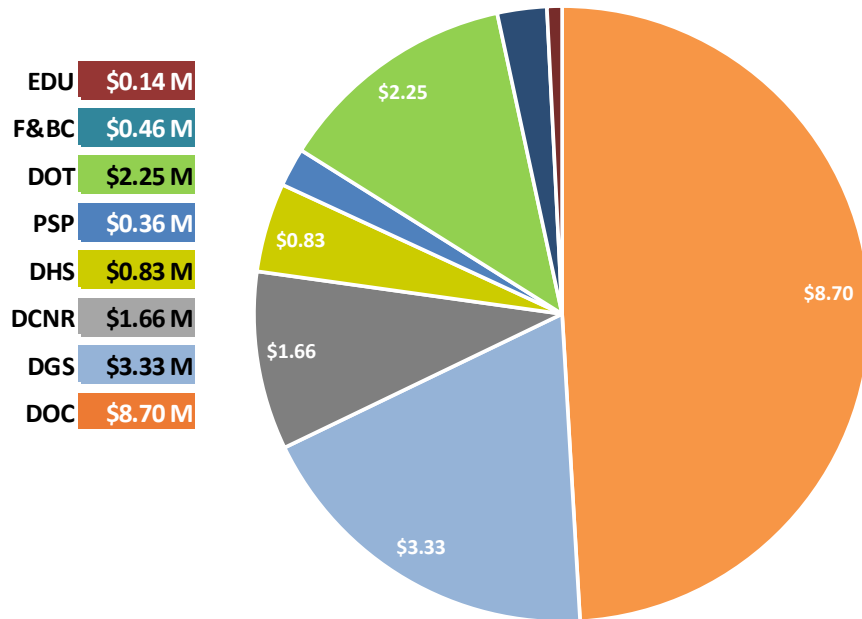


Chart 15. GESA Projects Investment

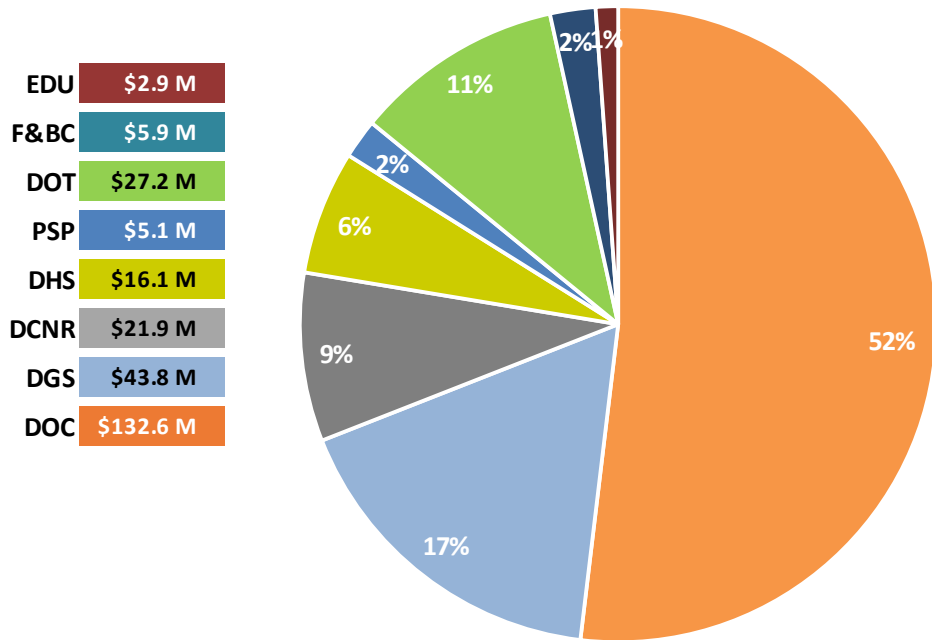


Chart 16. GESA Projects Development Status

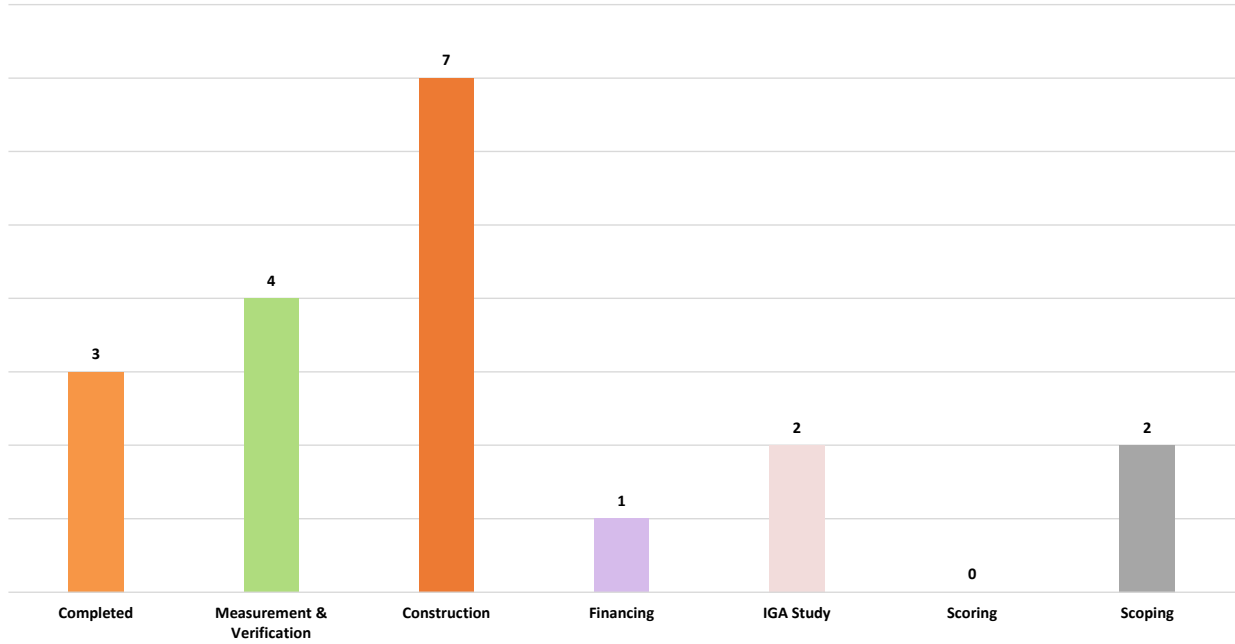


Chart 17. GESA Projects Environmental Benefit Examples

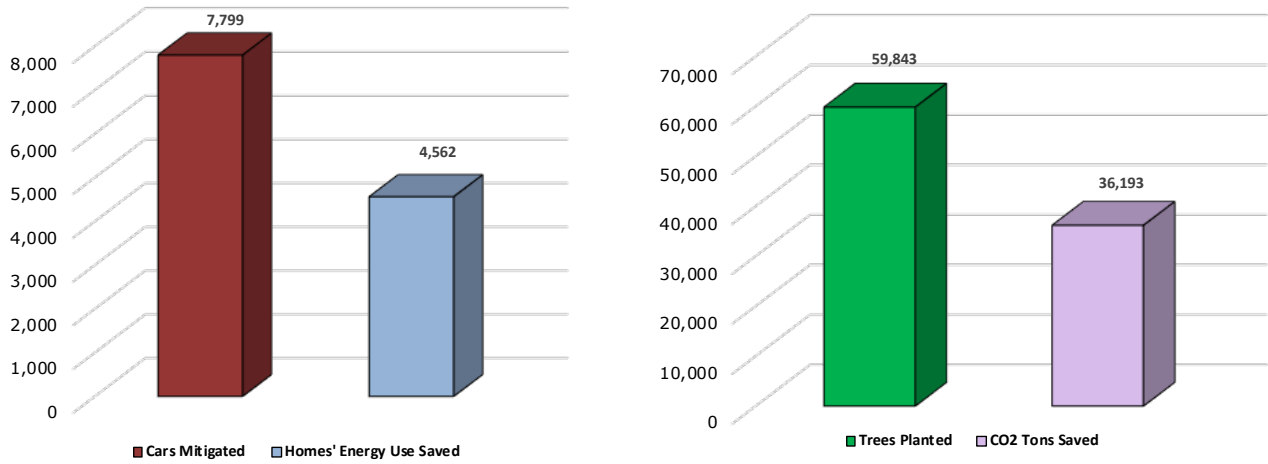


Table 16. GESA Projects Delivery and Savings Summary

Agency	Location	Energy Conservation Measures (ECMs)	Status	Value (M)	Annual Energy Cost Savings ¹	Cars Mitigated	Trees Planted	Home Energy Use Saved	CO2 Tons Saved
DOC	SCI Dallas	Lighting, water, boiler & sewage	Completed	\$20.00	\$2,126,256	326	2,505	191	1,515
PSP	Harrisburg Headquarters	Lighting, water & boiler	Completed	\$5.10	\$276,829	545	4,182	319	2,530
DGS	Keystone Building	Lighting & controls	Completed	\$3.00	\$329,677	367	2,816	215	1,703
ED	Thaddeus Stevens College	Lighting, controls, steam	Measurement & Verification	\$2.70	\$129,894	157	1,207	92	730
DCNR	West Region, Parks & Forests	Lighting & HVAC systems, building envelope	Measurement & Verification	\$5.50	\$340,851	439	3,370	257	2,038
DHS	Selinsgrove Center	Lighting, water, boilers & weatherization	Measurement & Verification	\$5.60	\$253,415	290	2,228	170	1,347
DGS	Capitol Complex	Lighting, window film, water systems, chillers	Measurement & Verification	\$18.20	\$1,162,511	1,375	10,550	804	6,381
DOC	SCI Muncy	Lighting, solar, steam traps, windows, AC, EMS s	Construction	\$18.30	\$517,178	424	3,250	248	1,966
DOC	SCI Houtzdale	Lighting, water, HVAC	Construction	\$30.50	\$1,170,814	656	5,031	383	3,043
DCNR	Central Region, Parks & Forests	Lighting, solar, sludge, BMS, electric to gas, geothermal	Construction	\$16.40	\$642,647	657	5,037	384	3,046
DOT	Districts 8 & 3	Lighting, weatherization, water conservation, BAS upgrades, fuel switches on HWH, steam traps	Construction	\$27.14	\$610,258	869	6,667	508	4,032
DGS	DGS Capitol Complex 2	Lighting, weatherization, BAS upgrades, HVAC upgrades/fuel switches, geothermal	Construction	\$22.60	\$755,727	883	6,776	516	4,098
FBC	Hatchery Facilities State-Wide	Lighting, weatherization, HVAC upgrades/fuel switches, water filtration & recovery	Construction	\$5.90	\$229,423	273	2,095	160	1,267
DOC	SCI Fayette	Lighting, BAS, chiller, boiler, water conservation	Construction	\$38.80	\$3,483,086	266	2,042	156	1,235
DOC	SCI Frackville	Steam, steam traps, lighting, BAS, chiller, water conservation	Investment Grade Audit	\$25.00	TBD	TBD	TBD	TBD	TBD
DHS	Wernersville State Hospital	Lighting, controls, weatherization, steam traps, condensate, windows, boiler fuel switch	Financing	\$10.50	\$362,509	272	2,087	159	1,262
DCNR	Eastern Region, State Parks & Forests	TBD	Investment Grade Audit	TBD	TBD	TBD	TBD	TBD	TBD
DGS	Reading, Scranton, Harrisburg	TBD	RFQ	TBD	TBD	TBD	TBD	TBD	TBD
DOC	SCI Mercer	TBD	RFQ	TBD	TBD	TBD	TBD	TBD	TBD
Total				\$255.24	\$12,391,075	7,799	59,843	4,562	36,193

¹Annual Energy Cost Savings and the Environmental Benefits are estimated.

In concert with the DGS Energy Resource Management Office, PSFEI advised on numerous GESA projects that included the following services:

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

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 to DGS for the following three GESA projects:

- Department of Conservation and Natural Resources—GESA 2022-1 (DCNR East)
- Department of General Services—GESA 2019-2 (Capitol Complex Phase 2)
- Department of General Services—GESA 2023-1 (Reading and Scranton Office Buildings)

Continued support for the following GESA projects was provided via PSFEI's contracts with the respective agencies:

- Department of Corrections—GESA 2017-2 (SCI Muncy)
- Department of Corrections—GESA 2018-1 (SCI Houtzdale)
- Department of Corrections—GESA 2020-1 (SCI Fayette)
- Department of Corrections—GESA 2021-1 (SCI Frackville)
- Department of Human Services—GESA 2021-2 (Wernersville State Hospital)
- Pennsylvania Department of Transportation—GESA 2019-1

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

SUMMARY OF SERVICES BY QUARTER

This section summarizes the services provided by PSFEI throughout the fiscal year. It is organized by quarter and type of support service: Energy Procurement, Energy Procurement—Solar, EnergyCAP, Engineering Services, GreenGov Council, and GESA.

FIRST QUARTER—JULY 1, 2022 TO SEPTEMBER 30, 2022

ENERGY ADVISORY SERVICES

Administered Request for Quote (RFQ) DGS 22-01 for the sale of Tier 1 Renewable Energy Certificates (RECs) for State Correctional Institute (SCI) Laurel Highlands. Through this solicitation, 16,825 RECs were sold for a total value of \$376,924.

ENERGY PROCUREMENT—SOLAR

Attended a virtual meeting with DGS personnel on August 29 to discuss the PA PULSE project.

Attended a virtual meeting with DGS personnel on September 8 to discuss PSFEI recommendations regarding the PA PULSE regulatory change request by Constellation Energy.

Attended a virtual meeting with DGS and Constellation Energy on September 9 regarding a regulatory change request.

Hosted a virtual meeting with DGS personnel on September 14 to review the PA PULSE regulatory change request.

Attended a meeting at Fort Indiantown Gap with DGS and Department of Military and Veterans Affairs (DMVA) personnel to discuss the PA PULSE project and the DMVA accounts included in the project.

ENERGYCAP

Processed electronic data interchange (EDI) and Bill CAPture kickouts on an ongoing basis and updated EnergyCAP configurations including meter and account creation for new accounts from all Commonwealth agencies.

Provided support and continued efforts throughout the quarter for the following ongoing projects:

- Production of Executive Quarterly Reports for Commonwealth agencies.
- Entry and tracking of electric vehicle (EV) charging station information for the Pennsylvania Department of Transportation (PennDOT).
- Creation of meter and account groups for the PA PULSE facilities.

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

- July
 - Participated in discussions with EnergyCAP and title regarding the Pennsylvania Power and Light (PPL) and American PowerNet (APN) bills. The cost from the PPL bills is not allocated correctly.
 - Hosted one training session for Department of Conservation and Natural Resources (DCNR) personnel.
 - Hosted a support session for DOC personnel to correct missing bills.
 - Participated in two EnergyCAP Program Plan meetings with the GreenGov Council.
- August
 - Reviewed and investigated abnormally high bills for the Pennsylvania Department of Environmental Protection (PADEP). The review determined that the high bills were a result of replacement electricity contracts due to the bankruptcy proceedings and electricity supply contract cancellations of electricity generation supplier Talen Energy.
 - Continued efforts with the Pennsylvania Liquor Control Board (PLCB) to build out a physical and financial hierarchy, and to process entries of water and sewer bills.
 - Participated in three EnergyCAP Program Plan meetings with the GreenGov Council.
- September
 - Continued data integrity investigation for the GreenGov Annual Report by identifying missing bills for each Commonwealth agency.
 - Continued efforts with PLCB to populate a physical and financial hierarchy.
 - Hosted several blended agency Dashboard Training sessions.
 - Hosted several Basic EnergyCAP Training sessions.
 - Participated in two EnergyCAP Program Plan meetings with the GreenGov Council.
 - Prepared and distributed Agency Quarterly Reports.
 - Assisted PADEP with the development of an agency-level dashboard.

ENGINEERING SERVICES

Responded to a request to provide reference material for EUI sources to the Director of Energy and Resource Management on July 21.

Started a review of the Capitol Complex cooling tower drawings on August 8 relative to an issue regarding safety concerns. Coordinated with the DGS Chief of the HVAC Division to obtain drawings and arrange a site visit for August 12 to review existing conditions with DGS personnel. Site visit observations and options to address the safety issues were provided in *PSFEI Report 22-23.0056.DGS.CAP.04.ME.Cooling Tower Debris Screens* issued August 31. Attended a meeting on September 15 with DGS personnel to discuss findings and potential solutions based on the August 12 visit. The results of the meeting were documented in *PSFEI Report 22-23.0056.DGS.CAP.05.ME.Cooling Tower Safety Issue*

issued September 27. Preliminary screen system concept drawings were provided September 27 via *PSFEI Report 22-23.0056.DGS.CAP.06.ME.Cooling Tower Safety Issue*. This effort is ongoing.

Researched fire sprinkler corrosion causes and prevention at the request of the Director of Energy and Resource Management. Findings were provided in *PSFEI Report ME-E 22/23-5* issued August 4.

Electrical Testing and Maintenance

- No activities requested this quarter.

Technology Reviews

- Completed a review of Advanced Cooling Technologies (ACT) Heat Pipe technology at the request of the Director of Energy and Resource Management. Finalized research of comparable technologies from other manufacturers and issued *PSFEI Report GN 22/23-1* on July 14 to summarize findings.

Training

- No activities requested this quarter.

GREENGOV COUNCIL

Supported efforts with DGS, the GreenGov Council, and DOC regarding the GreenGov Council's Energy Management System (EnMS) pilot program for SCI Phoenix. Attended a kickoff meeting on August 3 and continued to communicate via email. This effort is ongoing.

Continued efforts with DGS and the GreenGov Council to assist with development and review of the EnMS pilot program for the Rachel Carson State Office Building. Attended a progress meeting on August 31 and continued to communicate via email. This effort is ongoing.

Attended the GreenGov Council Fall All-Agency Meeting on September 7.

Attended the GreenGov Focus Group—Utility Management meeting on September 20.

Provided support for the following virtual meetings:

- Produced various reports in preparation for various focus group and all-agency meetings throughout the quarter.
- Attended weekly status meetings regarding EnergyCAP education and outreach efforts, kickout resolutions, data integrity efforts, and process improvements.

GUARANTEED ENERGY SAVINGS ACT

Reading and Scranton State Office Buildings

- Performed scoping audit activities for a potential GESA project at the Reading and Scranton State Office Buildings. The effort included site visits to the Reading State Office Building on July 25 and

Scranton State Office Building on August 3, reviewing building design documents, analyzing utility data, assembling and transmitting EnergyCAP utility data, and developing site observations and potential scopes of work as detailed in *PSFEI Report 22-23.0057.DGS.CEN.01.GS.Reading/Scranton SOB Scoping* issued August 16. PSFEI representatives met with the DGS energy engineer on August 12 to discuss findings, recommendations, and preferred options.

Northwest Office Building

- Attended a scoping visit on August 29 at the Northwest Office Building, which was added to the scope of the potential Reading/Scranton State Office Building GESA project. *PSFEI Report 22-23.0057.DGS.CEN.02.GS NW Office Bldg Scoping* issued September 12 detailed this effort. EnergyCAP utility data for the Northwest Office Building was provided to DGS on September 12.

DCNR East

- Discussed the GESA proposal review process and potential services that can be provided by PSFEI with the Director of Energy and Resource Management on August 29 regarding the RFQ for the 2022-1 DCNR East GESA project. Began reviewing the ESCos proposals on September 30.

Capitol Complex Phase 2

- Attended GESA construction meetings on July 14 and September 22.

Provided continued GESA support for the following agencies and facilities:

- Department of Human Services (DHS)
 - Selinsgrove
 - Wernersville
- DOC
 - SCI Fayette
 - SCI Frackville
 - SCI Houtzdale
 - SCI Huntingdon, legacy GESA contract resolution
 - SCI Laurel Highlands, legacy GESA project
 - SCI Muncy
- PennDOT
 - Communicated with the Director of Energy and Resource Management on September 28 via email to discuss the use of federal funds within a GESA project for solar and renewable energy technologies.

ENERGY ADVISORY SERVICES

Attended a virtual meeting with DGS and LCSWMA personnel on October 5 to discuss personnel changes and the Intergovernmental PPA.

Administered the DGS/PSFEI Bi-Monthly meeting on October 11 at the North Office Building.

Attended a virtual meeting with DGS and DCNR personnel on December 21 to address concerns with renewable energy development.

Administered the following Requests for Quotes:

- RFQ DGS 22-03 for the new State Archives Building natural gas account on October 25. Through this solicitation, a savings of \$106,065 is projected when compared to the utility rate over the lifetime of the awarded contract.
- RFQ DGS 22-04 for COSTARS member electricity accounts on October 4. Through this solicitation, two accounts were awarded. Due to the large size of the accounts, a utility-issued price to compare did not exist, so no projection of savings in comparison to the utility price was determined.
- RFQ DGS 22-05 for COSTARS member electricity accounts on November 1. Through this solicitation, 54 accounts were awarded, representing a projected savings of \$101,793 over the lifetime of the awarded contracts.
- RFQ DGS 22-06 for COSTARS member electricity accounts on November 9. Although no contracts were awarded through this solicitation, this represented the first time that traditional power sources were solicited in concert with renewable power sources for COSTARS members.
- RFQ DGS 22-07 for Commonwealth electricity accounts on December 7. Through this solicitation, 4,046 accounts were awarded. While electricity costs are expected to rise approximately \$11.1 million over the lifetime of the awarded contracts, a savings of \$10.6 million is projected when compared to the utility rates over the lifetime of the awarded contracts.
- RFQ DGS 22-08 for COSTARS member electricity accounts on December 14. Through this solicitation, 137 accounts were awarded, representing a projected savings of \$328,240 over the lifetime of the awarded contracts.
- RFQ DGS 22-09 for Commonwealth electricity accounts on December 20. Through this solicitation, 1,034 accounts were awarded. While electricity costs are expected to rise approximately \$3.3 million over the lifetime of the awarded contracts, a savings of \$4.7 million is projected when compared to the utility rates over the lifetime of the awarded contracts.

ENERGY PROCUREMENT—SOLAR

Provided the following support for the PA PULSE agreement:

- Analyzed Constellation Energy’s change-in-law request with respect to the agreement and provided recommendations and findings in an email to the DGS Energy Supply Administrator on October 20.
- Hosted a follow-up virtual meeting with DGS personnel on October 20 to discuss vendor-requested amendments to the agreement.
- Attended a meeting with DGS and Constellation Energy personnel on October 25 regarding requested amendments to the agreement.
- Attended a virtual meeting with DGS and Constellation Energy personnel on November 2 regarding requested amendments to the agreement.
- Developed a fixed-price lock strategy with respect to the agreement and summarized recommendations in an email to the DGS Energy Supply Administrator on December 1.
- Hosted a virtual meeting with DGS personnel on December 6 regarding vendor-requested amendments to the agreement.

ENERGYCAP

Processed EDI and Bill CAPture kickouts on an ongoing basis and updated EnergyCAP configurations including meter and account creation for new accounts from all Commonwealth agencies.

Provided support and continued efforts throughout the quarter for the following ongoing projects:

- Production of Executive Quarterly Reports for Commonwealth agencies.
- Entry and tracking of EV charging station information for PennDOT.
- Creation of meter and account groups for the PA PULSE facilities.

Provided the following extensive support for Commonwealth EnergyCAP data integrity efforts and ongoing monthly training:

- October
 - Hosted one training session for DCNR personnel.
 - Hosted a support session for DMVA personnel.
 - Participated in EnergyCAP Program Plan meetings with the GreenGov Council.
- November
 - Reviewed and investigated additional abnormally high bills for PADEP.
 - Continued efforts with PLCB to build out a physical and financial hierarchy, and to process entries of water and sewer bills.
 - Hosted one in-person training session for DGS personnel.
 - Continued efforts on meter validation and production of the GreenGov Council annual report data table.
- December
 - Hosted a virtual meeting with DGS personnel regarding calendar year 2023 goals for EnergyCAP.

- Attended various planning and coordination meetings regarding the GreenGov Council annual report data table.
- Hosted one in-person training session for DGS personnel.
- Prepared and distributed the GreenGov Council annual report data table.
- Participated in the GreenGov Utility Management Focus Group meeting.

ENGINEERING SERVICES

Reviewed and filed coal sampling results on December 16 and 17 on behalf of the Coal Committee; no issues were noted.

General

- Provided support for a proposed capital project to install building sub meters for electric, domestic water, chilled water, steam, and natural gas. Efforts included attending a virtual meeting on December 2 to discuss necessary information to be gathered in pursuit of establishing a master meter location and design attributes. Provided a follow-up overview of types and manufacturers of meters, methods of controls communication, recommended reporting methodologies, and data coordination with EnergyCAP. This effort is ongoing.

Electrical Systems

- Performed electrical switchgear preventative maintenance and testing at the Rachel Carson Building. Test results were provided in *PSFEI Report 22-23.0102.DGS.RAC.01.EL.Switchgear PM&T*, issued November 1, 2022.
- Performed transformer testing at the Agriculture Building. Test results were provided in *PSFEI Report 22-23.0159.DGS.CEN.01.EL.Greenhouse 3 Transformer Testing*, issued November 1, 2022.
- Performed electrical switchgear preventative maintenance and testing at the Labor and Industry Building during the week of December 12. Test results will be provided in a forthcoming PSFEI report.

Mechanical Systems

- Provided assistance in investigating the Capitol Complex cooling tower safety issue, which included a review of the adjacent capitol garage tunnel ventilation and fan equipment. Hosted a follow-up virtual meeting with DGS HVAC staff regarding an anticipated cooling tower shutdown to coordinate on-site contractor access. This effort is ongoing.
- Provided a third-party investigation of the Capitol Complex Central Plant modular chiller operational issues. Initial effort consisted of interviews with the DGS Energy Engineer and a site visit on October 26 to survey the modular chillers, as more fully described in *PSFEI Report 22-23.0155.DGS.CP.01.ME.Modular Chiller Site Survey*, issued October 26, 2022. Follow-up efforts consisted of a search for the technical drawings for review, a follow-up site visit on December 21 to retrieve trend data, and requests for additional data. This effort is ongoing.

Technology Reviews

- No activities requested this quarter.

Structural and Building Envelope

- No activities requested this quarter.

Water Systems

- No activities requested this quarter.

Training

- Hosted a coordination meeting on November 18 with DGS personnel to establish topics for the DGS HVAC Technician Training for the 2022–2023 fiscal year. Content outlines, instructor selection, and supporting material selection for instructors is in progress. This effort is ongoing.

GREENGOV COUNCIL

Continued efforts with DGS and the GreenGov Council to assist with development and review of the EnMS pilot program for the Rachel Carson State Office Building. Attended a progress meeting on November 30 and continued to communicate via email. This effort is ongoing.

Attended the GreenGov Focus Group—Construction and Leasing Specs meeting on October 19.

Attended the GreenGov Focus Group—Products and Materials meeting on December 6.

Attended the GreenGov Focus Group—Utility Management meeting on December 20.

Provided support for the following virtual meetings:

- Participated in various discussions with GreenGov Council and DGS personnel regarding quarterly report planning and the GreenGov Council annual report.
- Attended weekly status meetings regarding EnergyCAP education and outreach efforts, kickout resolutions, data integrity efforts, and process improvements.

GUARANTEED ENERGY SAVINGS ACT

Capitol Complex Phase 2

- Attended bi-weekly construction progress meetings.

DCNR

- Reviewed submitted ESCOs proposals and provided commentary prior to the ESCOs interviews consisting of costs, savings, and comparisons of ECMs.

- Attended ESCos interviews and summarized the sessions in *PSFEI Report 22-23.0055.DGS.CEN. 01.GS.GESA 2022-1 DCNR East RFQ Review*, issued November 14, 2022.

THIRD QUARTER—JANUARY 1, 2023 TO MARCH 31, 2023

ENERGY ADVISORY SERVICES

Investigated premature contract termination by MidAmerican Energy and analyzed the financial impact to the affected accounts. This effort is ongoing.

Attended a virtual meeting on January 17 with DGS, LCSWMA personnel, and APN representatives regarding hourly settlement methodology pertaining to the intergovernmental PPA with the Borough.

Attended a virtual meeting on January 20 with DGS and LCSWMA personnel regarding hourly settlement methodology for the intergovernmental PPA.

Hosted the DGS/PSFEI bi-monthly meeting on February 7 at the PSFEI State College office.

Administered a Strategic Energy Planning meeting on February 14 at the North Office Building.

Released the following RFQs. Bids for the following RFQs were due after the quarter ended; results will be reported in the next quarterly report:

- Released RFQ DR 22-01 for Demand Response providers for Commonwealth and Pennsylvania's State System of Higher Education (PASSHE) facilities on March 27.
- Released RFQ DGS 22-14 for Commonwealth electricity accounts on March 30.

Administered the following Requests for Quotes:

- RFQ DGS 22-11 for Commonwealth natural gas accounts on March 1. Through this solicitation, all 66 accounts were awarded and a savings of \$637,665 is projected when compared to the utility rate over the lifetime of the awarded contracts.
- RFQ DGS 22-12 for two DOC SCI Mahanoy natural gas accounts on March 1. Through this solicitation, both accounts were awarded and a savings of \$108,549 is projected when compared to the utility rate over the lifetime of the awarded contracts.
- RFQ DGS 22-05 for COSTARS member electricity accounts on November 1. Through this solicitation, 54 accounts were awarded, representing a projected savings of \$101,793 over the lifetime of the awarded contracts.

ENERGY PROCUREMENT—SOLAR

Provided the following support for the PA PULSE agreement:

- Attended meetings with DGS and Constellation Energy personnel on January 11, February 8, and March 7 regarding progress on the various PA PULSE project sites.

ENERGYCAP

Processed EDI and Bill CAPture kickouts on an ongoing basis and updated EnergyCAP configurations including meter and account creation for new accounts from all Commonwealth agencies.

Provided support and continued efforts throughout the quarter for the following ongoing projects:

- Creation of meter and account groups for the PA PULSE facilities.

Provided the following extensive support for Commonwealth EnergyCAP data integrity efforts and ongoing monthly training:

- January
 - Hosted two training sessions for Commonwealth employees; going forward, two training classes will be available each month.
- February
 - Supported the DMVA Veteran Homes and Air National Guard with chargeback configuration.
 - Reviewed and investigated abnormally high bills associated with the estimated readings in December from PPL. Each account was reviewed and corrections were made in EnergyCAP.
 - Attended a meeting with DGS on identifying solar meters in EnergyCAP.
- March
 - Conducted basic EnergyCAP training and dashboard training.
 - Prepared a dashboard for several DCNR state parks.

ENGINEERING SERVICES

General

- No activities requested this quarter.

Electrical Systems

- Performed infrared (IR) thermography surveys at the Judicial and Liquor Control Board Buildings in February. This effort is ongoing.
- Performed data collection for a power system study at the Labor and Industry Building from January through March. This effort is ongoing.
- Performed electrical switchgear preventative maintenance and testing at the Labor and Industry Building. Test results were provided in *PSFEI Report 22-23.0103.DGS.L&I.01.EL.Switchgear PM&T* issued February 8, 2023.
- Performed electrical switchgear preventative maintenance and testing at the Finance Building, during January and March. Test results will be provided in a forthcoming PSFEI report.

- Performed troubleshooting and analysis of a relay issue at the Judicial Building on February 3 and 16, 2023. Test results will be provided in a forthcoming PSFEI report.
- Performed electrical switchgear preventative maintenance and testing at the Central Plant. Test results were provided in *PSFEI Report 22-23.0199.DGS.CP.01.EL.Switchgear PM&T* issued March 20, 2023.

Mechanical Systems

- Provided assistance in investigating the Capitol Complex cooling tower safety issue. Visited the site multiple times during the planned cooling tower shutdown period in February with DGS HVAC staff and outside vendors and contractors to further assess potential solutions. This effort is ongoing.
- Continued to investigate Capitol Complex Central Plant modular chiller operational issues. Examined and analyzed documents and data collected in the previous quarter. Performed a detailed analysis of the trend data retrieved from the central building automation system. This effort is ongoing.

Structural and Building Envelope

- No activities requested this quarter.

Water Systems

- No activities requested this quarter.

GREENGOV COUNCIL

Attended the GreenGov Focus Group—Green Facility Management meeting on February 7.

Attended a meeting with DGS and the GreenGov Council on March 1 to discuss support for developing Building Performance Standards for Commonwealth facilities.

Attended the GreenGov Focus Group—Utility Management meeting on March 10.

Attended a kickoff meeting on March 13 to assist with development and implementation of the EnMS pilot program for the Keystone Building. This effort is ongoing.

Provided support for the following virtual meetings:

- Participated in various GreenGov EnergyCAP Program Plan meetings regarding quarterly reports, missing bills, and data integrity.
- Attended weekly status meetings regarding EnergyCAP education and outreach efforts, kickout resolutions, data integrity efforts, and process improvements.

GUARANTEED ENERGY SAVINGS ACT

- DCNR East
 - No activities requested this quarter.
- Capitol Complex Phase 2
 - Attended bi-weekly construction progress meetings.

FOURTH QUARTER—APRIL 1, 2023 TO JUNE 30, 2023

ENERGY ADVISORY SERVICES

Hosted the DGS/PSFEI bi-monthly meeting on April 11 at the PSFEI State College office.

Hosted a virtual DGS/PSFEI bi-monthly meeting on June 14 via Microsoft Teams.

Administered the following Requests for Quotes (RFQs):

- Released RFQ DR 22-01 for Demand Response providers for Commonwealth and PASSHE facilities on March 27 with bids due April 5. Contracts were awarded to NRG Curtailment Solutions.
- Released RFQ DGS 22-14 for Commonwealth electricity accounts on March 30 with bids due on April 12. Through this solicitation, 249 accounts were awarded, representing a projected cost reduction of \$1.2 million over the previous contract rates and a savings of over \$959,000 from the utility rates.
- Released RFQ DGS 22-13 for electricity management services on April 4 with bids due on April 13. A contract was awarded to APN for an initial term of three years.
- Released RFQ DGS 22-15 for COSTARS member electricity accounts on May 24 with bids due on June 13. Through this solicitation, 33 accounts were awarded, representing projected savings of over \$156,000 from the utility rates.
- Released RFQ DGS 22-16 for Commonwealth natural gas accounts on June 20 with bids due on July 11. The results of the solicitation will be reported in the next quarterly report.
- Released RFQ DGS 22-17 for COSTARS member electricity accounts on June 27 with bids due on July 11. The results of the solicitation will be reported in the next quarterly report.

ENERGY PROCUREMENT—SOLAR

Provided the following support for the PA PULSE agreement:

- Attended meetings with DGS and Constellation Energy personnel on April 24 and May 24 regarding progress on the various PA PULSE project sites.

ENERGYCAP

Processed EDI and Bill CAPture kickouts on an ongoing basis and updated EnergyCAP configurations including meter and account creation for new accounts from all Commonwealth agencies.

Attended a training session hosted by EnergyCAP personnel on April 12 regarding the chargeback process.

Attended a training session hosted by EnergyCAP personnel on June 15 regarding Power BI interface with EnergyCAP.

Attended weekly scrum meetings to coordinate efforts for the following week.

Provided support and continued efforts throughout the quarter for the following ongoing projects:

- Creation of meter and account groups for the PA PULSE facilities.
- Resolution of billing anomalies due to estimated electricity meter readings by PPL in December 2022.

Provided the following extensive support for Commonwealth EnergyCAP data integrity efforts and ongoing monthly training:

- April
 - Attended a meeting with DGS personnel regarding Capitol Complex chargebacks on April 6 and 20.
 - Participated in discussions on the EnergyCAP Program Plan.
 - Hosted one training session for Commonwealth employees.
 - Attended the EnergyCAP Catalyst user training conference in State College.
 - Attended an EnergyCAP training session on chargebacks and meter splits.
- May
 - Continued support for the DMVA Veteran Homes and Air National Guard locations with chargeback configuration.
 - Conducted basic EnergyCAP training and dashboard training.
 - Presented an EnergyCAP informational session at the DOC summit for Facilities Operations Managers.
- June
 - Conducted basic EnergyCAP training and dashboard training.
 - Prepared additional dashboards, as requested, for several DCNR state parks.
 - Attended a Power BI training session hosted by EnergyCAP.

ENGINEERING SERVICES

General

- No activities requested this quarter.

Electrical Systems

- Performed IR thermography surveys on Capitol Complex electrical bus ducts. Survey results were provided in *PSFEI Report 22-23.0047.DGS.CAP.01.EL.Bus Duct IR Survey*, issued April 20, 2023.
- Continued ongoing efforts for power system study modeling and creation of coordination study time current curves.
- Performed electrical switchgear preventative maintenance and testing at the Finance Building. Test results were provided in *PSFEI Report 22-23.0104.DGS.FIN.01.EL.Switchgear PM&T* issued April 18, 2023.
- Performed electrical switchgear preventative maintenance and testing at the Health and Welfare Building. Test results were provided in *PSFEI Report 22-23.0106.DGS.H&W.01.EL.Switchgear PM&T* issued June 14, 2023.

Mechanical Systems

- Visited the Capitol Complex cooling tower with a side stream filtration equipment vendor to further assess potential solutions to the sump debris buildup and safety issue. Provided updates during the April 11 and June 14 bi-monthly DGS/PSFEI meetings and are working with vendors to obtain quotes on potential solutions. This effort is ongoing.
- Completed an initial investigation of Capitol Complex Central Plant modular chiller operational issues. Results were provided in *PSFEI Report 22-23.0155.DGS.CP.02.ME.Modular Chiller Issues Progress Report* issued May 15, 2023.

Structural and Building Envelope

- No activities requested this quarter.

Water Systems

- No activities requested this quarter.

Training and Education

- Short Courses (included in the terms of the contract) offered between May and June 2023:
 - Boiler Pumps and Fans (May 9–11, 2023)—no DGS attendees
 - Electrical Distribution Systems (May 23–25, 2023)—no DGS attendees
 - HVAC and Steam (June 6–8, 2023)—three DGS attendees
 - Effective Facility Management Year 3 (June 27–29, 2023)—five DGS attendees

GREENGOV COUNCIL

Participated in bi-weekly meetings with federal agencies and National Laboratories regarding available technical assistance supporting the development of building performance standards.

Attended a follow-up meeting on May 9 regarding implementation of the EnMS pilot program for the Keystone Building. This effort is ongoing.

Attended the GreenGov Focus Group—Green Facility Management meeting on May 23.

Performed energy analysis and benchmarking for the Keystone Building in support of the EnMS pilot project implementation. *PSFEI Report 22-23.0259.DGS.KEY.01.EN.Energy Performance Target Setting* issued June 7, 2023, documented the results.

Attended a meeting with GreenGov and DGS Bureau of Real Estate personnel on June 21 regarding facility information data contained within the Commonwealth's TRIRIGA system.

Provided support for the following virtual meetings:

- Participated in various GreenGov EnergyCAP Program Plan meetings regarding quarterly reports, missing bills, and data integrity.
- Attended weekly status meetings regarding EnergyCAP education and outreach efforts, kickout resolutions, data integrity efforts, and process improvements.

GUARANTEED ENERGY SAVINGS ACT

Provided the following support:

- 2019-2 Capitol Complex Phase 2
 - Assisted with quantifying post-project natural gas usage for the 18th & Herr site in support of gas commodity contract bidding.
- 2022-1 DCNR East
 - Attended two bi-weekly IGA progress meetings.
- 2023-1 Scranton/Reading/Northwest State Office Buildings
 - Reviewed the ESCos submissions regarding water conservation and pump replacement.

SUMMARY OF EDUCATION SERVICES

EDUCATION OPPORTUNITIES

PSFEI provided numerous educational opportunities in support of our services to DGS both in-person at the Penn Stater Conference Center in State College, Pennsylvania and virtually via Zoom. DGS attendance at PSFEI educational training events is detailed in Table 17 on the following page.

The following PSFEI short course opportunities were provided in fiscal year 2022–2023:

- Effective Facility Management—*Year 2—Basic Management, Communication, and Supervisory Skills*, July 12–14, 2022. Topics of instruction focused on supervisory and leadership skills, worker motivation and workplace conflict, customer focus, and the art of listening and being heard.
- Boiler Short Course—*Pumps and Fans*, May 9–11, 2023. This course provided instruction on boiler system fan and pump fundamentals; forced draft and induced draft fan control; bearings and pulleys; motor and motor starters; variable frequency drives (VFDs); control applications; feedwater pump requirements; net positive suction head (NPSH) issues, considerations, and case studies; and energy flow. Course participants toured the Penn State University Park West Campus Steam Plant.
- Electrical Short Course—*Electrical Distribution Systems*, May 23–25, 2023. This course focused on electrical distribution switchgear, transformers, conductors, maintenance and testing, and cable termination and splicing. The cable and splicing session included a hands-on activity terminating and splicing medium voltage cables. Course participants toured the Penn State University Park West Campus Steam Plant and North Campus Chiller Plant electrical distribution systems.
- HVAC Short Course—*HVAC and Steam*, June 6–8, 2023. Participants who attended this course learned about HVAC thermodynamics basics; steam generation, distribution, and condensate system performance; HVAC equipment and steam; water hammer; kitchen HVAC fundamentals, and boiler and plant safety.
- Effective Facility Management—*Year 3—Facility Management Tools*, June 27–29, 2023. Topics of instruction focused on capital planning, scheduling, and budgeting for prioritized projects; asset management in a sustainable environment and new sustainable technologies; Americans with Disabilities Act (ADA) considerations; and contract management.

The following workshops were provided in fiscal year 2022–2023:

- Electrical Workshop—*National Fire Protection Association (NFPA) 70E Electrical Safety Training*, August 24 and November 16, 2022. Workshop topics included training requirements for qualified workers; risk control methods; electrically safe work conditions; energized work; shock and arc flash hazards; short circuit, coordination, and arc flash studies; personal protective equipment (PPE); arc flash mitigation; and testing and maintenance requirements.
- HVAC Workshop—*Flammable and Mildly Flammable Refrigerants*, November 22, 2022. Workshop topics included flammable refrigerants safety groups; hydrocarbon (HC) and hydrofluoroolefin

(HFO) refrigerants; United States Environmental Protection Agency (EPA) Significant New Alternatives Policy (SNAP) program-approved HC-HFO flammable refrigerants; A2L HFO refrigerants and applications; flammable refrigerant equipment labeling, equipment components, service tools and equipment, safety protocols, best service practices, removal options and procedures; and best practices for servicing A3 and A2L sealed systems.

Table 17. DGS Attendance at Short Courses and Workshops

Education Event	DGS Attendance
Short Courses	
Effective Facility Management—Years 2 and 3	13
Electrical Distribution Systems	---
HVAC and Steam	3
Pumps and Fans	---
Workshops	
Flammable and Mildly Flammable Refrigerants	1
NFPA70E Electrical Safety Training	9
Total	26

ACRONYMS AND ABBREVIATIONS

\$/dth	Dollars per dekatherm
\$/gal	Dollars per gallon
\$/mcf	Dollars per thousand cubic feet
\$/mgal	Dollars per thousand gallons
\$/mlb	Dollars per thousand pounds
\$/MMBtu	Dollars per million British thermal units
\$/sq-ft	Dollars per square foot
¢/kWh	Cents per kilowatt hour
Btu	British thermal unit
Btu/sqft	British thermal units per square foot
ACT	Advanced Cooling Technologies
ADA	Americans with Disabilities Act
APN	American PowerNet
Borough	Borough of Columbia
CNG	Compressed natural gas
Commonwealth	Commonwealth of Pennsylvania
CSPs	Curtailed Service Providers
DCNR	Department of Conservation and Natural Resources
DGS	Department of General Services
DHS	Department of Human Services
DMVA	Department of Military and Veterans Affairs
DOC	Department of Corrections
ECMs	Energy conservation measures
EDI	Electronic data interchange
EnMS	Energy Management System
EPA	U.S. Environmental Protection Agency
ERMA	Energy Risk Management Application
ESCos	Energy Service Companies
EUI	Energy Use Intensity
EV	Electric vehicle
FERC	Federal Energy Regulatory Commission
gal	Gallon
GESA	Guaranteed Energy Savings Act
HC	Hydrocarbon

HFO	Hydrofluoroolefin
HVAC	Heating, ventilation, and air conditioning
IGA	Investment Grade Audit
IR	Infrared
kW	Kilowatt
kWh	Kilowatt-hour
kWh/sq-ft	Kilowatt hours per square foot
lbs/hr	Pounds per hour
lbs/MMBtu	Pounds per million British thermal units
L&I	Department of Labor & Industry
LCSWMA	Lancaster County Solid Waste Management Authority
mcf	One thousand cubic feet
mgal	One thousand gallons
mlb	One thousand pounds
MMBtu	One million British thermal units
MWh	Megawatt hours
NFPA	National Fire Protection Association
NPSH	Net positive suction head
NYMEX	New York Mercantile Exchange
PADEP	Pennsylvania Department of Environmental Protection
PA PULSE	Pennsylvania Project to Utilize Light and Solar Energy
PASSHE	Pennsylvania's State System of Higher Education
PEMA	Pennsylvania Emergency Management Agency
PennDOT	Pennsylvania Department of Transportation
PLC	Peak load contribution
PLCB	Pennsylvania Liquor Control Board
PPA	Power Purchase Agreement
PPE	Personal protective equipment
PPL	Pennsylvania Power and Light
PSFEI	Penn State Facilities Engineering Institute
PUC	Pennsylvania Public Utility Commission
RECs	Renewable Energy Credits
RFQ	Request for Quote
SCI	State Correctional Institute
SNAP	Significant New Alternatives Policy
VFDs	Variable frequency drives

sqft

Square feet

W/sqft

Watts per square foot