

STATE FACILITY UTILITY MANAGEMENT

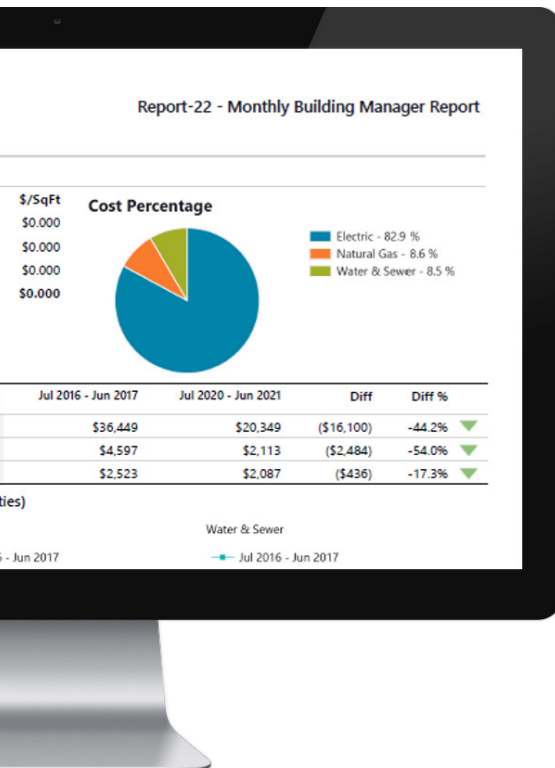


Utility Data Management Report FY2021



Executive Summary

This report provides in-depth utility usage, cost data, and analysis for State facilities by each utility type and by each organizational group. Additionally, it highlights case study examples of the **Utility Data Management (UDM) platform's** features and benefits, such as accommodating remote and alternative workplace solutions (AWS), greater visibility of utility usage and billing anomalies, increased ability to identify energy conservation opportunities within State facilities, and enhanced accountability and capability for cross-functional collaboration.



Centralized and Detailed

As a central hub for ongoing and historical electric, water/sewer, natural gas, chilled water, steam, and propane billing data, the UDM platform provides State agencies and Higher Education institutions with the value-added ability to remotely track, benchmark, and report utility usage while automating the collection of monthly utility invoices.

FOUR ORGANIZATIONAL GROUPS

- General Government
- The University of Tennessee (UT) System
- Locally Governed Institutions (LGIs)
- The Tennessee Board of Regents (TBR)

SERVING

8,800
facilities



REPRESENTING



10,000+
utility meters



109M
square feet



FY2021 UTILITY DATA

State Facility Utility Management's (SFUM) analysis for these facilities shows the State of Tennessee spent roughly **\$172 million** in FY2021, with **electric** representing approximately **62%** of the total costs.



3.4%

decrease in
State utility costs
compared to FY2020

8.4%

decrease in
State utility costs
compared to FY2019

This overall decline is largely attributed to reductions in utility usage and costs from pandemic-related occupancy behaviors and operations practices.

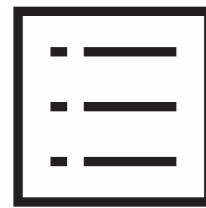


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Introduction

NORRIS DAM IN
EAST TENNESSEE



About SFUM

Residing in the Office of Energy Programs (OEP) within the **Tennessee Department of Environment and Conservation (TDEC)**, the **State Facility Utility Management (SFUM)** team provides State General Government agencies and Higher Education institutions with energy insights.

Background

SFUM was formed in January 2017 following the issuance of Executive Order 63, which transferred the building management statutory responsibilities for State-owned and -managed properties from the Department of General Services (DGS) to TDEC (Tenn. Code Ann. §§ 4-3-1012 and 4-3-1017-1019). Among these responsibilities are the analysis and reporting on the State's aggregate annual energy costs and usage, (Tenn. Code Ann. § 4-3-1012(3)), which is the subject of this report.

To address this requirement, SFUM manages the collection and analysis of data from utility bills for State-owned and -managed facilities.

The State's Utility Data Management (UDM) platform allows the SFUM team, UDM platform end-users, and other stakeholders to analyze utility data, track costs and usage, audit bills, and report on general energy practices.

The UDM platform provides State General Government agencies and Higher Education institutions with the ability to remotely track, benchmark, and report energy use while automating the collection of monthly utility invoices for 8,800 facilities across four organizational groups¹:

37% General Government

25% The University of Tennessee (UT) System

27% Locally Governed Institutions (LGIs)

11% The Tennessee Board of Regents (TBR)

¹ The following percentages represent the share of the State building portfolio that is attributed to each organizational group.

UDM PLATFORM BENEFITS

With the UDM platform, State facility managers, accounting staff, and administrators are able to:



Support alternative workplace solutions (AWS) with digital billing access



Have greater visibility into utility usage and billing anomalies



Use enhanced reporting to perform analysis with much greater detail and efficiency



Increase capability for cross-functional collaboration

Several case studies included in this report highlight the successful integration of the UDM platform. For example, the platform continues to assist in **tracking savings** at the Ellington Agricultural Center and Fleming Training Center following the completion of mechanical systems and lighting upgrades in 2016 and 2017, respectively.

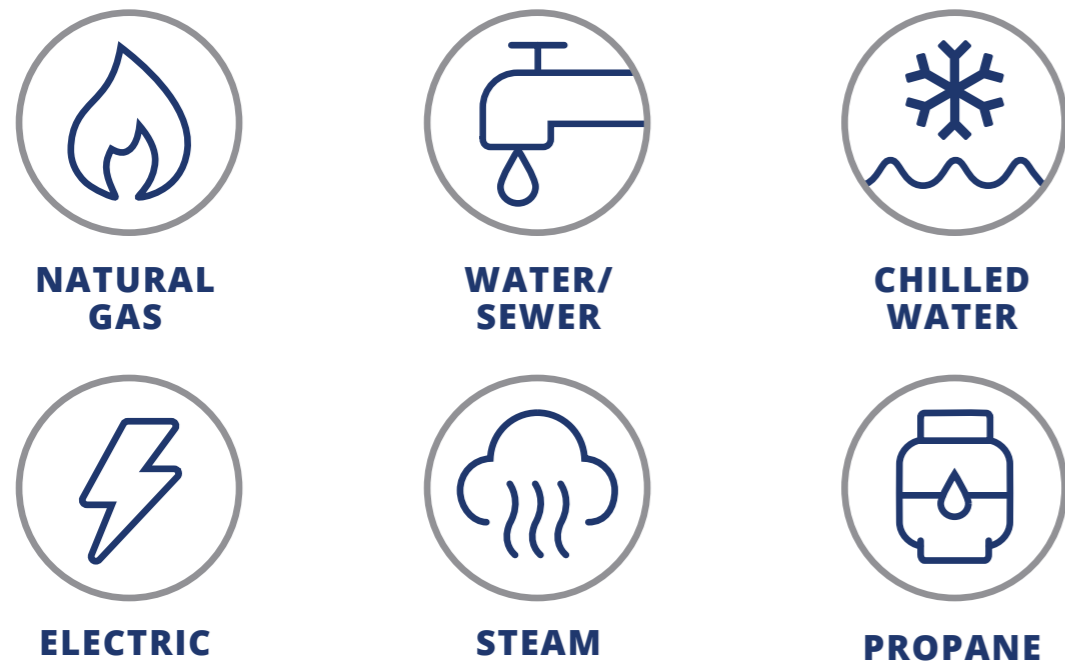
Other examples include the leveraging of UDM data to **identify abnormal spikes in water and energy use** by the Department of Transportation (TDOT), which further investigation identified as a water leak and a maintenance issue causing irregular natural gas consumption. As a result of UDM data analysis, TDOT was able to recuperate tens of thousands of dollars from the agency's utility providers.

[READ MORE >>](#)

Objectives and Key Observations

The objectives of this report are to **communicate the State’s utility cost and usage** and to underscore the capabilities and **benefits of the UDM platform**, which has facilitated the transition away from manual data collection, entry, and analysis.

This report compares utility usage data for State Fiscal Years (FY)² 2019, 2020, and 2021 by organizational group and the six types of utility commodities captured in the UDM platform for the State:



STATE UTILITY DATA FOR FY2021

\$172,085,040

spent on energy and water utilities across all State-owned and -managed facilities.

PERCENTAGE OF TOTAL UTILITY COSTS

62.1%

Electric power (remains largest)

Down from FY2020 (65%) and FY2019 (65.4%)

95.6%

Electric, water/sewer, natural gas combined

Down from FY2020 (96%), lower than FY2019 (95.9%)

3.4% decrease (\$6,090,299) in overall State utility costs compared to FY2020

5.7%

decrease in natural gas costs

Despite a usage increase of 5.2%

This may result from, but is not limited to, changes in rate structures or changes derived from contract negotiations.

WHY THE DECREASE?

The decrease in overall utility costs is primarily a result of reductions in electric power usage and rates. When comparing the three-year period covering FY2019-FY2021, the decrease is even more marked: **\$15,678,002 or 8.3%**. This can be largely attributed to a decrease in electric costs (**13.7%**) and usage (**10.7%**) during this period.

The overall decline in utility consumption and costs reflect a continued pattern of reduced occupancy since the onset of the Coronavirus Disease 2019 (COVID-19) pandemic in early March 2020. Since that time, many State entities have encouraged or mandated remote work for non-essential employees.

² The State of Tennessee Fiscal Year runs from July 1 to June 30 for the following calendar year (CY). For example, FY2021 encompasses July 1, 2020 to June 30, 2021.

Adoption, Assistance, and Training

The SFUM team continues to provide technical assistance and additional training opportunities to UDM platform end-users (e.g., State fiscal personnel, utility and facility managers, building maintenance personnel, sustainability professionals) from across the four organizational groups — General Government, UT System, LGIs, and TBR — with the intent to maximize UDM platform utilization and optimize overall energy management of State facilities.



Questions about this report or requests to become a registered UDM platform user can be directed to the SFUM team at tdec.sfum@tn.gov.





UDM Platform

TENNESSEE STATE LIBRARY
AND ARCHIVES, NASHVILLE, TN

About the UDM Platform

The **Utility Data Management (UDM) platform** serves as a central repository for the historical and ongoing utility cost and usage data³ of approximately 8,800 State-owned and -managed facilities. It is predominantly used for utility tracking, reporting, and benchmarking for General Government agencies and Higher Education institutions and bill payment integration for General Government agencies.⁴



LAUNCHED IN

2019



SERVING

78

General Government agencies and Higher Education institutions

DATA REPRESENTING



8,800+
accounts



10,700
utility meters



109M
square feet

A POWERFUL, EFFICIENT TOOL

Since the platform's launch, the SFUM team has been providing aggregated utility usage and cost data for State facilities to help fiscal personnel, State building maintenance, utility and facility managers, sustainability professionals, and technical assistance providers **gain actionable insights into their utility data.**

Before the UDM platform, obtaining this data required significant effort to locate utility accounts, gather utility bills, and manually enter data. As a result, utility cost and usage data were rarely analyzed by State personnel.



TENNESSEE STATE CAPITOL BUILDING, NASHVILLE, TN

³ Cost and usage data for most utilities are predominately captured monthly. Some utility bills are captured on a quarterly or other basis.

⁴ For FY2021, the UDM platform contains utility bill data for 99.99% of the utility meters that, as of March 23, 2022, have been identified for General Government agencies and Higher Education institutions.

Scope and Configuration

State Portfolio

The SFUM team and the UDM platform software vendor, EnergyCAP, completed the 3-year project development, configuration, and implementation in May 2019.

During this period, the SFUM team and EnergyCAP worked with facility managers, sustainability managers, and accounts payable (AP) staff for each of the 78 General Government agencies and Higher Education institutions, identified in Table 2.1, to create the desired organizational groupings and hierarchy structures related to buildings, meters, and accounts.

Once the appropriate hierarchy structures were created, SFUM input each building's unique building data into the UDM platform, including address, latitude and longitude, square footage, original construction date, and use type.

In addition, customized fields were created to meet specific needs, including building status, county, management type, and building ownership.

TABLE 2.1 | State Entities with Owned or Managed Building Stock (by Organization Type)

	GENERAL GOVERNMENT ⁵	UNIVERSITY OF TENNESSEE (UT) SYSTEM ⁶	LOCALLY GOVERNED INSTITUTIONS (LGIs) ⁷	TENNESSEE BOARD OF REGENTS (TBR) ⁸
SHARE OF PORTFOLIO (% of sq. ft.)	37%	25%	27%	11%
ASSET PORTFOLIO	25 Agencies	5 Campuses 2 Institutes	6 Locally Governed Institutions	27 Tennessee Colleges of Applied Technology 13 Community Colleges

⁵ See Appendix C for a full list of General Government agencies.

⁶ See Appendix D for a full list of UT System campuses and institutes. The University of Tennessee Southern at Pulaski was acquired by the UT System in early FY2022. Thus, it is not included in this report but will be highlighted in the FY2022 UDM Report.

⁷ See Appendix E for a full list of Locally Governed Institutions.

⁸ See Appendices F and G for a full list of Community Colleges and Tennessee Colleges of Applied Technology, respectively.

Project Implementation

To include as much historical data as possible,

SFUM worked with EnergyCAP to collect historical billing data from utility vendors providing service to State facilities as far back as each billing system would allow.



DATA FROM

362

utility vendors



DATING BACK TO

2012

(in some cases)

The SFUM team has established ongoing duplicate billing⁹ for all Higher Education institutions and any non-General Government executive branch agencies that opted out of the UDM platform AP integration with Edison.

The UDM platform **captures each line item and charge from a utility bill**, which may include usage, cost, demand, power factor, customer charges, miscellaneous fees, credits, penalties, and erroneous or unauthorized charges such as taxes and charitable contributions. Bill line items associated with telecommunications, refuse, and vehicle fuels are captured in the UDM platform only if they appear as a line item on a utility bill.

⁹To capture billing data for State entities not using the UDM platform for utility bill pay approval, the SFUM team established a method of receiving a physical or electronic duplicate bill (or the data from the bill) to manually enter into the UDM platform.

BILL PAYMENT INTEGRATION WITH EDISON

The UDM platform was successfully integrated with



the General Government's bill payment system, Edison, through collaborative efforts with Finance and Administration's (F&A) Division of Accounts, Edison team, and Strategic Technology Solutions (STS).

This integration covers 22 of 25 General Government executive branch agencies and makes the process for bill review, approval, payment, and reconciliation substantially more efficient.

The UDM platform **bridges communication gaps and promotes collaboration between staff**, while proactively mitigating potential utility billing errors through automated bill audits and utility data reports that allow for faster, more detailed analysis.

QUESTIONS? READ OUR FAQ »

UDM Platform Functionality

The UDM platform is the hub for the State of Tennessee's utility and energy data.

With the ability to provide analysis and reporting functions that were not readily available in the past, the UDM platform is a tool for State personnel to improve their operations.

FACILITY / ENERGY MANAGERS CAN:



- Identify potentially energy-inefficient facilities
- Assist in the evaluation of energy conservation projects
- Support measurement and verification (M&V) efforts
- Track emissions
- Obtain U.S. Environmental Protection Agency (EPA) ENERGY STAR® ratings or other building certifications

ACCOUNTING AND BUDGET STAFF CAN:



- Identify billing errors
- Create utility budget forecasts
- Share standardized reports with leadership

Further, the inclusion of AP integration into the UDM platform **streamlines the utility bill accounting workflow**. Automating bill entry, improving bill auditing, and simplifying cost allocations **saves accounting and budget staff valuable time** that can be spent on other tasks.

[LEARN MORE ABOUT FEATURES >>](#)

The UDM platform allows accounting, energy management, and sustainability professionals to work together to improve building operations by centralizing the State's utility bill data and providing powerful analysis tools with an easy-to-use web interface.



UDM Platform User Benefits

FOR FACILITY AND ENERGY MANAGERS:

Data-driven detection of leaks:

Frequent usage data reviews and utility bill audits allowed for early detection and identification of leaks.

Increased visibility: Management staff now have access to and visibility of utility cost and usage data, critical information lacking before the UDM platform, to aid in making informed energy-related decisions.

Enhanced reporting and analysis:

End-users can generate reports and perform analyses with much greater detail and speed than before.

Better benchmarking: With the UDM platform, management staff can compare Energy Use Intensity (EUI) across similar building types at organizational, multi-organizational, or State portfolio levels to identify best-performing buildings and associated energy management practices.

FOR ACCOUNTING AND BUDGET STAFF IN GENERAL GOVERNMENT:

Improved Alternative Workplace Solutions (AWS):

As a web-based platform, the UDM platform promotes AWS for AP staff.

Increased communication:

Bridges communication gap between centralized and remote AP staff and promotes collaboration between AP and facility management staff.

Bill entry automation / Reduced billing errors:

Eliminates manual bill entry errors and reduces staff time needed to enter utility bills, allowing resources to be applied to other tasks.

Process standardization:

Streamlines or standardizes F&A Division of Accounts and Edison utility business processes across agencies.

Bill auditing:

Easier identification of questionable bills, billing errors, and unauthorized charges by utility service providers.

Greater accountability:

The UDM platform provides tracking for AP user workflow steps and activities.

Late fee mitigation:

The UDM platform's reports can identify bills that have not been received from the utility vendor before they are past due.

“The UDM platform has freed an average of 60-90 minutes per day per DGS AP staff member, as they no longer have to scan invoices to be attached to vouchers or key data. This has resulted in more time available to process invoices.”

DGS CENTRAL ACCOUNTING ASSISTANT DIRECTOR

“Before the UDM platform, TDEC AP staff members would spend 7.5 hours entering invoices, and reconciliation could take three days. This is now reduced to 2.4 hours for review and approval, with reconciliation occurring daily.”

TDEC ACCOUNTING MANAGER

Highlights and Case Studies



This section outlines the UDM platform's key features and capabilities to help State employees make informed decisions regarding utility and building management. Case study examples are provided to demonstrate the UDM platform's real world applications for end-users to support organizational and employee outcomes.

CASE STUDY #1

Facilitation of AWS

The UDM platform continues to support AWS for General Government agency AP staff by providing a central repository for utility bills that can be **accessed from any physical location** by using the online UDM platform. **Utility bills are automatically uploaded**, removing the need for AP staff to access paper bills and/or scan and upload bills to another system. **Multiple end-users can work in the UDM platform simultaneously** to review, approve, or edit the same batch of bills, as well as different batches of bills. Additionally, the UDM platform **facilitates team collaboration** with the use of bill notes, assigned flags, shared dashboards, and reporting features.



The UDM platform's ability to track, record, and date individual user activities accommodated agency fiscal personnel to embrace workplace flexibility more since the onset of the COVID-19 pandemic.

CASE STUDY #2

Identification of Unauthorized Charges

The UDM platform continues to assist General Government AP staff in identifying unauthorized charges, such as charitable contributions and taxes or other fees from which the State is exempt and seeking utility vendor reimbursement.

For General Government, 89% of the 5,372 utility bills processed monthly are automatically drafted for payment by the utility provider. In FY2021, the UDM platform documented General Government agencies were charged a total of \$247.02 in "round-up" charitable contributions and \$6,928.77 in taxes. Of these charges, \$3,964.52 were for bills set up for autopay, and may have gone unnoticed **without the UDM platform flagging these charges.**

Agency efforts with utility providers have resulted in unauthorized charges being removed from future bills in the utility provider's bill system and the issuance of some credits for the accounts.




\$3,964
of unauthorized charges on autopaid bills were flagged by the UDM platform in FY2021

CASE STUDY #3

Grouping and Benchmarking State Facilities

The State building portfolio contains a wide variety of buildings, diverse in square footage, occupancy, and purpose. The UDM platform provides users **the capability to group and compare like buildings** within their organization and allows SFUM to compare like buildings across the State portfolio. Cost and usage of State facilities can be compared to others serving similar functions by assigning a 'primary use' to categorize buildings by function.

 The SFUM team has identified the primary use for many but not all State facilities, so please contact the team at tdec.sfum@tn.gov for your organization's buildings.

The **Groups & Benchmarks tool** in the UDM platform highlights facilities within an agency or campus by ranking them in terms of cost or use per square foot and cost or use per day. This tool quickly provides visibility into facility outliers at a campus or agency and assists in benchmarking efforts to identify facilities in need of future Energy Conservation Measures (ECMs).

Figure 2.1 is an example of this function, organizing TBR's libraries by electricity cost per area.

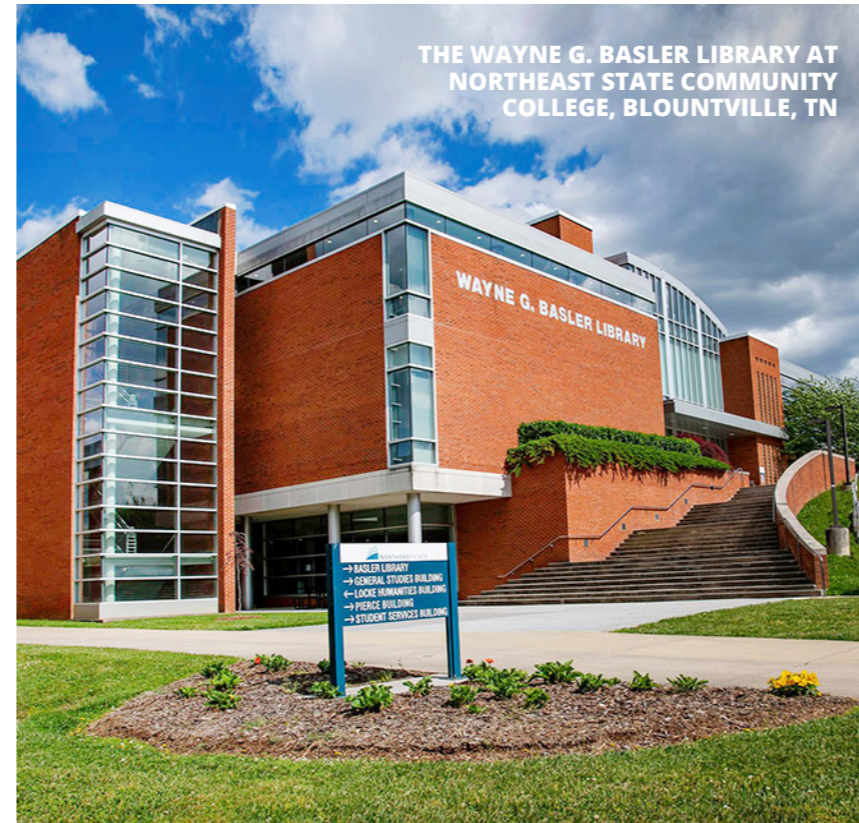
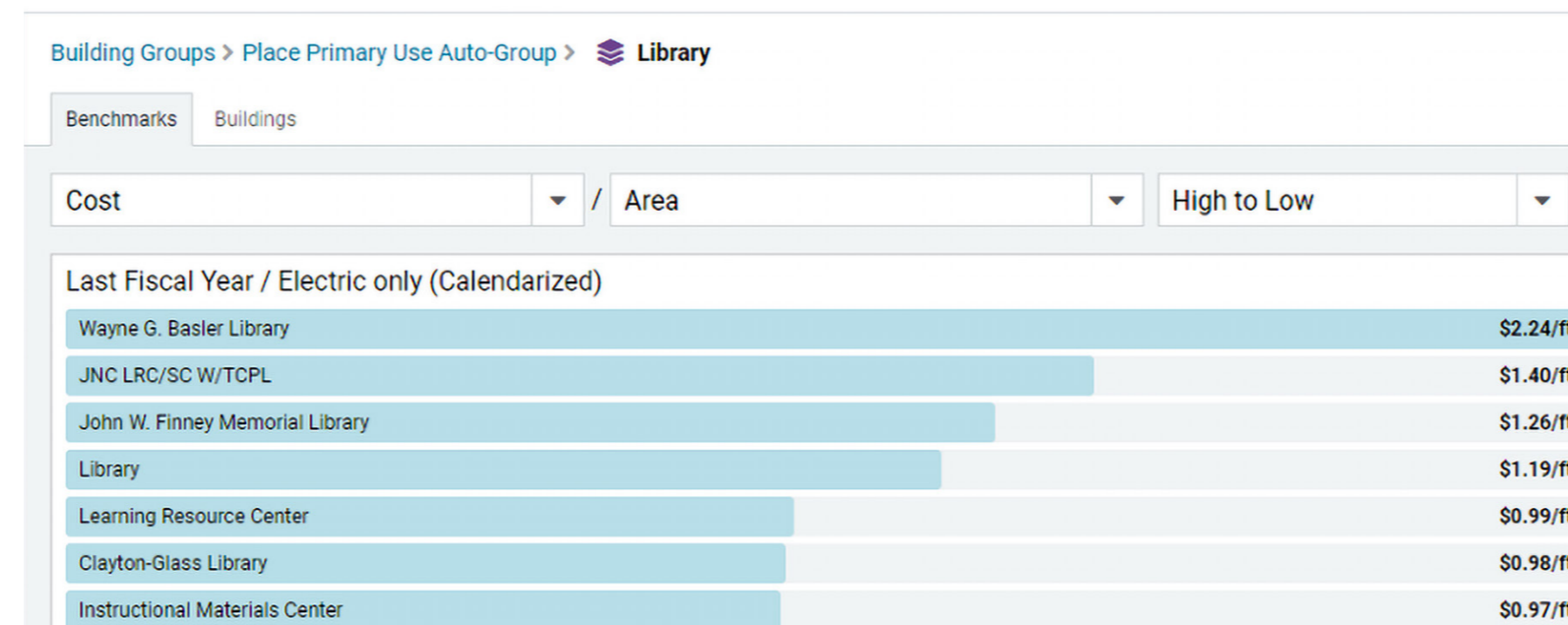


FIGURE 2.1 | Example of TBR Buildings with Primary Use Type 'Library' Ranked by Cost/Area (UDM Platform, Groups & Benchmarks View)



CASE STUDY #4

Meter Recognition Efforts

SFUM was able to support the Tennessee Department of Transportation (TDOT) with their efforts to develop an internal database to track the electrical billing information for all Intelligent Transportation System (ITS) assets statewide.

SFUM contributed to this initiative by **using the UDM platform to validate account and meter property data and provide billing information** for 210 TDOT accounts associated to demarcation points for several counties across the State of Tennessee.

The database that TDOT is developing will allow them the ability to link the meter number to the demarcation point. Some of the demarcation points were initially set up as a flat rate but have since been moved to a meter rate, while others have been disconnected. The database will aid in indicating any inaccurate and unnecessary billing for the ITS assets.

CASE STUDY #5

Utility Reimbursements

The UDM platform continues to be utilized by end-users to assist with ensuring that expenses of the utility accounts managed do not exceed an agency's allocated budget.

Fiscal and Energy Management personnel with the Department of Military use the UDM platform **to generate monthly utility data spend reports** that define cost and consumption for each building, which aids in the creation of supporting documentation utilized for Federal and State reimbursement of Army Guard utility expenditures.

CASE STUDY #6

Billing Discrepancy Validation

In January 2021, SFUM received a notice from local utility provider Milan Public Utilities for overbilling affecting the Department of Military in the amount of \$202.40 due to a faulty meter at one of its facilities.

Working with SFUM, the Department of Military's AP team was able to **verify through the UDM platform** the credit had been successfully applied to the account.



CASE STUDY #7

Detection of Energy Spikes and Water Leaks

Tennessee Department of Transportation

In March 2021, the UDM platform alerted SFUM and TDOT staff of an abnormal water use and cost spike at one of its facilities in Nashville. The UDM platform's **bill audit feature** noted a marked increase in month over month water usage — from 400 cubic feet (CCFs) in February to 7,769 CCFs in March — resulting in a cost increase of more than \$78,000. Upon SFUM's confirmation of the spike through consumption and cost analysis, TDOT facility managers discovered a water leak at the facility.

TDOT worked with local provider Metro Water Services (MWS) to make the appropriate repairs and received a \$65,141.92 reimbursement from MWS for the time period of the leak.

Tennessee Highway Patrol (THP)

In December 2020, the SFUM team alerted the DGS AP team of higher-than-average water usage and associated costs at the THP Fallbranch facility. **UDM data revealed abnormal water usage and costs** during a five-month period between August and December 2020.

With this information, Jones Lang LaSalle (JLL) maintenance personnel inspected the facility and noted a defective float valve inside the cooling tower, which was causing a steady stream of water to overflow into a culvert located outside. As a result, DGS and its partner JLL replaced the float valve and secured the tower to continue normal operations.



\$65,142

was reimbursed after the UDM platform flagged abnormal data resulting from a water leak

CASE STUDY #8

Tracking Energy Savings

Facility Managers with TDOT and the Tennessee Department of Tourist Development (TDTD) were able to **use the UDM platform to determine the amount of Generation Credits** earned for each of the Welcome Centers participating in the TVA Green Power Providers Generation Agreement.

The agency was able to evaluate the performance of each of the photovoltaic (PV) systems at each of the Welcome Center locations by comparing report data from the UDM platform of monthly generation credit earnings to the monthly actual output for each of the PV systems between June 2017 and October 2020.

TOTAL GENERATION CREDITS EARNED:

\$5,455
(Mitchellville/
Robertson Co.)

\$5,062
(Ardmore/
Giles Co.)

\$5,400
(Tiftonia/
Hamilton Co.)

Utility data from the UDM platform has **aided third-party contractors in the review and validation of energy savings** generated after the completion of ECMs.

The Tennessee Wildlife Resources Agency (TWRA) asked SFUM to pull monthly cost and consumption trend data for the engineer of record on projects to verify continued energy savings since the completion of the mechanical (HVAC) and electrical (lighting) upgrades at the Ellington Agricultural Center Office in 2016 and the Fleming Training Center in 2017. Figure 2.2 details FY2017 – FY2021 cost savings by utility.

TDTD has used the UDM platform to help track the energy reduction impact that each of the lighting and water ECMs had at each of the 16 Welcome Centers, since being implemented in CY2013. Thanks to the UDM platform, TDTD was able to **review year-over-year cost and consumption comparison data** for the last five fiscal years for all State of Tennessee Welcome Centers. Figure 2.3 shows associated cost and usage savings.

FIGURE 2.2 | Monthly Building Manager Report Comparing Energy Reduction Savings for FY2017 to FY2021 for the Fleming Training Center

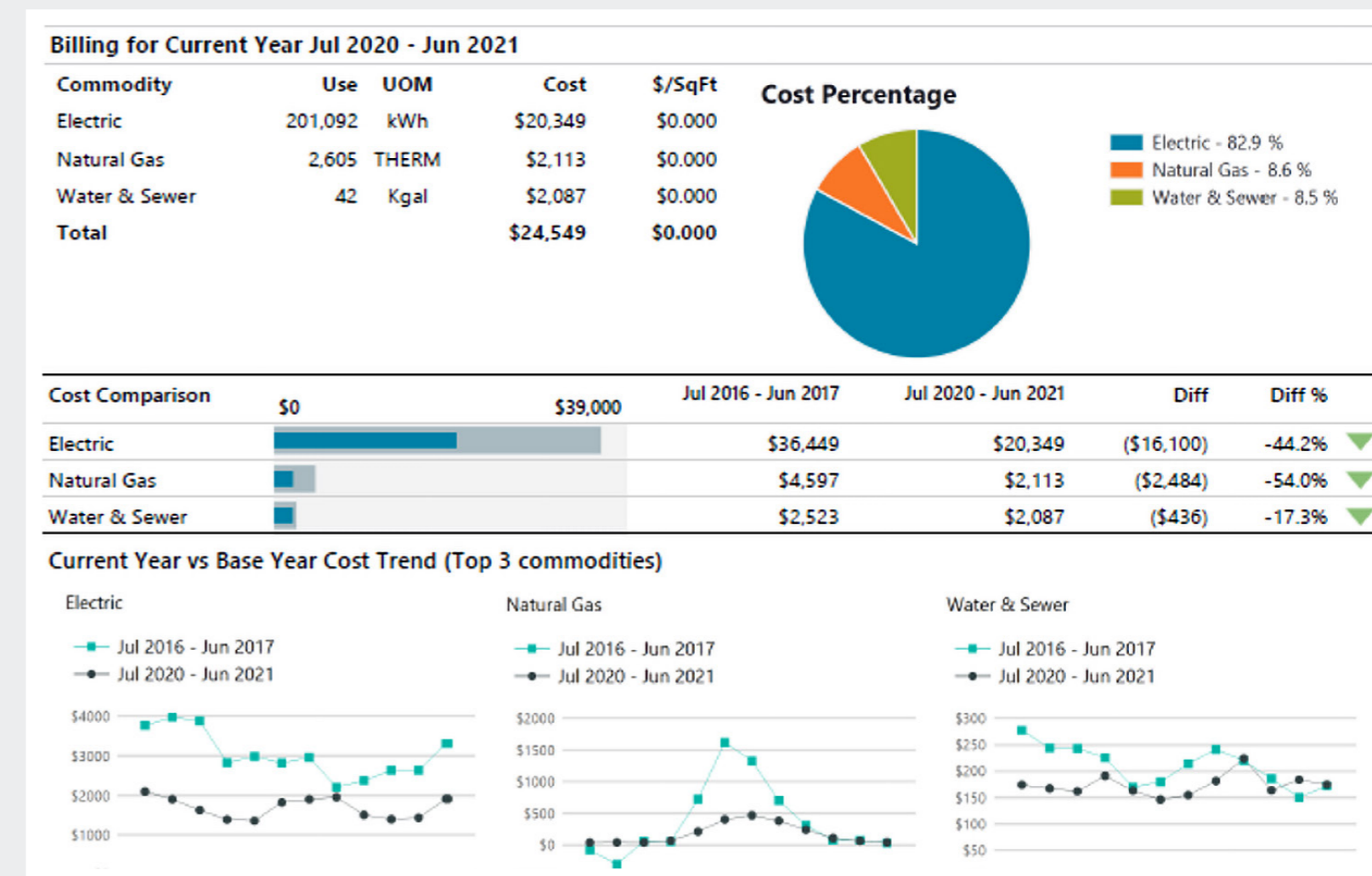


FIGURE 2.3 | Year-over-Year Cost and Use Comparison Reports for Tourist Development Welcome Centers (UDM Report)

Welcome Centers	Cost, Jul - Jun					UOM	Change over 2019-2020	
	Jul 2016 - Jun 2017	Jul 2017 - Jun 2018	Jul 2018 - Jun 2019	Jul 2019 - Jun 2020	Jul 2020 - Jun 2021			
Total	\$328,523	\$324,747	\$319,720	\$322,468	\$300,041	\$	-\$22,427	-7.0 %

Welcome Centers	Use, Jul - Jun					UOM	Change over 2019-2020	
	Jul 2016 - Jun 2017	Jul 2017 - Jun 2018	Jul 2018 - Jun 2019	Jul 2019 - Jun 2020	Jul 2020 - Jun 2021			
Total	10,323	10,679	10,352	9,460	9,140	MMBtu	-320	-3.4 %

CASE STUDY #9

Ascertainment of Billing Irregularities

In December 2020, the TWRA observed that local utility provider Memphis Light, Gas & Water (MLGW) had overestimated the gas meter usage for 31 consecutive months, from February 2018 through October 2020, at one of its facilities.

Using data from the UDM platform, TWRA was able to **compare prior usage and costs** to determine a baseline for normal natural gas consumption at the facility.

As a result, MLGW issued TWRA a check in the amount of \$14,001.59 for the overestimation.



\$14,000

was reimbursed after the UDM platform helped indicate an overestimation of gas usage



CASE STUDY #10

Using the UDM Platform as a Decision-Making Tool: Submetering

When a utility meter serves one facility or area, the allocation of cost and consumption data from a utility bill is relatively straightforward. However, in many instances, a single meter can serve multiple facilities. This makes attributing cost and consumption to downstream facilities a challenge. SFUM utilizes three methods to address meters serving multiple facilities and encourages each State agency and campus to determine which method is best for their facilities.

METHOD 1: Associating all cost and consumption to the facility believed to be the largest consumer.

METHOD 2: Assigning all meters serving multiple facilities to a group or a placeholder facility created by SFUM known as a Multi-Facility Meter (MFM), so that the cost and consumption data from the meter gets captured at an organizational level.

METHOD 3: Allocating the cost and consumption data to downstream facilities by using square footage or a designated percentage.

A State entity requiring facility-level consumption data when only one revenue meter is present should explore installing submeters.

While the UDM platform does not currently interface with submeters, SFUM can provide guidance to interested facility managers looking to manually upload interval data. **Ranking Reports, such as Figure 2.4, can be used** to quickly view those shared meters with the highest monthly costs, indicating potential candidates for submetering.

FIGURE 2.4 | Example of Report Ranking Meters by Highest Cost/Day (UDM Report)

Rank	Meter Name	Cost Per Day (\$/day)	Cost (\$)
1	500 Flat Fork Rd - ELE	\$5,316.33	\$18,883,593
2	674 Horsehead Rd Prison - ELE	\$4,514.29	\$11,953,832
3	Hwy 87 W - ELE	\$3,908.40	\$13,073,586
4	2 NW Correctional Comp Site - ELE	\$3,610.62	\$13,388,194
5	Airbase Rd - ELE	\$3,288.50	\$11,887,932
6	Deaderick St - ELE	\$2,380.75	\$8,508,792
7	Prison Rd - ELE01	\$2,318.17	\$6,845,559
8	311 7th Ave N - ELE	\$2,241.72	\$7,964,835
9	7575 Cockrill Ben Blvd - ELE	\$2,221.93	\$7,910,089
10	William R Snodgrass Tn Tower - CHW01	\$2,122.91	\$7,557,562



Cost and Usage Data

SHELBY AVENUE BRIDGE,
NASHVILLE, TN

Methodology

This section presents a high-level analysis of the State building portfolio, including the General Government executive branch agencies, the UT System, TBR, and LGIs. It also provides:

- An overview of differences in utility cost and usage from FY2019 through FY2021
- Utility usage for each individual organizational type listed above

SFUM accessed the cost and usage information in the UDM platform, which contains 99.9% of utility billing data for known State meters for FY2021. (These percentages do not include the utility propane, as some agencies procure propane via purchase orders outside the UDM platform.)

The analysis is limited to monthly data, as not all State-owned or -managed facilities offer data at greater intervals.

Data Collection

Over the past three fiscal years, the SFUM team, with assistance from agencies and campuses, collected 97.2% of all identified State meters in FY2019, 99.1% in FY2020, and 99.9% in FY2021.



IN FY2021

99.9%

of identified State meters were collected



OF THOSE 8,800+ STATE ACCOUNTS

63%

are processed directly into the UDM platform

37%

require a duplicate bill for processing

For accounts that require a duplicate bill, 76% come from the utility provider and 24% are provided by the campus or agency.



The SFUM team relies on the State's agencies, campuses, and utility providers to inform them of new accounts. **Please make SFUM aware at tdec.sfum@tn.gov of any new account** for your organizations so the appropriate channels to receive the ongoing bills can be set up and cost and consumption can be accurately reported.

Data integrity and collection are the key foundational elements for a utility data management platform.



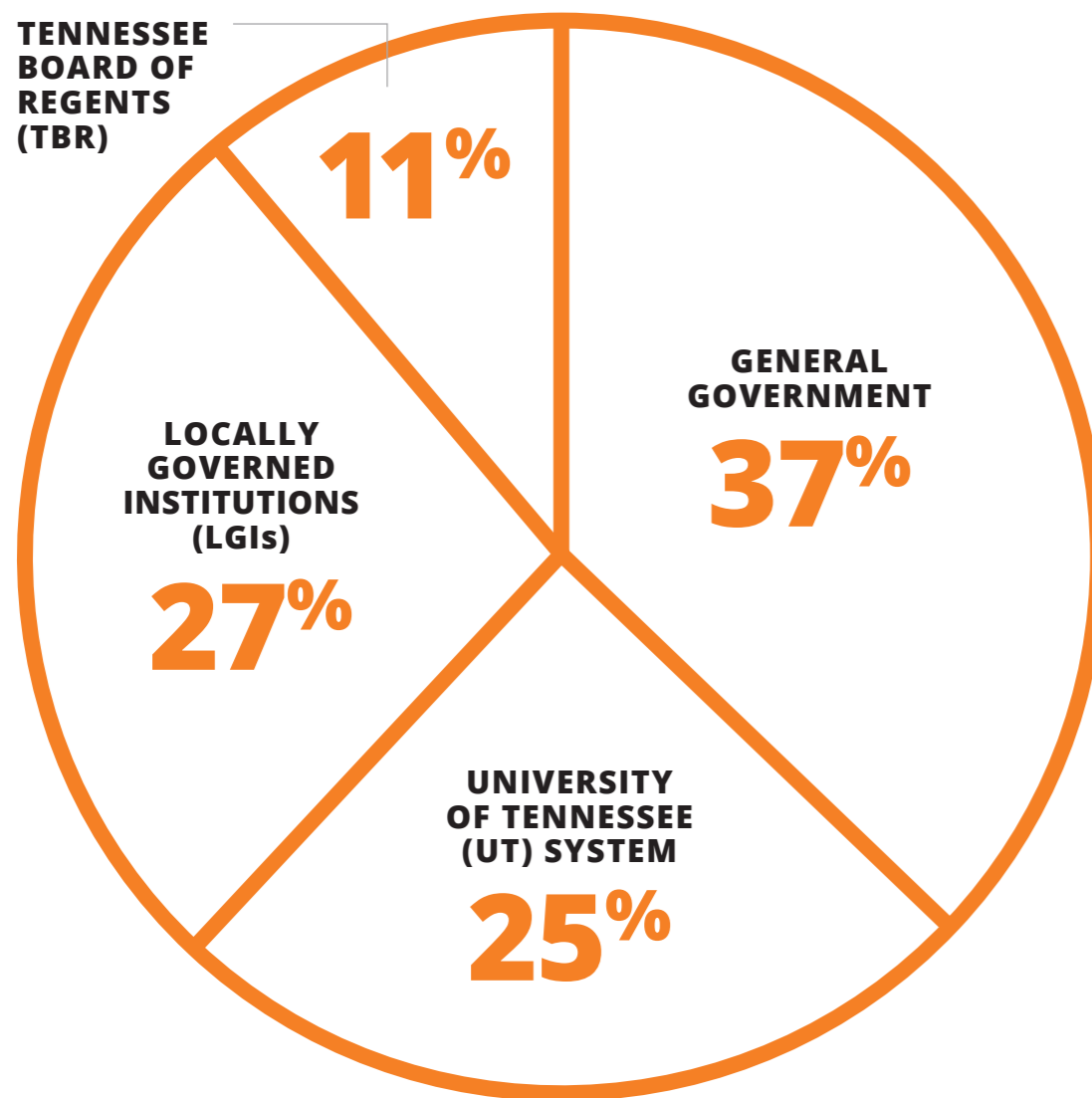
DATA RECONCILIATION

The SFUM team carried out data analysis using a dataset output from **14 different organization group databases** within the UDM platform.

Because of the real-time nature of the platform, the cost and usage figures reported are subject to change as any missing bills are obtained and entered, or if SFUM is notified of additional accounts covering this timeframe by an agency or campus. This can lead to minor differences in the usage or cost values for the different datasets.

Overall State Portfolio and Observations

FIGURE 3.1 | FY2021 Share of Portfolio by Organizational Group (% of sq. ft.)



TOTAL UTILITY COSTS FOR FY2021

\$172,085,040

spent on energy and water utilities across all State-owned and -managed facilities

3.4% decrease (\$6,090,299) in overall State utility costs compared to FY2020

8.3% decrease (\$15,678,002) in overall State utility costs compared to FY2019

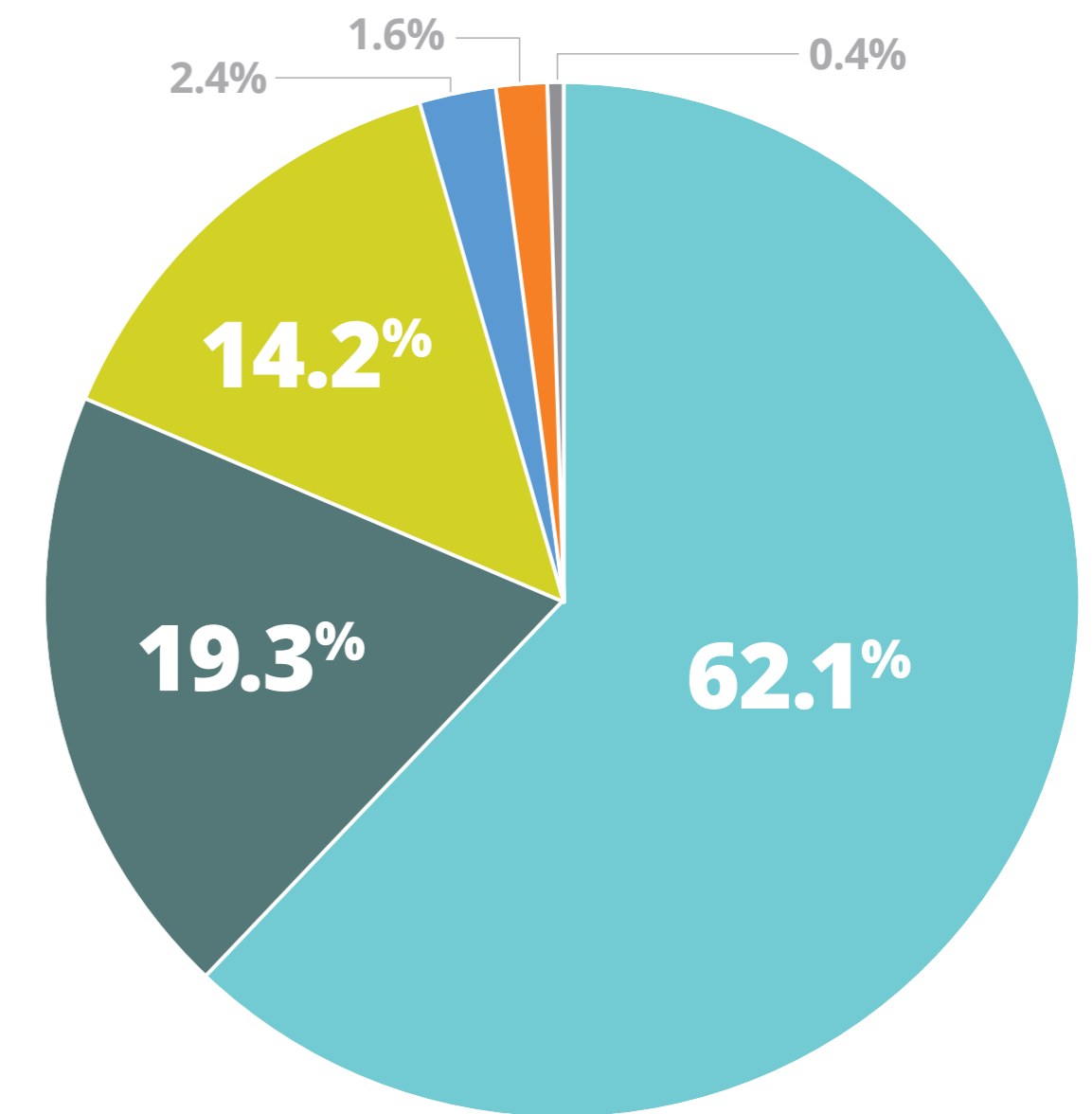
These decreases are primarily a result of reductions in electric power usage and rates.¹⁰

ELECTRIC POWER FROM FY2019-FY2021

13.7% decrease in costs

10.7% decrease in usage

FIGURE 3.2 | FY2021 All State Utility Cost Profile



Electric (\$106,834,546) | Chilled Water (\$4,155,212)
 Water/Sewer (\$33,290,967) | Steam (\$2,793,515)
 Natural Gas (\$24,395,651) | Propane (\$615,148)

¹⁰The overall decline in utility consumption and costs reflects a continued pattern of reduced occupancy since the onset of the COVID-19 pandemic in early March 2020. Since that time, many State entities have encouraged or mandated remote work for non-essential employees.





FY2019-FY2021 Comparison

TABLE 3.1 | Change in FY2019-FY2021 in Overall Cost and Overall Usage by Utility


UTILITY COMMODITY	USAGE CHANGE (%)	TOTAL USAGE CHANGE	COST CHANGE (%)	TOTAL COST CHANGE (\$)
ELECTRIC	-10.7%	-135,419,820 kWh	-13.0%	-\$15,945,008
WATER / SEWER	-5.0%	-169,583 kgal	6.3%	\$1,971,344
NATURAL GAS	5.2%	+4,001,703 Therms	-5.8%	-\$1,500,120
CHILLED WATER	-4.9%	-909,950 ton-hr	-2.2%	-\$93,809
STEAM	-1.2%	-2,472 Mlb	-4.9%	-\$144,463
PROPANE	-1.1%	-5,117 Therms	5.9%	\$34,054

TOTAL = -\$15,678,002

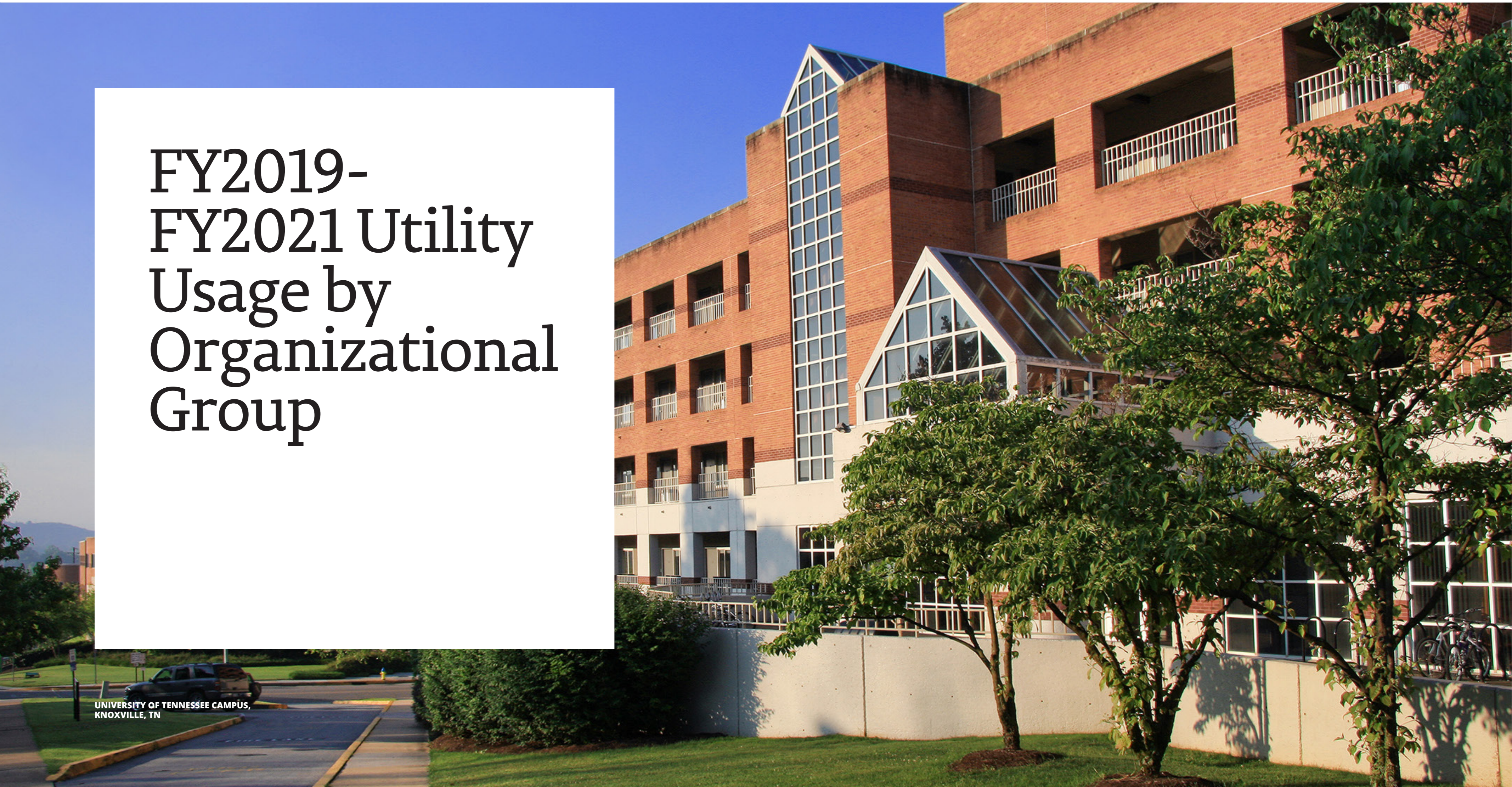
KEY TAKEAWAYS

-  Substantial decreases in both electricity cost and electricity use
-  Although water and sewer use decreased, cost increased
-  Although propane usage decreased, propane cost increased
-  Although natural gas usage increased, natural gas cost decreased

Reasoning: Cost increases accompanying usage decreases or cost decreases accompanying usage increases may result from, but are not limited to, changes in rate structures or changes derived from contract negotiations.

 The State benefited from a net reduction of **\$15,678,002 (8.3%)** in overall utility costs in FY2021, down from \$187,763,042 in FY2019

FY2019- FY2021 Utility Usage by Organizational Group



General Government

✉ WANT MORE DETAILED DATA? EMAIL US.

TOTAL UTILITY COSTS FOR FY2021

\$68,469,566

⚡ Electric power
63.7%

🚰 Water/sewer
18.8%

Total utility cost per year comparison, General Government

FY2019	\$71,886,909
FY2020	\$70,366,847
FY2021	\$68,469,566

FIGURE 3.3 | Commodity Cost per Year Comparison, General Government

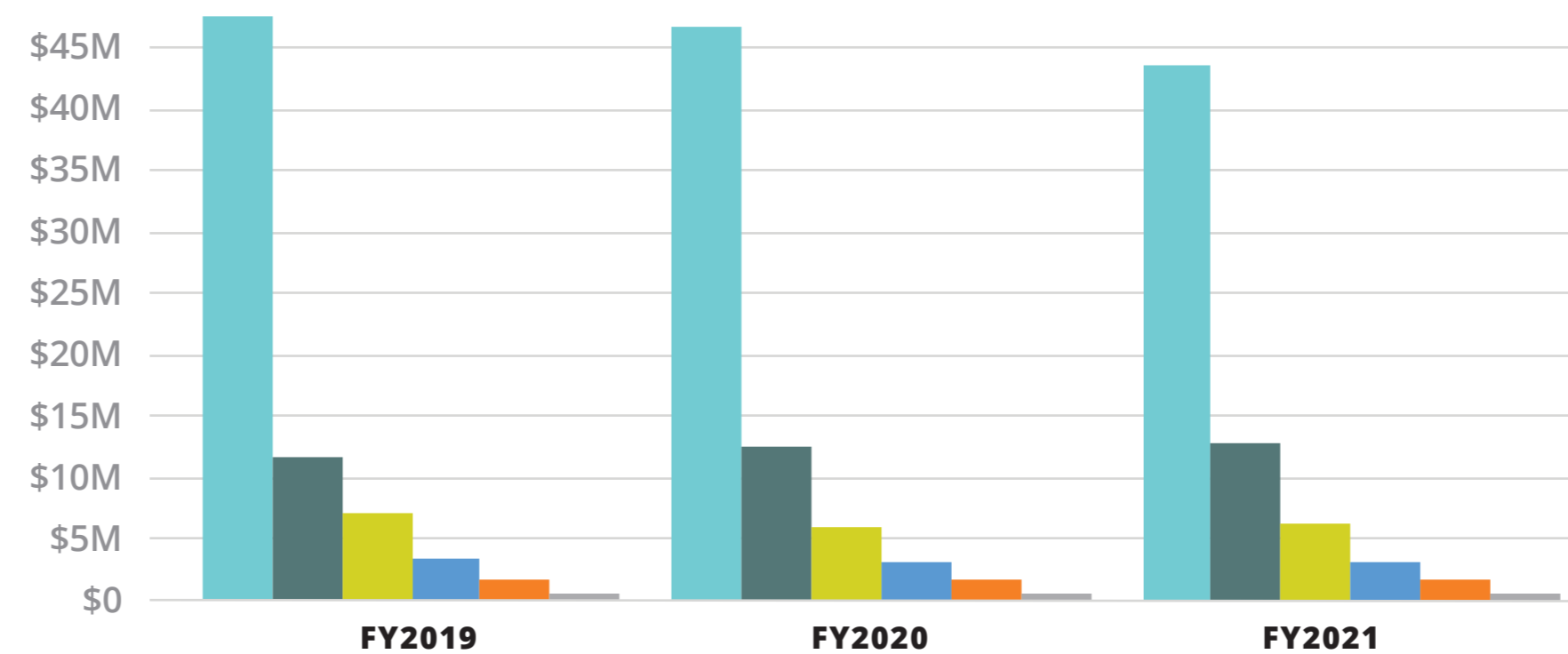
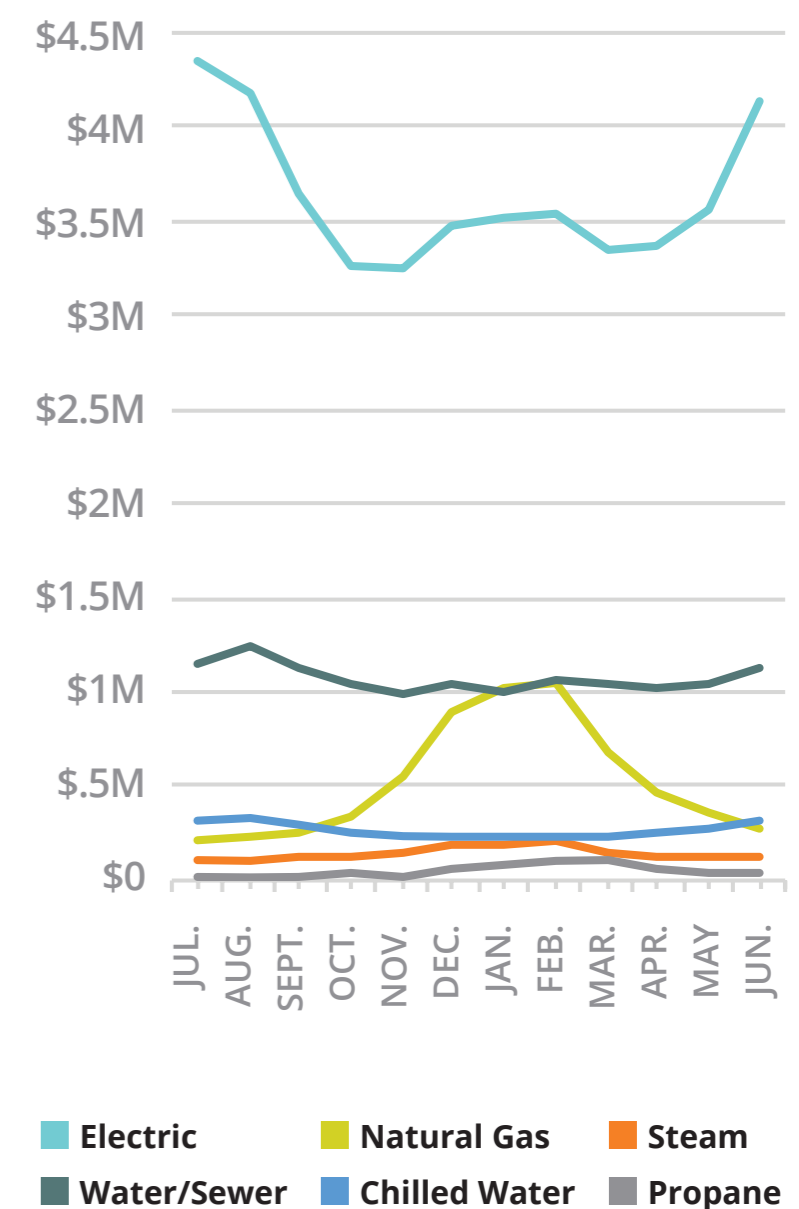


TABLE 3.2 | FY2021 Utility Cost by Commodity, General Government

COMMODITY	USAGE	UOM	COST	PERCENT
ELECTRIC	434,450,768	kWh	\$43,647,839	63.7%
WATER/SEWER	1,369,041	kgal	\$12,898,089	18.8%
NATURAL GAS	18,537,509	Therms	\$6,322,538	9.2%
CHILLED WATER	13,019,176	ton-hr	\$3,236,233	4.7%
STEAM	113,129	Mlb	\$1,771,222	2.6%
PROPANE	453,729	Therms	\$593,646	0.9%

FIGURE 3.4 | FY2021 Commodity Cost per Month, General Government



The University of Tennessee (UT) System¹¹

WANT MORE DETAILED DATA? EMAIL US.

TOTAL UTILITY COSTS FOR FY2021

\$50,222,552

Electric power **60.6%**

Water/sewer **22.6%**

Total utility cost per year comparison, UT System

FY2019	\$54,170,560
FY2020	\$49,840,716
FY2021	\$50,222,552

FIGURE 3.5 | Commodity Cost per Year Comparison, UT System

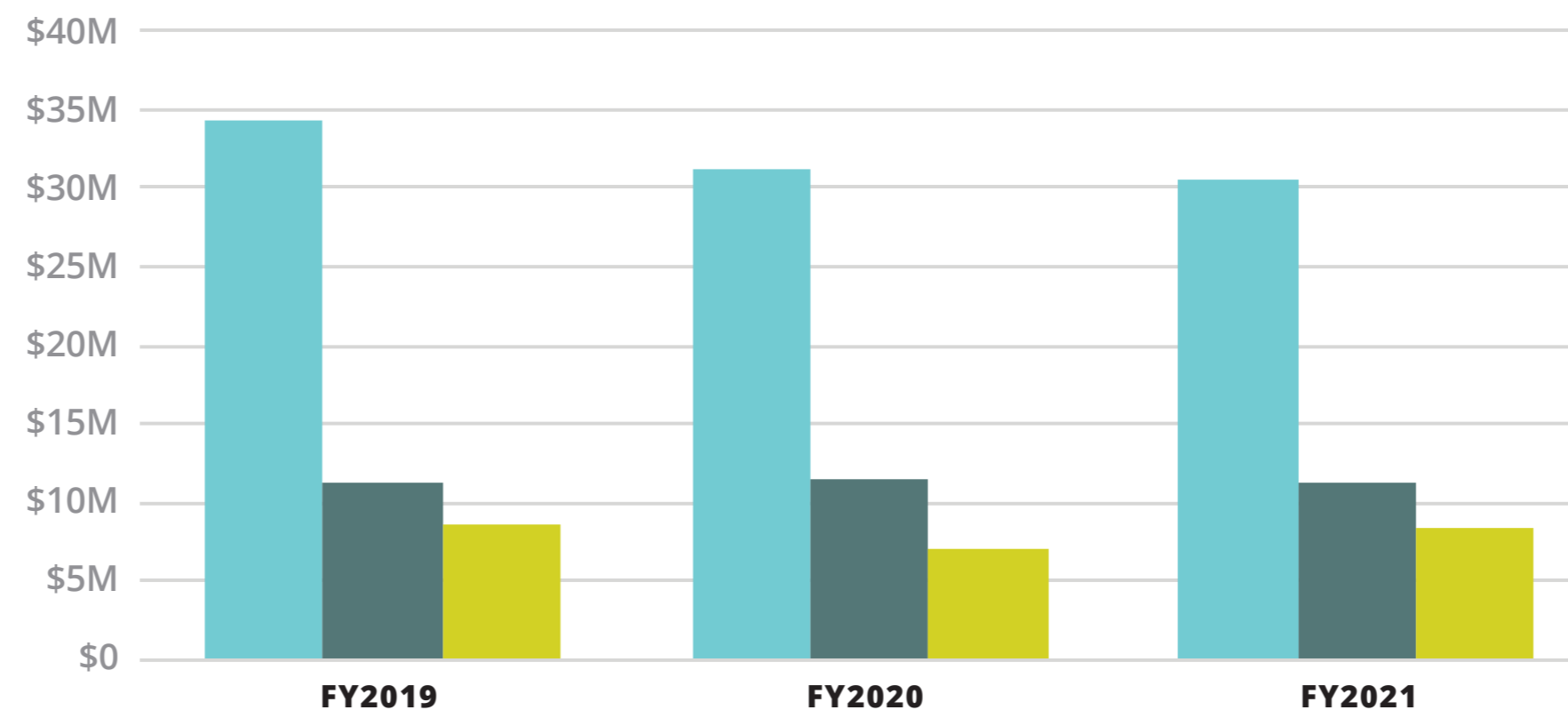


FIGURE 3.6 | FY2021 Commodity Cost per Month, UT System

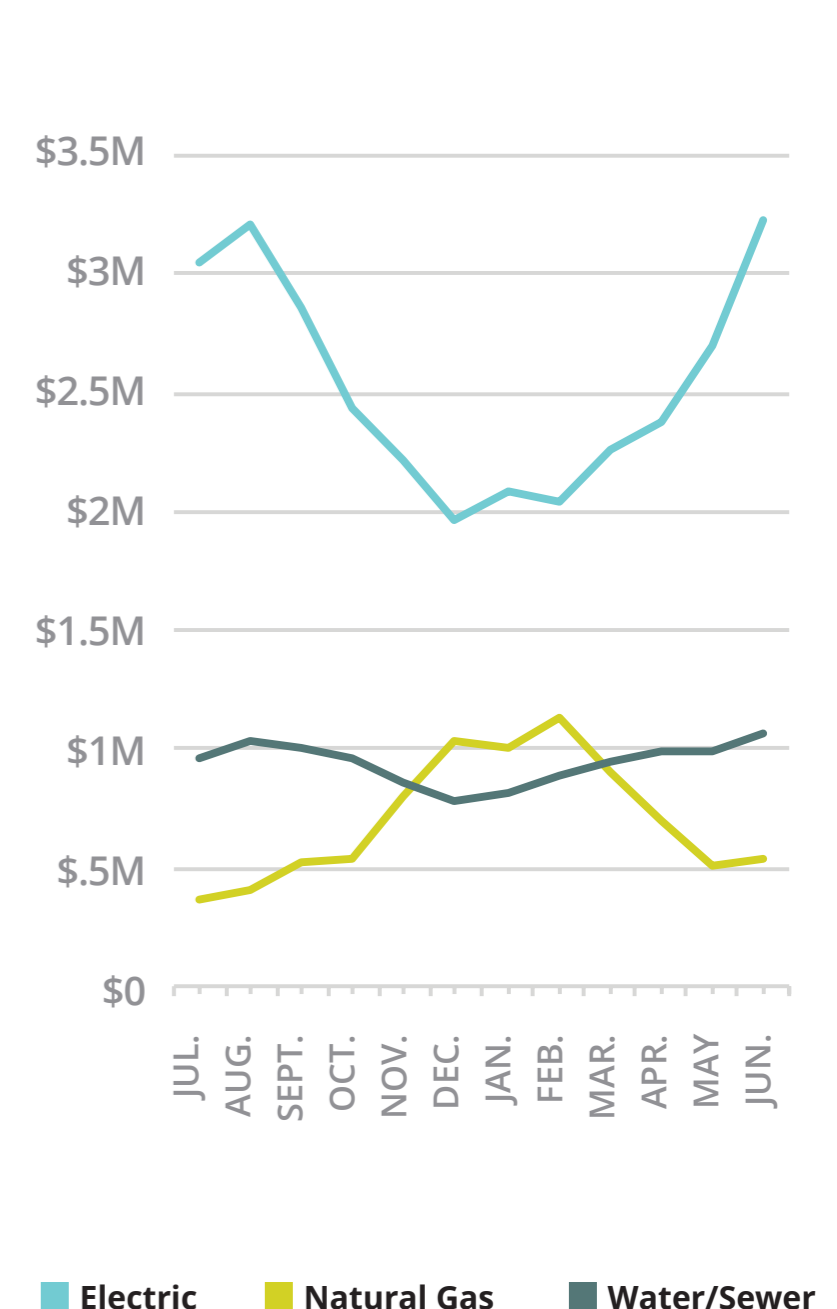


TABLE 3.3 | FY2021 Utility Cost by Commodity, UT System

COMMODITY	USAGE	UOM	COST	PERCENT
ELECTRIC	371,104,353	kWh	\$30,442,758	60.6%
WATER/SEWER	846,432	kgal	\$11,336,925	22.6%
NATURAL GAS	33,613,051	Therms	\$8,442,869	16.8%

¹¹ The University of Tennessee Southern at Pulaski wasn't acquired by UT System until after the close of FY2021 in July 2021, therefore this campus will not be included until the FY2022 UDM Report.

Locally Governed Institutions (LGIs)

WANT MORE DETAILED DATA? EMAIL US.

TOTAL UTILITY COSTS FOR FY2021

\$32,997,965

Electric power **52%**

Water/sewer **21.3%**

Total utility cost per year comparison, LGIs

FY2019	\$39,548,919
FY2020	\$36,879,938
FY2021	\$32,997,965

FIGURE 3.7 | Commodity Cost per Year Comparison, LGIs

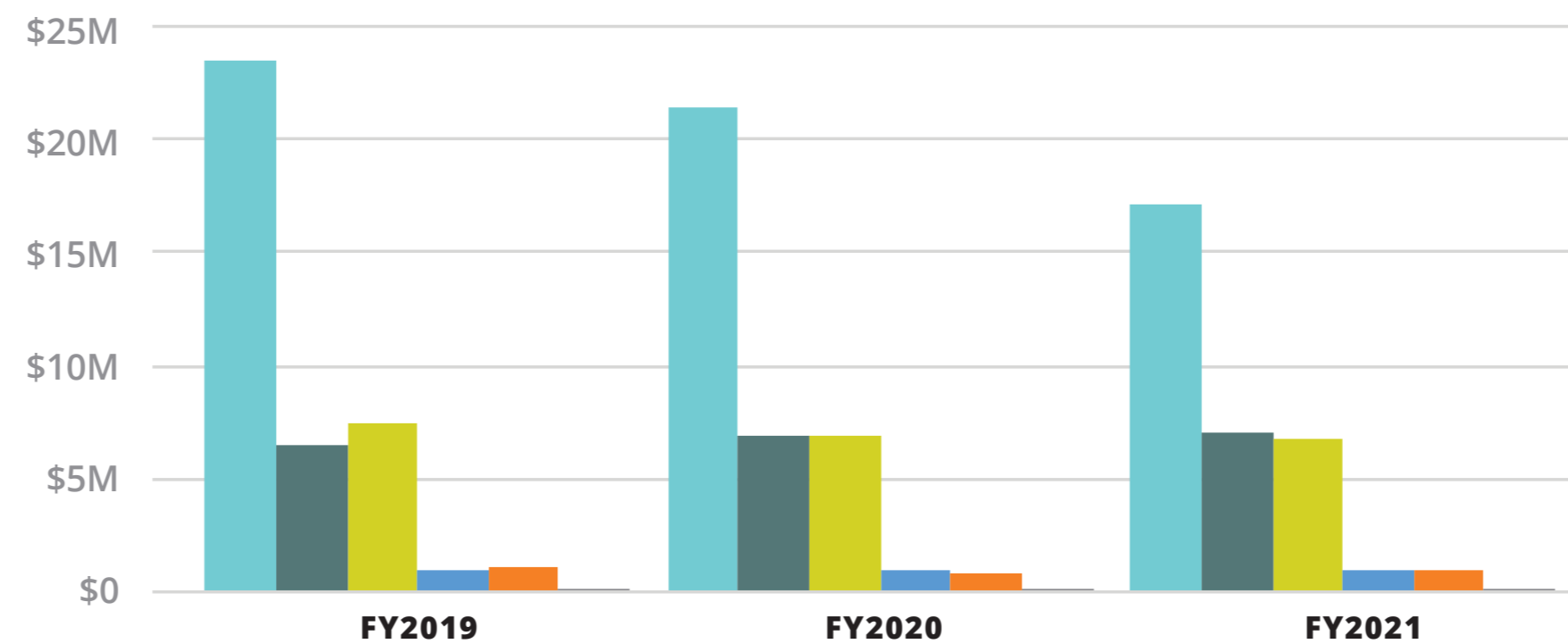
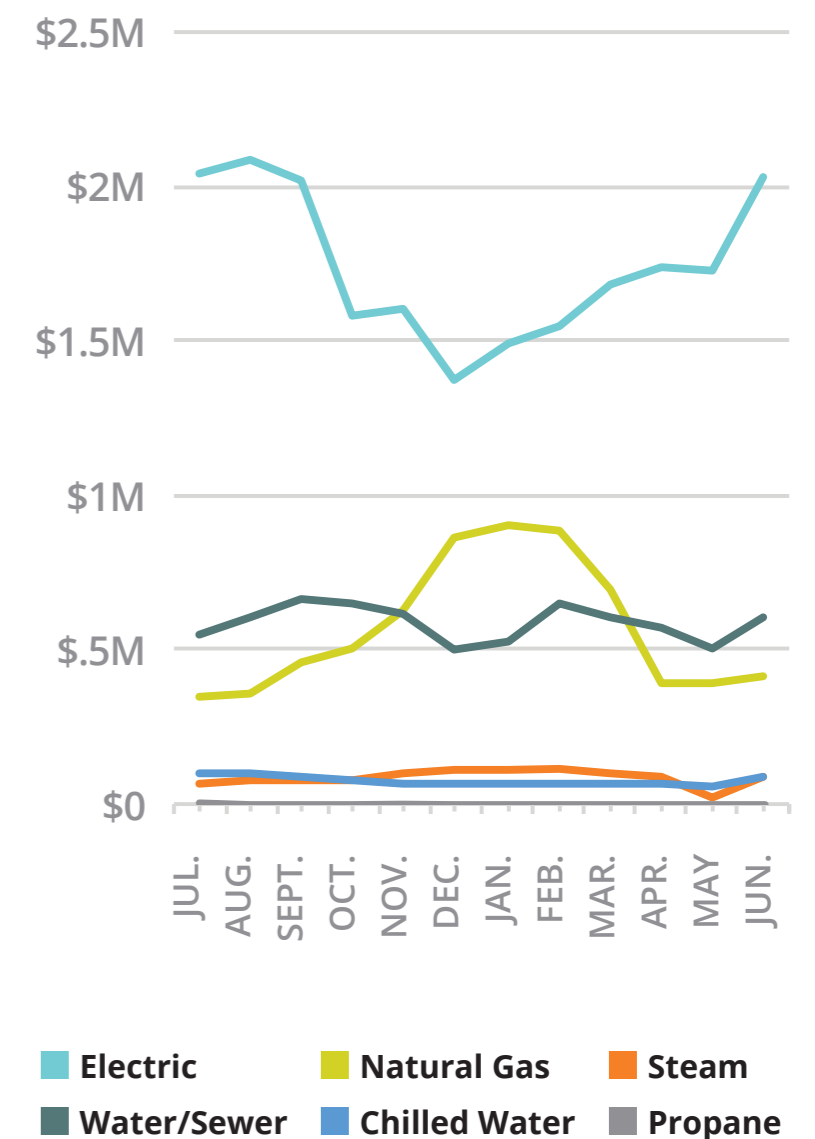


TABLE 3.4 | FY2021 Utility Cost by Commodity, LGIs

COMMODITY	USAGE	UOM	COST	PERCENT
ELECTRIC	164,142,117	kWh	\$17,165,924	52.0%
WATER/SEWER	766,348	kgal	\$7,035,787	21.3%
NATURAL GAS	25,057,328	Therms	\$6,833,578	20.7%
CHILLED WATER	4,544,250	ton-hr	\$918,980	2.8%
STEAM	86,603	Mlb	\$1,022,293	3.1%
PROPANE	13,112	Therms	\$21,403	0.06%

FIGURE 3.8 | FY2021 Commodity Cost per Month, LGIs



The Tennessee Board of Regents (TBR)

WANT MORE DETAILED DATA? EMAIL US.

TOTAL UTILITY COSTS FOR FY2021

\$20,394,957

Electric power **76.4%**

Natural gas **13.7%**

Total utility cost per year comparison, TBR

FY2019	\$22,156,654
FY2020	\$21,087,838
FY2021	\$20,394,957

FIGURE 3.9 | Commodity Cost per Year Comparison, TBR

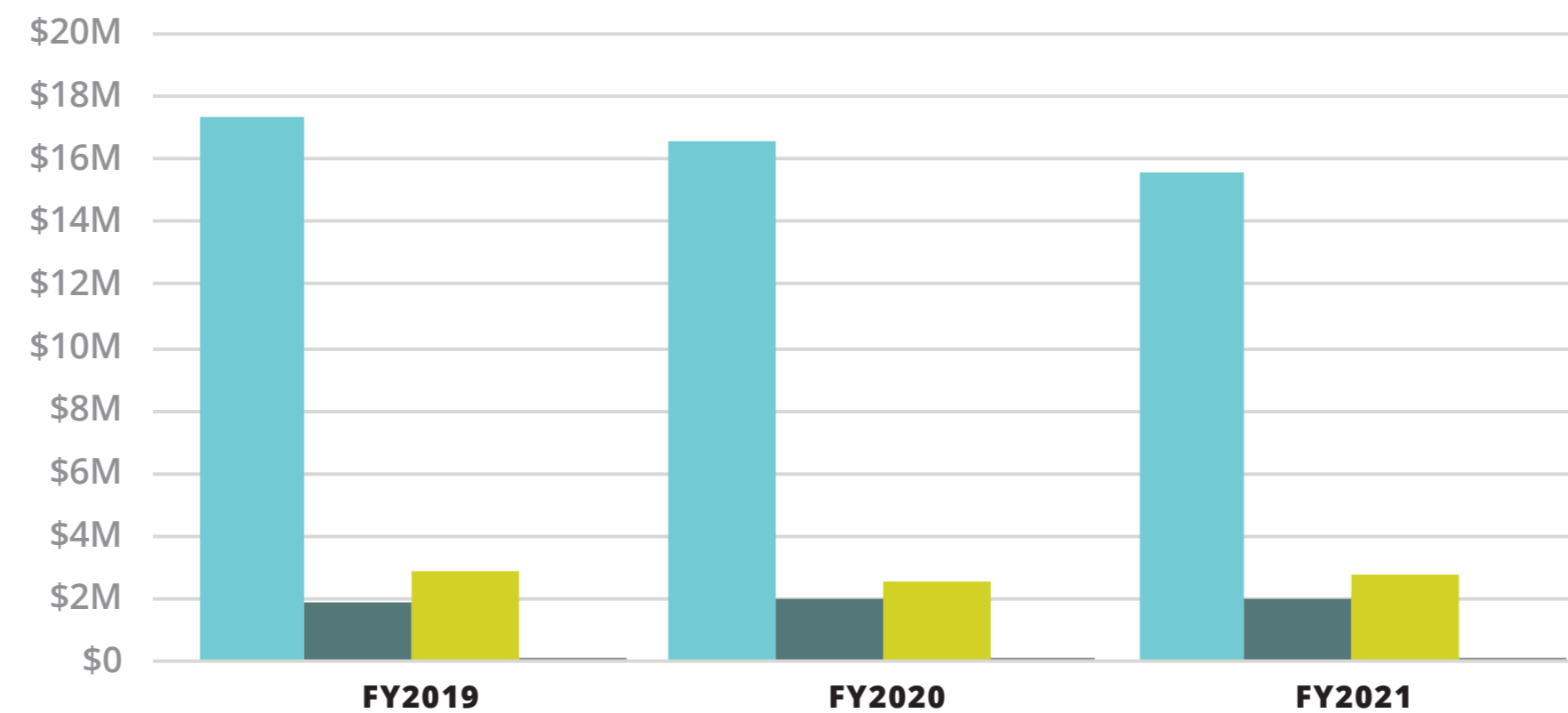


FIGURE 3.10 | FY2021 Commodity Cost per Month, TBR

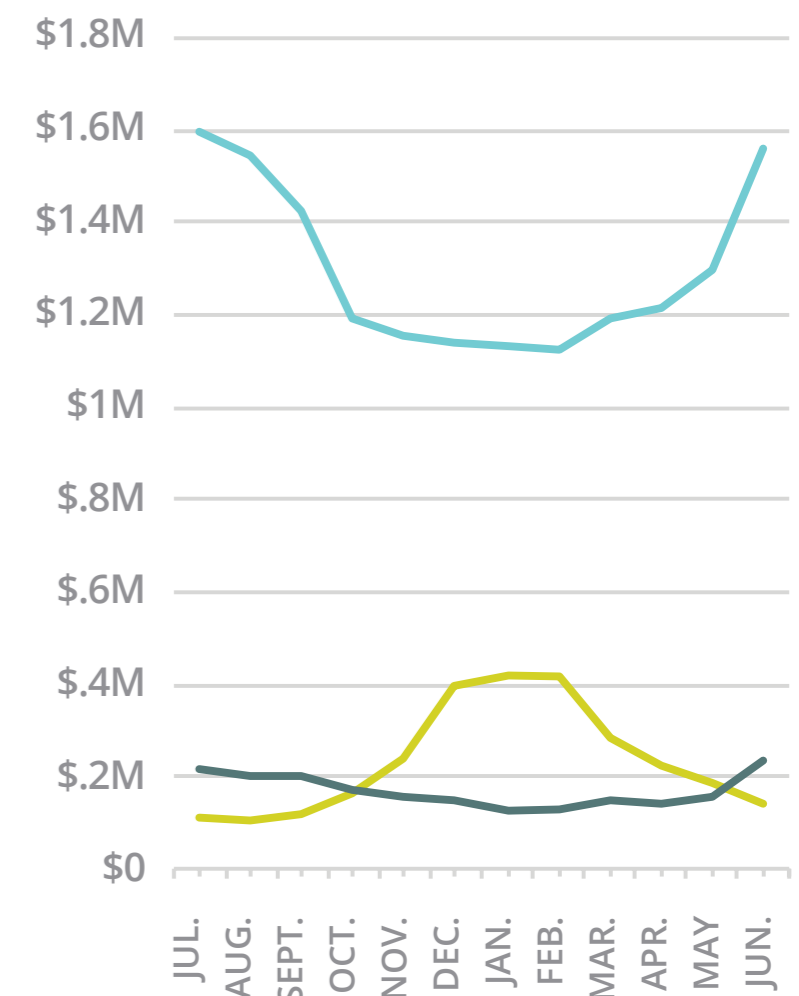


TABLE 3.5 | FY2021 Utility Cost by Commodity, TBR

COMMODITY	USAGE	UOM	COST	PERCENT
ELECTRIC	158,195,837	kWh	\$15,578,024	76.4%
WATER/SEWER	232,650	kgal	\$2,020,167	9.9%
NATURAL GAS	4,225,220	Therms	\$2,796,666	13.7%
PROPANE	0	Therms	\$100	0.00049%

Electric, Natural Gas, Water/Sewer, Propane



Looking Ahead

CHICKASAW STATE PARK
IN WEST TENNESSEE

Interfacing with Current Operating Systems

To promote efficiency, ensure data integrity, and reduce silos within and between State organizations, SFUM will explore the potential of the UDM platform to interface with other operating systems utilized by the State, such as:

ArcGIS



Integrating this tool with the UDM platform may empower agencies to overlay additional specific building information with utility consumption and cost history. This would give decision makers added visibility into their operations and maintenance practices. For example, Tennessee State Parks (TSP) could overlay Geographic Information Systems (GIS) and UDM data to tie in utility information with general building characteristics and systems. UDM data integration may present utility information in addition to standard metrics like visitation, revenue, etc.

ENERGY STAR® Portfolio Manager® (ESPM)



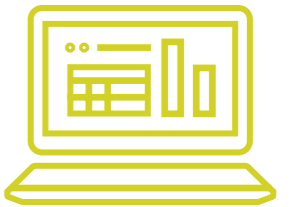
Integrating data with this free utility management software, provided by the U.S. EPA, will allow State personnel to assign widely recognized benchmarking scores and compare their facilities on a national level. The SFUM team has successfully pushed data from the UDM platform directly into ESPM and is currently piloting the UDM platform and ESPM integration with a total of four buildings.

Interval Data



The SFUM team is exploring the use of interval billing information from utility providers for facilities that have smart meters, facility submeters, and building management systems. With the introduction of specially located submeters, UDM platform users can determine consumption and costs for specific building units or energy consuming infrastructure, such as an Air Handling Unit (AHU). Submetering information can be imported to help users build consumption profiles and plan future energy efficiency actions. Currently, SFUM is collecting interval billing data for several buildings and plans to share its analysis in the next report.

Computerized Maintenance Management Systems (CMMS)



The SFUM team is looking at the feasibility of connecting with agency or campus facility management systems, such as CMMS. For example, TDEC utilizes HIPPO CMMS to input and track work orders, preventative maintenance schedules, equipment inventory, and submit for major maintenance funding consideration. Similar to ArcGIS, integrating the UDM platform with CMMS will facilitate incorporation of utility data with general building information, providing the opportunity to make more informed decisions.

Energy Liaison Program (ELP)



With an anticipated launch in FY2023, the ELP is designed to provide education and outreach, continued professional development and technical assistance for State personnel (e.g., facility managers, building maintenance personnel, and sustainability professionals).

Leveraging the features and benefits of the UDM platform, ELP will help State employees share best practices, identify potential energy savings opportunities in their facilities, and get connected to programs and resources to support the integration of energy efficiency into capital projects.

WANT TO PARTICIPATE?

Send a note to SFUM at tdec.sfum@tn.gov.

Accessing the UDM Platform

Access to the UDM platform is available to all State employees of participating General Government agencies, TBR schools, UT System schools, and Locally Governed Institutions (for a full list of participating agencies, see **Appendices**).

READY TO REGISTER?

Questions about this report or requests to become a registered UDM platform user can be directed to the SFUM team at tdec.sfum@tn.gov.





Additional Info

STATUE OF EDWARD WARD CARMACK
IN FRONT OF THE TENNESSEE STATE
CAPITOL, NASHVILLE, TN

Appendices

APPENDIX A

UDM Report and Dashboard References

FIGURE 2.1, P. 15

Example of TBR Buildings with Primary Use Type 'Library' Ranked by Cost/Area (UDM Platform, Groups & Benchmarks View)

This graphic is pulled from the **Groups & Benchmarks** module.



Description:

The Groups & Benchmarks tool allows for like buildings to be grouped and compared within a single organization, as well as across the overall State portfolio.

Facilities can be ranked by cost or use per square foot and cost or use per day.

FIGURE 2.2, P. 17

Monthly Building Manager Report Comparing Energy Reduction Savings for FY2017 to FY2021 for the Fleming Training Center

This graphic is pulled from the Monthly Building Manager Report – Report-22 in the UDM platform. Reports can be accessed from the **Reports** module.



Description:

It is a report for building managers showing monthly performance, use, and cost vs. a previous year. Pie charts and tabular data break out use and cost for each utility. Cost trend charts are shown for the top three utilities. Heating Degree Days (HDD) and Cooling Degree Days (CDD) statistics are available when grouping by building.

FIGURE 2.3, P. 17

Year-over-Year Cost and Use Comparison Reports for Tourist Development Welcome Centers (UDM Report)

This graphic is pulled from the Year-over-Year Comparison – Report-06 in the UDM platform. Reports can be accessed from the **Reports** module.



Description:

The report is a tabular comparison of two or more years of data for a given object type: accounts, buildings, utilities, cost center, meters, place types, or vendors. Results are sorted alphabetically. Percentage change is provided for the two most recent years in the report. Actual, calendarized, and normalized data are all available.

FIGURE 2.4, P. 18

Example of Report Ranking Meters by Highest Cost/Day (UDM Report)

This graphic is pulled from the Ranking Report – Report-02 in the UDM platform. Reports can be accessed from the **Reports** module.



Description:

The report is a data table to compare and rank similar objects. It can identify extreme average unit cost for a meter, an indicator of an inappropriate rate schedule, data errors, or facility problems such as low load factor.

APPENDIX B

Utility Usage Calculations

TABLE 3.1, P. 22

Change in FY2019-FY2021 in Overall Cost and Overall Usage by Utility

Calculations for each utility commodity:

Usage Change (%) =

$$\frac{\{(FY2021\ usage)-(FY2019\ usage)\}}{\{(FY2019\ usage)\}}$$

Total Usage Change =

$$(FY2021\ usage-FY2019\ usage)$$

Cost Change (%) =

$$\frac{\{FY2021\ cost-FY2019\ cost\}}{\{(FY2019\ cost)\}}$$

Total Cost Change (\$) =

$$(FY2021\ cost-FY2019\ cost)$$

APPENDIX C

List of General Government Agencies¹²

- Department of Agriculture
- Department of Children’s Services
- Department of Commerce & Insurance
- Department of Correction
- Department of Economic & Community Development
- Department of Education
- Department of Environment & Conservation
- Department of General Services
- Department of Health
- Department of Human Services
- Department of Intellectual & Developmental Disabilities
- Department of Mental Health & Substance Abuse Services
- Department of Military
- Department of Safety & Homeland Security
- Department of Tourist Development
- Department of Transportation
- Department of Veterans Services



TENNESSEE STATE LEGISLATIVE PLAZA IN NASHVILLE, TN

- Legislative Services
- National Civil Rights Museum
- Tennessee Bureau of Investigation
- Tennessee District Attorneys General Conference
- Tennessee District Public Defenders Conference
- Tennessee Rehabilitative Initiative in Correction
- Tennessee Secretary of State
- Tennessee Wildlife Resources Agency

APPENDIX D

List of UT System Facilities

CAMPUSES

- The University of Tennessee – Chattanooga
- The University of Tennessee – Health Science Center at Memphis
- The University of Tennessee – Knoxville
- The University of Tennessee – Martin
- The University of Tennessee – Southern at Pulaski¹³

INSTITUTES

- The University of Tennessee – Institute of Agriculture
- The University of Tennessee – Space Institute

¹²The list of General Government agencies captured in the UDM platform only consists of agencies that pay utilities for State-owned and -managed facilities.

¹³The University of Tennessee Southern at Pulaski was acquired by the UT System in early FY2022. Thus, it is not included in this report but will be highlighted in the FY2022 UDM Report.

APPENDIX E

List of Locally Governed Institutions

Austin Peay State University

East Tennessee State University

Middle Tennessee State University

Tennessee State University

Tennessee Tech University

University of Memphis

APPENDIX F

List of TBR Community Colleges

Chattanooga State Community College

Cleveland State Community College

Columbia State Community College

Dyersburg State Community College

Jackson State Community College

Motlow State Community College

Nashville State Community College

Northeast State Community College

Pellissippi State Community College

Roane State Community College

Southwest Tennessee Community College

Volunteer State Community College

Walters State Community College



APPENDIX G

List of TBR Tennessee Colleges of Applied Technology

- | | |
|----------------------------|-------------------|
| TCAT Athens | TCAT McKenzie |
| TCAT Chattanooga | TCAT McMinnville |
| TCAT Covington | TCAT Memphis |
| TCAT Crossville | TCAT Morristown |
| TCAT Crump | TCAT Murfreesboro |
| TCAT Dickson | TCAT Nashville |
| TCAT Elizabethton | TCAT Northwest |
| TCAT Harriman | TCAT Oneida |
| TCAT Hartsville | TCAT Paris |
| TCAT Hohenwald | TCAT Pulaski |
| TCAT Jacksboro | TCAT Ripley |
| TCAT Jackson ¹⁴ | TCAT Shelbyville |
| TCAT Knoxville | |
| TCAT Livingston | |

¹⁴TCAT Whiteville has become part of TCAT Jackson as of October 2021.

APPENDIX H

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APPENDIX I

Abbreviations

AHU – Air Handling Unit

AP – Accounts Payable

AWS – Alternative Workplace Solutions

CCF – Hundred Cubic Feet

CMMS – Computerized Maintenance Management Systems

COVID-19 – Coronavirus Disease 2019

CY – Calendar year

EPA – U.S. Environmental Protection Agency

EUI – Energy Use Intensity

DGS – Tennessee Department of General Services

ELP – Energy Liaison Program

ESPM – ENERGY STAR® Portfolio Manager®

F&A – Tennessee Department of Finance & Administration

FY2019 – Fiscal Year 2019 (July 1, 2018 – June 30, 2019)

FY2020 – Fiscal Year 2020 (July 1, 2019 – June 30, 2020)

FY2021 – Fiscal Year 2021 (July 1, 2020 – June 30, 2021)

GIS – Geographic Information Systems

HVAC – Heating, Ventilation, and Air Conditioning

ITS – Intelligent Transportation System

JLL – Jones Lang Lasalle

kgal – Kilo-gallon

kWh – Kilo-watt hour

LGIs – Locally Governed Institutions of higher education

MFM – Multi-Facility Meter

Mlb – Thousand Pounds (of Steam)

MLGW – Memphis Light Gas & Water

M&V – Measurement and Verification

MWS – Metro Water Services (Nashville)

OEP – TDEC Office of Energy Programs

PV – Photovoltaic

SFUM – State Facility Utility Management

Sq. ft. – Square foot / feet

STS – Strategic Technology Solutions

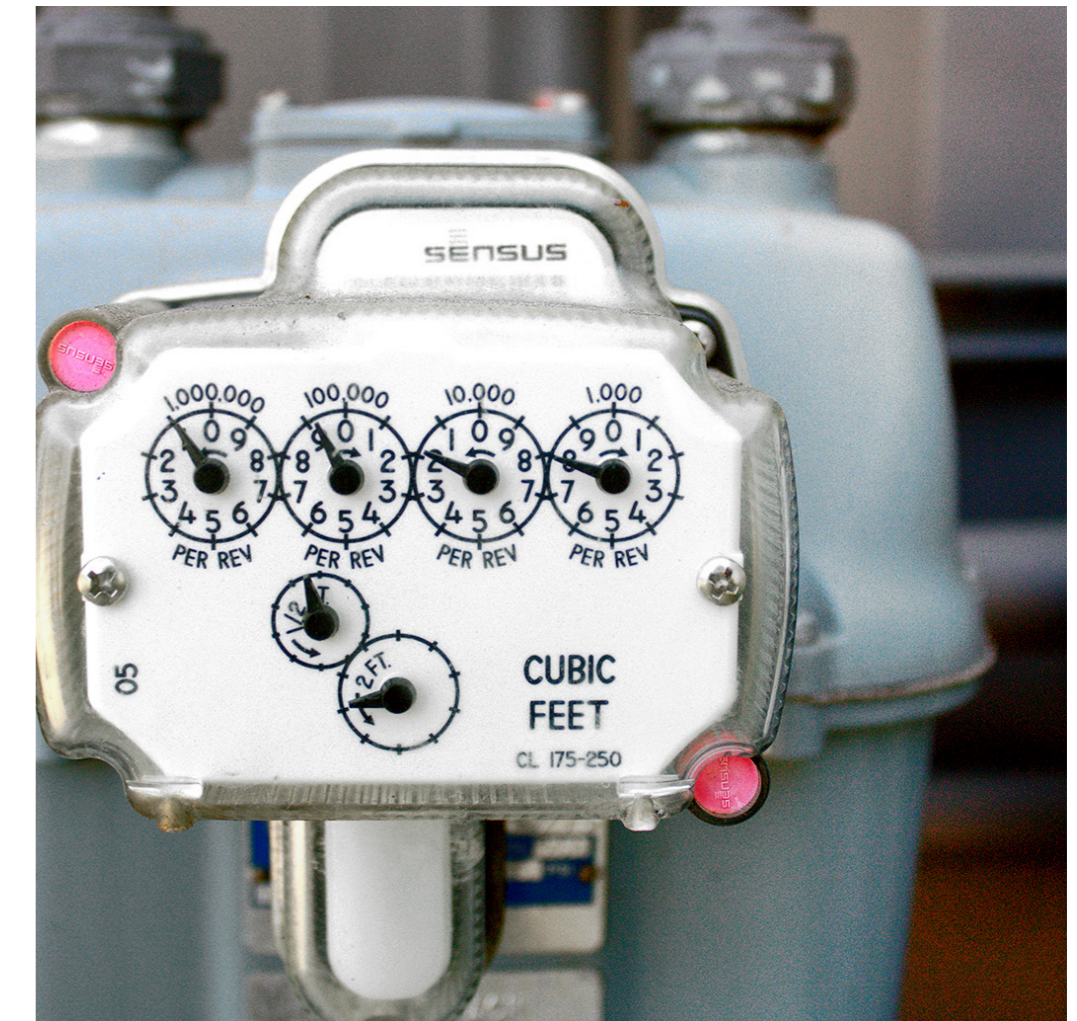
TBR – Tennessee Board of Regents

TDEC – Tennessee Department of Environment & Conservation

TDOT – Tennessee Department of Transportation

TDTD – Tennessee Department of Tourist Development

THP – Tennessee Highway Patrol



TSP – Tennessee State Parks

TVA – Tennessee Valley Authority

TWRA – Tennessee Wildlife Resources Agency

UDM – Utility Data Management

UOM – Unit of Measurement

UT – University of Tennessee

Acknowledgments and Disclaimers

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OEP SFUM partnered with **Milepost Consulting, SPC** on the compilation and design of this report.



IMAGE ATTRIBUTION

Original photo of Tennessee State Library and Archives courtesy of sos.tn.gov.

Photos of The Wayne G. Basler Library Northeast State Community College, Nashville State Community College, and Tennessee College of Applied Technology - Jackson at Whiteville courtesy of the schools.

Photo of the McGhee Tyson Air National Guard Base courtesy of the facility.

Photo of the Ellington Agricultural Center courtesy of the Tennessee Department of Agriculture.

Photo of Chickasaw State Park courtesy of TDEC and State of Tennessee staff.