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Department of
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Annual Report on Energy-Efficient Purchasing

Fiscal Year 2019 - 2020

Department of General Services | Central Procurement Office | December 2020



Contents

- BACKGROUND AND STATUTE..... 1
- LIFE CYCLE COSTING 1
- ENERGY EFFICIENCY STANDARDS 1
- ENERGY STAR ANALYSIS 2
- MULTIYEAR ENERGY STAR ANALYSIS..... 7

BACKGROUND AND STATUTE

This report on energy-efficient purchases for fiscal year 2020 provides information on the State's procurement of energy-efficient equipment and appliances to meet the requirements of Tenn. Code Ann. § 4-3-1105(20).

Tenn. Code Ann. § 4-3-1105(20) requires the Department of General Services to prepare an annual report on the activities concerning the definition and implementation of an energy efficiency code for State procurement of equipment and appliances. The report shall include savings realized by the State as a result of the office's activities expressed in both units of energy saved and monetary cost-avoidance.

LIFE CYCLE COSTING

It is the policy of the State to use the life cycle cost of commodities as developed and disseminated by the federal government where feasible (Tenn. Code Ann. §12-3-906).

Where federal energy efficiency standards are established, life cycle cost shall be used in the contracting for major energy-consuming products. In determining life cycle costs, the acquisition cost of the product, the energy consumption, the projected energy cost over the useful life of the product, and the anticipated resale or salvage value of the products may be considered in the evaluation.

ENERGY EFFICIENCY STANDARDS

Pursuant to Tenn. Code Ann. § 12-3-905, State agencies shall use energy efficiency standards prescribed by Energy Star for the purchase of major energy consuming products. Energy Star is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy that has established energy efficiency standards that are used by the federal government in its contracting for major energy-consuming products, as well as energy-efficient best practices. The Energy Star website (www.energystar.gov) provides a list of qualified products and commodities meeting Energy Star's minimum energy specifications, life cycle cost calculations, and life cycle cost formula information. Currently, the Energy Star rating can be found on products in more than 50 product categories. Where practicable, the State uses Energy Star certification and this list of qualified products and commodities as acceptable brands and models as requirements in bid documents.

ENERGY STAR ANALYSIS

The Central Procurement Office is committed to helping reduce the State’s energy costs by identifying and creating contracts with the most energy-efficient product offerings available. In addition to reducing energy usage, Energy Star rated products tend to offer longer service lives than conventional products, minimizing the frequency of replacement. The Central Procurement Office continues to make strides to ensure agencies have access to the most energy-efficient products at the most beneficial price to the State through statewide contracts. There are currently 11 statewide contracts that either exclusively list Energy Star products or include Energy Star rated offerings; three of these 11 statewide contracts contain lease/rental options of Energy Star products.

In the following section, the Central Procurement Office has provided a summary, by commodity grouping, of the Energy Star products purchased or leased/rented through statewide contracts during fiscal year 2020, along with the estimated savings associated with each. All of the calculated energy savings and cost avoidance amounts are estimates and represent a comparison of Energy Star rated commodities versus conventional commodities, where applicable.¹ To determine the estimated kilowatt hours (kWh) and gallons of water saved for each commodity, the electricity consumption of Energy Star rated products is measured against conventional electricity consumption as defined by Energy Star or manufacturer specifications. The estimated lifetime kilowatt hour savings and lifetime gallon savings are calculated based on the product’s expected useful life as estimated by Energy Star. Electricity cost avoidance is calculated using the Tennessee average commercial electricity rate of \$0.10571 per kilowatt hour for fiscal year 2020 (www.eia.gov) multiplied by the lifetime kilowatt hour savings. Water cost avoidance is calculated using the U.S. average water rate of \$0.00901 per gallon (www.energystar.gov) multiplied by the lifetime gallons saved. These savings are reported in present dollar values and do not reflect future changes in electricity and water rates.

The Central Procurement Office has separated purchase contracts and lease/rental contracts for detailed analysis. Products purchased by the State through statewide contracts in fiscal year 2020 will have energy savings that are realized over the lifetime of the product. Therefore, the cost avoidance reported will be realized over the course of the useful life of each commodity, which ranges from five to 11 years. Savings for products leased or rented by the State through statewide contracts in fiscal year 2020 are estimated for a one-year lease/rental period only.

¹Mailing machines, uninterruptible power systems, and additional Energy Star products, denoted as Other Energy Star items, are certified as Energy Star products, but the Energy Star program does not currently provide a comparison of energy use for these products versus conventional (non-Energy Star) products. Therefore, energy savings are not measured for these commodity groupings or items.

Purchase Contracts:

The State purchased 17,964 Energy Star products for a total spend amount of \$10,622,994 in fiscal year 2020 through statewide contracts. The commodity categories of items purchased from these contracts in fiscal year 2020 are listed below with the quantities and spend amount for each.

Purchase Contract Commodity	# of Units Purchased	Spend Amount
Appliances ²	207	\$111,552
Computers & Monitors	14,072	\$4,772,866
Lights & Lamps	2,235	\$11,600
Multi-Function Devices	145	\$73,135
Printers & Scanners & Fax Machines	159	\$68,625
Uninterruptible Power Systems	487	\$166,425
Telephones & Televisions	407	\$98,767
Other Energy Star ³	252	\$5,320,024
TOTAL	17,964	\$10,622,994

The purchased Energy Star products are estimated to save approximately 4,637,522 kilowatt hours and 5,394,311 gallons of water over the course of the next 11 years. Using the current Tennessee electricity and water rates, these savings equate to an estimated \$538,835 in total cost avoidance over the course of five to 11 years.

PURCHASE CONTRACTS Lifetime Analysis						
Commodity	Estimated Useful Life	Lifetime kWh Saved	Electricity Cost Avoidance	Lifetime Gallons Saved	Water Cost Avoidance	Total Utility Cost Avoidance
Appliances	10.99	328,863	\$34,764	5,394,311	\$48,603	\$83,367
Computers & Monitors	4.56	2,117,200	\$223,808	N/A	N/A	\$223,808
Lights & Lamps	5.11	2,035,112	\$215,132	N/A	N/A	\$215,132
Multi-Function Devices	6.00	58,289	\$6,162	N/A	N/A	\$6,162
Printers & Scanners & Fax Machines	5.07	66,234	\$7,002	N/A	N/A	\$7,002
Telephones & Televisions	6.98	31,824	\$3,364	N/A	N/A	\$3,364
TOTAL		4,637,522	\$490,232	5,394,311	\$48,603	\$538,835

² Appliances includes refrigerators, freezers, dishwashers, clothes washers and dryers, and dehumidifiers.

³ Other Energy Star includes thermostats, HVAC units, laboratory refrigerators and freezers, and servers.

The total savings will be realized over the useful life of each product. Each commodity grouping has varying lifetime expectancies, as detailed in the table above. For each commodity, the expected electricity savings are summarized into the annual kilowatt hours saved per fiscal year for the duration of the commodity's useful life. The number of gallons saved and the total utility cost avoidance each year are not included in the analysis below. Most energy savings are realized within the next five years, but savings from Energy Star purchases made in fiscal year 2020 will continue to be realized through 2030.

Total kWh Saved		Total kWh Saved per Fiscal Year by Purchased Commodity					
Fiscal Year	kWh Saved	Computers & Monitors	Lights & Lamps	Multi-Function Devices	Printers & Scanners & Fax Machines	Telephones & Televisions	Appliances
2020	919,821.0	464,298.2	398,260.8	9,714.9	13,064.0	4,559.3	29,923.8
2021	919,821.0	464,298.2	398,260.8	9,714.9	13,064.0	4,559.3	29,923.8
2022	919,821.0	464,298.2	398,260.8	9,714.9	13,064.0	4,559.3	29,923.8
2023	919,821.0	464,298.2	398,260.8	9,714.9	13,064.0	4,559.3	29,923.8
2024	715,529.8	260,007.0	398,260.8	9,714.9	13,064.0	4,559.3	29,923.8
2025	88,920.7		43,808.4	9,714.9	914.3	4,559.3	29,923.8
2026	34,391.9					4,468.1	29,923.8
2027	29,923.8						29,923.8
2028	29,923.8						29,923.8
2029	29,923.8						29,923.8
2030	29,624.6						29,624.6
Total	4,637,522	2,117,200	2,035,112	58,289	66,234	31,824	328,863

Lease/Rental Contracts:

The State also leased or rented Energy Star products through statewide contracts. In fiscal year 2020, the State leased/rented 4,267 products for a total of \$4,187,318. The State saved approximately 1,626,514 kilowatt hours of electricity and 1,872,304 gallons of water using these products in comparison to conventional products. Since these products were not purchased, lifetime estimates were not included in the calculations. The amounts reported in the table below represent estimated savings and cost avoidance for fiscal year 2020 only. The combined savings from electricity and water cost avoidance for leased/rented Energy Star products totals \$188,808 for fiscal year 2020.

LEASE/RENTAL CONTRACTS							
Savings Reported for FY 2020 Only							
Commodity	# of Units Leased/ Purchased	Spend Amount	Estimated kWh Saved	Electricity Cost Avoidance	Estimated Gallons Saved	Water Cost Avoidance	Total Estimated Cost Avoidance
Dishwashing Machine Rental	17	\$145,125	321,646	\$34,002	1,872,304	\$16,869	\$50,870
Multi-Function Device Lease	3,892	\$3,922,373	1,304,868	\$137,938	N/A	N/A	\$137,938
Mailing Machine Lease/Rental ⁴	358	\$119,820	N/A	N/A	N/A	N/A	N/A
TOTAL	4,267	\$4,187,318	1,626,514	\$171,939	1,872,304	\$16,869	\$188,808

Combined Savings and Environmental Impact of FY 2020 Purchase and Lease/Rental Contracts:

Cost avoidance realized over the expected lifetimes of Energy Star products procured in fiscal year 2020 through purchase contracts and the cost avoidance realized during fiscal year 2020 through lease/rental contracts totals a combined \$727,643. It is important to reiterate that total cost avoidance is calculated using current electricity and water rates and will be realized over the next 11 years for the purchase contracts while lease/rental products are realized during fiscal year 2020 only.

In total, the estimated 6,264,036 kilowatt hours of electricity saved results in a cost avoidance of approximately \$662,171 while the 7,266,615 gallons of water saved equals approximately \$65,472 in cost avoidance. To place these savings in perspective, the State’s kilowatt hour savings are equivalent to the electricity needed to power 475 homes based on the average household electricity consumption in Tennessee (www.nespower.com). The State’s water savings are equivalent to the gallons of water needed to fill the Tennessee Aquarium in Chattanooga over six and half times (www.tnaqua.org). The reduction of 6,264,036 kilowatt hours of electricity consumption eliminates an estimated 4,882 tons of carbon dioxide (CO₂) from polluting our atmosphere. This is equivalent to reducing the annual greenhouse gas (GHG) emissions of 957 passenger vehicles. This information was obtained using a calculator provided by the Environmental Protection Agency (www.epa.gov). The chart below details a summary of the combined utility and cost savings and environmental impact of all the Energy Star items procured in fiscal year 2020 through purchase and lease/rental contracts.

⁴ Mailing Machines are classified as Energy Star products, but the Energy Star program does not currently provide a comparison of energy use for these products versus conventional (non-Energy Star) products. Therefore, energy savings are not measured for these commodity groupings or items.

FY 2020 Energy Star Item Purchasing Summary:

Energy Star Items
Procured



22,231

Energy Star Spend
Amount



\$14,810,312

Utility Cost Avoidance



\$727,643

kWh of Electricity Saved



6,264,036

Gallons of Water Saved



7,266,615

Tons of CO₂ Eliminated



4,882

Reduced Annual GHG
Emissions of



957

Passenger Vehicles

Electricity Saved
Equivalent to Powering



475

TN Homes

Water Saved Equivalent
to Filling TN Aquarium



6.6

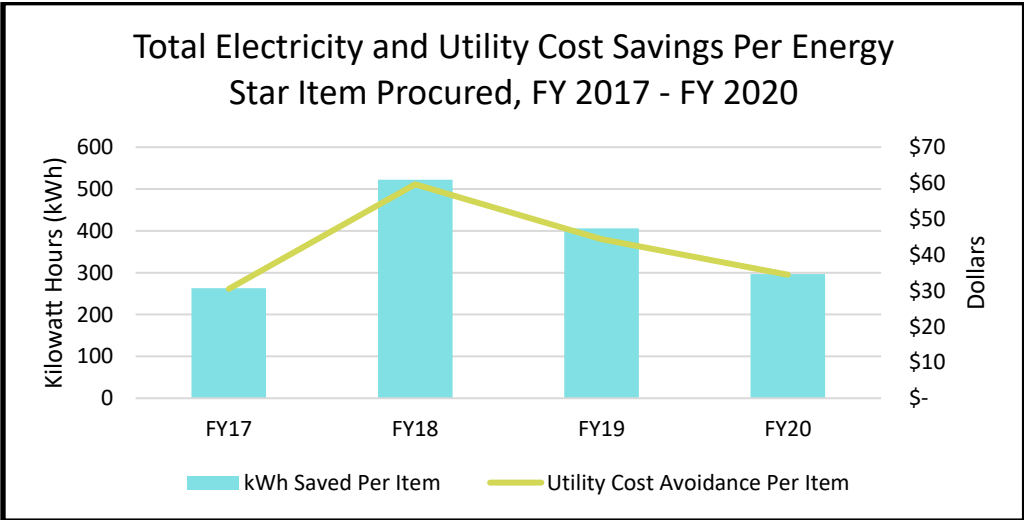
Times

MULTIYEAR ENERGY STAR ANALYSIS

To examine trends in the State’s Energy Star purchasing and resulting cost avoidance, the Central Procurement Office has compared data from fiscal year 2020 to previous fiscal years. The total cost avoidance from electricity and water savings through purchase and lease/rental statewide contracts has fluctuated over the last several reporting years. This is impacted by several factors such as the total quantity of items procured, the distribution of those items across the categories, and the efficiency of each item. The table below shows the variance year-over-year in electricity and water savings and resulting estimated total utility cost avoidance from Energy Star purchases and leases/rentals.

Fiscal Year	Total kWh Saved	Total Gallons Saved	Total Utility Cost Avoidance
FY 2013	19,158,365		\$2,085,650
FY 2014	16,887,983	10,703,972	\$1,895,238
FY 2015	7,323,191	9,890,099	\$822,589
FY 2016	16,678,493	10,820,616	\$1,805,779
FY 2017	5,942,161	9,961,965	\$689,024
FY 2018	10,442,180	2,996,552	\$1,192,973
FY 2019	6,771,423	2,909,245	\$738,735
FY 2020	6,264,036	7,266,615	\$727,643

The chart below illustrates the efficiency of the calculated Energy Star items purchased and leased/rented with the kilowatt hours saved per item and the total utility cost avoidance per item. It is important to note that prior to fiscal year 2017, lease and rental items were measured by the number of lease/rental terms procured within the fiscal year rather than the number of units leased/rented within the year. For example, two dishwashers rented would be reported as a quantity of 24 for the 24-month lease terms prior to fiscal year 2017 rather than being reported as a quantity of two for the two dishwasher units that were rented. Therefore, only fiscal years 2017 through 2020 are reported below.



Detailed below are several factors that have impacted the fluctuation in estimated lifetime cost avoidance for fiscal years 2019 and 2020 broken down by Energy Star category for purchase contracts.

Appliances:

- The number of Energy Star appliances purchased increased this fiscal year with 74 (56%) additional items compared to fiscal year 2019. As a result, the total estimated kWh of electricity and gallons of water saved increased. The estimated number of gallons saved per appliance increased 108%, while the estimated electricity savings per appliance decreased by 26%.
- There were 53 water-consuming items, such as washers and dishwashers, purchased in fiscal year 2020 and only 25 similar items in fiscal year 2019, which resulted in an increase in total water savings. These units were more water-efficient but had similar energy efficiency.
- The energy efficiency of most items purchased in fiscal year 2020 was slightly less efficient or of similar efficiency compared to fiscal year 2019. The dryer appliance sub-category saw the largest efficiency decrease with a 35% drop in efficiency from fiscal year 2019. Despite the decrease in per unit efficiency, the dryers still saved an average of 1,923 kWh compared to conventional dryers. Dehumidifiers were the one appliance sub-category where the energy efficiency increased per unit. The dehumidifiers purchased in fiscal year 2020 were 26% more efficient than those purchased in fiscal year 2019.

Computers and Monitors:

- Overall, the number of Energy Star items purchased in the computers and monitors category in fiscal year 2020 increased by 4,736 items (51%) compared to fiscal year 2019. The number of computers purchased increased significantly by 116% with 6,138 more laptops and desktops procured, but the number of monitors purchased decreased 35% with 1,402 fewer monitors. The electricity savings anticipated as a result of the computer and monitor Energy Star items purchased increased by 19%, which is to be expected with the overall increase in the number of Energy Star items purchased.
- On average, the Energy Star items in this category were 21% less efficient in fiscal year 2020 than in fiscal year 2019. The computers purchased were slightly less efficient on average while the monitors were significantly more efficient; when considering the weighted average with more computers purchased than monitors, the kWh saved per unit for the computers and monitors category declined this fiscal year. These Energy Star items are still estimated to save 150 kWh per unit on average compared to conventional items.
- Historically, the computers and monitors category has had the largest fluctuations from year to year. This is due in part to the four-year life cycle of the laptops and desktop computers as well as the refresh cycle the State utilizes to ensure computers are maintained and replaced appropriately. Monitors appear to follow a two-year purchasing cycle with higher purchase volumes every other year. Fiscal year 2019 represented a spike in the number of monitors purchased, and fiscal year 2020 follows with a more typical dip in purchases of monitors. The significant increase in purchases of computers does not

appear to coincide with the typical four-year purchasing trend. The spike in purchases for fiscal year 2020 may be due to the COVID-19 pandemic and the increased demand for laptops to enable remote work. The number of laptops purchased in fiscal year 2020 increased by 201% compared to fiscal year 2019.

Lights and Lamps:

- The number of lights and lamps purchased in fiscal year 2020 declined 35% by 1,183 lights and lamps compared to fiscal year 2019. The number of kWh estimated to be saved as a result of the Energy Star lights and lamps purchased declined 43%. The average kWh saved per unit decreased by 12% from fiscal year 2019 to fiscal year 2020. This decline in electricity savings is likely because the weighted lifetime of all the lights and lamps purchased in fiscal year 2020 is expected to be 5.11 years versus the 5.53 years expected of the lights and lamps purchased in fiscal year 2019. With the items purchased in fiscal year 2019 lasting slightly longer, it is logical that the amount of electricity savings would also be higher.

Multi-Function Devices, Printers, Scanners, and Fax Machines:

- The number of multi-function devices, printers, scanners, and fax machines purchased in fiscal year 2020 declined slightly by 86 devices, and 22% less than the prior fiscal year's purchases. Despite the decrease in purchased items, there was an increase of 29% in the estimated electricity savings from the Energy Star items purchased compared to the prior fiscal year. This increase in energy savings is due to the increased efficiency of the items. In fiscal year 2019 the average kWh savings per unit in this category was 131 kWh while the average savings per unit in fiscal year 2020 is more than triple that at 417 kWh.
- This increase in efficiency is due to the increased efficiency of two sub-categories. Both printers and multi-function devices are significantly more efficient than last fiscal year with up to four times the kWh savings per unit on average. Printers and multi-function devices also represent the largest sub-categories in terms of the number of items purchased.

Uninterruptible Power Systems:

- There was a 45% increase in the number of Energy Star uninterruptible power systems purchased in fiscal year 2020 compared to fiscal year 2019 with an additional 150 items purchased. Uninterruptible power systems are Energy Star certified items; however, the Environmental Protection Agency does not have a calculator to measure the energy savings for these items when comparing them to conventional models. The estimated kWh savings and electricity cost avoidance from these Energy Star uninterruptible power systems is not known.

Telephones and Televisions:

- There was a 12% decline in the number of telephones and televisions purchased in fiscal year 2020 compared to fiscal year 2019 with 56 fewer items. The estimated kWh electricity savings also declined by 16% compared to fiscal year 2019. The efficiency of the items purchased remained relatively stable with only a 4% decline with the average item in the

telephone and television category saving 82 kWh per unit in fiscal year 2019 compared to 78 kWh per unit in fiscal year 2020.

Other Energy Star Items:

- There was a 77% increase in the number of other Energy Star items purchased in fiscal year 2020 with 110 additional items compared to the prior fiscal year. This category for fiscal year 2020 includes servers, thermostats, HVAC systems and ventilation equipment, and laboratory refrigerators and freezers. All sub-categories saw an increase in the number of items purchased compared to the prior year, but servers had the largest increase with an additional 82 servers purchased and reported in fiscal year 2020. These are Energy Star certified items; however, the Environmental Protection Agency does not have a calculator to measure the energy savings for these items when comparing them to conventional models. The estimated kWh savings and electricity cost avoidance from these Energy Star items is not known.

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<https://www.tn.gov/generalservices/procurement.html>



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