FY 2024

STATE ENERGY MANAGEMENT PROGRAM

ANNUAL STATE AGENCY ENERGY USAGE

LEGISLATIVE REPORT

COMPILED BY:

MISSISSIPPI DEVELOPMENT AUTHORITY

ENERGY AND NATURAL RESOURCES DIVISION

ACKNOWLEDGMENTS

The Mississippi Development Authority wishes to recognize each member of the Legislature and the Governor's Office for entrusting this important task to the Mississippi Development Authority – Energy and Natural Resources Division (MDA-ENRD).

ENRD thanks all staff members at each state agency who work diligently to submit the energy utility data in a timely manner. This report would not have been possible without their cooperation.

Effective management of energy resources helps conserve taxpayer dollars and ensures additional capacity is available for economic development. We look forward to continued progress in energy management in the coming year.

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EXECUTIVE SUMMARY

The Mississippi Energy Sustainability and Development Act of 2013 (herein referred to as The Act), effective July 1, 2013, amended Section §57-39-19, Mississippi Code of 1972 annotated, requires the Mississippi Development Authority-Energy and Natural Resources Dvision (MDA-ENRD), to coordinate the development and implementation of a general energy management plan for state-owned-and-operated facilities in conjunction with the Department of Finance and Administration's (DFA) Bureau of Building, Grounds and Real Property Management. This report serves to update the Governor and the Legislature on statewide energy consumption and costs, including highlighting savings projects that are among the goals of the State Energy Management Program. The purpose of this program is to help state-owned facilities operate in an energy-efficient manner, reduce operating costs, and demonstrate successful energy consumption reduction strategies.

This report includes two parameters that make up annual energy usage: electricity and natural gas. Data for FY 2024 are shown in Table ES1 and compared to consumption and costs incurred in FY 2021 through FY 2023. Square footage data was acquired through DFA's Enhanced Information System (EIS) for the purpose of benchmarking building performance (for example, in dollars/square foot) in future reports. This year's results show that the statewide average cost is $1.55 per square foot.

The state experienced a decrease in energy costs for both electricity and natural gas this fiscal year over last year. The difference in the total annual energy cost for the state reflects a cost decrease of -4.3% percent from FY 2023 to FY 2024.

Table ES1: Annual State Agency Energy Consumption and Cost

Parameter/ (Units)	FY 2021	FY 2022	FY 2023	FY 2024	% Δ
Electricity usage/ Kilowatt hours (kWh)	1,047,395,249	1,097,039,105	1,105,318,221	1,088,091,537	-1.6%
Average cost for kWh	$0.075	$0.082	$0.094	$0.096	2.3%
Total annual electricity cost	**$78,920,534**	**$90,166,829**	**$103,447,142**	**$104,210,415**	**0.7%**
Natural gas usage/ Hundred cubic feet (ccf)	32,836,635	32,547,213	31,085,704	31,493,689	1.3%
Average cost per ccf	$0.48	$0.68	$0.79	$0.58	-26.4%
Total annual natural gas cost	**$15,647,339**	**$22,184,588**	**$24,526,948**	**$18,295,478**	**-25.4%**
Total annual energy cost	**$94,567,873**	**$112,351,418**	**$127,974,090**	**$122,505,893**	**-4.3%**
Total square feet (Ft^2)	74,665,366	74,665,366	78,785,815	78,785,815	0.0%
Average cost per square foot ($/ft^2$)	$1.26	$1.50	$1.62	$1.55	-4.0%

Table ES1 shows that electricity consumption decreased by 1.6% for the year, but the price (rate) increased by 2.3%. Natural gas consumption increased by 1.3% for the year, but the price (rate) decreased significantly by 26.4% for the year. The combined electricity and natural gas cost of energy on a per-square-foot-basis for the state was lower by $0.07 per foot this fiscal year over last year, resulting in a 4.0 % overall operating cost decrease.

Statistics in Table ES1 represent the aggregate results of utility data obtained from 77 state agencies and divisions. More than 1,500 monthly utility bills are compiled by ENRD staff and uploaded into a cloud-based energy management system. ENRD is tracking more than 3,000 unique data points in this system monthly (see Table ES2). Annual subscription fees for the database platform are currently covered through the ENRD budget.

Table ES2: Annual Energy Data Gathering Parameters

Number of agencies reporting billing data	77
Number of utility bills tracked annually	>18,000
Number of monthly utility bills reported	>1,500
Number of unique data points captured in database monthly	~3,000
Number of registered users in Mississippi database	~150

Table ES3 provides examples of the financial savings that have resulted from effective energy-management strategies employed by DFA. Energy use intensity (EUI) is a measure of how a specific building utilizes energy and is expressed in thousand-Btu per square foot per year. EUI for the Woolfolk State Office Building has decreased by more than 25% over 11 years, resulting in a savings of approximately $880,000 over the same period. Cumulative savings for all energy-efficiency projects initiated by DFA total more than $5.4 million for the prior 11 years.

Table ES3: Program Successes

	WOOLFOLK BUILDING	ALL DFA BUILDINGS
Cost to implement (including engineering fees)	$6,000.00	$1,400,000.00
Eleven-year cumulative savings	$880,000.00	$5,400,000.00
Eleven-year EUI reduction	25%	10%
Future savings identified	$90,0000/year	$500,000/year
Loss of employee comfort	None	None

ENERGY COST FORECAST AND RECOMMENDATIONS

The U.S. Energy Information Administration (EIA) forecasts a 3.3% increase in electricity prices for the remainder of calendar year 2024 and into 2025. This follows a 12-month period of stable electric rates. The commercial price of natural gas for this same period is expected to decrease by 6.4% in this commodity. These assumptions, including no provision for any significant growth in state facility square footage, point to a slight overall energy cost increase in the next fiscal year of 1.9% for most Mississippi agencies. Officials can anticipate a total energy cost estimate of approximately $124.8 million for FY 2025.

The Act also called for the formation of an advisory board consisting of individuals from various agencies that would convene "no fewer than once each year in order to review the implementation of the State Energy Management Plan (SEMP)." An advisory group of selected large energy users would play a key role in raising awareness and accountability toward optimizing energy consumption across state government.

From 2013-2015, 33 agencies were equipped with approximately 1,000 smart meters reporting electricity consumption for specific buildings in 15-minute intervals as part of a pilot. The vast majority of these smart meters, which were purchased with American Recovery and Reinvestment Act (ARRA) funds, ceased to transmit data due to rapid advances in mobile communications technology. Research into replacement options is continuing; however, upfront implementation currently is cost prohibitive. Another challenge is the need for a uniform framework for all state agencies to monitor and monetize smart meter data to maximize the return on future investments. Smart meters, or Advanced Meter Infrastructure, are electronic devices that monitor, measure and relay energy consumption data to a central point at regular intervals that can be set by the user. This interval can be as short as a minute or as long as 24 hours. Collecting data at 15-minute intervals is considered beneficial to provide insights into a building's operation while balancing it with the need to store excessive amounts of data.

Setting savings targets with achievable goals that are supported by proactive investments and cost management efficiency measures will help lower the state's energy utility costs in both the short and long term.

END OF EXECUTIVE SUMMARY

I. INTRODUCTION

The Act requires MDA-ENRD to coordinate the development and implementation of a general energy management plan for state-owned-and-operated facilities in conjunction with DFA's Bureau of Building, Grounds and Real Property Management. This report serves to update the Governor and Legislature on statewide energy consumption and costs, including highlighting savings projects, which encompass the goals of SEMP. The purpose of this program is to help state-owned facilities operate in an energy-efficient manner, reduce operating costs to the General Fund and demonstrate successful energy consumption reduction strategies.

In 2010, the U.S. Department of Energy awarded funds to the state of Mississippi through ARRA to use toward major investments in both energy efficiency and renewable energy projects. ENRD granted DFA $3.75 million to administer the state smart metering project. The successful implementation of this project was initiated through two solicitations: one for smart meter installation and the other for a web-based energy data monitoring system.

Smart meter image courtesy *ITRON*

In 2012, ENRD and DFA adopted a web-based data monitoring system to manage state agency energy metrics. It captured the daily demand readings from the smart meters, in addition to the monthly billing data submitted by covered agencies. Section II of this report includes data analysis and reports generated through the web-based data system. Due to rapid advancements in mobile communication technology, the 2G technology that supported the smart meters was taken offline in 2018. As a result, the database program now consists of monthly utility bill data emailed to ENRD by state agencies.

II. REQUIRED METRICS

The Act requires ENRD to report the following metrics specifically:

A. Total energy consumption and total costs related to energy for the state
B. Year-to-year increases or decreases by the state
C. Forecast models for the upcoming fiscal year

All agencies and/or their subdivisions have reported FY 2024 utility data, and a statewide view of energy consumption is available. Year-to-year comparison reports are also available as all agencies have now submitted at least eight years of historical billing data into the state's database system.

A. Energy Consumption and Costs for the State of Mississippi

The state's database system tracks the total energy consumption and costs in all the covered agencies throughout the state. The estimated total square footage for state facilities with data being analyzed in this program is 78.8 million square feet as per DFA's EIS for FY 2023. The following statewide metrics in Table 1 represent four years: FY 2021 through FY 2024.

Table 1: Annual State Agency Energy Consumption and Cost

Parameter/ (Units)	FY 2021	FY 2022	FY 2023	FY 2024	% Δ
Electricity usage/ Kilowatt hours (kWh)	1,047,395,249	1,097,039,105	1,105,318,221	1,088,091,537	-1.6%
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Figure 1: Visual of the annual changes in total energy cost for the State.

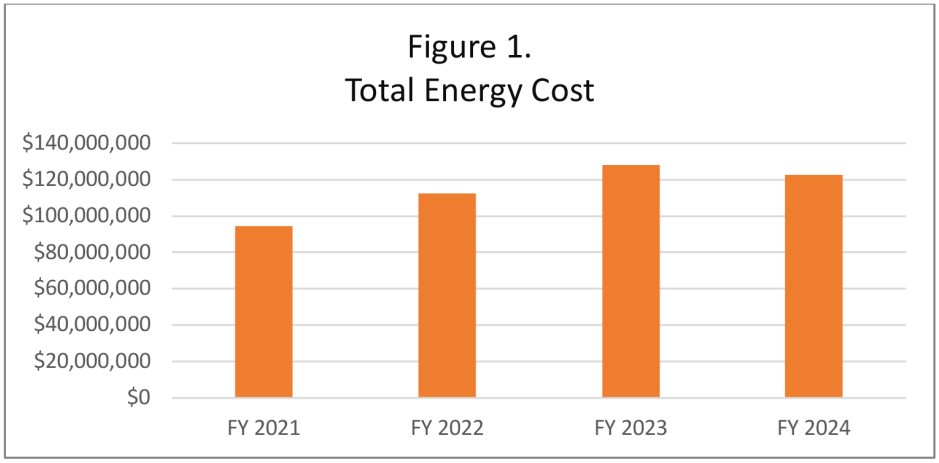


Figure 2: Visual of the annual changes in electricity cost for the State.

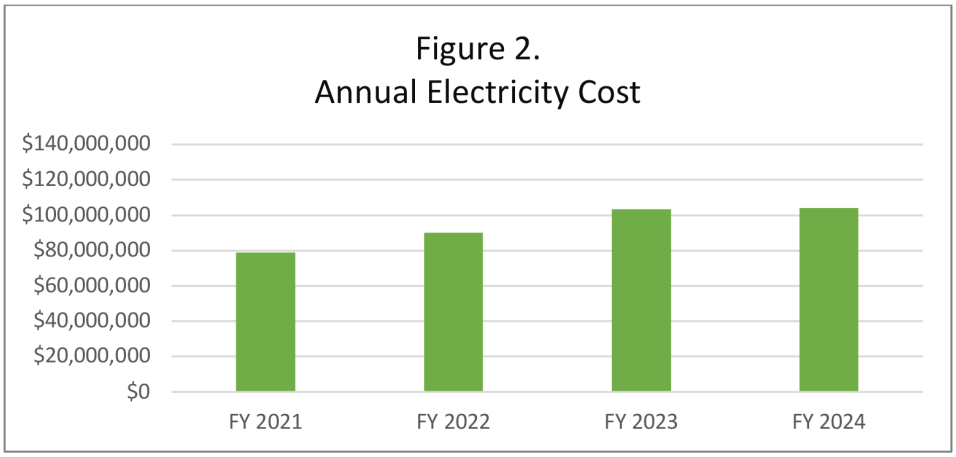
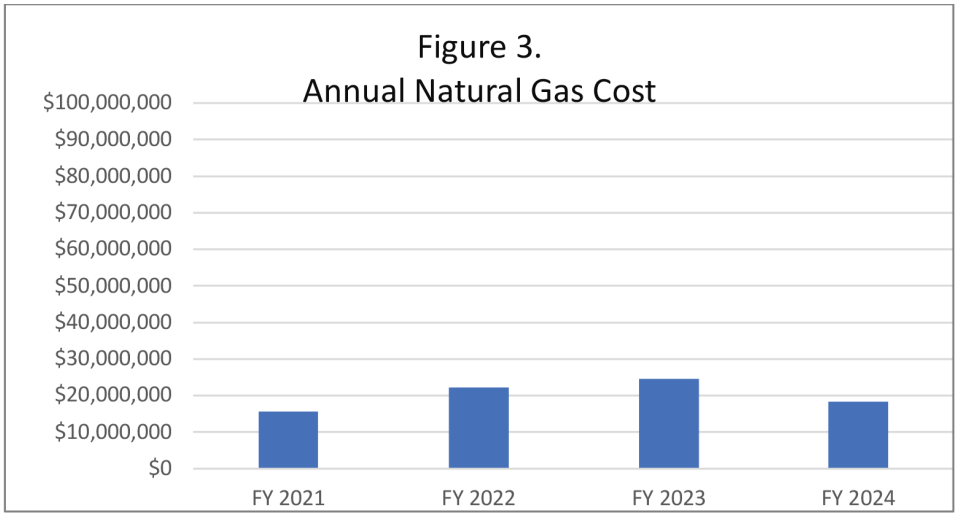


Figure 3: Visual of the annual changes in natural gas cost for the State.



As noted in Figure 4, most of the annual energy expenses stem from electricity charges, accounting for 85% of the state's cost. Fifteen percent of the annual cost is from natural gas. Natural gas is the primary choice for heating fuel, although negligible amounts of propane are used in locations where natural gas is unavailable.

Figure 4: FY 2024 Ratio of Total State Energy Expenditures

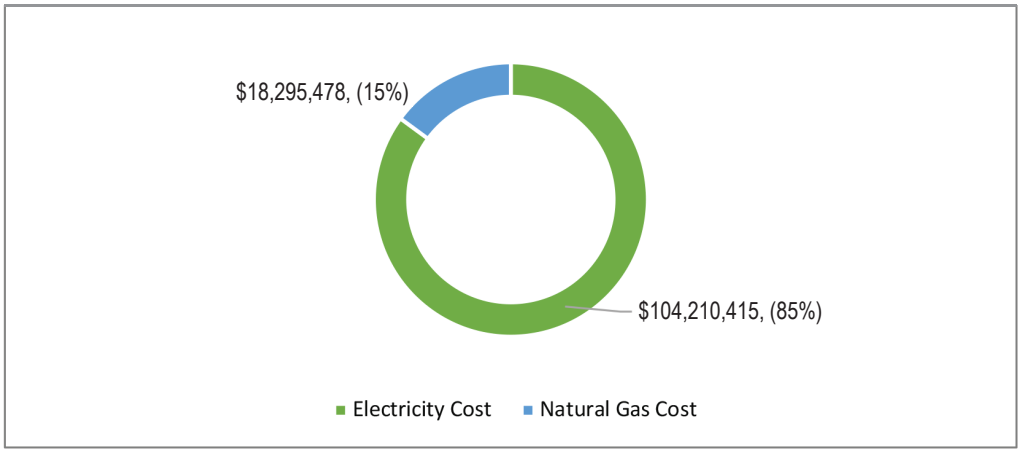
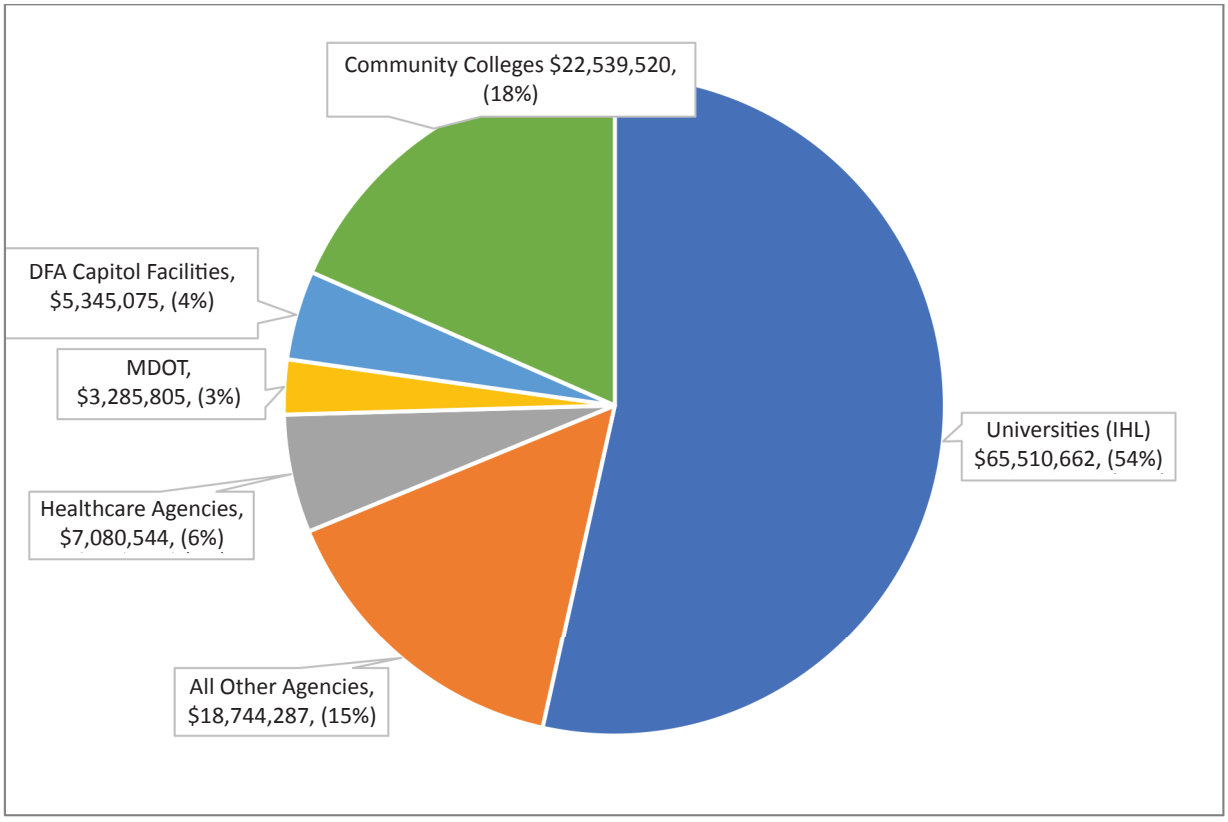


Figure 5: FY 2024 Total Energy Cost by Agency Type



As a group, state universities are the largest energy consumers among allies, with a combined total of 54% of all energy costs (ref. Table 2 and Figure 5). These charts describe how the annual energy spend is allocated between the different grouping of state agency types.

Table 2: FY 2024 Total Energy Cost by Agency Type

INSTITUTION CATEGORY	TOTAL COST ENERGY
Universities (IHL)	$65,510,662.00
All Other Agencies	$18,744,287.00
Healthcare Agencies	$7,080,544.00
MDOT	$3,285,805.00
DFA Capitol Facilities	$5,345,075.00
Community Colleges	$22,539,520.00
ANNUAL TOTAL	$122,505,893.00

B. Data Collection and Analysis

There are more than 150 registered user accounts in the state's database system inclusive of 77 state agencies and/or their subdivisions whose data is compiled in this system. As the system was set up, ENRD chose to use utility data from FY 2014-FY 2015 as a baseline for benchmarking. Data sets presented in this annual report cover the period from March 1, 2023, to February 29, 2024. This 12-month period was selected for this year's report due to the fact that ENRD was changing database software vendors in the final quarter of FY2024. Therefore, not all state agencies were able to get the final quarter's energy data loaded into the new software system. As a result, they were unable to meet the September 1 annual report deadline.

C. Benchmarking for Energy Performance

Using reports from the database program, the EUI metric can be determined. EUI is a measure of the total building energy consumed in a facility in a given period and is measured in Btu (or kBtu) per square foot per year, a standard metric that combines both electricity in kilowatt hours and gas per hundred cubic feet. This benchmark information can be used to compare one building against another by using square footage area, which equalizes each building for an accurate "apples-to-apples" comparison.

Calculation of EUI

EUI expresses a building's energy use as a function of its size. EUI is presented as energy per square foot per year. It is calculated by dividing the total energy consumed by the building in one year (measured in Btu) by the total gross floor area of the building. To calculate an EUI number, annual kilowatt hours are multiplied by 3,413 (to convert to Btu) and annual hundred feet of gas (ccf) is multiplied by 100,000 (to convert to Btu). These two amounts are then added together, and their total is divided by the square footage of the facility. That number is then divided by 1,000 to express the results in kBtu (thousand Btu). It is important to note that the EUI does not take energy cost into consideration.

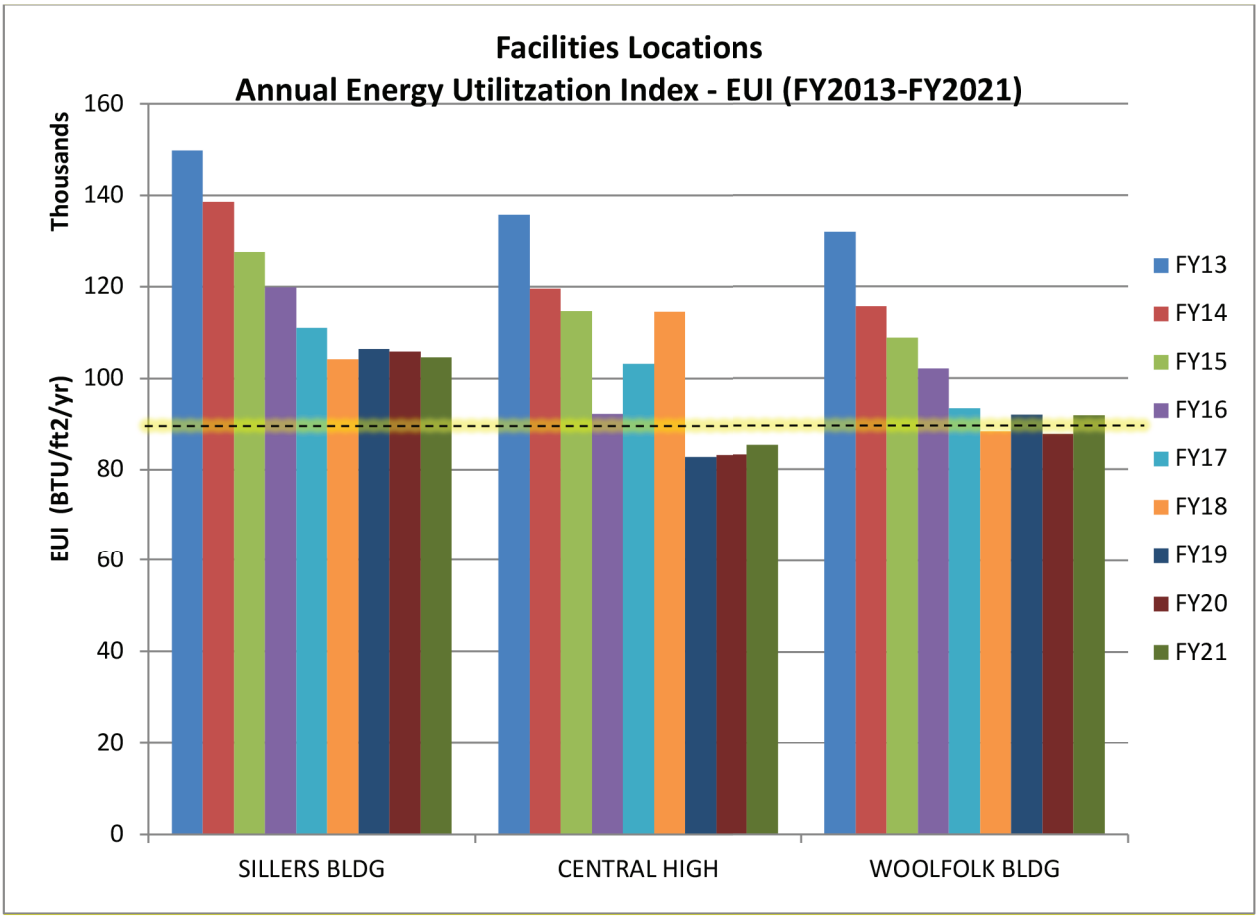
$$\text{EUI (kBtu/ft2/year)} = \frac{[(\text{kwh/year} * 3{,}413 + \text{ccf/year} * 100{,}000)/\text{area ft2}]}{1{,}000}$$

A Btu is a measure of the heat content of fuels or energy sources. It is the quantity of heat required to raise the temperature of one pound of liquid water by one degree Fahrenheit at the temperature that water has its greatest density (approximately 39 degrees Fahrenheit). According to the U.S. Department of Energy, one Btu is approximately equal to the energy released by burning a match.

An analysis of buildings with high EUIs within a portfolio of buildings can validate cost-saving projects that are focused on the least-efficient facilities. Use of this information has led to successful energy efficiency projects for multiple state agencies. However, reducing EUI is generally a multi-year process that requires target setting, project implementation and detailed measurement and verification of energy consumption. A nine-year trend is shown for three select buildings under the Office of Capitol Facilities in Figure 6.

Annual ongoing efficiency projects were developed by DFA to last over a multi-year period. Successful projects created significant energy intensity reduction at one facility and achieved target EUI goals for two other buildings. The goals were to achieve EUIs below the national average for similar government office buildings around the country, according to data published by the U.S. Department of Energy. All three buildings are still monitored closely each year to ensure that these EUI's remain below the national average.

Figure 6: Office of Capitol Facilities EUI (FY 2013-FY 2021)



Note: The dotted horizontal line at 90,000 represents the national average EUI for office buildings and provides a target for benchmarking building performance.

It is noted in Appendix B that there are significant variations in different state agencies' EUI. It is to be expected that facilities that house large computer server rooms or chemical laboratories or provide medical treatment will have much higher energy intensity than typical office buildings.

Caveat: EUI for an entire agency is only beneficial for comparing year-over-year changes in its own energy consumption and is not intended to be used for comparing one agency to another.

D. Forecast Models for the Upcoming Fiscal Year

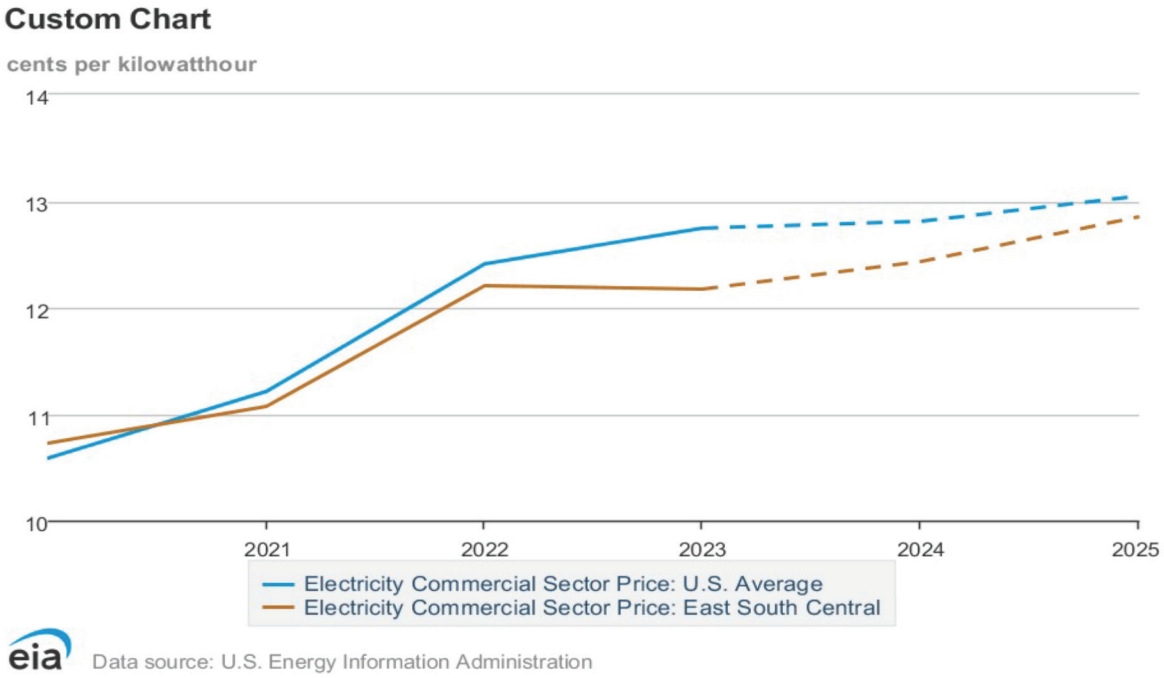
To provide accurate forecast models for FY 2025, MDA requires all agencies to submit 100% of their complete cost and consumption data for the previous fiscal year. For FY 2024, 76 of the 77 reporting agencies submitted complete data for the past fiscal year, but one agency's data was incomplete. The EIA's forecasts for energy pricing for the next 12-18 months were reviewed (see Figures 7 and 8 below). It is estimated that average commercial prices for electricity are expected to increase by about 3.3 % and commercial natural gas prices are expected to decline by about 6.4%. These price forecasts indicate the state should experience an estimated total energy expenditure of $124.8 million in FY 2025.

This estimate does not consider any influence from external factors such as adverse weather, major HVAC equipment malfunctions or increases in new building square footage. Setting savings targets with achievable goals that are supported by proactive investments and energy-efficiency measures can help lower the state's overall energy utility costs.

Projections

The charts below show the historic trends of energy pricing, with forecasted estimates for next year.

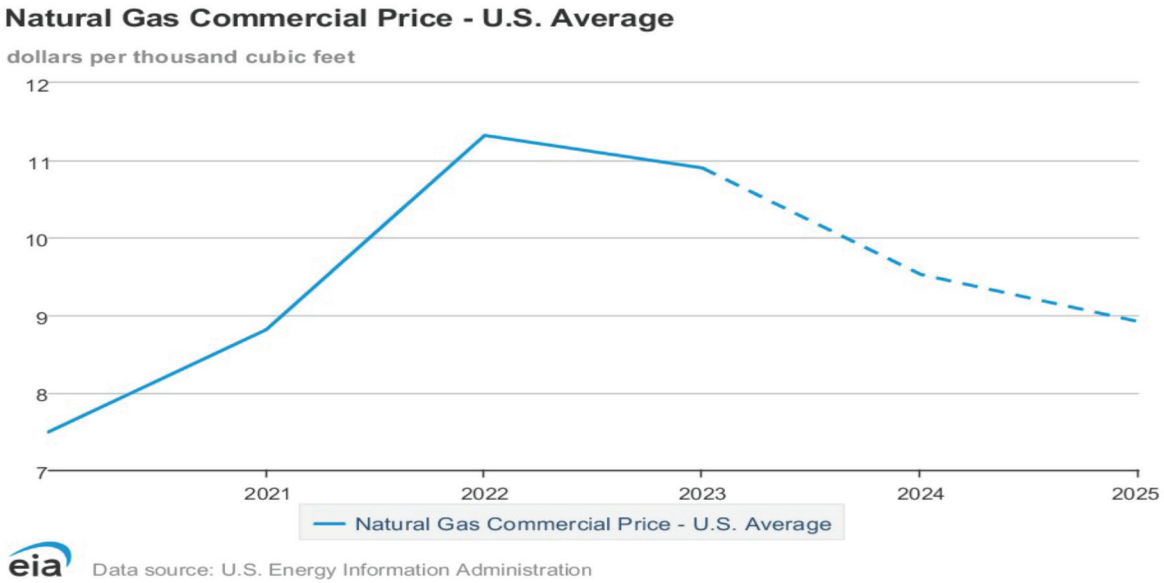
Figure 7: Electricity Price Historic Trend and Projection (2020-2025)



Source: STEO Data Browser - 7c. U.S. Regional Retail Electricity Prices (eia.gov)

Figure 8: Natural Gas Price Historic Trend and Projection (2020-2025)

Source: STEO Data Browser - 5b. U.S. Regional Natural Gas Prices (eia.gov)



III. FY 2024 ENERGY-EFFICIENCY SUCCESS STORIES

Following are energy success stories from a few state agencies. State agency energy savings are a result of identifying energy waste through the application of utility data analysis tools such as ENRD's utility database program. With the assistance of engineers and energy consultants, several state agencies and institutions have implemented energy-efficiency projects during the year that resulted in significant annual savings in both energy and costs.

OFFICE OF CAPITOL FACILITIES

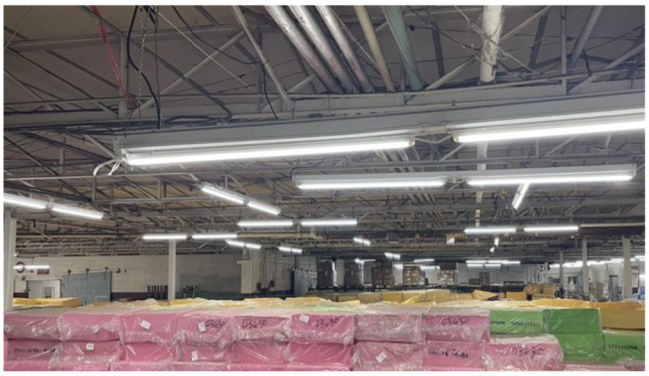
The Office of Capitol Facilities provides building operation and maintenance services for more than 20 government facilities in the Jackson area. The most well-known of these buildings is the New Capitol, a facility that is used year-round. In addition to hundreds of typical office lighting fixtures, this building also contained almost 2,000 individual incandescent light bulbs that required replacement with a more efficient lighting technology. These lamps were decorative in nature, creating a challenge to locate suitable replacement lamps with new LED technology that was more efficient than the energy-wasting bulbs. In a recent energy-efficiency project funded by DFA and performed in cooperation with State Capitol officials, the inefficient 40-watt lamps were replaced with new highly efficient 4.5-watt LED lamps on a one-to-one basis. This new project has created an electrical efficiency improvement of 88%.

This project is expected to reduce electricity usage in the Capitol by over 200,000 kilowatt hours per year and will save an estimated $20,800 for the state each year.

MISSISSIPPI INDUSTRIES FOR THE BLIND

Located in Jackson, Mississippi Industries for the Blind (MIB) is a manufacturing facility that provides training and employment opportunities for individuals who are blind or visually impaired. An energy audit conducted in 2023 revealed the need to replace all interior and exterior inefficient lighting. In a project partially funded through a matching grant program by ENRD, more than 1,200 different fixtures, ranging from fluorescent to high-pressure sodium to incandescent (all obsolete and inefficient types of lighting) were replaced with new LED technology. In addition to the energy cost savings, MIB indicated that the greater benefit was the improvement in both the quantity and quality of light, resulting in improved working conditions for its employees and staff.

BEFORE



AFTER

This project required a total capital expense of $93,000, and it will save an estimated $37,300 in annual energy and maintenance costs, creating an exceptional project payback of 2.5 years.

IV. CONCLUSION

Since the passage of The Act, ENRD has diligently worked to support state agencies in reducing energy consumption and energy costs. From FY 2014 to FY 2024, state agencies have developed plans to address energy performance in their facilities, as well as collect and report energy consumption and cost data. With additional funding for replacement of smart meter equipment and enhanced data reporting, additional cost savings could be achieved. This would support the management of energy costs in real time and would contribute to even greater reductions in the state's energy expenses. Projects such as those administered by the Office of Capitol Facilities, which saved $5.4 million over 11 years, were originally based on energy data available through the smart meter program. The availability of accurate energy consumption data within a comprehensive energy management plan provides state agencies with the information and tools needed to make effective decisions to prioritize energy performance in their facilities.

EIA forecasts a 3.3% increase in electricity prices for the remainder of calendar year 2024 and into 2025. This follows a 12-month period of stable electric rates. The commercial price of natural gas for this same future period is expected to decrease by 6.4%. These assumptions, including no provision for any significant growth in state facility square footage, point to a slight overall energy cost increase of 1.9% in the next fiscal year for most Mississippi agencies. Officials can anticipate a total energy cost estimate for the state of approximately $124.8 million for FY 2025.

The formation of an advisory board consisting of various agency personnel would be instrumental in the evaluation and review of the SEMP. While many state agencies have been proactively involved in energy management, a formal advisory board would be a significant step toward optimizing energy efficiency across state government.

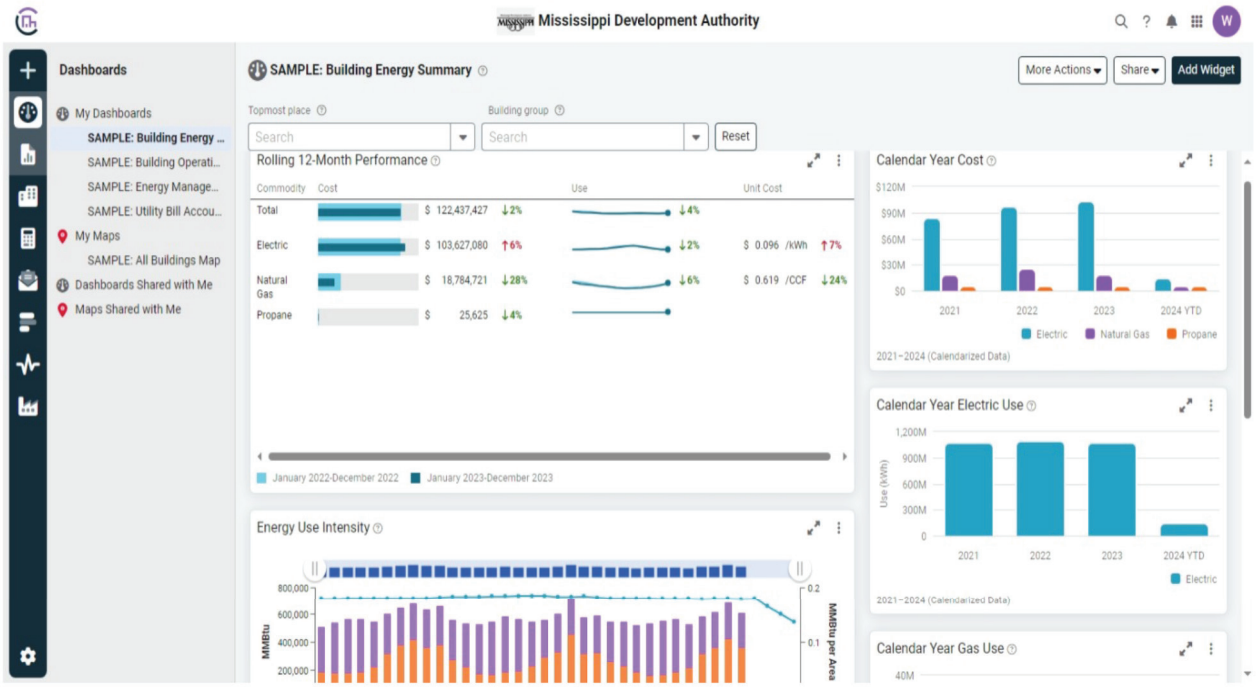
ENRD continues to work with state agencies to ensure state-owned facilities are operated in an energy-efficient manner to reduce operating costs and demonstrate successful energy consumption reduction strategies. In addition to gathering data for the SEMP, ENRD supports state agencies, municipalities and private-sector organizations with a variety of energy-efficiency financing programs, including an energy revolving loan program and the Lead By Example program.

APPENDIX A: STATE ENERGY MANAGEMENT PROGRAM TECHNICAL SUPPORT AND TRAINING

Online Resources and Virtual Support

Resources related to SEMP are available at: https://mississippi.org/community-resources/office-energy/ In addition, MDA has adopted a new cloud-based utility bill database for FY 2025. Known as EnergyCap, this software platform ultimately will enable agency energy management coordinators to populate and manage their utility billing data for all energy commodities. Video tutorials and other training tools are available to each participating agency. A screen shot of the website, which can be found at https://mississippi-development-authority-um.app.poweredbyenergycap.com, is shown below.

Screen Shot of EnergyCap



Energy Management Plan Resources

Several new documents were developed during FY 2020 – FY 2021 to provide streamlined technical assistance for managing yearly energy data and developing five-year Energy Management Plans (EMP). The documents are listed below beginning with the EMP Checklist, Frequently Asked Questions and a Concise Guide to Energy Audits. Two templates, the five-year EMP and the walk-through energy audit also were provided to agencies in electronic format.

ENERGY MANAGEMENT PLAN CHECKLIST

INTRODUCTION

- ☐ Provide agency and representative's names.
- ☐ Provide contact information and physical address.
- ☐ Identify the agency's designated energy coordinator, and list whether they are an internal staff member or if those duties have been outsourced.
- ☐ List dates of last walk-through energy audit and/or a comprehensive energy audit.

OPERATION AND MAINTENANCE

- ☐ List potential operation and maintenance procedures discovered in walk-through audit.
- ☐ Provide a timeline for completing each procedure.
- ☐ If possible, estimate energy cost savings and potential maintenance savings.
- ☐ Remember to consider the five-year planning period when completing the timeline.

ENERGY EFFICIENCY MEASURES

- ☐ List potential energy efficiency measures (EEM) discovered in your energy audit.
- ☐ Provide a timeline for completing each measure.
- ☐ Calculate expected savings in energy usage (kwh or ccf) and cost savings (in dollars) for each EEM.
- ☐ Remember to consider the five-year planning period when completing the timeline.

OTHER

- ☐ List changes to the facility or campus that may impact past or future consumption.
- ☐ Describe energy awareness initiatives directed to personnel at the facility.
- ☐ Review plan and ensure that it is reflective of actions over a five-year period.
- ☐ Sign and date plan and submit electronically.

FREQUENTLY ASKED QUESTIONS (FAQS)

Q: Should I conduct an energy audit?

At a minimum, a Level I "walk-through audit" should be conducted to identify potential energy cost saving measures. Energy audits provide an assessment of how a building's performance can be improved with a review of base building systems and equipment use (see State Agency Concise Guide to Energy Audits). It is recommended that any facility that has not had a Level II or Level III audit conducted within the past five years consider scheduling an audit. However, a comprehensive audit is not a requirement.

Q: What if everything that can be done to save energy has already been completed?

If operation and maintenance procedures are conducted annually, and comprehensive capital-intensive measures were installed at your agency in the past five years, evaluate the outcomes and report verified savings by cost and energy measures.

Q: Does ENRD conduct energy audits?

ENRD does not currently have staff available for energy audits. Agency officials are encouraged to conduct walk-through audits of their facilities utilizing maintenance and building facility personnel. If funds are available, an agency may also retain the services of a qualified professional who can conduct a comprehensive capital-intensive energy audit.

Q: What if financing is not guaranteed for a given EEM?

Although they may not be funded, all feasible recommended EEMs should be included in the agency's EMP. At the end of the five-year period, any measures that were not completed due to lack of funding can be explained in that manner. It is recommended that proposed improvements are ranked by highest potential return on investment when scheduling projects.

Q: Does MDA provide any financial support for energy efficiency programs?

ENRD offers low-interest loans through the Energy Efficiency Revolving Loan Fund. This program is available to state agencies in conjunction with other sources of funding, including state appropriations or federal and non-federal grants and loans.

STATE AGENCY CONCISE GUIDE TO ENERGY AUDITS

Energy audits are a powerful tool for uncovering operational and equipment improvements that will save energy, reduce energy costs and lead to better building performance. Energy audits can be performed as a stand-alone effort on a per-building basis, or they may be conducted as part of a larger analysis across an owner's entire group of facilities.

Energy audits are used to identify the following:

- No-cost operational or maintenance adjustments that save energy
- Short-term, low-cost energy-efficiency retrofit recommendations
- Opportunities for long-term building improvements
- Action plans for energy-efficiency capital investments

Simple energy audits equip building owners with a good list of no-cost or low-cost recommendations and a general overview for future planning. Many of the simple recommendations are easily implemented by maintenance staff, and energy savings are experienced almost immediately. Operational cost savings resulting from the simple audit can then be invested in future capital energy-efficiency projects.

More detailed energy audits are designed to provide a comprehensive energy-efficiency capital investment plan with savings payback that can be coordinated with a facility owner's financial goals. This type of complex energy audit is typically part of a larger EMP and may include partnering with an engineering firm or energy services company to incorporate full energy savings opportunities.

What Is an Energy Audit?

The purpose of an energy audit (also referred to as an energy assessment or technical energy analysis) is to determine how and where energy is used in a facility and to identify opportunities to improve the facility's efficiency. Simple energy audits can be conducted with in-house personnel, but more detailed energy auditing services are provided by energy consultants, engineering firms and energy services companies. The energy auditor conducts the audit process while working closely with building owners and maintenance staff to ensure accuracy of data collection and the correct application of energy-efficiency recommendations.

The audit typically begins with a review of historical and current utility data and the benchmarking of each building's energy use against similar buildings. Next, an on-site inspection of the physical building and its operations will be performed. The most important outcome of an energy audit is a list of recommended EEMs, calculated energy savings and an assessment of whether the EEM costs are a good financial investment for the owner.

Types of Energy Audits

Energy audits usually take on a whole-building approach by examining the building mechanical systems (HVAC), building envelope, operations and maintenance procedures, building operating schedules and the functions of the building's energy management system and controls. Whole-building audits reveal the most accurate energy-savings opportunities.

However, energy audits can be targeted to address specific systems (i.e., just HVAC or lighting). While targeted audits may miss "big-picture" energy savings opportunities, they are a great option if the need is for a specific energy-efficiency retrofit project with limited funds to invest.

Levels of Energy Audits

ASHRAE defines three levels of building audits. Each audit level builds on the previous level. As the complexity of the audit increases, so does the thoroughness of the site assessment, the amount of data collected and the detail provided in the final audit report. Each level of effort translates into identifying more energy-savings opportunities.

In addition, there is a Preliminary Energy-Use Analysis (PEA), which is a prerequisite for any level of audit. Each state agency is expected to complete a PEA and a Level I Audit as part of its Annual EMP. The format for these analyses is discussed below.

Preliminary Energy-Use Analysis

The PEA precedes an audit of the building. Within a PEA, the auditor determines historic utility use, peak demand and cost of all utility types (electric, natural gas, other fuels and possibly even water). The PEA develops an EUI of each separate building, expressed as a formula in Btu/ft2 (Btus per square foot). Sometimes this EUI also is expressed as the "Energy Utilization Index" of a building. The auditor then compares the building's EUI to the EUI of similar-use buildings to determine the potential for improved energy performance and to assess whether more detailed audits are likely to identify opportunities for energy savings.

Level I Audit – Walk-Through Survey

This will identify low-cost/no-cost measures for energy-saving opportunities and a general overview of potential capital improvements. Activities include an assessment of energy bills and a brief on-site inspection of each building and its operational characteristics. This level includes a checklist of "no-cost, low-cost" energy-savings opportunities.

Level II Audit -- Energy Survey and Analysis

This audit identifies all components included in Level I and provides the savings and cost analyses of all practical EEMs that are in line with the facility's economic criteria, financial plans and building constraints. This level includes an in-depth analysis of energy costs, energy usage and building characteristics, which provides a more in-depth look at how energy is used in a building. The facility owner now has actionable information on recommended improvements and the financial impact of those improvements.

Level III Audit -- Detailed Analysis of Capital-Intensive Modification

This will identify all components included in Level II and sometimes is referred to as an "investment grade" audit. It focuses on the capital-intensive projects identified in Level II and provides more rigorous engineering and economic analyses. This audit also includes detailed, on-going energy use monitoring and data collection, as well as engineering design analysis.

FORMAT FOR ENERGY AUDITS – TO BE USED BY STATE AGENCIES

Preliminary Energy-Use Analysis (PEA)

The on-site energy auditor first performs a PEA by examining utility data, building and HVAC system data, operational schedules and other facility information. In general, the energy auditor should collect and review at least two years of utility usage data to account for variations and patterns of energy use. All forms of energy (electricity, natural gas, other heating fuel, etc.) should be included in this analysis if available.

After this data is collected, the energy auditor can calculate each building's EUI value. This EUI (expressed in kBTU/square foot) enables the auditor to benchmark this data against the energy use of similar buildings to highlight energy-efficiency opportunities and provide an early estimate of potential savings. The energy auditor also looks for any changes in energy use over time and potential causes for those changes.

Comparing each building's EUI to other buildings of similar use, both within a specific organization and across similar-use buildings in the same region, reveals the energy-efficiency of the building. The higher the number, the less energy-efficient the facility. As a relative comparison, an EUI of 85-90 kBtu/ft2 is a standard average EUI for a multi-story, office-type use building located in the Southeast U.S. For more information, go to https://www.eia.gov/consumption/commercial/.

Level I Energy Audit:

To assist in conducting a Level I Energy Audit, see separate documents available through ENRD titled: WALK-THROUGH ENERGY AUDIT and INDIVIDUAL BUILDING FORM CHECKLIST.

The written results of an EMP report should include:

- Brief description of facilities and agency personnel contact info
- Building-by-building checklist of walk-through audit findings
- List of low-cost and no-cost energy measures
- List of potential EEM's for further consideration

Online Training

ENRD will provide multiple training sessions to agency energy management coordinators using the online database platform, which is used as a by all state agencies that pay utility bills and are required to submit data. This training will be conducted through both in-person and virtual meetings throughout the year. The following sessions are included in the training:

- How to submit monthly utility consumption and cost data to MDA
- How to correctly read a utility bill and discern possible billing errors
- How to generate reports showing an agency's annual energy costs and consumption from the online database program
- How to export energy reports from the program that are used to analyze opportunities for energy and cost reduction
- How to request additional services that ENRD provides to state agencies for energy management planning, employee awareness programs, etc.

In addition to the online training, ENRD provides individual assistance to agencies throughout the course of the year upon request.

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University of MS Medical Center	$14,165,122	$12,496,674	$1,668,448	145,545,441	5,225,178	$0.09	$0.32	5,258,326	$2.69	193.8
Mississippi State University	$13,763,185	$10,390,393	$3,372,792	120,997,369	3,712,677	$0.09	$0.91	9,426,990	$1.46	83.2
University of Mississippi	$11,297,136	$10,080,667	$1,216,469	136,510,968	3,525,790	$0.07	$0.35	8,387,212	$1.35	97.6
University of Southern Mississippi	$8,487,020	$6,415,793	$2,071,227	77,886,391	2,122,020	$0.08	$0.98	5,035,494	$1.69	94.9
DFA Office of Capitol Facilities	$5,345,075	$4,500,169	$844,906	42,752,420	1,616,649	$0.11	$0.52	3,430,404	$1.56	89.7
MS Dept of Corrections	$4,633,217	$4,051,740	$581,477	35,649,371	3,133,900	$0.11	$0.19	3,585,470	$1.29	121.3
Jackson State University	$4,286,236	$3,617,238	$668,998	40,979,889	1,079,227	$0.09	$0.62	2,642,070	$1.62	93.8
Hinds Community College	$3,893,718	$3,458,452	$435,266	29,983,761	624,059	$0.12	$0.70	3,052,545	$1.28	54
MS Gulf Coast Community College	$3,604,013	$3,294,117	$309,895	33,498,665	930,087	$0.10	$0.33	2,385,932	$1.51	86.9
Alcorn State University	$3,537,288	$3,188,196	$349,092	28,020,214	434,690	$0.11	$0.80	2,004,598	$1.76	69.4
Mississippi University for Women	$3,010,116	$2,196,960	$813,156	22,313,857	685,718	$0.10	$1.19	1,347,854	$2.23	107.4
Dept of Wildlife, Fisheries, & Parks	$2,403,017	$2,217,230	$185,787	18,618,659	161,985	$0.12	$1.15	2,334,730	$1.03	34.2
Delta State University	$2,285,326	$2,098,250	$187,076	21,297,979	521,020	$0.10	$0.36	1,674,006	$1.37	74.5
Mississippi Valley State University	$2,047,368	$1,811,804	$235,564	18,242,883	552,210	$0.10	$0.43	2,160,209	$0.95	54.4
Northwest MS Community College	$2,024,610	$1,910,698	$113,912	19,893,052	115,466	$0.10	$0.99	1,421,514	$1.42	55.9
Dept of Public Safety	$2,009,233	$1,685,058	$324,176	13,858,865	347,137	$0.12	$0.93	552,441	$3.64	148.5
Mississippi State Hospital	$1,815,890	$1,574,644	$241,246	16,193,862	713,134	$0.10	$0.34	1,178,332	$1.54	107.4
Itawamba Community College	$1,737,223	$1,548,761	$188,462	13,941,860	184,882	$0.11	$1.02	1,415,542	$1.23	46.7
Northeast MS Community College	$1,516,155	$1,294,503	$221,652	10,186,050	170,264	$0.13	$1.30	1,315,355	$1.15	39.4
Dept of Transportation - Jackson	$1,457,477	$1,225,903	$231,574	11,625,151	270,162	$0.11	$0.86	772,634	$1.89	86.3
East MS State Hospital	$1,457,202	$1,119,832	$337,370	10,918,336	299,289	$0.10	$1.13	546,818	$2.66	122.9
State Veterans Affairs Board	$1,407,896	$1,002,655	$405,242	9,376,259	515,045	$0.11	$0.79	317,303	$4.44	263.2
Copiah-Lincoln Community College	$1,275,167	$1,149,794	$125,374	10,006,737	110,690	$0.12	$1.13	773,737	$1.65	58.4
Pearl River Community College	$1,274,238	$1,154,502	$119,736	12,547,853	196,589	$0.09	$0.61	996,783	$1.28	62.7
MS State Dept of Health	$1,250,466	$1,045,680	$204,786	10,464,860	518,683	$0.10	$0.40	308,507	$4.05	283.9
East MS Community College	$1,195,859	$1,172,074	$23,785	9,223,457	0	$0.13	$0.00	1,002,726	$1.19	31.4
MS Public Broadcasting	$1,160,621	$1,160,621	$0	10,626,376	0	$0.11	$0.00	97,956	$11.85	370.2

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Jones County Junior College	$1,100,392	$1,019,607	$80,785	9,723,600	118,720	$0.11	$0.68	1,105,059	$1.00	40.8
Ellisville State School	$1,033,950	$875,872	$158,078	9,208,919	380,472	$0.10	$0.42	613,559	$1.69	113.2
Information Technology Services	$944,220	$876,312	$67,908	7,829,455	57,794	$0.11	$1.18	76,405	$12.36	425.4
Holmes Community College	$917,265	$828,597	$88,668	7,497,755	72,181	$0.11	$1.23	1,039,750	$0.88	31.6
MS Delta Community College	$854,069	$763,945	$90,123	6,887,551	132,754	$0.11	$0.68	1,105,059	$0.77	33.3
Southwest MS Community College	$833,807	$721,494	$112,314	7,284,469	130,980	$0.10	$0.86	518,128	$1.61	73.3
East Central Community College	$799,307	$672,558	$126,748	7,091,278	189,107	$0.10	$0.67	602,195	$1.33	71.6
USM Gulf Park Campus	$788,080	$582,039	$206,041	6,412,897	421,910	$0.09	$0.49	292,965	$2.69	218.7
MS Dept of Human Services	$786,381	$672,336	$114,045	5,241,109	95,309	$0.13	$1.20	276,661	$2.84	99.1
Meridian Community College	$765,544	$713,333	$52,211	6,891,440	87,741	$0.10	$0.60	765,463	$1.00	42.2
IHL Education & Research Center	$758,888	$678,422	$80,466	6,695,052	165,840	$0.10	$0.49	198,274	$3.83	198.9
Coahoma Community College	$748,153	$646,081	$102,072	5,074,864	224,678	$0.13	$0.45	653,639	$1.14	60.9
DOE - School for Blind & Deaf	$600,459	$436,047	$164,412	4,079,237	143,677	$0.11	$1.14	463,070	$1.30	61.1
USM Gulf Coast Research Labs	$584,849	$528,764	$56,085	5,805,443	59,370	$0.09	$0.95	242,585	$2.41	106.2
North MS Regional Center	$564,881	$443,658	$121,223	4,010,326	237,396	$0.11	$0.51	410,400	$1.38	91.2
Hudspeth Regional Center	$525,041	$465,431	$59,610	4,519,202	128,013	$0.10	$0.47	339,363	$1.55	83.2
MSU Agricultural & Forestry Exp Stations	$500,048	$471,134	$28,914	4,074,695	24,203	$0.12	$1.20	1,518,980	$0.33	10.7
Boswell Regional Center	$478,664	$435,260	$43,404	3,400,412	52,431	$0.13	$0.83	373,358	$1.28	45.1
MS Dept of Employment Security	$476,212	$349,249	$126,963	2,900,908	105,338	$0.12	$1.21	113,000	$4.21	180.8
Dept of Agriculture & Commerce	$417,211	$370,356	$46,855	2,426,595	36,115	$0.15	$1.30	81,024	$5.15	146.8
Dept of Transportation District 2	$407,468	$316,647	$90,821	2,469,045	69,930	$0.13	$1.30	370,488	$1.10	41.6
Dept of Transportation District 7	$341,386	$311,601	$29,785	2,193,390	23,747	$0.14	$1.25	274,104	$1.25	36
South MS Regional Center	$320,857	$278,961	$41,896	2,476,280	44,908	$0.11	$0.93	242,478	$1.32	53.4
Dept of Transportation District 3	$315,226	$265,867	$49,359	1,796,039	29,150	$0.15	$1.69	287,936	$1.09	31.4
MS School of Arts	$305,867	$243,007	$62,860	2,261,148	82,466	$0.11	$0.76	69,000	$4.43	231.4
MS Dept of Rehab Services	$304,809	$285,973	$18,836	2,743,396	13,446	$0.10	$1.40	248,228	$1.23	43.1
Mississippi Dept of Environmental Quality	$286,890	$221,621	$65,268	1,978,418	89,634	$0.11	$0.73	54,267	$5.29	289.6

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North MS State Hospital	$268,534	$178,749	$89,785	1,905,844	75,951	$0.09	$1.18	103,726	$2.59	135.9
Mississippi Emergency Management Agency	$267,509	$214,012	$53,497	2,049,276	71,371	$0.10	$0.75	189,433	$1.41	74.6
Dept of Transportation District 5	$261,585	$241,536	$20,049	1,938,420	19,995	$0.13	$1.00	419,669	$0.62	20.5
Dept of Transportation District 1	$257,547	$208,665	$48,883	1,720,660	37,343	$0.12	$1.31	338,767	$0.76	28.4
Dept of Transportation District 6	$245,115	$233,115	$12,000	1,938,455	10,000	$0.12	$0.00	327,023	$0.75	23.3
Public Employment Retirement System	$233,761	$168,995	$64,766	1,417,884	55,520	$0.12	$1.17	87,000	$2.69	119.4
Mississippi State Fire Academy	$223,878	$177,676	$46,201	1,415,823	49,821	$0.13	$0.93	93,968	$2.38	104.4
Dept of Revenue - ABC Warehouse	$206,120	$196,143	$9,977	1,648,548	8,398	$0.12	$1.19	227,937	$0.90	28.4
South Mississippi State Hospital	$192,646	$145,887	$46,760	1,529,100	61,937	$0.10	$0.76	69,808	$2.76	163.5
Central Mississippi Residential Center	$191,085	$162,792	$28,293	1,194,299	26,528	$0.14	$1.07	130,826	$1.46	51.4
Mississippi Forestry Commission	$166,182	$151,282	$14,900	885,038	6,943	$0.17	$2.15	213,385	$0.78	17.4
Mississippi Workers Compensation Comm.	$151,820	$133,475	$18,345	1,077,901	15,741	$0.12	$1.17	29,338	$5.17	179
Mississippi Library Commission	$131,186	$106,674	$24,512	828,030	21,270	$0.13	$1.15	58,702	$2.23	84.4
Specialized Treatment Facility	$123,433	$108,779	$14,654	1,029,183	13,855	$0.11	$1.06	60,449	$2.04	81
Mississippi Adolescent Center	$108,359	$90,081	$18,279	762,378	18,226	$0.12	$1.00	61,283	$1.77	72.2
Mississippi Bureau of Narcotics	$98,635	$95,067	$3,568	711,619	3,387	$0.13	$1.05	56,206	$1.75	49.2
Mississippi Industries for the Blind	$97,177	$81,753	$15,423	588,952	11,559	$0.14	$1.33	175,990	$0.55	18
Mississippi Dept of Marine Resources	$66,907	$66,907	$0	569,043	0	$0.12	$0.00	63,926	$1.05	30.4
Mississippi Dept of Archives & History	$45,240	$45,240	$0	261,789	0	$0.17	$0.00	84,207	$0.54	10.6
Pat Harrison Waterway District	$29,348	$29,348	$0	193,283	0	$0.15	$0.00	163,981	$0.18	4
Grand Gulf Military Commission	$21,733	$21,733	$0	156,712	0	$0.14	$0.00	30,808	$0.71	17.4
Mississippi Gaming Commission	$10,019	$10,019	$0	83,044	0	$0.12	$0.00	9,000	$1.11	31.5
Tombigbee River Water Management	$8,273	$5,905	$2,367	52,749	1,985	$0.11	$1.19	29,457	$0.28	12.8

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