



Department of
General Services



Annual Report on Energy-Efficient Purchasing

FY 2021 - 2022

Department of General Services | Central Procurement Office | December 2022



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BACKGROUND AND STATUTE

This report on energy-efficient purchases for FY 2022 provides information on the State of Tennessee'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 used by the federal government in its contracting for major energy-consuming products and energy-efficient best practices. The Energy Star's 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 practical, 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 lists Energy Star products or include Energy Star-rated offerings; three of these eleven statewide contracts contain lease/rental options for 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 FY 2022, along with the estimated savings associated with each. All 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 energy consumption of Energy Star-rated products is measured against conventional energy 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 \$0.11703 per kilowatt hour for FY 2022 (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 electricity and water rate changes.

The Central Procurement Office has separated purchase contracts and lease/rental contracts for detailed analysis. Products purchased by the State through statewide contracts in FY 2022 will have energy savings realized over the product’s lifetime. Therefore, the reported cost avoidance will be realized over the useful life of each commodity, which ranges from five to twelve years. Savings for products leased or rented by the State through statewide contracts in FY 2022 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 19,429 Energy Star products for a total spend amount of \$14,877,252 in FY 2022 through statewide contracts. The commodity categories of items purchased from these contracts in FY 2022 are listed below with the quantities and spend amount for each.

PURCHASE CONTRACT FY22 Spend Analysis		
Purchase Contract Commodity	# Of Units Purchased	Total Spend Amount
Appliances ²	399	\$ 190,520
Computers & Monitors	17,691	\$ 13,640,216
Lights & Lamps	492	\$ 2,595
Multi-Function Devices	35	\$ 29,041
Printers, Scanners & Fax Machines	115	\$ 36,779
Uninterruptible Power Systems	12	\$ 984
Telephones & Televisions	1	\$ 220
Other Energy Star ³	684	\$ 976,897
Grand Total:	19,429	\$ 14,877,252

The purchased Energy Star products are estimated to save approximately 3,739,352 kilowatt hours and 1,650,551 gallons of water over the next 12 years. Using the current Tennessee electricity and water rates, these savings equate to an estimated \$452,488 in total cost avoidance over the course of five to twelve 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	11.30	435,984.00	\$ 51,023	1,650,551	\$ 14,871	\$ 65,895
Computers & Monitors	4.90	3,096,905	\$ 362,431	-	-	\$ 362,431
Lights & Lamps	4.30	146,462	\$ 17,140	-	-	\$ 17,140
Multi-Function Devices	6.00	13,815	\$ 1,617	-	-	\$ 1,617
Printers, Scanners & Fax Machines	5.90	46,089	\$ 5,394	-	-	\$ 5,394
Telephones & Televisions	6.00	97	\$ 11	-	-	\$ 11
Grand Total:		3,739,352	\$ 437,616	1,650,551	\$ 14,871	\$ 452,488

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, integrated desktops, tablets, computer workstations 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 FY for 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 FY 2022 will continue to be realized through 2033.

Total kWh Saved		Total kWh Saved per FY by Purchased Commodity					
FY	Annual kWh Saved	Appliances	Multi-Function Devices	Telephones & Televisions	Printers, Scanners & Fax Machines	Computers & Monitors	Lights & Lamps
2022	714,795.35	38,582.65	2,302.50	16.16	7,811.69	632,021.42	34,060.93
2023	714,795.35	38,582.65	2,302.50	16.16	7,811.69	632,021.42	34,060.93
2024	714,795.35	38,582.65	2,302.50	16.16	7,811.69	632,021.42	34,060.93
2025	714,795.35	38,582.65	2,302.50	16.16	7,811.69	632,021.42	34,060.93
2026	627,750.60	38,582.65	2,302.50	16.16	7,811.69	568,819.32	10,218.28
2027	47,931.90	38,582.65	2,302.50	16.20	7,030.55		
2028	38,582.65	38,582.65					
2029	38,582.65	38,582.65					
2030	38,582.65	38,582.65					
2031	38,582.65	38,582.65					
2032	38,582.65	38,582.65					
2033	11,574.85	11,574.85					
Total:	3,739,352	435,984	13,815	97	46,089	3,096,905	146,462

Lease/Rental Contracts:

The State also leased or rented Energy Star products through statewide contracts. In FY 2022, the State leased/rented 2,785 products for \$1,242,800. The State saved approximately 9,095,242 kilowatt hours of electricity and 28,650,675 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 FY 2022 only. The combined savings from electricity and water cost avoidance for leased/rented Energy Star products total \$1,322,559 for FY 2022.

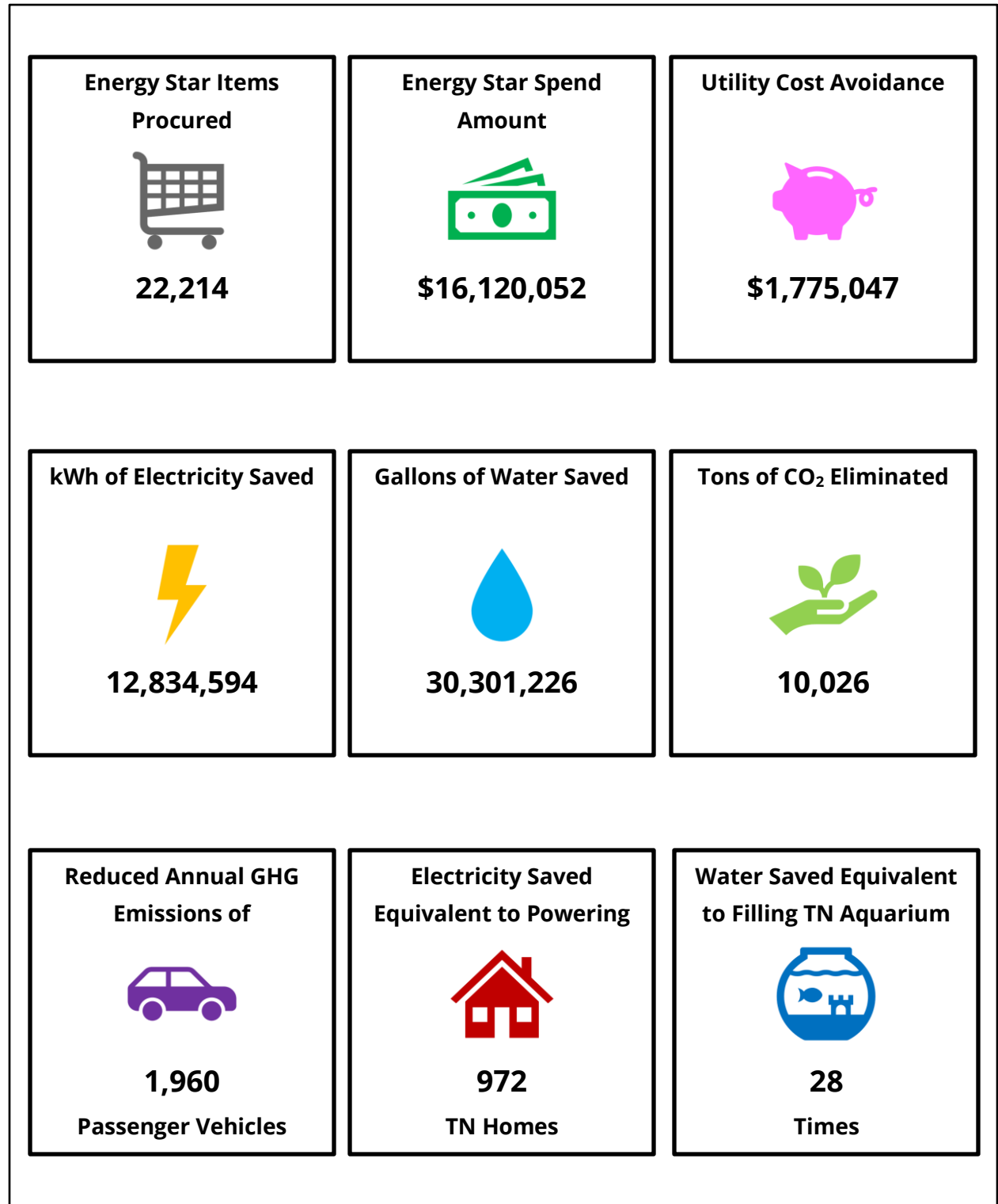
RENTAL & LEASES FY22 Savings Analysis							
Commodity	# Of Units Leased/Rented	Spend Amount	Estimated kWh Saved	Electricity Cost Avoidance	Estimated Gallons Saved	Water Cost Avoidance	Total Estimated Cost Avoidance
Dishwashing Machine Rentals	22	\$ 92,492	4,921,951	\$ 576,016	28,650,675	\$ 258,143	\$ 834,159
Multi-Function Device Leases	2,759	\$ 1,146,182	4,172,247	\$ 488,278	-	-	\$ 488,278
Printers, Scanners & Fax Machines Leases	4	\$ 4,127	1,044	\$ 122	-	-	\$ 122
Grand Total:	2,785	\$ 1,242,800	9,095,242	\$ 1,064,416	28,650,675	\$ 258,143	\$ 1,322,559

Combined Savings and Environmental Impact of FY 2022 Purchase and Lease/Rental Contracts:

Cost avoidance realized over the expected lifetimes of Energy Star products procured in FY 2022 through purchase contracts and the cost avoidance realized during FY 2022 through lease/rental contracts totals a combined \$1,775,047. It is important to reiterate that total cost avoidance is calculated using current electricity and water rates and will be realized over the next 12 years for the purchase contracts while lease/rental products are realized during FY 2022 only.

In total, the estimated 12,834,594 kilowatt hours of electricity saved results in cost avoidance of approximately \$1,502,033, while the 30,301,226 gallons of water saved equals approximately \$273,014 in cost avoidance. In other words, the State’s kilowatt-hour savings are equivalent to the electricity needed to power 972 homes based on the average household electricity consumption in Tennessee (www.nespower.com). The State’s water savings are comparable to the gallons of water needed to fill the Tennessee Aquarium in Chattanooga over 28 times (www.tnaqua.org). The reduction of 12,834,594 kilowatt hours of electricity consumption eliminates an estimated 10,026 tons of carbon dioxide (CO₂) from polluting our atmosphere. This is equivalent to reducing the annual greenhouse gas (GHG) emissions of 1,960 gasoline-powered passenger vehicles driven for one year. This information was obtained using a calculator provided by the Environmental Protection Agency (www.epa.gov). The chart on the following page summarizes the combined utility and cost savings and environmental impact of all the Energy Star items procured in FY 2022 through purchase and lease/rental contracts.

FY 2022 Energy Star Item Purchasing Summary:



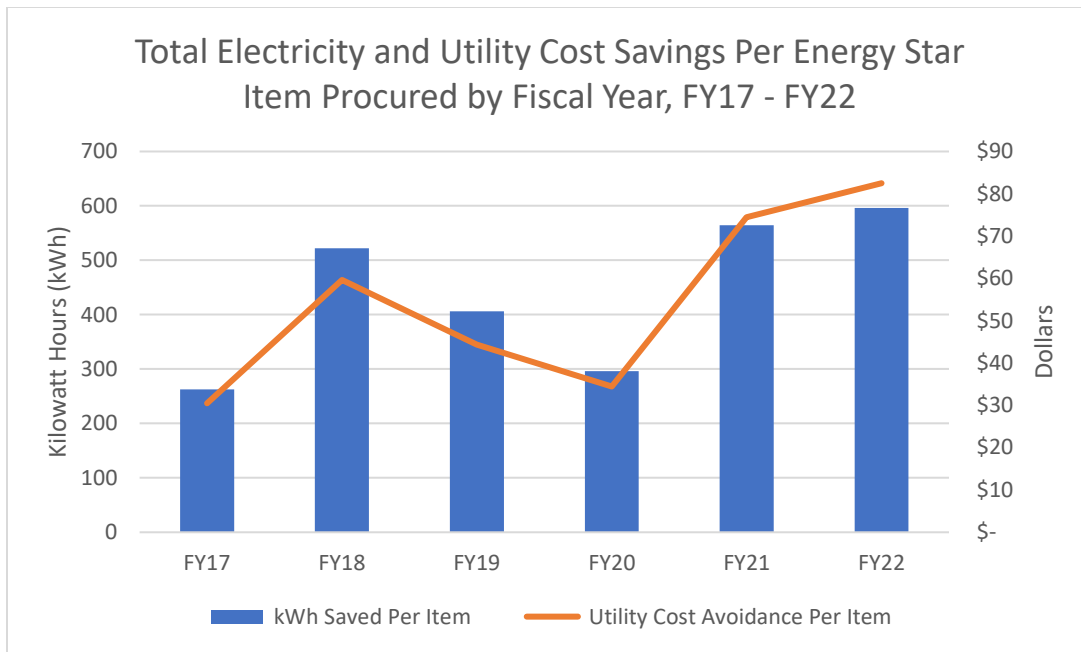
MULTIYEAR ENERGY STAR ANALYSIS

To examine trends in the State’s Energy Star purchasing and resulting cost avoidance, the Central Procurement Office has compared data from FY 2022 to earlier FYs. 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 affected by several factors such as the total quantity of items procured, 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 the resulting estimated total utility cost avoidance from Energy Star purchases and leases/rentals.

MULTIYEAR ENERGY STAR ANALYSIS			
FY	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	12,379,613	27,987,481	\$ 1,632,494
FY22	12,834,594	30,301,226	\$ 1,775,047

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 before FY 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 before FY 2017 rather than being reported as a quantity of two for the two dishwasher units that were rented. Therefore, only FYs 2017 through 2022 are reported below.

The noticeable increase in efficiency in the most recent fiscal years is due in part to improved capabilities in measuring electricity and water savings. In previous 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 years starting from 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. In 2022, we have been able to improve our calculations and have thus updated all past applicable errors found in recent fiscal years. The charts included in this report have been updated to display the most accurate depiction of energy savings data.



Detailed below are several factors that have impacted the fluctuation in estimated lifetime cost avoidance for FYs 2021 and 2022 broken down by Energy Star category for purchase contracts.

Appliances:

- The number of Energy Star appliances purchased increased this fiscal year with 14 (+3.6%) additional items compared to FY 2021. As a result, the total estimated kWh of electricity saved increased.
- Out of the 399 appliances purchased in FY 2022, there were 65 water-consuming items, such as washers and dishwashers. Overall water-consuming items comprise only 16% of the total appliance purchased. This is a direct decrease from the previous year, which had 26% of its appliances defined as water-consuming items.
- Overall, there was a decrease in the following: Residential Refrigerators, Residential Dishwashers, and Clothes Washers.
- Ultimately, four appliance items contributed more energy savings this fiscal year than the previous year. The following items showed increases in electrical efficiency contribution: Dehumidifiers (171%), Residential Freezers (143%), Air Purifiers (17%), and Compact Refrigerators (10%). These increases are directly correlated to the purchase increase for each appliance item.

Computers and Monitors:

- Overall, the number of items purchased in this Energy Star category in FY 2022 increased by 4,091 items (30.1%) compared to FY 2021. The overall number of monitors purchased increased significantly by 171%, with 3,422 more monitors having been procured. However, the number of laptops purchased decreased by 12% with 1,351 fewer laptops being purchased. There also was a dramatic increase of 273% (2,020 units) in desktops procured this fiscal year than procured last fiscal year. As a result, this fiscal year, we saw a 30% increase in the amount of “Computer & Monitor” items purchased, which has led

to a 48% increase in the estimated lifetime kWh of electricity saved for this Energy Star category.

- Historically, the “Computers & Monitor” category has had the most significant 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 uses to ensure computers are maintained and replaced appropriately.
- The 2020 Coronavirus Pandemic has affected the Energy Star category. Please note that supply chain issues, along with the increased demand for remote technology played a heavy hand in the vast fluctuations found in the procurement of computers and monitors the past two fiscal years.

Lights and Lamps:

- The number of lights and lamps purchased in FY 2022 decreased by 76%, with 1,562 fewer lights and lamps having been procured this FY. The estimated kWh saved over a lifetime because of the Energy Star lights and lamps purchased decreased by 70%.
- Overall, the decrease in the number of items purchased for this Energy Star category was slightly offset by an improvement to our in-house calculators. This fiscal year we adapted the calculator to capture and analyze more types of lightbulbs. This improvement has allowed us to customize the variety of wattages the calculator recognizes, ultimately capturing five additional types of LED light bulbs.

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

- The number of multi-function devices, printers, scanners, and fax machines purchased in FY 2022 decreased by 119 devices. Overall, there was a decrease of 58% of the estimated kWh saved over a lifetime for this Energy Star category.
- Printers and scanners saw a decrease in energy savings due to the 51% decrease in devices bought this fiscal year.
- The fluctuations in this Energy Star category could be due to the 2020 Coronavirus Pandemic and the decrease in office space use throughout the State of Tennessee.

Uninterruptible Power Systems:

- There was a 96% decrease in the number of Energy Star uninterruptible power systems purchased in FY 2022 compared to FY 2021, with 271 fewer items. This aligns with the 42% decrease seen last FY, from 2021 to 2020. 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 unknown.

Telephones and Televisions:

- There was a substantial decrease in the number of telephones and televisions purchased in FY 2022 compared to FY 2021.
- This Energy Star category has been the most volatile category regarding the number of procurements recorded each fiscal year. This could partly be due to the nature of remote work in the State of Tennessee. However, we hope to dig more into this category in future years.

Other Energy Star Items:

- There was a 276% increase in the number of other Energy Star items purchased in FY 2022 with 502 more items having been procured. This increase is unsurprising because three sub-category types are added to this category, ultimately leading to 435 more items being counted.
- Historically this category has included servers, thermostats, HVAC systems and ventilation equipment, and lighting items. The State has identified three additional Energy Star sub-categories this fiscal year, which will be collected and reported moving forward. The new sub-categories are Tablets, Integrated Desktops, and Computer Workstations.
- All but one sub-category saw a substantial decrease in the number of items purchased compared to the prior year.
- 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 are 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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