



Annual Report on Energy-Efficient Purchasing

Fiscal Year 2020 - 2021

Department of General Services | Central Procurement Office | December 2021



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BACKGROUND AND STATUTE

This report on energy-efficient purchases for fiscal year 2021 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 2021, 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 \$0.1115 per kilowatt hour for fiscal year 2021 (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 2021 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 13 years. Savings for products leased or rented by the State through statewide contracts in fiscal year 2021 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 19,812 Energy Star products for a total spend amount of \$14,357,975 in fiscal year 2021 through statewide contracts. The commodity categories of items purchased from these contracts in fiscal year 2021 are listed below with the quantities and spend amount for each.

PURCHASE CONTRACT FY21 Spend Analysis		
Purchase Contract Commodity	# Of Units Purchased	Total Spend Amount
Appliances ²	604	\$ 262,887
Computers & Monitors	13,600	\$ 6,138,015
Lights & Lamps	2,549	\$ 7,088,991
Multi-Function Devices	33	\$ 7,300
Printers, Scanners & Fax Machines	236	\$ 75,561
Uninterruptible Power Systems	283	\$ 68,825
Telephones & Televisions	2,325	\$ 551,934
Other Energy Star ³	182	\$ 164,462
Grand Total:	19,812	\$ 14,357,975

The purchased Energy Star products are estimated to save approximately 58,977,024 kilowatt hours and 11,591,636 gallons of water over the course of the next 13 years. Using the current Tennessee electricity and water rates, these savings equate to an estimated \$6,680,377 in total cost avoidance over the course of five to 13 years.

PURCHASE CONTRACTS Lifetime Analysis							
Purchase Contract Commodity	Estimated Useful Life (YR)	Lifetime kWh Saved	Electricity Cost Avoidance	Lifetime Gallons Saved	Water Cost Avoidance	Total Utility Cost Avoidance	
Appliances	12.38	53,830,891	\$ 6,002,144	11,591,636	\$ 104,441	\$ 6,106,585	
Computers & Monitors	4.44	2,097,255	\$ 233,845	-	-	\$ 233,845	
Lights & Lamps	4.27	2,726,225	\$ 303,973	-	-	\$ 303,973	
Multi-Function Devices	6.00	17,160	\$ 1,913	-	-	\$ 1,913	
Printers, Scanners & Fax Machines	5.88	125,792	\$ 14,025	-	-	\$ 14,025	
Telephones & Televisions	7.00	179,701	\$ 20,036	-	-	\$ 20,036	
Grand Total:		58,977,024	\$ 6,575,936	11,591,636	\$ 104,441	\$ 6,680,377	

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

³ Other Energy Star includes thermostats, HVAC units, lighting/led strips, 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 2021 will continue to be realized through 2033.

Total kWh Saved		Total kWh Saved per Fiscal Year by Purchased Commodity					
Fiscal Year	Annual kWh Saved	Appliances	Telephones & Televisions	Multi-Function Devices	Printers, Scanners & Fax Machines	Lights & Lamps	Computers & Monitors
2021	5,508,954	4,348,214	25,672	2,860	21,393	638,460	472,355
2022	5,508,954	4,348,214	25,672	2,860	21,393	638,460	472,355
2023	5,508,954	4,348,214	25,672	2,860	21,393	638,460	472,355
2024	5,508,954	4,348,214	25,672	2,860	21,393	638,460	472,355
2025	4,778,359	4,348,214	25,672	2,860	21,393	172,384	207,836
2026	4,395,572	4,348,214	25,672	2,860	18,826		
2027	4,373,886	4,348,214	25,672				
2028	4,348,214	4,348,214					
2029	4,348,214	4,348,214					
2030	4,348,214	4,348,214					
2031	4,348,214	4,348,214					
2032	4,348,214	4,348,214					
2033	1,652,321	1,652,321					
Total:	58,977,024						
		53,830,889	179,704	17,160	125,791	2,726,224	2,097,256

Lease/Rental Contracts:

The State also leased or rented Energy Star products through statewide contracts. In fiscal year 2021, the State leased/rented 2,812 products for a total of \$1,202,853. The State saved approximately 10,576,828 kilowatt hours of electricity and 37,317,053 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 2021 only. The combined savings from electricity and water cost avoidance for leased/rented Energy Star products totals \$1,515,543 for fiscal year 2021.

RENTAL & LEASES FY21 Savings Analysis								
Commodity	# Of Units Leased/ Rented	Spend Amount	Estimated kWh Saved	Electricity Cost Avoidance	Estimated Gallons Saved	Water Cost Avoidance	Total Estimated Cost Avoidance	
Dishwashing Machine Rentals	18	\$ 77,247	6,410,764	\$ 714,800	37,317,053	\$336,227	\$1,051,027	
Multi-Function Device Leases	2,764	\$ 1,117,318	4,164,255	\$ 464,314	-	-	\$ 464,314	
Printers, Scanners & Fax Machines Leases	23	\$ 4,586	1,809	\$ 202	-	-	\$ 202	
Mailing Machines Lease/Rentals ⁴	7	\$ 3,702	-	-	-	-	-	
Grand Total:	2,812	\$ 1,202,853	10,576,828	\$1,179,316	37,317,053	\$336,227	\$ 1,515,543	

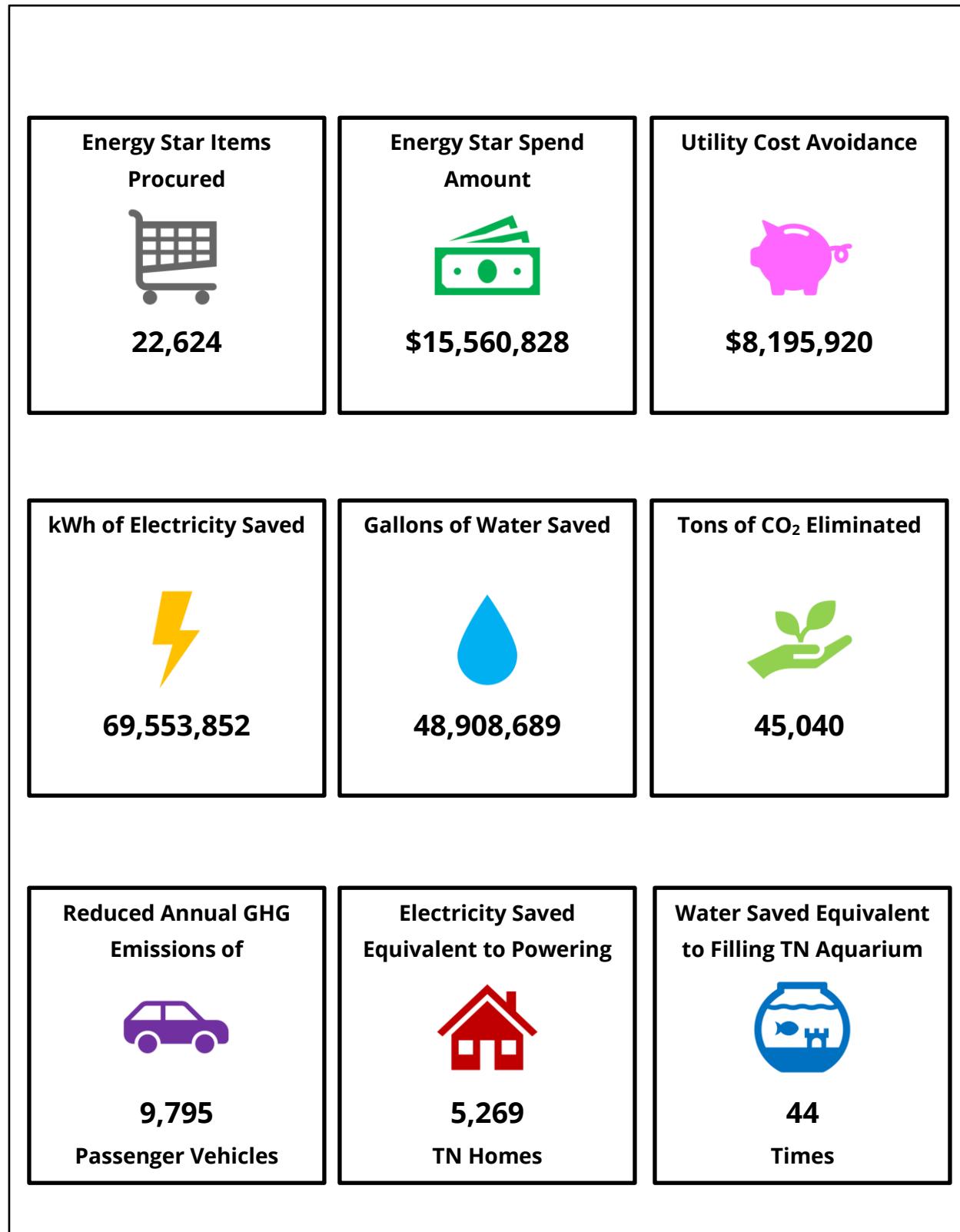
Combined Savings and Environmental Impact of FY 2021 Purchase and Lease/Rental Contracts:

Cost avoidance realized over the expected lifetimes of Energy Star products procured in fiscal year 2021 through purchase contracts and the cost avoidance realized during fiscal year 2021 through lease/rental contracts totals a combined \$8,195,920. It is important to reiterate that total cost avoidance is calculated using current electricity and water rates and will be realized over the next 13 years for the purchase contracts while lease/rental products are realized during fiscal year 2021 only.

In total, the estimated 69,553,852 kilowatt hours of electricity saved results in a cost avoidance of approximately \$7,755,252 while the 48,908,689 gallons of water saved equals approximately \$440,668 in cost avoidance. To place these savings in perspective, the State's kilowatt hour savings are equivalent to the electricity needed to power 5,269 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 44 times (www.tnaqua.org). The reduction of 69,553,852 kilowatt hours of electricity consumption eliminates an estimated 45,040 tons of carbon dioxide (CO₂) from polluting our atmosphere. This is equivalent to reducing the annual greenhouse gas (GHG) emissions of 9,795 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 2021 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 2021 Energy Star Item Purchasing Summary:

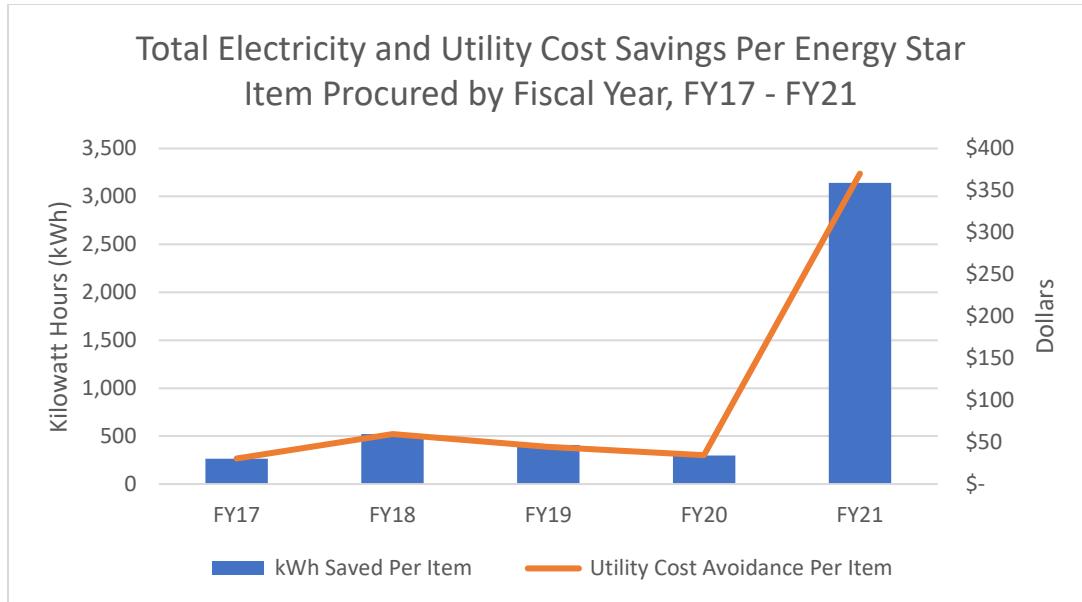


MULTIYEAR ENERGY STAR ANALYSIS

To examine trends in the State's Energy Star purchasing and resulting cost avoidance, the Central Procurement Office has compared data from fiscal year 2021 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.

MULTIYEAR ENERGY STAR ANALYSIS			
Fiscal Year	Lifetime kWh Saved	Total Gallons saved Lifetime	Total Utility Cost Avoidance
FY13	19,158,365		\$ 2,085,650
FY14	16,887,983	10,703,972	\$ 1,895,238
FY15	7,323,191	9,890,099	\$ 822,589
FY16	16,678,493	10,820,616	\$ 1,805,779
FY17	5,942,161	9,961,965	\$ 689,024
FY18	10,442,180	2,996,552	\$ 1,192,973
FY19	6,771,423	2,909,245	\$ 738,735
FY20	6,264,036	7,266,615	\$ 727,643
FY21	69,553,852	48,908,689	\$ 8,195,920

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 2021 are reported below. The large increase in efficiency in fiscal year 2021 is due in part to improved capabilities in measuring electricity and water savings. In prior fiscal years, the Central Procurement Office has relied on EPA calculators to compare the Energy Star items to conventional items. Many of these EPA calculators are out-of-date. For fiscal year 2021, the Central Procurement Office utilized real-time data from the EPA to create up-to-date calculators to compare the electricity and water usage of Energy Star items purchased/leased/rented by the State to the utility usage of conventional models.



Detailed below are several factors that have impacted the fluctuation in estimated lifetime cost avoidance for fiscal years 2020 and 2021 broken down by Energy Star category for purchase contracts.

Appliances:

- The number of Energy Star appliances purchased increased this fiscal year with 397 (+192%) additional items compared to fiscal year 2020. As a result, the total estimated kWh of electricity and gallons of water saved increased. The estimated number of gallons saved per appliance increased 103%, while the estimated electricity savings per appliance increased by over 5,510% which is about 56 times more per unit than last fiscal year 2021.
- There were 99 water-consuming items, such as washers and dishwashers, purchased in fiscal year 2021 and only 53 similar items in fiscal year 2020, which resulted in an increase in total water savings. These units were both more water-efficient and energy efficient.
- Overall, the energy efficiency of most items purchased in fiscal year 2021 were more energy efficient than items purchased in fiscal year 2020. However, the freezer subcategory saw a drop in energy saved. There was an 82.5% drop in efficiency per unit from fiscal year 2020. This drop is due to more accurate reporting this fiscal year and using correct Energy Star standards and calculators. Despite the decrease in efficiency per unit, the freezer subcategory did end up saving 3,753 kWh more in electric savings than last fiscal year. The increase in cumulative electric savings is due to an increase in the number of freezers bought this fiscal year; the State bought 14 freezers in fiscal year 2021 versus having bought only one freezer in fiscal year 2020.
- Overall, appliances this year were 56 times more energy efficient than last fiscal year, saving an average of 89,124 kWh per Item purchased compared to saving an average of 1,589 kWh per item purchased in fiscal year 2020. This year the State has been able to save an additional \$6,023,218 in lifetime Utility Cost Avoidance.

Computers and Monitors:

- Overall, the number of Energy Star items purchased in the computers and monitors category in fiscal year 2021 decreased by 472 items (-3%) compared to fiscal year 2020. The number of computers purchased increased significantly by 65% with 292 more desktops procured, but the number of laptops purchased decreased. The number of monitors purchased decreased with monitors seeing a 24% decrease with 625 fewer monitors being purchased. However, the increase in desktops purchased allowed for there to be more energy savings this fiscal year. This fiscal year we saw a 2% increase in estimated electricity savings per device, overall generating an additional savings of \$10,037 for this Energy Star category.
- On average, the purchased Energy Star rated computers were almost three times more efficient than last fiscal year, while the monitors were significantly less efficient. These Energy Star items are still estimated to save 154 kWh per unit on average compared to conventional items, which is an increase from the 150 kWh saved per unit in 2020.
- 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.

Lights and Lamps:

- The number of lights and lamps purchased in fiscal year 2021 increased 14% by an additional 314 lights and lamps compared to fiscal year 2020. The number of kWh estimated to be saved as a result of the Energy Star lights and lamps purchased increased 34%. The average kWh saved per unit increased by 17% from fiscal year 2020 to fiscal year 2021.
- These Energy Star items purchased this fiscal year are estimated to save 1,070 kWh per unit on average compared to conventional items. This is an increase when compared to the 911 kWh savings per unit reported last fiscal year. This increase was most likely impacted from the more accurate data collection and analysis process that took place in 2021.

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

- The number of multi-function devices, printers, scanners, and fax machines purchased in fiscal year 2021 decreased by 112 devices, purchasing 77% fewer multi-function devices while purchasing more than double the number of printers purchased last fiscal year. Overall, 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 purchased. In fiscal year 2020 the average kWh savings per printer or scanner was 417 kWh while the average savings per unit in fiscal year 2021 increased 28%.
- Printers and Scanners saw an increase in energy savings due to the 48% increase in devices bought this fiscal year, coupled with the 28% increase in kWh savings garnered per unit.

Uninterruptible Power Systems:

- There was a 42% decrease in the number of Energy Star uninterruptible power systems purchased in fiscal year 2021 compared to fiscal year 2020, with 204 fewer items. 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 471% increase in the number of telephones and televisions purchased in fiscal year 2021 compared to fiscal year 2020 with 1,918 more items. The spike was mostly made up of an overwhelming increase in telephone purchases, causing the estimated kWh electricity savings for this commodity to increase by more than five times when compared to fiscal year 2020. However, the efficiency of the items purchased remained relatively stable with only a 1% decline with the average item in the telephone and television category saving 78 kWh per unit in fiscal year 2020 compared to 77 kWh per unit in fiscal year 2021.

Other Energy Star Items:

- There was a 28% decrease in the number of other Energy Star items purchased in fiscal year 2021 with 70 fewer items compared to the prior fiscal year. This category for fiscal year 2021 includes servers, thermostats, HVAC systems and ventilation equipment, and lighting items. All but two sub-categories saw a significant decrease in the number of items purchased compared to the prior year. Lighting items, which include LED Strips, were not captured in last fiscal year's report. This sub-category does not have any related historical purchases referenced and therefore beginning fiscal year 2021, the State has identified one additional Energy Star sub-category which moving forward will now be collected and reported.
- The items that fall under this category are in fact 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.

Central Procurement Office
312 Rosa L. Parks Avenue, 3rd Floor
William R. Snodgrass Tennessee Tower
Nashville, TN 37243
(615) 741-1035

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



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