

# PERFORMANCE AUDIT

State Agency Energy Conservation and Alternative  
Energy Efforts and Accomplishments  
and  
Review of Plans for Reducing the Use of Petroleum  
Products  
January 2013



STATE OF TENNESSEE  
COMPTROLLER OF THE TREASURY

Department of Audit  
Division of State Audit



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January 8, 2013

The Honorable Ron Ramsey  
Speaker of the Senate  
The Honorable Beth Harwell  
Speaker of the House of Representatives  
The Honorable Mike Bell, Chair  
Senate Committee on Government Operations  
The Honorable Barrett Rich, Vice Chair  
House Committee on Government Operations  
The Honorable Steve Southerland, Chair  
Senate Energy and Environment Committee  
The Honorable Ron Lollar, Vice Chair  
House Conservation and Environment Committee  
and  
Members of the General Assembly  
State Capitol  
Nashville, Tennessee 37243

Ladies and Gentlemen:

Transmitted herewith is the performance audit on State Agency Energy Conservation and Alternative Energy Efforts and Accomplishments and Review of Plans for Reducing the Use of Petroleum Products. This audit was conducted pursuant to the requirements of Section 8-4-103, *Tennessee Code Annotated*.

Sincerely,

Arthur A. Hayes, Jr, CPA  
Director

AAH/dww  
12-030

State of Tennessee

# Audit Highlights

Comptroller of the Treasury

Division of State Audit

Performance Audit

## **State Agency Energy Conservation and Alternative Energy Efforts and Accomplishments**

**and**

## **Review of Plans for Reducing the Use of Petroleum Products**

January 2013

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### **AUDIT OBJECTIVES**

The objectives of the audit were to (1) assess whether state agencies adequately resolved findings in the January 2008 *State Government Energy Conservation Efforts* performance audit, guided by that audit's recommendations; (2) determine the extent to which the Department of General Services has improved its efforts to collect, monitor, and analyze utility costs and usage data, and to set yearly energy goals for state facilities; (3) determine the extent to which the Department of General Services has coordinated energy conservation measures in state facilities with other agencies and public higher education institutions; (4) determine the actions the Department of General Services and the State Building Commission have taken to define, implement, and enforce an energy efficiency code for state buildings; (5) determine the actions the State Fire Marshal's Office has taken to define, implement, and enforce an energy efficiency code for non-state buildings; (6) determine the extent to which the Department of General Services' State Building Energy Management Program and the State Building Commission have and can use energy savings performance contracts to fund energy efficiency projects in state facilities using appropriate payback periods; (7) assess whether the Department of General Services has ensured that commodities and products purchased by the State of Tennessee are purchased according to formal energy efficiency standards; (8) determine whether the Department of General Services performs life-cycle cost analyses for motor vehicles and other major energy-consuming products, and to what extent these analyses affect future purchases; (9) determine whether the Department of Transportation has increased access to biofuel stations throughout the state through its Biofuel Green Island Corridor Grant Program; (10) determine the extent to which the Department of Environment and Conservation's Alternative Fuel Innovations Grants improved the access to and use of alternative fuels by local governments and public universities; (11) determine the effectiveness of the Department of Environment and Conservation's Clean Tennessee Energy

Grants in decreasing energy costs and emissions, assuming implementation during fieldwork; (12) determine how the Biodiesel Manufacturer's Incentive Fund was used by the Department of Economic and Community Development, as authorized by Section 67-3-423, *Tennessee Code Annotated*, to increase the manufacturing and distribution of biodiesel in Tennessee (Section 67-3-423 expires on July 1, 2013); (13) determine the extent to which the University of Tennessee Biofuels Initiative's demonstration cellulosic ethanol biorefinery has moved from the pilot stage to full production of renewable energy; (14) determine the extent to which the Department of Economic and Community Development's Volunteer State Solar Initiative has met its renewable energy goals; (15) determine the extent to which the Department of Economic and Community Development's use of federal Energy Efficiency and Conservation Block Grant funds has resulted in significant energy savings, emission reductions, and economic growth by small- and medium-sized cities and counties; (16) determine how the Department of Economic and Community Development, in cooperation with Pathway Lending, ensures energy savings are achieved through its Energy Efficiency Loan Program, which funds energy efficiency improvements by commercial and industrial businesses; (17) determine the effectiveness of the Department of Economic and Community Development's Tennessee Clean Energy Technology Grant program in replacing the use of fossil fuels by installing clean energy systems for Tennessee's businesses; (18) determine how the Department of Economic and Community Development ensured the projects funded through its Small Business Energy Loan and the Local Government Energy Loan Programs were completed as planned and had a significant impact on energy savings; and (19) analyze the current petroleum reduction reports sent to the Office of the Comptroller of the Treasury by agencies with more than ten vehicles in their fleet, as mandated by Section 4-22-103, *Tennessee Code Annotated*.

## FINDINGS

### **Better monitoring of energy conservation projects funded through state grant or loan programs is needed**

The Department of Economic and Community Development's Energy Division offered three grant or loan opportunities to increase energy efficiency and conservation: the Small Business Energy Loans, Local Government Energy Loans, and Clean Energy Technology Grants. The auditors analyzed the types of documentation program personnel collected to facilitate the monitoring of projects by reviewing a sample of 97 loan files. Our review found that, in the files we reviewed, program policies and rules regarding project monitoring documentation appear to have been disregarded. Also, our review showed

that formal, written monitoring procedures do not exist (page 11).

### **The Department of Economic and Community Development's Energy Division did not collect data to determine energy loan or grant programs' impact**

The auditor's review of the Energy Division's three grant or loan opportunities revealed that the division only collected estimated energy savings data rather than determining actual energy savings. Our review found that these estimates are not always reliable enough to be used to show program effectiveness due to project changes. It also does not appear the division had any plans or procedures to collect actual energy savings data for energy conservation projects (page 13).

**The Energy Division appears to have made unsupported incentive payments from the Biodiesel Manufacturer’s Incentive Fund**

In 2007, the General Assembly created the Tennessee Biodiesel Manufacturer’s Incentive Fund to make incentive payments for biodiesel manufactured in Tennessee and sold to a Tennessee distributor. The auditors reviewed all documents available about the fund, and it is unclear to the auditors the actual amount of biodiesel produced and sold in Tennessee; therefore, it is also unclear whether the Department of Economic and Community Development provided the appropriate amount of incentive for the biodiesel (page 15).

**The General Assembly may wish to consider revising state law to reflect how building energy standards are currently established and enforced in the state**

The General Assembly may wish to consider revising Section 13-19-101 and Section 4-3-734, *Tennessee Code Annotated*, since these sections set minimum energy efficient building standards that are less stringent than the codes set and enforced by the Department of Commerce and Insurance and the State Building Commission (page 18).

**The Department of General Services has still not implemented a formal utility monitoring system incorporating both cost and usage data**

The department is required by state law to develop and implement a formal utility monitoring system assessing both energy cost and usage data for state-owned buildings. The Department of General Services, through its State of Tennessee Real Estate Asset Management Division, has not developed a utility monitoring system for state-owned buildings capable of analyzing both cost and usage data, using

specific yearly conservation/energy management goals as benchmarks (page 23).

**The Department of General Services has not complied with statutes requiring agency coordination in energy conservation**

To assist the department in developing “an energy management plan for state government,” as required by Section 4-3-1017, *Tennessee Code Annotated*, Section 4-3-1018 requires state agencies to provide liaisons to the department. The department, through its State of Tennessee Real Estate Asset Management Division, has not undertaken formal coordination efforts in the area of energy management with other state agencies, including interaction with liaisons (page 27).

**Required rules and regulations on energy efficiency standards for state purchases have not been issued, although the Department of General Services has complied with laws on purchasing energy saving products, life-cycle cost analyses, and preparing an annual report on energy-efficient purchasing**

Section 12-3-605, *Tennessee Code Annotated*, requires “rules and regulations relative to energy efficiency standards for major energy-consuming products to be procured by the state.” In addition, Section 12-3-606 requires “rules requiring life cycle costs to be used by the commissioner in contracting for major energy-consuming products.” None of these rules and regulations has been issued (page 29).

**The State Building Commission should revise the Sustainable Design Guidelines to comply with the statutory energy mandate on renewable energy options for new state buildings**

Section 4-3-1012, *Tennessee Code Annotated*, requires “an energy efficiency

code for future state buildings to include a review of renewable options by means of life-cycle analysis” which “shall be mandatory.” The *Sustainable Design Guidelines*, which act “as a minimum standard and guideline for designers to insure that the principles of good sustainable design and construction practices are being implemented on State of Tennessee projects” make the investigation of “on-site opportunities for renewable power” optional (page 34).

**The Department of Transportation has tried to increase access to biofuels through the Biofuel Green Island Corridor grant program, but it should document its monitoring of grant recipients and continue to work toward meeting its access goals**

Section 54-1-136, *Tennessee Code Annotated*, gives the Department of Transportation the authority to establish a grant program to assist private fuel stations to pay for storage tanks and pumps used to sell biofuel “including, but not limited to, ethanol (E85) and biodiesel (B20).” The department has established the program but

has not developed and implemented a system of documented site visits by program staff to determine if grant funds are spent appropriately by recipients. The Chattanooga and West Tennessee areas are lacking private fuel stations selling biofuels (page 39).

**The Department of Environment and Conservation should establish and implement adequate, formal policies and procedures for energy grant recipient monitoring, including standardized reporting requirements for grant recipients**

Two Department of Environment and Conservation renewable energy grant programs we reviewed during fieldwork, the Alternative Fuel Innovations Grant Program and the Clean Tennessee Energy Grant program, lacked such policies and procedures. We could not find documentation of monitoring visits of Alternative Fuel Innovations Grant recipients. The Clean Tennessee Energy Grant program was in the process of initial implementation, so there was no such documentation to review (page 46).

## **OBSERVATIONS AND COMMENTS**

The audit also discusses the following issues: The Department of Economic and Community Development’s Energy Division continues to collect program effectiveness and impact data for the Volunteer State Solar Initiative; the Department of Economic and Community Development’s Energy Division plans to collect actual energy savings data for the Energy Efficiency Conservation Block Grant Program; more detailed documentation could assist Pathway Lending to ensure energy efficiency loan projects are completed as intended; the State Building Commission, in cooperation with the Department of General Services, should consider whether to reinstate performance-based contracting for energy-related projects; and the status of pilot biorefinery efforts to use switchgrass to produce ethanol.

## **ISSUES FOR LEGISLATIVE CONSIDERATION**

The General Assembly may want to revise the statutory language in Sections 13-19-101 and 4-3-734, *Tennessee Code Annotated*, in order to eliminate potential confusion about which published energy standard is the state's minimum building energy standard. The General Assembly also may wish to revise these statutes and Section 4-3-710(4), *Tennessee Code Annotated*, to reflect how building energy standards are currently established and enforced in the state.

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**INTRODUCTION**

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**PURPOSE AND AUTHORITY FOR THE AUDIT**

This performance audit was conducted pursuant to *Tennessee Code Annotated*, Title 8, Chapter 4. Under Section 8-4-103, the General Assembly mandated that on or before January 8, 2013, the Comptroller of the Treasury would undertake a performance audit of those agencies and departments authorized or required by legislation or executive order to act relative to the conservation of energy, the study and production of alternative sources of energy, and energy security in the state. The Comptroller of the Treasury is required to assess the extent to which such agencies and departments have fulfilled their mandates and capitalized on authorizations relative to energy conservation, production, and security and to report findings and recommendations.

**OBJECTIVES OF THE AUDIT**

The objectives of the audit were to

1. assess whether state agencies adequately resolved findings in the January 2008 *State Government Energy Conservation Efforts* performance audit, guided by that audit's recommendations;
2. determine the extent to which the Department of General Services has improved its efforts to collect, monitor, and analyze utility costs and usage data, and to set yearly energy goals for state facilities;
3. determine the extent to which the Department of General Services has coordinated energy conservation measures in state facilities with other agencies and public higher education institutions;
4. determine the actions the Department of General Services and the State Building Commission have taken to define, implement, and enforce an energy efficiency code for state buildings;
5. determine the actions the State Fire Marshal's Office has taken to define, implement, and enforce an energy efficiency code for non-state buildings;

6. determine the extent to which the Department of General Services' State Building Energy Management Program and the State Building Commission have and can use energy savings performance contracts to fund energy efficiency projects in state facilities using appropriate payback periods;
7. assess whether the Department of General Services has ensured that commodities and products purchased by the State of Tennessee are purchased according to formal energy efficiency standards;
8. determine whether the Department of General Services performs life-cycle cost analyses for motor vehicles and other major energy-consuming products, and to what extent these analyses affect future purchases;
9. determine whether the Department of Transportation has increased access to biofuel stations throughout the state through its Biofuel Green Island Corridor Grant Program;
10. determine the extent to which the Department of Environment and Conservation's Alternative Fuel Innovations Grants improved the access to and use of alternative fuels by local governments and public universities;
11. determine the effectiveness of the Department of Environment and Conservation's Clean Tennessee Energy Grants in decreasing energy costs and emissions, assuming implementation during fieldwork;
12. determine how the Biodiesel Manufacturer's Incentive Fund was used by the Department of Economic and Community Development, as authorized by Section 67-3-423, *Tennessee Code Annotated*, to increase the manufacturing and distribution of biodiesel in Tennessee (Section 67-3-423 expires on July 1, 2013);
13. determine the extent to which the University of Tennessee Biofuels Initiative's demonstration cellulosic ethanol biorefinery has moved from the pilot stage to full production of renewable energy;
14. determine the extent to which the Department of Economic and Community Development's Volunteer State Solar Initiative has met its renewable energy goals;
15. determine the extent to which the Department of Economic and Community Development's use of federal Energy Efficiency and Conservation Block Grant funds has resulted in significant energy savings, emission reductions, and economic growth by small- and medium-sized cities and counties;
16. determine how the Department of Economic and Community Development, in cooperation with Pathway Lending, ensures energy savings are achieved through its Energy Efficiency Loan Program, which funds energy efficiency improvements by commercial and industrial businesses;

17. determine the effectiveness of the Department of Economic and Community Development's Tennessee Clean Energy Technology Grant program in replacing the use of fossil fuels by installing clean energy systems for Tennessee's businesses;
18. determine how the Department of Economic and Community Development ensured the projects funded through its Small Business Energy Loan and the Local Government Energy Loan Programs were completed as planned and had a significant impact on energy savings; and
19. analyze the current petroleum reduction reports sent to the Office of the Comptroller of the Treasury by agencies with more than ten vehicles in their fleet, as mandated by Section 4-22-103, *Tennessee Code Annotated*.

## **SCOPE AND METHODOLOGY OF THE AUDIT**

The State of Tennessee's statutorily mandated internal energy usage conservation activities from January 2008 through June 2012 were reviewed. In addition, state agencies' alternative energy production efforts were also reviewed for the same period. We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. Methods used included

1. review of applicable legislation and policies and procedures;
2. review of studies conducted by state, federal, and private entities;
3. examination of the entities' records, reports, and information summaries;
4. interviews with departments' staff and staff of other state agencies that interact with the agencies; and
5. review of information and interviews with personnel from other states and the federal government.

The Comptroller of the Treasury is a member of the State Building Commission, an entity discussed in this audit. We do not believe the Comptroller's service on this board affected our ability to conduct an independent audit.

## **STATUS OF AUDIT FINDINGS FROM THE 2008 STATE GOVERNMENT ENERGY CONSERVATION EFFORTS**

We reviewed the status of prior audit findings and found several were not corrected or partially corrected. Each finding is listed below with its status noting whether it is corrected, partially corrected, or not corrected and referring to additional information, if available, in the report.

1. The State Building Commission and State Building Energy Management Program should continue to evaluate the Energy Savings Performance Contracting Model and develop a written standard process for performance-based contracting for energy related projects that includes a mechanism for acquiring measurement and verification contracts (not corrected, see observation on the State Building Commission).
2. The Department of Finance and Administration and the Department of General Services should cooperate to formalize utility monitoring efforts to include both cost and usage data (not corrected, see finding 5).
3. The State Building Commission should review current payback period practices and develop written guidelines for agencies to follow when seeking project approval (not corrected, see observation on the State Building Commission).
4. The Department of Transportation should place more priority on improving access to E85 pumps statewide (partially corrected, see finding 9).
5. Weaknesses exist in the Department of General Services' compliance with state laws regarding life-cycle costs and energy efficiency standards (partially corrected, see finding 7).
6. The General Assembly should consider clarifying several energy statutes (corrected).
7. The Department of Finance and Administration should take steps to adhere to other statutory mandates (partially corrected, see finding 8).
8. The General Assembly may wish to consider revising state law to allow the state to continually adopt and update energy building codes as published by standard-setting organizations (corrected, discussed in finding 8 in the section concerning the State Fire Marshal's Office).
9. The Department of Economic and Community Development has failed to prepare statutorily required Energy Impact Assessment (corrected).
10. General Services and the Board of Standards do not comply with statutes regarding energy efficiency standards (partially corrected, see finding 7).

## **RECENT HISTORY OF STATE GOVERNMENT ENERGY CONSERVATION EFFORTS**

### ***Alternative Fuels Working Group – February 2006***

Governor Bredesen formally established the Alternative Fuels Working Group by Executive Order 33 on February 14, 2006. The working group includes representatives from the Departments of Agriculture, Economic and Community Development, Environment and Conservation, General Services, Health, and Transportation and was attached to the Department of Environment and Conservation.

The working group was directed to develop a strategic plan that would make Tennessee a leader in the production, distribution, and use of biofuels. This strategic plan was approved by the working group and submitted to the Governor's Office in fall 2007. The five strategic goals are to

- increase awareness and knowledge of biodiesel through outreach and education;
- increase production of traditional and alternative feedstock (e.g., corn, soybeans, switchgrass) to obtain an output of 590 gallons of biofuel annually by 2017;
- increase overall annual biofuel production capacity to one billion gallons by 2017;
- displace 17 percent of petroleum fuel usage by improving biofuel demand as well as storage and delivery infrastructure; and
- coordinate Tennessee's alternative fuels program with other states and organizations.

Department of Agriculture personnel said the recommendations from this report were merged into the work of the Energy Policy Task Force.

### ***Energy Policy Task Force – March 2008***

Governor Bredesen formally established the Energy Policy Task Force by Executive Order 54 on March 19, 2008. The working group included representatives from the Departments of Economic and Community Development (to which it is attached), Environment and Conservation, General Services, and Finance and Administration as well as representatives from the public and the General Assembly.

The task force was charged with developing a State Energy Plan. In 2009, the General Assembly passed the Tennessee Clean Energy Future Act of 2009, which addressed the work and findings of the task force. The Department of Economic and Community Development's Energy Division director said that Task Force has not convened since she joined the department as a program manager in April 2010.

## ***American Recovery and Reinvestment Act – March 2009***

The American Recovery and Reinvestment Act (ARRA) provided the State of Tennessee, through the federal Department of Energy, \$210.6 million for statewide programs to increase energy efficiency and to build energy assurance capabilities.

The Volunteer State Solar Initiative is the Department of Economic and Community Development's State Energy Plan ARRA program funded with \$62.5 million. The initiative is a comprehensive solar energy and economic development program with two principal projects: the Tennessee Solar Institute and the West Tennessee Solar Farm.

The Tennessee Solar Institute provided assistance to the solar industry through workforce development training, technical assistance, and managing partnerships to support commercialization. The Institute also administered two grant programs: the Installation Grant program, which deployed small-scale solar photovoltaic systems to 156 grantees; and the Innovation Grant program, which provided 80 grants to encourage growth in the state's solar industry.

The West Tennessee Solar Farm, located in Haywood County, is a five megawatt power generation facility. The Department of Economic and Community Development contracted with the University of Tennessee to design, build, and manage the solar farm.

The Energy Efficiency and Conservation Block Grant program provided funding to communities to develop, promote, implement, and manage local energy efficiency activities such as replacing inefficient lighting in government buildings or performing energy-efficient building retrofit measures. Tennessee communities received \$42.2 million for this program. Twenty-seven cities or counties received the funding directly from the Department of Energy, while the Department of Economic and Community Development received \$13.8 million to subgrant to communities that were not eligible for direct funding. Through three rounds of grants in 2010 and 2011, Economic and Community Development provided funding to 145 cities and counties. In 2012, an additional three grants were awarded to communities that had been placed on a retention list, bringing the total number of grants to 148.

The Energy Efficient Appliance Rebate Program provided consumer rebates for replacing old, inefficient appliances with Energy Star-rated appliances. The Department of Economic and Community Development received \$5.96 million to administer these rebates for existing room air conditioners, central air conditioners, air source heat pumps, or gas furnaces.

The Enhancing State Governments' Energy Assurance Capabilities program focuses on building regional energy assurance capabilities by enhancing inter- and intrastate coordination and cooperation during energy emergencies. Economic and Community Development received \$770,000 to revise and expand the state's existing energy assurance plans (e.g., Petroleum Contingency Plan), to conduct exercises to test these plans, and to enhance the state's ability to better track energy supplies during disruptions.

ARRA increased funding for the Weatherization Assurance Program, which assists with the weatherization of the homes of low-income, elderly, and disabled persons to reduce home energy costs and increase home energy efficiency. The Department of Human Services received \$99.1 million for this expansion of services to administer on behalf of the department through contracts with 18 nonprofit agencies and local governments.

### ***Tennessee Valley Authority Settlement – April 2011***

In April 2011, Tennessee and other states were parties to a federal court settlement under the Clean Air Act with the Tennessee Valley Authority. Under the consent decree, Tennessee will receive \$26.4 million over five years to fund energy efficiency projects. Governor Bill Haslam selected the Department of Environment and Conservation to serve as the lead agency to develop and manage a process for selection and implementation of these projects for Tennessee.

On January 11, 2012, Governor Haslam announced the Clean Tennessee Energy Grant program, which includes purchasing five Nissan LEAF electric vehicles for the state fleet and adding reflective film to the Tennessee Tower's exterior windows. The Clean Tennessee Energy Grant program is designed to provide grants to state and local governments, utility districts, and private businesses or organizations to purchase, install, and construct energy projects. Grant proposals were due to the Department of Environment and Conservation in March 2012; approved projects were announced in June 2012.

### ***University of Tennessee Biofuels Initiative***

Beginning in fiscal year 2007-2008, the General Assembly provided funding over five years to the University of Tennessee (totaling \$70.98 million) in order to build a biofuel demonstration production facility and research campus in Vonore, Tennessee. To facilitate this initiative, the University of Tennessee established Genera Energy LLC, a private, for-profit, limited liability company, in consultation with the Office of the Attorney General and the University of Tennessee Research Foundation. Genera Energy partnered with DuPont Danisco Cellulosic Ethanol for construction and operation of the facility through a 10-year lease. The demonstration production facility has been in operation since January 2010.

Genera Energy has four objectives for the production facility and research center:

- to demonstrate the establishment of a dedicated biomass energy crop supply chain with Tennessee farmers to supply a cellulosic biorefinery;
- to demonstrate the pre-commercial production of ethanol from Tennessee-grown switchgrass and other biomass feedstocks;
- to establish in Tennessee premier long-term research and development capability in bioenergy and bioproducts; and,
- to develop a viable, sustainable, long-term path to commercialization of cellulosic biofuels and energy crops in Tennessee.

## **CURRENT STATE GOVERNMENT ENERGY EFFICIENCY ACTIVITIES**

Multiple state agencies work to promote energy conservation and efficiency. Their activities range widely and focus on both the public and private sectors.

### ***Department of General Services***

Effective October 1, 2011, the Department of Finance and Administration's Real Property Administration Division (RPA) was transferred to the Department of General Services to create the State of Tennessee Real Estate Asset Management Division (STREAM). STREAM's responsibilities include operating, managing, and maintaining the state's real estate assets in a manner that ensures a comfortable, safe, and secure working environment. RPA's State Building Energy Management Program also moved to STREAM to combine with General Services' Energy Conservation and Sustainability Group.

The Purchasing Division's goal was to provide an effective and efficient centralized procurement process for goods and services used by all state agencies. Its services included establishing statewide contracts and processing one-time purchase orders in excess of \$25,000. Executive Order 59, signed by Governor Bredesen in December 2008, requires state agencies to purchase Energy Star rated products for purchases of energy consuming products. The Purchasing Division calculated that purchasing Energy Star products in fiscal year 2011 through statewide contracts would save \$5.5 million. The Purchasing Division was replaced by the Central Procurement Office in April 2012.

Motor Vehicle Management (MVM) oversees the state's fleet of vehicles. In 2012, the majority of the dispatch fleet was replaced with a short-term rental program, WeCar, provided through Enterprise Rent-A-Car. (Vehicles assigned to specific agencies are not involved in this program.) The vehicles available through this rental program consist of 75 fuel-efficient vehicles and 5 vans. Overflow vehicle needs, as well as short-term rental needs outside of the downtown Nashville area, are available through Enterprise Rent-a-Car locations statewide. MVM still manages 20 vehicles used by the Governor's Office, the van pool, and the Tennessee Emergency Management Agency.

### ***Department of Economic and Community Development, Energy Division***

In addition to the American Recovery and Reinvestment Act-funded programs (discussed on page 6), the Energy Division administers, the division also oversees a number of other programs.

The Local Government Energy Loan Program offered low-interest loans to municipal and county governments to improve the energy efficiency of local government-owned buildings through energy efficiency retrofits. The program provided free energy audits to identify needed energy efficiency measures. Since 1991, 120 loans were approved totaling \$26.29 million. The

maximum loan amount was \$500,000, though no new loans were approved after July 31, 2010. In November 2012, 44 loans were still in repayment.

The Small Business Energy Loan Program provided private-sector companies funding opportunities to increase energy efficiency, retrofit buildings, and improve operations. These loans were available to existing Tennessee small businesses with fewer than 300 employees or less than \$3.5 million in annual gross sales or receipts. Starting in 1988, 242 loans were approved totaling \$9.6 million. The maximum loan amount was \$300,000, and no new loans were approved after June 30, 2010. In November 2012, 32 loans were still in repayment.

The division created the Tennessee Clean Energy Technology Grants for Tennessee businesses to purchase and install a solar or other clean energy technology system in order to supplant the use of fossil fuels. The grant award amount was 40 percent of total project costs or \$75,000, whichever was less. Between 2006 and December 30, 2011, the division awarded 79 grants totaling \$4.55 million.

In 2010, the Department of Economic and Community Development collaborated with Pathway Lending to create the Energy Efficiency Loan Program, which provides a low-interest revolving loan fund to assist Tennessee businesses in making energy improvements. The General Assembly provided Pathway \$15 million for this loan fund. TVA and Pinnacle National Bank also contributed \$15 million, and Pathway contributed \$5 million. Designated a “community development lending institution” by the federal government, Pathway Lending has made 47 loans totaling \$5.7 million as of October 31, 2012, and 46 of these loans have started repayment.

The Tennessee Energy Education Network promotes the establishment and reinforcement of K-12 energy education programs in Tennessee schools which teach the science of energy, energy efficiency, and energy conservation. This network is funded through the annual State Energy Program grant provided by the federal Department of Energy. The network’s activities include energy camps for teachers and energy management workshops.

The division’s Energy Assurance Planning increases Tennessee’s preparedness for disruptions related to the state’s energy resources. This activity is funded through the annual State Energy Program grant provided by the U.S. Department of Energy, though the division also received American Recovery and Reinvestment Act funding for this program (as described previously on page 6). The Energy Division, in its role of increasing Tennessee’s preparedness against disruptions relating to the state’s energy resources, oversees all Emergency Support Function #12 (ESF-12) activities under the Tennessee Emergency Management Plan, serves as the department liaison to the Tennessee Emergency Management Agency, attends energy emergency planning exercises and seminars, and maintains information relative to the Motor Fuel Contingency Plan. (ESF-12 activities are part of U.S. Department of Energy efforts to maintain continuous, reliable energy sources during national emergencies.)

In September 2010, the Energy Division offered a \$2,500 rebate to the first 1,000 Tennesseans who purchased a Nissan LEAF SL Model with DC Fast Charge and who signed up to participate in the Electric Vehicle Project. This project is federally funded and administered

by ECotality, and Tennessee is one of six states participating in the project. (Nissan North America is one of the partners for the project.) The Chevrolet VOLT was added to the rebate program in early 2012. Electric vehicle owners who receive the rebate are required to provide charging data to ECotality. The Energy Division confirms project participation with ECotality before the Department of Revenue processes the rebate. The deadline to sign up for the program and receive a rebate has been extended into 2013. At the end of November 2012, 436 rebates have been paid, while an additional 138 rebates are being processed.

Pursuant to Executive Order 25, signed on November 26, 2012, the programs and functions of the Energy Division will be transferred to the Department of Environment and Conservation effective January 1, 2013.

### ***Department of Transportation***

In 2006, Governor Bredesen allocated \$1.5 million to the Department of Transportation for the Biofuel Green Island Corridor Grant Project, which provides funding to partner retail stations in areas where reasonably accessible and convenient retail biofuels (E85 ethanol and B20 biodiesel) are not in place. The department also allocated \$480,000 of federal Congestion Mitigation and Air Quality Improvement funds to support the installation of biofuel stations in state air quality nonattainment and maintenance areas. The department expects that a statewide network of biofuel stations will encourage and expand the use of biofuels, help stimulate rural economic development, and reduce vehicle emissions. (See finding 9.)

### ***Department of Environment and Conservation***

The Department of Environment and Conservation administered the Alternative Fuel Innovation Grant program, which was designed to encourage local governments and public universities to assess opportunities to increase their use of biofuels and create projects to take advantage of those opportunities. The grant program was funded through \$1 million of dedicated appropriations for Tennessee's alternative fuel initiatives. In July 2007, 14 innovation grant projects were announced (see finding 10).

The department was designated the lead state agency to develop and manage a process for selection and implementation of TVA Settlement projects for Tennessee, including the Clean Tennessee Energy Grants.

### ***State Building Commission***

The State Building Commission (SBC) oversees all state building construction, renovation, demolition, and land and lease transactions for state government. SBC chooses a State Architect, who serves as the commission's Chief Staff Officer. The State Architect is responsible for implementing SBC's by-laws, policies, and procedures. Members of the SBC are the Governor, Lieutenant Governor, Speaker of the House of Representatives, Comptroller of the

Treasury, Secretary of State, State Treasurer, and the commissioner of the Department of Finance and Administration.

The SBC developed the *Sustainable Design Guidelines* for the procurement agencies (State of Tennessee Real Estate Asset Management in the Department of General Services, the Board of Regents and the University of Tennessee) to use as part of their designer manuals. These guidelines are minimum standards to ensure that the principles of good sustainable design and construction practices are being implemented on all new construction, renovation, and maintenance projects for the State of Tennessee. These guidelines have been formulated using U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) standards as a basis for comparison, and have been tailored for state government use.

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## OVERALL CONCLUSION

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This report discusses six entities in state government involved in energy conservation and alternative fuel activities. As noted in the following sections, several state agencies have been assigned energy conservation responsibilities by the General Assembly. Their activities range widely and focus on both the public and private sectors. There is not a single agency responsible for coordinating the activities or monitoring the accomplishments. The General Assembly should consider whether centralization of energy conservation activities is needed.

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## DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT

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### FINDINGS AND RECOMMENDATIONS

#### **1. Better monitoring of energy conservation projects funded through state grant or loan programs is needed**

##### **Finding**

The Department of Economic and Community Development's Energy Division offered three grant or loan opportunities to Tennessee's small businesses or local governments in order to increase energy efficiency and conservation: the Small Business Energy Loans, Local Government Energy Loans, and Clean Energy Technology Grants. The Small Business and Local Government Energy Loan programs stopped providing new loans in summer 2010; the final Clean Energy Technology Grant closed on December 30, 2011. In order to review the monitoring activities for the energy conservation projects funded through these loans and grants,

the auditors drew a sample<sup>1</sup> of the loan files for each program to analyze the types of documentation program personnel collected to facilitate the monitoring of the projects. We also interviewed current Energy Division personnel as well as reviewed division policies and rules and regulations. The purpose of monitoring these projects is twofold: to ensure the loan or grant funding is actually spent on an energy conservation project and to determine whether significant changes have been made to the project that would affect the energy usage and cost savings of the project. Overall, our review identified the following problems with the Energy Division's monitoring of the energy conservation projects.

- Program policies and rules regarding project monitoring documentation appear to have been disregarded in some of the files the auditors reviewed for the Small Business and Local Government Energy Loan programs. These policies and rules specify that the Energy Division complete a work completion form and that invoices should be submitted when the project is completed. In 28 files we reviewed, the work completion forms and/or invoices were not included. In fact, none of the Local Government Energy Loan files we reviewed had these documents. Since policies and rules were not followed in these cases, the project was not monitored properly.
- Formal, written monitoring procedures do not exist for the Clean Energy Technology Grant. As a result, the thoroughness of the documentation that shows the energy conservation projects were monitored varied depending on which program personnel performed the monitoring, and these documents were not consistently maintained in program files. For example, some site visits were documented on a form that included only a signature, date, and general statement about the visit; other site visits documented the type of technology that was actually installed as well as any changes from the original project proposal that might have occurred. However, some of the files we reviewed did not indicate a site visit had been made by program personnel. Also, program personnel started taking photographs while at the site visits, but not all of the projects we were told had photographs actually had these photographs in the project files we reviewed.

### **Recommendation**

More effective monitoring is needed for energy conservation projects funded through energy loan or grant programs. For future programs, the Energy Division needs to develop formal, written policies and procedures to ensure consistency and thoroughness in monitoring activities. Also, when such monitoring policies are in place, management should ensure that program personnel comply with those policies.

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<sup>1</sup> Our judgmental sample for the three programs contained 97 files in total. For the Small Business Energy Loans, the auditors randomly selected 20 percent of total number of loans provided; however, the number reviewed was reduced to 33 because completed loan files had been destroyed according to the department's records retention policy and three files from our sample were missing. For the Local Government Energy Loan program, 24 files were reviewed, which represents 20 percent of the total number of loans provided. For the Clean Energy Technology Grant, the auditors reviewed 12 project files with known problems, and randomly selected 28 files (about 40 percent) of the remaining files to review. The results of our review apply only to the files reviewed.

## **Management's Comment**

We concur that more effective monitoring than what occurred for the defunct Small Business (SBEL) and Local Government Energy Loan (LGEL) programs and the earlier years of the defunct Tennessee Clean Energy Technology Grant (TNCET) program is necessary to the proper monitoring of current and future state grant or loan programs. With regard to the SBEL and LGEL, these programs stopped providing loans in the summer of 2010. Thus, when the current ECD administration and the current director began their tenures, these programs were not active from a project monitoring standpoint. Energy Division staff currently oversee the repayment of these loans and will continue to do so until all final repayments are collected and processed. We would like to note that the SBEL and LGEL programs appear to have been reviewed during the previous performance audit that was published in January 2008, but that report did not comment on any deficiencies in these programs. Accordingly, no significant changes were made to the SBEL and LGEL programs from the time of their prior performance audit and the time the last loan was approved in 2010.

With regard to TNCET, the Energy Division concurs that the early monitoring of the Clean Energy Technology grant program needed to be improved but submits that significant improvement occurred during the life of the program.

Since the SBEL, LGEL, and TNCET programs are defunct, no corrective action plans will be put in place for these programs. The Energy Division agrees to be mindful of the recommendations made in this audit report when it develops, implements, and manages future loan and grant programs. Just as it did before implementing various aspects of its current grant programs, the Energy Division's management will develop formal, written policies and procedures to ensure consistency and thoroughness in monitoring activities.

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## **2. The Department of Economic and Community Development's Energy Division did not collect data to determine energy loan or grant programs' impact**

### **Finding**

Our review of the Clean Energy Technology Grant Program, Small Business Energy Loan Program, and Local Government Energy Loan Program revealed that the Energy Division in the Department of Economic and Community Development only collected estimated energy savings data rather than determining actual energy savings. Determining actual energy savings data would allow the Energy Division programs to show that these programs are successful at improving energy efficiency.

The sources of these estimates are energy audits performed when each energy conservation project was proposed to program personnel, but our review found that these estimates are not always reliable enough to be used to show program effectiveness. While reviewing a sample of these programs' documentation, the auditors found that some of the energy projects were changed during project implementation in ways that reduced the estimated

energy savings identified in the project's energy audit. For example, one project's energy audit proposed four energy conservation measures, but only one of these measures was actually performed; the estimated energy usage and cost savings were based on all four measures being completed. The auditors did not find documentation in any of the files showing updated estimates if the project changed after its initial proposal.

Based on our review, it does not appear that the Energy Division had any plans or procedures to collect actual energy savings data for energy conservation projects in the Clean Energy Technology Grant and Small Business Energy Loan programs. However, the Local Government Energy Loan Program's rules and regulations specified that loan recipients should provide, or arrange for their energy distributors to provide, copies of monthly utility bills to the Department of Economic and Community Development during the term of the loan. While reviewing a sample of this program's loan files, we did not see any indication that monthly utility bills were collected. If the Energy Division had collected utility bills as required, program personnel would have been able to examine actual energy data and determine the effectiveness of each project at reducing energy usage and costs. Energy Division personnel said a close-out report for the Tennessee Clean Energy Technology Grant program would be in its fiscal year 2012 annual report; however, since the Local Government and Small Business energy loans will be in repayment until 2016 and 2017, respectively, close-out reports for these programs are not yet expected.

### **Recommendation**

For future state-funded energy loan or grant programs, the Energy Division should create a system to collect and review actual energy savings data in order to accurately determine the effectiveness of the programs.

### **Management's Comment**

We concur that with regard to the defunct SBEL, LGEL, and TNCET programs, the Energy Division collected only estimated energy savings data rather than collecting data that would have allowed the Energy Division to determine actual energy savings. It should be noted, however, that the SBEL and LGEL programs appear to have been reviewed during the previous performance audit that was published in January 2008, but that report did not comment on any deficiencies in these programs. Accordingly, no changes were made to the SBEL and LGEL programs from the time of their review for the previous performance audit and the time the last loan was approved in 2010.

Since the SBEL, LGEL, and TNCET programs are defunct, no corrective action plans will be put in place for these programs. The Energy Division management agrees to be mindful of the recommendations made in this audit report when it develops, implements, and manages future loan and grant programs. Just as it has done with certain current grant programs, the Energy Division management will create a system to collect and review actual energy savings data in order to accurately determine the effectiveness of programs.

### 3. The Energy Division appears to have made unsupported incentive payments from the Biodiesel Manufacturer’s Incentive Fund

#### Finding

In order to determine how the Biodiesel Manufacturer’s Incentive Fund was used to increase the manufacture and distribution of biodiesel in Tennessee, the auditors reviewed all documents available about the fund within the Energy and Fiscal Divisions of the Department of Economic and Community Development (ECD). Our review found that except for one month’s data, the number of biodiesel gallons for which incentive payments were made to Tennessee biodiesel manufacturers did not correspond to the number of biodiesel gallons produced and sold in Tennessee reported on sales tax returns obtained from the Department of Revenue.

In 2007, the General Assembly authorized the Department of Revenue and the Department of Economic and Community Development to create the Tennessee Biodiesel Manufacturer’s Incentive Fund. This fund is to be used by the Department of Economic and Community Development (ECD) to make incentive payments for biodiesel manufactured in Tennessee and sold to a Tennessee distributor. According to ECD, \$1 million was appropriated to this incentive fund. The fund is set to be repealed on July 1, 2013.

Four biodiesel manufacturers contracted with ECD in 2008 and 2009 to receive monthly incentive payments; however, only two of these companies submitted requests for payment and received incentive payments during fiscal years 2008 and 2009, as shown in Table 1 below. A review of Secretary of State business records indicated that three of these four companies filed dissolution papers since the incentive fund was created. No claims for incentive payments have been made since January 2009.

		<u>Appropriations</u>	<u>\$ 1,000,000</u>
<u>Company</u>	<u>Contract Amount &amp; Contract Year</u>	<u>Incentive Payments</u>	<u>Fund Balance</u>
Milagro Biofuels	\$325,000 - 2008	\$ 254,139.40	\$ 745,860.60
Memphis Biofuels	515,000 - 2008	515,000.00	\$ 230,860.60
Freedom Biofuels	103,000 - 2008	-	\$ 230,860.60
Big Biodiesel	2,000 - 2008	-	\$ 230,860.60
Milagro Biofuels	70,860.60 - 2009	70,860.60	\$ 160,000.00
	<b>Interest - 2008</b>	\$38,281.40	\$ 198,281.40
	<b>Interest - 2009</b>	840.08	\$ 199,121.48
		<b><u>Remaining Balance</u></b>	<b><u>\$ 199,121.48</u></b>

Sources: Payment Information from STARS & ECD; Auditor Review of Contracts.

Based on our review of ECD's documentation, it is unclear how the fund's program personnel determined the number of biodiesel gallons produced, which is used to calculate the incentive payments. Current Energy Division personnel did not administer these incentive payments, and their knowledge of incentive fund operations is limited to the same documentation reviewed by the auditors.

By reviewing correspondence in the program files, we learned that the Department of Revenue personnel would provide biodiesel production amounts reported on state sales tax returns to the fund program's personnel. We obtained these amounts and compared these production numbers to the biodiesel gallons listed on ECD's payment vouchers used to make the incentive payments. Other than these payment vouchers, no other documentation was kept in the program's files that indicated the number of gallons used to make incentive payments. Our analysis shows that out of 18 incentive payments with a payment voucher, only one payment matched the Department of Revenue's data (see Table 2). Also, for two of the incentive payments, the number of gallons listed on the payment vouchers was more than the amount reported on the sales tax returns while the remaining 15 incentive payments were for fewer gallons than reported on the tax returns.

Because there are discrepancies between these two production numbers, the actual amount of biodiesel produced and sold in Tennessee is unclear. Therefore, it is also unclear whether ECD provided the appropriate amount of incentive for the company's biofuel production. Any program that expends taxpayer funds should have verifiable documentation to support the expenditures.

While ECD has not contracted with other companies to receive incentive funds, if any biodiesel producer applies for the incentive, the Energy Division will be responsible for processing the application and providing incentive payments.

**Table 2**  
**Biodiesel Gallons Comparison**

<u>Company</u>	<u>Payment Month</u>	<u>ECD Payment Information: Biodiesel Production Sold to TN Distributors</u>	<u>Revenue Sales Tax Information: Biodiesel Production In-State Sales</u>	<u>Difference</u>
Milagro Biofuels	September-07	242,523	328,723	(86,200)
	October-07	276,803	332,703	(55,900)
	November-07	237,976	312,987	(75,011)
	December-07	132,681	194,629	(61,948)
	January-08	127,512	134,512	(7,000)
	February-08	129,003	156,103	(27,100)
	March-08	Incomplete Documentation		
	April-08	Incomplete Documentation		
	May-08	7,200	26,268	(19,068)
	June-08	92,481	92,481	-
	November-08	117,000	163,335	(46,335)
	December-08	98,330	161,930	(63,600)
	January-09	138,973	122,746	16,227
	Memphis Biofuels	September-07	265,036	300,613
October-07		376,567	505,813	(129,246)
November-07		241,210	369,958	(128,748)
December-07		173,806	175,201	(1,395)
January-08		227,145	262,249	(35,104)
February-08		296,283	288,835	7,448
March-08		Incomplete Documentation		
April-08		Incomplete Documentation		
May-08		478,083	485,084	(7,001)
June-08	Incomplete Documentation			

Sources: Payment information from the Department of Economic and Community Development and Tax Return Data from the Department of Revenue.

### Recommendation

If the Energy Division provides incentive payments to biodiesel manufacturers in the future, adequate and verifiable information should be obtained to ensure that any incentive payments follow the purpose of the Tennessee Biodiesel Manufacturer's Incentive Fund and that the amount of biodiesel used for incentive payments is accurate. Any information obtained regarding the amount of biodiesel produced should be corroborated, and any discrepancies should be reconciled. Any supporting documentation should be maintained by the Energy Division.

## Management's Comment

We concur. As noted in the report, no incentive payments have been made since January 2009. The Energy Division has not received any applications for the incentive payments under the current ECD administration or during the tenure of the current Energy Division Director, who has held the position since June 2011. That being the case, it has not been necessary to implement a corrective action plan. However, as the statute creating this fund will not be repealed until July 1, 2013, the Energy Division recognizes that applications may be received before the statute is repealed. Should that occur, the Energy Division management will follow each of the recommendations set forth in this audit report, and the Energy Division Director will work with the Tennessee Department of Environment and Conservation (TDEC) Internal Audit to ensure that any incentive payments are adequately supported. (As noted in the report, the programs and functions of the Energy Division will be transferred to TDEC effective January 1, 2013.)

With regard to the maintenance of Energy Division records, the Energy Division follows the current state Records Disposal Authorization (R.D.A.) guidelines, which requires retention of records for 5 years after the end of the project or program.

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#### **4. The General Assembly may wish to consider revising state law to reflect how building energy standards are currently established and enforced in the state**

### Finding

The General Assembly may wish to consider revising certain sections of *Tennessee Code Annotated* since these sections set minimum energy efficient building standards that are less stringent than the codes set and enforced by the Department of Commerce and Insurance and the State Building Commission (SBC). The previous Energy Audit (published in 2008) also recommended revising certain statutes so the state could enforce the adoption of the most recent energy building codes.

The Department of Commerce and Insurance has the authority to set minimum energy building standards for public and private facilities through its rules and regulations (see Section 68-120-101[a][1], *Tennessee Code Annotated*; SBC also has concurrent jurisdiction to set the standards for state buildings (see Section 4-15-104[a]). Currently, the Department of Commerce and Insurance enforces the 2006 edition of the International Energy Conservation Code (IECC) maintained by the International Code Council. SBC enforces the American Society of Heating, Refrigeration, and Air-conditioning Engineers Standard 90.1, 2007 edition.

However, several sections of *Tennessee Code Annotated* specify older, less stringent minimum energy building codes for the state. Section 13-19-101, *Tennessee Code Annotated*, specifies the 1992 Edition of the Model Energy Code as containing the minimum energy efficiency requirements for new buildings. In 1999, the Model Energy Code was incorporated

into the IECC. In 2008, the General Assembly amended Section 4-3-734, *Tennessee Code Annotated*, to require that the minimum energy conservation standards for new residential construction be the 2003 edition of the IECC although the law suggests that builders of both residential and commercial construction voluntarily comply with the 2006 edition.

Additionally, the General Assembly has given the Department of Economic and Community Development's Energy Division the authority to recommend mandatory energy and lighting efficiency building standards for new and renovated buildings (see Section 4-3-710[4], *Tennessee Code Annotated*). Energy Division personnel stated that this function was transferred to the Department of Commerce and Insurance in 2009 although the statute has not been changed to reflect this transfer. Representatives from Commerce and Insurance said that the energy standard established by the department—the 2006 edition of the IECC—contains building and lighting energy efficiency standards.

### **Recommendation**

The General Assembly may want to revise the statutory language in Sections 13-19-101 and 4-3-734, *Tennessee Code Annotated*, in order to eliminate potential confusion about which published energy standard is the state's minimum building energy standard. The General Assembly also may wish to revise these statutes and Section 4-3-710(4), *Tennessee Code Annotated*, to reflect how building energy standards are currently established and enforced in the state.

### **Management's Comment**

We concur. As noted in the report, this function is now and has been the responsibility of the Department of Commerce and Insurance. TDEC expects to propose revisions to the Energy Division's "enabling statute" in future legislative sessions. Such proposal will seek to repeal Section 4-3-710(4), *Tennessee Code Annotated*.

## OBSERVATIONS AND COMMENTS

### The Department of Economic and Community Development’s Energy Division Continues to Collect Program Effectiveness and Impact Data for the Volunteer State Solar Initiative

Because the Volunteer State Solar Initiative is funded through the American Recovery and Reinvestment Act, the Department of Economic and Community Development’s Energy Division is required to report certain metrics, including energy impact metrics, to the federal Department of Energy (DOE). The auditors reviewed the progress made by the Energy Division in collecting and analyzing these impact metrics in order to measure the effectiveness of the initiative. At the end of fieldwork for this performance audit, data collection efforts by the Energy Division had not yet concluded since not all of the conservation projects have been completed.

As discussed on page 6 in the report’s introduction, the Volunteer State Solar Initiative has two major programs—the West Tennessee Solar Farm and the Tennessee Solar Institute (TSI). TSI has implemented a number of grants and activities related to solar energy and economic development that are available for private businesses located in Tennessee. Table 3 below shows the funding amounts for the initiative’s programs and grants as well as the contract period.

**Table 3**  
**Volunteer State Solar Initiative Programs and**  
**Grants Funding and Contract Periods**

West Tennessee Solar Farm – May 2010 to September 2013	\$31 million
Tennessee Solar Institute – April 2010 to July 2012	
Solar Innovation Grants	\$12.7 million
Solar Installation Grants	\$10.8 million
Other TSI Activities	\$ 5.7 million

Source: Program Documentation.

Due to the variety of activities funded through the Solar Initiative, the types of metrics reported for each program also vary. Many of the activities report the DOE-required impact metrics including the estimated amount of energy demand or consumption reduced, energy costs saved, emissions (greenhouse gases and criteria air pollutants) reduced, and the estimated amount of energy generated from renewable energy systems. Some of the activities collect other types of metrics required by DOE (e.g., the number of buildings retrofitted).

#### *West Tennessee Solar Farm*

Since January 2012, the West Tennessee Solar Farm has been producing power as portions of the solar array (i.e., grouping of solar panels) have been tested and made operational. Therefore, actual impact data relating to the amount of energy generated by the solar array and the reduction of emission are being collected. The Solar Farm became fully operational in March 2012.

## *Tennessee Solar Institute*

For the Solar Installation Grant program, the Tennessee Solar Institute (TSI) collected the same impact data as the Solar Farm since the purpose of this grant also is to expand solar power production. However, TSI continues to report these impact metrics as estimates rather than actual amounts because DOE only requires the estimated data, and at the end of our review, not all of the projects had been completed.

TSI also administers the Innovation Grant program, which is designed to encourage growth in the state's solar industry through six different categories of grants.<sup>2</sup> The data collected by TSI and reported to DOE differ with each grant category. For example, Technological Assistance grants provided, in part, funds for energy audits, and grant recipients collected data on the number of audits performed and the square footage audited. Alternatively, recipients of the Renewable Energy Products grants (who purchased items such as solar arrays or geothermal systems) collected the same DOE-required impact data as the Solar Farm and Installation Grant projects. Similar to the Installation Grants, any of the energy impact data collected and reported are estimated amounts.

TSI is collecting additional data not required by DOE for its grants and other activities (e.g., workforce development) that can be used to measure impact, and is starting to obtain from grantees actual data on energy savings as a result of the completed energy conservation projects. Energy Division personnel said that they are formulating plans to analyze this data as the Solar Initiative is concluding. DOE approved an extended period of performance for the initiative until September 30, 2013, during which the Energy Division staff said they will write a close-out report that will include an assessment of the effectiveness of the Solar Initiative.

### **The Department of Economic and Community Development's Energy Division Plans to Collect Actual Energy Savings Data for the Energy Efficiency Conservation Block Grant Program**

Since 2010, the Department of Economic and Community Development's Energy Division has distributed \$13,818,200 of grant funds to cities and counties across the state of Tennessee for the Energy Efficiency and Conservation Block Grant Program (EECBG). In order to determine how effective the EECBG Program has been at improving energy savings and reducing fossil fuel emissions, the auditors reviewed the process through which grant recipients report energy savings data to the Energy Division. At the beginning of May 2012, the Energy Division had only collected final estimates of energy savings from grant recipients with completed energy conservation projects. However, the Energy Division is planning to conduct an energy measurement and verification study of the conservation projects funded that will assess the impact of the program.

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<sup>2</sup> The six categories of Innovation Grants are Technological Assistance, Workforce Development, Renewable Energy Products, Process Improvements, Technological Improvements, and Facility and Equipment Improvement.

When the EECBG program was implemented by the U.S. Department of Energy (DOE), states were required to submit estimated energy impact data. This impact data included energy savings (in annual kilowatt hours), energy cost savings, renewable energy generation, and emissions reductions. However, in June 2011, DOE no longer required states to submit any of this impact data. Even so, the Energy Division continued to collect certain impact data from grant recipients—specifically, the energy savings and cost savings. Energy Division personnel said they continued to collect the impact data as a matter of project monitoring best practices.

Energy savings and cost savings are reported by grantees in both monthly reports and a final report. Program personnel said that the data reported in the monthly report are estimates of energy savings based on the proposed energy conservation project while the data in the final report are the estimates of energy savings based on the completed project. If the project changes during execution, any change in the proposed energy savings amount would be reflected in the monthly reports. At the beginning of May 2012, grant recipients had submitted the final estimated energy savings for 127 projects.

Since the data in the final reports are only estimates of the energy savings of the project, the Energy Division received from DOE an extended period of performance through March 2013. During this time the Energy Division will collect utility data from a sample of the EECBG projects to determine the actual energy savings of the sample projects as well as to assess the overall effectiveness of the program.

In addition, according to DOE's April 2011 EECBG evaluation plan, DOE is planning to perform a nationwide evaluation of the EECBG program that will be managed by the Oak Ridge National Laboratory and completed in December 2012. DOE reports that two of the primary outcomes that will be studied during this program evaluation are energy usage and cost savings.

### **More Detailed Documentation Could Assist Pathway Lending to Ensure Energy Efficiency Loan Projects Are Completed as Intended**

Since 2010, Pathway Lending has offered Energy Efficiency loans to commercial and industrial businesses that own or lease facilities in Tennessee in order to invest in assets to reduce energy and/or utility consumption and emissions. The General Assembly appropriated and the Department of Economic and Community Development granted Pathway \$15 million for this loan program. As of October 31, 2012, 47 loans have been issued, totaling \$5.7 million. We reviewed the Energy Efficiency Loan program to determine whether the projects for which the loan was provided were completed as intended to achieve energy conservation. Through our review of loan documentation of 25 approved loans (all loans approved through February 2012), we determined that more detailed documentation could assist Pathway's ability to ensure proper project completion.

Pathway uses a variety of ways to document the completion of the projects and to verify that the project was not substantially different than the project proposal so as to significantly affect the energy savings potential of the project. For many of the loans we reviewed, Pathway receives the contractors' invoices from the loan recipient detailing the completed project. On

occasion, Pathway is invoiced directly by the contractor. The auditors observed that for some of these loans, the invoices did not provide sufficient detail to confirm the details of the project. For example, one project's final invoice listed two line items, "subcontractor" and "fixtures." Because this project was a lighting project, the proposal listed specific lighting fixtures that would replace the current fixtures, but the final invoice did not list the specific fixtures installed. For this project and other projects where invoices are collected, Pathway could have difficulty confirming whether the project was completed as proposed. Therefore, Pathway should ensure the invoices and other documentation it obtains are detailed enough for adequate review.

Otherwise, other aspects of the loan program appear to be adequately managed, including Pathway's efforts to collect and analyze energy data post-project to determine actual energy savings. At the time of our review, Pathway had analyzed actual energy data for 10 projects. Nine of these projects had documented energy savings, while one project did not save energy due to increases in the loan recipient's energy demand.

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## DEPARTMENT OF GENERAL SERVICES

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### FINDINGS AND RECOMMENDATIONS

**5. The Department of General Services has still not implemented a formal utility monitoring system incorporating both cost and usage data**

#### Finding

The Department of General Services is required by state law to develop and implement a formal utility monitoring system assessing both energy cost and usage data for state-owned buildings. Section 4-3-1105, *Tennessee Code Annotated*, requires the Department of General Services to supervise "the supplying of utilities to the state-owned buildings under the department's control and implement a system for monitoring and controlling the cost of such utilities." Section 4-3-1012, *Tennessee Code Annotated*, requires the department to develop and implement "a formalized monitoring and analyzing schedule for utility data from state buildings, including both costs and usage."

Section 4-3-1012 also requires, as part of the State Building Energy Management Program (SBEM), the definition and implementation of "specific yearly conservation/energy management goals for state-owned facilities in coordination with the state architect's office and the state building commission." Governor Bill Haslam's Executive Order 7 transferred SBEM's statutory and other functions from the Department of Finance and Administration to the Department of General Services in September 2011. Specifically, these functions were transferred to the Department of General Services' State of Tennessee Real Estate Asset Management (STREAM) Division.

The January 2008 *State Government Energy Conservation Efforts* performance audit found that the Department of Finance and Administration and the Department of General Services needed to formalize utility monitoring efforts to include both cost and usage data. The Department of Finance and Administration had assigned the responsibility to monitor utility data to SBEM. However, SBEM's director stated that the program lacked the resources to review energy usage for every state building. The department had to gather its own data on energy units used (which it obtained directly from utility providers) because the Department of General Services only had data on energy costs (dollar amounts).

At the time of the 2008 performance audit, the Department of General Services paid many, but not all, state utility bills through its Office of Financial Management. For example, the department did not directly pay for some leased facilities' utilities because the landlord had agreed to pay for utilities within the contracted rental costs. The department did gather data from the utility bills; however, the only data gathered were the actual dollars spent on utilities, not the energy units billed and/or used. (Currently, the Office of Financial Management pays utility bills for all state buildings, whether state owned or leased, involved in the Facilities Revolving Fund.)

The 2008 performance audit also found that SBEM had not defined and implemented specific yearly conservation/energy management goals for state-owned facilities, as required by Section 4-3-1012, *Tennessee Code Annotated*. At the time of that audit, Department of Finance and Administration officials reported that their department had not established such goals since state agencies which controlled buildings were not mandated to participate in SBEM under Section 4-3-1017, *Tennessee Code Annotated*. Section 4-3-1017 required an executive order to mandate such participation, which had not been issued by the Governor. Public Chapter 718, passed by the General Assembly in March 2008, amended Section 4-3-1017 so as to require participation in SBEM (without an executive order) "by all departments and agencies of the executive branch and by all state colleges and universities operated by the board of trustees of the University of Tennessee or the state board of regents."

The Department of General Services, through STREAM, has not developed a utility monitoring system for state-owned buildings capable of analyzing both cost and usage data, using specific yearly conservation/energy management goals as benchmarks. STREAM management stated that without good utility usage data, they will not be able to establish these goals. STREAM is still in the process of developing such a system. (For example, STREAM was conducting a pilot project obtaining energy usage data regarding the William R. Snodgrass Tennessee Tower from Nashville Electric Service in May 2012.) Officials from the University of Tennessee system, Tennessee Board of Regents, and the Tennessee Higher Education Commission stated that their organizations were not exchanging energy data with STREAM. None of these organizations have established a comprehensive monitoring system for both energy cost and usage data.

## Utility Monitoring Systems

The Energy Star program, in the United States Environmental Protection Agency (EPA) through its *Guidelines for Energy Management*, suggests a number of steps for a successful strategy in energy management. These steps are listed below.

- Commit to continuous improvement (organizations' success in seeing financial returns from superior energy management is based on regularly assessing energy performance and implementing steps to increase energy efficiency).
- Assess performance (assessing performance is the periodic process of evaluating energy use for all major facilities and functions in the organization and establishing a baseline for measuring future results of efficiency efforts).
- Set goals (setting clear and measurable goals is critical for understanding intended results, developing effective strategies, and reaping financial gains).
- Create an action plan (successful organizations use a regularly updated, detailed action plan to ensure a systematic process to implement energy performance measures).
- Implement an action plan (gaining the support and cooperation of key people at different levels within the organization is an important factor for successful action plan implementation in many organizations).
- Evaluate progress (evaluation results and information gathered during the formal review process are used by many organizations to create new action plans, identify best practices, and set new performance goals).
- Recognize achievements (providing recognition to those who helped the organization achieve these results motivates staff and employees and brings positive exposure to the energy management program).

A utility monitoring system for analyzing both cost and usage data is essential in assessing the performance of energy efficiency efforts. The EPA's Portfolio Manager is one system an organization can use for gathering and tracking energy use and cost data for buildings, including benchmarking energy performance against similar facilities. This online, interactive system allows building managers to, among other things, verify underperforming buildings and investments in energy conservation. It is available to states and any user who wants to track energy consumption in commercial buildings.

Both Alabama and North Carolina are in the process of introducing the Portfolio Manager to monitor state building energy costs and usage. The Energy Manager of Alabama's Department of Economic and Community Affairs stated that the department's Energy Division is responsible for providing training to departments and agencies in the use of Portfolio Manager software and had conducted three related training workshops as of March 2012. Alabama

Executive Order 25, effective November 15, 2011, requires that all state agencies must implement the Portfolio Manager to measure and report energy efficiency for state facilities. State universities are responsible for their own utility management.

North Carolina recently started using the Portfolio Manager as part of its Utility Savings Initiative. Managed by the North Carolina Energy Office, the Utility Savings Initiative was created in July 2002 in response to state legislation enacted in September 2001. The legislation required the Energy Office to develop a comprehensive program to manage energy, water, and other utility use for state agencies and state institutions of higher learning. The program was initially responsible for coordinating state agencies and University of North Carolina system institutions in their efforts to manage and reduce energy consumption and cost. In addition to these state entities, the program now provides services to North Carolina's community colleges, public schools, and county and municipal governments. These services include training, outreach, and performance contracting.

We contacted three other neighboring states regarding utility monitoring: Georgia, Missouri, and Virginia. Missouri uses software from a private vendor, not EPA's Portfolio Manager, to monitor utility costs and usage. Energy officials from Georgia and Virginia, although recognizing the need for a system to monitor energy costs and usage, said that their states do not perform such monitoring. Georgia has tried to introduce such a system but has had difficulties obtaining the necessary data (e.g., getting state agencies to cooperate and acquiring utility company data that is reliable). Virginia has not implemented such a system for financial reasons. A report issued in November 2010 by the Operational Review Task Force established by Virginia's Governor also mentioned energy data collection problems such as inconsistency of data and lack of a common utility billing system.

STREAM management also mentioned difficulties in obtaining energy data in developing a utility monitoring system. Specifically, STREAM had difficulties in transferring data between its Utility Management Server software system and Edison. Management said that because of problems with Edison coding, the data became corrupted and thus unreliable. Management stated that although Portfolio Manager is a useful tool, it has no immediate plans to use the program.

### **Recommendation**

The Department of General Services' State of Tennessee Real Estate Asset Management (STREAM) Division should develop and implement "a formalized monitoring and analyzing schedule for utility data from state buildings, including both costs and usage," as required by Section 4-3-1012, *Tennessee Code Annotated*. The monitoring system should include not only state-owned buildings but those buildings which are leased by the state. Such a system should take into consideration energy purchase and consumption data from the state's institutions of higher education, whose participation in state building energy management is required by Section 4-3-1017, *Tennessee Code Annotated*.

STREAM should also develop and implement, in conjunction with the utility monitoring system, “specific yearly conservation/energy management goals for state-owned facilities in coordination with the state architect’s office and the state building commission,” as required by Section 4-3-1012, *Tennessee Code Annotated*.

### **Management’s Comment**

We concur. Edison, the state enterprise resource planning program, is primarily an accounts payable program which does not lend itself to energy management or the collection of energy consumption data. The Department of General Services (DGS) is working in harmony with Edison and OIR to create a process for entry of full utility invoice cost and consumption data in a standard, consistent format that can be utilized to conduct the required analyses necessary to energy management, as well as be used to properly allocate the utility costs to the user departments and agencies. The resulting data collection software will be utilized for DGS buildings prior to implementation statewide.

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**6. The Department of General Services has not complied with statutes requiring agency coordination in energy conservation**

#### **Finding**

Section 4-3-1017, *Tennessee Code Annotated*, authorizes the State Building Energy Management Program (SBEM) to develop energy management plans “for the most efficient use of energy by state buildings.” The Department of General Services’ State of Tennessee Real Estate Asset Management (STREAM) Division took over responsibilities of the SBEM from the Department of Finance and Administration’s Division of Real Property Administration when that division’s functions were transferred to the Department of General Services in September 2011 by executive order. To assist STREAM in developing “an energy management plan for state government,” Section 4-3-1018, *Tennessee Code Annotated*, has the following requirement:

each department of state government, institution or agency having control of or responsibility for the management or operation of a building used by state government, including the postsecondary public institutions and subparts of the University of Tennessee, the state board of regents and the state board of education, whether owned or leased, shall designate a representative for each building or group of buildings under one (1) management as a liaison with the department. Such person shall be the building manager or superintendent or someone familiar with the operation of the building.

In addition, Section 4-3-1019, *Tennessee Code Annotated*, requires the following state agencies to cooperate with the Department of Finance and Administration (now the Department of General Services) in order to facilitate the coordination of energy conservation as part of state buildings’ operations:

- the Department of Economic and Community Development;
- the State Building Commission;
- the Tennessee Higher Education Commission;
- the Tennessee Board of Regents;
- the University of Tennessee Board of Trustees; and
- the State Board of Education.

STREAM management said that their division had not undertaken formal coordination efforts in the area of energy management with other state agencies, including interaction with liaisons. One STREAM official stated that his division worked with other state departments informally to gather data regarding energy usage, but he admitted that the information was not as detailed as STREAM staff would like. The official said that in his six years with the program, he had seen communication and collaboration with other departments who managed state buildings “fade away.”

#### Interaction With Other State Agencies

We contacted officials of the state agencies mentioned in Section 4-3-1019, *Tennessee Code Annotated*, regarding coordination in energy management, with the exception of the State Board of Education (which deals mostly with local governments). These officials confirmed that lack of coordination with STREAM. In fact, officials from four of the five agencies were not familiar with the coordination requirement of Section 4-3-1019 when contacted.

We also contacted officials of six state agencies regarding the liaison requirements of Section 4-3-1018, *Tennessee Code Annotated*. Only one agency reported liaison activities, while officials from five of the six agencies stated that they were not familiar with the requirements. Without state agency officials’ familiarity with state law requiring coordinated efforts among their agencies to maximize the efficient use of energy, cooperation among state agencies in this area is seriously limited.

### **Recommendation**

The Department of General Services’ State of Tennessee Real Estate Asset Management (STREAM) Division should develop and implement a program to inform state agencies about their obligations in maximizing the efficient use of energy in state buildings under Sections 4-3-1017, 4-3-1018, and 4-3-1019, *Tennessee Code Annotated*. STREAM should also develop and implement a program of coordination among state agencies, including the use of agency liaisons, in the area of energy savings as required by these statutes. To facilitate this coordination, STREAM should consider using modern communications technology (e.g., e-mail “blasts”) to facilitate this coordination in order to reduce time-consuming and costly face-to-face meetings. However, such technology should not preclude active participation of individuals appointed as

liaisons by state agencies, including face-to-face meetings to discuss well-developed, energy-savings proposals.

### Management's Comment

We concur. The DGS-STREAM-Sustainability Group (SBEM) is collaborating with the Office of the State Architect (OSA) to improve building planning, design, construction, operation and maintenance through a high performance building (HPB) program. This HPB program will provide the coordination for a consistent approach to energy conservation for all state buildings. Note that the energy management liaison from each department, institution or agency designated in TCA 4-3-1018(a) is a critical champion for energy conservation in that department, institution or agency.

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- 7. Required rules and regulations on energy efficiency standards for state purchases have not been issued, although the Department of General Services has complied with laws on purchasing energy saving products, life-cycle cost analyses, and preparing an annual report on energy-efficient purchasing**

### Finding

Legislatively required rules and regulations pertaining to energy efficiency standards have yet to be adopted by the Department of General Services and the State Procurement Commission (located at the department). However, the Department of General Services has resolved other findings of the January 2008 *State Government Energy Conservation Efforts* performance audit relating to energy efficiency.

Section 4-3-1105(20), *Tennessee Code Annotated*, (as noted in Table 4) requires the Department of General Services to prepare “an annual report on the activities of the department concerning the definition and implementation of an energy efficiency code for state procurement of equipment and appliances,” and submit this report to leadership in both the executive and legislative branches. (See Table 4 for the specific officials.) The law also requires the department to publish the report on its website. The department did submit the *Tennessee Department of General Services Annual Report on Energy-efficient Purchasing, Fiscal Year 2010-2011* to the leadership and put the report on its website.

### Rules and Regulations

Section 12-3-605, *Tennessee Code Annotated*, requires the Board of Standards, in consultation with the Department of General Services, to “adopt rules and regulations relative to energy efficiency standards for major energy-consuming products to be procured by the state.” In addition, Section 12-3-606 requires the Board of Standards, when energy efficiency standards are established, to “adopt rules requiring life cycle costs to be used by the commissioner in contracting for major energy-consuming products.” (Section 4-56-101 transferred the

procurement functions from the Board of Standards to the new State Procurement Commission, as of April 2012.) None of these rules and regulations has been issued. The January 2008 performance audit found the same problem.

Status of Other Findings in the January 2008 *State Government Energy Conservation Efforts* Performance Audit Relating to Procurement Energy Efficiency Standards and Life-Cycle Cost Analyses

The 2008 performance audit found weaknesses in the Department of General Services' compliance with state laws regarding energy efficiency standards and life-cycle costs. There are several statutes associated with these weaknesses. See Table 4 for a description of these statutes.

**Table 4**  
**Statutes Relating to Energy Efficiency Standards and Life-Cycle Costs**  
**Pertaining to the *State Government Energy Conservation Efforts* Performance Audit**  
**January 2008**

Section <i>Tennessee Code Annotated</i>	Description
4-3-1105(17)	Requires the Department of General Services to provide “state vehicle energy management life-cycle (operational and maintenance) cost analysis”
4-3-1105(18)	Requires the department to “Define and implement an energy efficiency code for state procurement of equipment and appliances.”
4-3-1105(20)	Requires the department to prepare “an annual report on the activities of the department concerning the definition and implementation of an energy efficiency code for state procurement of equipment and appliances.” The department must “publish the report on the department’s web site and submit the report to the governor, the speakers of the senate and the house of representatives, the chairs of the government operations committees of the senate and the house of representatives, and the chairs of the environment, conservation and tourism committee of the senate and the conservation and environment committee of the house of representatives, or their successor committees. The report shall include savings realized by the state as a result of the office’s activities expressed in both units of energy saved and monetary cost-avoidance.”

4-3-1109	Mandates the department to ensure “that at least twenty-five percent (25%) of newly purchased passenger motor vehicles procured for use in areas designated by the United States environmental protection agency (EPA) as ozone nonattainment areas shall be hybrid-electric vehicles; provided, that such vehicles are available at the time of procurement. In the event that such vehicles are not available at the time of procurement, the department may instead meet this mandate by procuring compact fuel-efficient vehicles. In areas not designated by the EPA as ozone nonattainment areas, the department shall ensure that at least twenty-five percent (25%) of newly purchased passenger motor vehicles are hybrid-electric vehicles or compact fuel-efficient vehicles.”
12-3-604	Mandates the department to determine “which commodities and products purchased by the state may be purchased according to energy efficiency standards” and gives the department the duty “to recommend those commodities and products to the board of standards for adoption and use in state purchasing procedures.”
12-3-605	Requires the Board of Standards, in consultation with the Department of General Services, to “adopt rules and regulations relative to energy efficiency standards for major energy-consuming products to be procured by the state,” and “where feasible, adopt [energy efficiency] standards at least as stringent as the federal standards.” The section also requires that all “future office equipment, appliances, lighting and heating and cooling products and systems purchased by and for state agencies shall be Energy Star qualified; provided, that such Energy Star qualified products and systems are commercially available.”
12-3-606	Requires the Board of Standards, when energy efficiency standards are established, to “adopt rules requiring life cycle costs to be used by the commissioner in contracting for major energy-consuming products. In determining life cycle costs, the board of standards and the commissioner may consider the acquisition cost of the product, the energy consumption and the projected cost of energy over the useful life of the product, and the anticipated resale or salvage value of the product.”

Energy Efficiency Standards and Life-Cycle Cost Analyses for Product Purchases

The 2008 performance audit found that the Department of General Services and the Board of Standards had not complied with Sections 12-3-604 through 606, *Tennessee Code Annotated*. In addition to not adopting the rules and regulations mentioned above, the department had not taken adequate steps to determine which commodities and products the state

could purchase according to energy efficiency standards, as required by Section 12-3-604. The audit also found that the department could not provide documentation of compliance with the requirements of Section 12-3-606, *Tennessee Code Annotated*, regarding the use of life-cycle cost analyses for the purchase of major energy-consuming products.

Other than the lack of rules and regulations, it appears that the department has mostly resolved the weaknesses regarding the use of energy efficiency standards and life-cycle cost analyses in purchasing energy-consuming products. The department's *Purchasing Policy Manual* cites Governor Phil Bredesen's Executive Order 59 requiring the use of energy efficiency standards prescribed by Energy Star for the purchase of energy consuming products. (Energy Star is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy that has established energy efficiency standards to help consumers, businesses, and government agencies identify the most energy-efficient product models for their needs.) The Executive Order requires that all "future office equipment, appliances, lighting, and heating and cooling products and systems purchased by or for Executive branch state agencies shall be Energy Star qualified," if they "are commercially available."

A major advantage of purchasing an Energy Star-qualified product is that life-cycle cost analyses are part of the program's qualification standards. According to Energy Star's *Strategic Vision and Guiding Principles*, purchasers "will recover their investment in increased energy efficiency within a reasonable period of time." The program recognizes two costs when an energy-consuming product is purchased: 1) the initial cost of the product at the time of purchase, and 2) the cost of energy to operate that product over its lifetime. Energy Star specifications require that a product qualified under the program recover any cost differential at the time of purchase with a similar model "through utility bill savings, within the life of the product, generally between 2 and 5 years."

We reviewed a random sample of seven energy-consuming products purchased by state agencies in fiscal year 2011 to determine if they met the energy efficiency and life-cycle cost requirements of both statute (e.g., Section 12-3-605, *Tennessee Code Annotated*, requiring the purchase of Energy Star-qualified products, if commercially available) and the *Purchasing Policy Manual*. One product was a laptop, two products were desktop computer "bundles" with monitors, and four products were four different types of lamp bulbs. All three computers (including monitors) were Energy Star qualified, and so were two of the four lamp bulbs. (In assessing the monitors for Energy Star qualification, we also determined that all 4,831 computer monitors purchased in fiscal year 2011 were Energy Star qualified.) Department management stated that for the two bulb types that were not Energy Star qualified, there were no energy efficiency or life-cycle analyses available. However, both of the light bulb types were compact fluorescent lamps, which can save up to 75 percent of the energy of a comparable traditional incandescent bulb.

#### Life-Cycle Cost Analyses for State Vehicles

The 2008 performance audit also found that the Department of General Services' Motor Vehicle Management Division had not provided "state vehicle energy management life-cycle (operational and maintenance) cost analysis," as required by Section 4-3-1105(17), *Tennessee*

*Code Annotated.* The only documentation the division provided was a monthly report of average vehicle costs. The division now does perform life-cycle analyses as required by Section 4-3-1105(17). Invitations to bid for state vehicle contracts contain life-cycle analysis cost language, in addition to such language in the *Purchasing Policy Manual*. The division uses a “Vehicle Evaluation Model” spreadsheet to evaluate life-cycle costs for prospective vehicles to be purchased. This model determines a total cost of ownership for each vehicle.

Division management stated that all vehicle cost information is “captured” by Edison’s Fleet Focus module from the time a vehicle enters service until disposal. Management added that it had no standard time for life-cycle cost analyses but preferred quarterly vehicle cost reports as data are lacking for adequate monthly reports. We reviewed the division’s vehicle cost reports for calendar years 2010 and 2011. These reports provide the following annual costs for each vehicle in the state fleet: fuel, maintenance, depreciation, and administration. The total of these costs is divided by total miles driven to obtain a cost per mile for each vehicle. The reports also have the initial purchase price for each vehicle.

Division management stated that the new WeCar leasing program in cooperation with Enterprise is not subject to energy efficiency requirements for vehicle purchases of Section 4-3-1109, *Tennessee Code Annotated* (the program involves renting, not purchasing, vehicles). Management said, however, that the program, although having no hybrid vehicles, had mostly fuel-efficient passenger vehicles. All options were open for a state agency in acquiring new vehicles, including using a rental (i.e., WeCar), leasing, and actually purchasing a vehicle. (The WeCar program provided short-term rental while the leasing involved 36 months or 60,000 miles.) The October 2011 performance audit of the Department of General Services reviewed the department’s compliance with Section 4-3-1109 in vehicle purchases and found no problems.

### **Recommendation**

The Department of General Services, in cooperation with the State Procurement Commission, should develop and adopt rules and regulations that satisfy the requirements of Sections 12-3-605 and 12-3-606, *Tennessee Code Annotated*, concerning energy efficiency standards and life-cycle costs. In addition, the department should ensure that all major energy-consuming products purchased by the state meet Energy Star specifications regarding energy efficiency and life-cycle costs.

### **Management’s Comment**

We concur. All previous audit findings have been addressed with the exception of the formal establishment of a separate rule in regard to the energy efficiency standards for the Central Procurement Office (CPO). The CPO has started the administrative approval process of its rules and regulations (the “Rules”). Presently, the Central Procurement Office is seeking an Energy Efficiency Policy for recommendation before the Advisory Council on January 3, 2013, which will then go before the Procurement Commission for approval at its January 2013 meeting. The Energy Efficiency Policy, once approved by the Procurement Commission, will have the

force and effect of law. The administrative rules approval process takes several months and requires a public hearing, a 30 day public comment period, approval by the Attorney General, referral to Government Operations, and filing with the Secretary of State. After public comments are received, the rules, as revised by public comment, will be presented to the Procurement Commission for approval. After the Rules, as revised, are approved, they are then filed with the Tennessee Attorney General for approval. The Rules may also be referred to Government Operations. Once approved by the Attorney General, the Rules will be filed with the Secretary of State's Office. The entire process should be complete, barring no complications, by May of 2013.

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## STATE BUILDING COMMISSION

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### FINDING AND RECOMMENDATION

- 8. The State Building Commission should revise the *Sustainable Design Guidelines* to comply with the statutory energy mandate on renewable energy options for new state buildings**

#### Finding

Section 4-15-104, *Tennessee Code Annotated*, authorizes the State Building Commission “to prescribe standards and promulgate rules and regulations for the construction of state buildings, and the procedure to be followed” and encourages the commission “to promulgate rules and regulations that require design, construction, and certification of state buildings with at least a rating of two (2) Green Globes or an equivalent rating under a comparable standard.” Section 4-15-106, *Tennessee Code Annotated*, gives the commission the responsibility “to enforce the code for energy conservation in new building construction, compiled in title 13, chapter 19, as to all buildings designed or constructed for the state of Tennessee after January 1, 1979.”

Section 4-3-1012, *Tennessee Code Annotated*, requires the Department of Finance and Administration to define and implement “an energy efficiency code for future state buildings to include a review of renewable options by means of life-cycle analysis” which “shall be mandatory.” Governor Bill Haslam’s Executive Order 7 transferred that department’s state building energy management program functions to the Department of General Services in September 2011.

The January 2008 *State Government Energy Conservation Efforts* performance audit found that the Department of Finance and Administration did not comply with Section 4-3-1012 since the state’s energy efficiency code did not include a review of renewable options by means of life-cycle cost analysis for future state buildings. The state’s energy efficiency code, contained in the *Sustainable Design Guidelines* issued by the State Building Commission, still does not require such life-cycle cost analyses.

### Sustainable Design Guidelines

First issued in 2008, *Sustainable Design Guidelines* was the product of the Tennessee Sustainability Task Force composed of representatives of the Office of the State Architect, the Tennessee Board of Regents, the University of Tennessee, the Tennessee Higher Education Commission, and a team of private consultants. The guidelines act as part of the design manuals of the Department of General Services' State of Tennessee Real Estate Asset Management (STREAM) Division, the Tennessee Board of Regents, and the University of Tennessee "as a minimum standard and guideline for designers to insure that the principles of good sustainable design and construction practices are being implemented on State of Tennessee projects." All new state buildings being constructed under the *Sustainable Design Guidelines* must focus on meeting or exceeding "minimum standards established by recognized sustainable and energy efficient design organizations such as LEED, Green Globes, and Energy Star."

The *Sustainable Design Guidelines* meet the recommendation of Section 4-15-104, *Tennessee Code Annotated*, that state buildings should be constructed "with at least a rating of two (2) Green Globes or an equivalent rating under a comparable standard." However, the guidelines' Energy Efficiency and Atmosphere Protection section does not require "a review of renewable options by means of life-cycle cost analysis" mandated by Section 4-3-1012. The *Sustainable Design Guidelines Checklist* makes the investigation of "on-site opportunities for renewable power" optional.

We reviewed building design information pertaining to random samples of five building projects completed by STREAM, the Tennessee Board of Regents, and the University of Tennessee using the 2008 version of the *Sustainable Design Guidelines* (no buildings had been completed using the updated 2011 version, as of April 2012). Only one of the five building designs appeared to comply with Section 4-3-1012 requiring a review of renewable options using life-cycle cost analysis. The Department of Finance and Administration responded in the January 2008 audit that the guidelines, then under development, would help resolve lack of compliance with Section 4-3-1012.

### State Fire Marshal's Office Enforcement of Energy Code for Non-state Buildings

As non-state buildings are major energy consumers in Tennessee, we decided to review the State Fire Marshal's efforts in making these buildings more energy efficient. Section 68-120-101, *Tennessee Code Annotated*, gives the State Fire Marshal's Office (located in Department of Commerce and Insurance's Code Enforcement Section) the authority to establish and enforce "minimum statewide building construction safety standards." These standards must include "provisions relative to structural strength and stability; **energy efficiency**; means of egress; fire resistant ratings and requirements; and fire protection equipment and materials (emphasis added)." Section 68-120-101 allows the State Fire Marshal's Office to use energy efficiency standards from the International Code Council. In June 2011, the office required the use of the 2006 edition of International Energy Conservation Code (issued by the International Code Council) for all non-state building designs submitted to it on or after July 1, 2011.

Section 68-120-101 also allows the State Fire Marshal to exempt local jurisdictions from minimum statewide standards, with the exception of state buildings (owned or leased), educational facilities (including daycare centers), and other occupancies that require an inspection by the State Fire Marshal's Office for initial licensure. These jurisdictions must have building safety standards approved by the State Fire Marshal's Office in order to gain the exemption. The State Fire Marshal had approved the exemption of 37 local jurisdictions, including those containing Tennessee's major urban centers, as of November 2011. (Nashville/Davidson County was exempt with the exception of Oak Hill, Belle Meade, Forest Hills, Berry Hill, and Lakewood.)

We reviewed building design information pertaining to a random sample of six building projects, whose designs were evaluated by the State Fire Marshal's Office using the 2006 edition of International Energy Conservation Code. It appears these projects met the 2006 International Energy Conservation Code standards.

### **Recommendation**

The State Building Commission, the Department of General Services' State of Tennessee Real Estate Asset Management (STREAM) Division, the Tennessee Board of Regents, and the University of Tennessee should ensure that mandatory review of renewable energy options by means of life-cycle cost analysis, as required by Section 4-3-1012, *Tennessee Code Annotated*, is performed for all designs of future state buildings. As part of this process, the State Building Commission should incorporate this mandatory review in the *Sustainable Design Guidelines'* Energy Efficiency and Atmosphere Protection section. The review should first determine possible viable renewable energy options (e.g., based on the building location and available technologies) and then perform life-cycle cost analyses to determine if these options should be incorporated in a building's design.

### **Management's Comments**

#### Office of the State Architect:

We concur. The latest edition of the Sustainable Design Guidelines, which are incorporated as a part of the Designers' Manual for design and construction of state facilities, is being reviewed together with the initiative for High Performance Building requirements that are being drafted for future approval. These initiatives will set forth the requirement to consider renewable energy options for new state buildings based upon justified pay-back periods as determined by Life Cycle Cost Analysis (LCCA).

#### University of Tennessee:

We concur that the "Sustainable Design Guidelines" should be consistent with relevant statutory requirements and will be pleased to participate with the State Building Commission, its

staff, and other state procurement agencies in developing and implementing any necessary revisions.

Board of Regents:

We concur. The Tennessee Board of Regents will continue to work with the staff of the State Building Commission on issues related to the *Tennessee Sustainable Guidelines*.

**OBSERVATION AND COMMENT**

**The State Building Commission, in Cooperation With the Department of General Services, Should Consider Whether to Reinstate Performance-Based Contracting for Energy-Related Projects**

Energy savings performance contracting involves a contract between a public agency and a third-party energy services company (ESCO), which will provide a service or group of services to reduce energy consumption at the agency. Such services typically include activities such as engineering, installation, and maintenance of energy-saving capital improvements. As a result of the energy-saving improvements, the state agency would be able to use the resulting energy savings to pay for the improvements rather than having to fund the project at the beginning.

A performance contract requires the ESCO to guarantee cost savings stated in the contract or make up the difference between projected and actual energy savings. Determination of actual savings resulting from services provided by the ESCO is through the measurement and verification (M&V) process. M&V could be performed various ways, including through an independent, third-party contractor, or by a separate division of the ESCO with results verified by an agency employee.

The following lists examples of products and services that could be provided through a performance-based contract:

Energy-efficient lighting	Indoor air quality analysis
HVAC* maintenance and repair	Modernized temperature controls
HVAC automation	High-efficiency heat pumps
Thermal storage systems	Ground-source heat pumps
Lighting controls	Variable-speed drives
Training services	Energy-efficient motors
Boiler modernization	Chiller modernization
Commissioning services	Advanced utility metering
Alternative/renewable energy systems	Insulation and reduced air filtration

\* Heating, ventilation, and air conditioning.

The state energy management plan, *Integrating Energy Services for State Buildings: An Energy Action Plan for Tennessee Buildings*, issued by the Department of Finance and Administration in July 2001, states that performance contracting “is perhaps the most significant

tool available to the State in implementing this plan.” The Department of General Services’ *State Building Energy Management Program Status Report FY 2011* stated that performance contracting was a “key element” of the state energy management plan.

However, the Department of General Services’ State of Tennessee Real Estate Asset Management (STREAM) Division management stated that performance contracting is no longer used by state agencies in Tennessee. (STREAM took over responsibilities of the state building management program from the Department of Finance and Administration’s Division of Real Property Administration when that division’s functions were transferred to the Department of General Services in September 2011.) There had been seven performance contracts with five ESCOs since 2000, according to the *State Building Energy Management Program Status Report FY 2011*. The last performance contract was signed with Siemens in September 2003.

### Issues Regarding Implementation of Performance Contracting

The January 2008 *State Government Energy Conservation Efforts* performance audit found that the State Building Commission and State Building Energy Management Program (SBEM), now transferred to STREAM, should continue to evaluate the energy savings performance contracting model introduced in the state energy management plan, *Integrating Energy Services for State Buildings: An Energy Action Plan for Tennessee Buildings*. The audit mentioned the need for written guidance made available for agencies who had not yet procured a performance contract and needed a standard process to follow. The performance audit also found that the State Building Commission and SBEM needed to develop a written, standard process for performance-based contracting for energy-related projects that included a mechanism for acquiring M&V contracts.

STREAM management said that there are several obstacles that need to be overcome to reinstate energy savings performance contracting for state agencies. Management stated that the contract method used for performance contracting in the past was the standard “design/bid/construct” method, instead of the “design/build” method more suitable to performance contracting. Under the “design/bid/construct” method, the project designer is under contract to the state and, being independent from the contractor, has significant authority to oversee work with regard to conformance with the drawings and specifications. Under the “design/build” method, on the other hand, the contractor employs the designer directly and it is the owner’s (i.e., state agency’s) responsibility to protect the owner’s interest and evaluate the quality of the work as it relates to conformance with the drawings and specifications prepared by the designer.

In addition, an ESCO needs to be involved in the evaluation and development of a project in order to maximize energy savings. Such involvement is required by the model outlined in the federal contracting process that served as a model for the state in the state energy management plan. Instead, an ESCO had often been obligated to take a project from a list of capital maintenance projects in the capital budget and try to tailor State Building Commission-prescribed criteria in order to find energy savings. This resulted in a loss of potential energy savings as the ESCO was prevented from helping structure projects at the initial stages to make the projects more amenable to energy-saving measures.

One of the State Building Commission criteria an ESCO had to deal with was the commission's mandated payback period. The eight-year payback period that the State Building Commission typically used was not suitable for HVAC systems, which require a payback period generally in the twelve- to fifteen- year range. This limits the improvements to HVAC systems. (The 2008 performance audit also determined the need to align payback periods with the nature of energy projects, including useful life.)

As noted in the 2008 performance audit, STREAM management cited the lack of M&V review of performance contracts to determine actual savings made by actions of the ESCO. The M&V process, through an M&V contractor, to determine whether the ESCO's work (e.g., engineering, and installation of energy-saving capital improvements) had achieved projected energy savings was typically not funded by the owner (i.e., the state agency) because it was not part of that agency's operating budget. The State Building Commission, in cooperation with the Department of General Services' State of Tennessee Real Estate Asset Management (STREAM) Division, should study the advantages and disadvantages of performance-based contracting for energy-related projects and consider whether it is a method state agencies should use.

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## DEPARTMENT OF TRANSPORTATION

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### FINDING AND RECOMMENDATION

- 9. The Department of Transportation has tried to increase access to biofuels through the Biofuel Green Island Corridor grant program, but it should document its monitoring of grant recipients and continue to work toward reaching its access goals**

#### Finding

Section 54-1-136, *Tennessee Code Annotated*, gives the Department of Transportation the authority to establish a grant program to assist private fuel stations to pay for storage tanks and pumps used to sell biofuel "including, but not limited to, ethanol (E85) and biodiesel (B20)." The department has established the program but has not developed and implemented a system of documented site visits by program staff to determine if grant funds are spent appropriately by recipients.

The Department of Transportation established the Biofuel Green Island Corridor Grant Project in 2006 to support the installation of biofuel stations using \$1.5 million in state funds and \$480,000 from the federal Congestion Mitigation and Air Quality (CMAQ) Improvement program. The CMAQ funds must be used for projects in state air quality nonattainment and maintenance areas. The program's goal is "green island" refueling stations for E85 ethanol and B20 biodiesel no more than 100 miles apart along designated corridors (specifically, interstate and state highways, and urban areas where flex-fuel vehicles tend to be concentrated). The program seeks to identify partner retail stations in areas where reasonably accessible and

convenient retail biofuel stations are not in place. A minimum of 20 percent in nonfederal matching funds is required. The program reimburses retail stations for biofuel distribution equipment (e.g., pumps and storage tanks).

E85 Ethanol

Ethanol is a liquid alcohol fuel that can be made by fermenting and distilling starch crops such as corn. In addition, ethanol can be made from “cellulosic biomass” such as trees and grasses. The most prevalent use of fuel ethanol in the United States is as an additive in gasoline in a blend of 10 percent ethanol and 90 percent gasoline called E10 (also called “gasohol”). However, E10 is not considered a biofuel. E85 contains up to 85 percent ethanol blended with unleaded gasoline. E85 can be used in flexible fuel vehicles (FFVs), which are specially designed to run on gasoline, E85, or any mixture of the two. Several vehicle manufacturers produce FFVs. Because of ethanol’s lower energy content, FFVs operating on E85 usually experience a 25–30% drop in miles per gallon, according the U.S. Department of Energy. (See Table 5 on the advantages and disadvantages of E85 compared to regular gasoline.)

**Table 5  
E85 Compared to Regular Gasoline**

<b>Advantages</b>	<b>Disadvantages</b>
<ul style="list-style-type: none"> <li>• Domestically produced, reducing use of imported petroleum</li> <li>• Lower emissions of air pollutants</li> <li>• More resistant to engine knock</li> <li>• Added vehicle cost is very small</li> </ul>	<ul style="list-style-type: none"> <li>• Can only be used in flex-fuel vehicles</li> <li>• Lower energy content, resulting in fewer miles per gallon</li> <li>• Limited availability</li> <li>• Currently expensive to produce</li> </ul>

Source: U.S. Department of Energy.

B20 Biodiesel

Biodiesel is a non-petroleum based diesel made from vegetable oils, animal fats, or recycled restaurant greases. Although biodiesel can be used in its pure form (B100), it is commonly blended with petroleum diesel, resulting in blends including B2 (2 percent biodiesel), B5, and B20, which is a blend of 20 percent biodiesel and 80 percent petroleum diesel. Advantages of biodiesel include that it is safe (non-toxic), biodegradable, and produces less air pollutants than petroleum-based diesel. A disadvantage is that not all vehicle manufacturers cover biodiesel use in their warranties. (See Table 6 on the advantages and disadvantages of biodiesel compared to petroleum diesel.)

**Table 6  
Biodiesel Compared to Petroleum Diesel**

<b>Advantages</b>	<b>Disadvantages</b>
<ul style="list-style-type: none"> <li>• Domestically produced from non-petroleum, renewable resources</li> <li>• Can be used in most diesel engines, especially newer ones</li> <li>• Less air pollutants (other than nitrogen oxides)</li> <li>• Less greenhouse gas emissions (e.g., B20 reduces CO2 by 15%)</li> <li>• Biodegradable</li> <li>• Non-toxic</li> <li>• Safer to handle</li> </ul>	<ul style="list-style-type: none"> <li>• Use of blends above B5 not yet approved by many auto makers</li> <li>• Lower fuel economy and power (10% lower for B100, 2% for B20)</li> <li>• Currently more expensive</li> <li>• B100 generally not suitable for use in low temperatures</li> <li>• Concerns about B100's impact on engine durability</li> <li>• Slight increase in nitrogen oxide emissions possible in some circumstances</li> </ul>

Source: U.S. Department of Energy.

As of May 2012, the Biofuel Green Island Corridor Grant Project had funded biofuel distribution equipment at 25 retail fuel stations, providing E85 in 21 locations and B20 in 15 locations. (See Table 7 and the map on page 43.) These stations reported selling 1,911,662 gallons of E85 and 638,630 gallons of B20 in calendar years 2009 through 2011. (See Table 8.) As of May 2012, there was approximately \$1,297,000 left in the project's fund.

**Table 7  
Biofuel Green Island Corridor Grant Retail Fuel Stations  
May 2012**

<b>East Tennessee Region</b>		
<b>Total Number of Stations</b>	<b>Number of Stations Selling Specific Type of Biofuel</b>	
	<b>E85</b>	<b>B20</b>
7	6	6
<b>Middle Tennessee Region</b>		
<b>Total Number of Stations</b>	<b>Number of Stations Selling Specific Type of Biofuel</b>	
	<b>E85</b>	<b>B20</b>
17	14	8
<b>West Tennessee Region</b>		
<b>Total Number of Stations</b>	<b>Number of Stations Selling Specific Type of Biofuel</b>	
	<b>E85</b>	<b>B20</b>
1	1	1

All Regions		
Total Number of Stations	Number of Stations Selling Specific Type of Biofuel	
	E85	B20
25	21	15

Source: Department of Transportation.

**Table 8  
E85 and B20 Annual Sales  
Biofuel Green Island Corridor Grant Retail Fuel Stations  
Calendar Years 2009 Through 2011**

East Tennessee Region		
Year	Gallons of E85	Gallons of B20
2009	102,426	20,595
2010	186,514	51,769
2011	257,108	52,057
Total	546,048	124,421
Middle Tennessee Region		
Year	Gallons of E85	Gallons of B20
2009	132,829	137,705
2010	285,879	173,878
2011	911,171	181,934
Total	1,329,879	493,517
West Tennessee Region		
Year	Gallons of E85	Gallons of B20
2009	0	14,377
2010	4,515	1,408
2011	31,220	4,907
Total	35,735	20,692
All Regions		
Year	Gallons of E85	Gallons of B20
2009	235,255	172,677
2010	476,908	227,055
2011	1,199,499	238,898
Total	1,911,662	638,630

Source: Department of Transportation.



The January 2008 *State Government Energy Conservation Efforts* performance audit found that the Department of Transportation needed to place greater priority on improving access to E85 pumps statewide. The audit recommended that the Department of Transportation should continue to expand public access to E85 and B20 pumps through the Biofuel Green Island Corridor Grant Project to fully realize the benefits of alternatively fueled vehicles. Department of Transportation management stated for the current audit that the program's goal of "green island" refueling stations for B20 biodiesel and E85 ethanol no more than 100 miles apart along designated corridors (for which there was no time goal) was going to be difficult to reach. Management added that the program got a "zero response" from the Chattanooga area in terms of grant requests from gas stations, and an inadequate response from West Tennessee, despite making "extra points" available for applications from those areas. (See the map on page 43 on the location of retail stations with E85 and B20 pumps and Table 8 on sales figures for E85 and B20 by region.) Management asserted that the program could not force grants on retail fuel stations.

During the grant selection process, the Biofuel Green Island Corridor Grant Project gives highest priority to proposals in counties designated by the program as "target" counties, while also giving added consideration to other priority counties. (See the map on page 43 for the location of these counties.) The program's minimum goal is one E85 and one B20 pump in each priority county and three E85 and three B20 pumps in urban areas (Hamilton, Knox, Davidson, Shelby and the Tri-Cities area). The program gives priority to retail fuel stations in those counties that did not have sufficient E85 and B20 pumps to meet the program's goal of "green island" refueling stations for B20 biodiesel and E85 ethanol no more than 100 miles apart along designated corridors. Biofuel Green Island Corridor Grant Project efforts to make fuel retailers aware of available grants include information through its website and interaction with other state agencies, the Tennessee Fuel and Convenience Store Association, and local Clean Cities coalitions. (These local organizations are part of the U.S. Department of Energy's Clean Cities program, which focuses on a range of efforts at the local level to reduce petroleum consumption.)

We interviewed five fuel retailers, who operated 44 percent of the 25 retail stations participating in the program. These retailers had generally positive opinions about the Green Island Biofuel Grant Project's role in creating the infrastructure needed to provide Tennessee citizens with biofuels, in addition to educating customers on the advantages of these fuels. However, most retailers could not remember or were not aware of any site visits from Department of Transportation staff to verify equipment paid by the program had indeed been installed. Our review of the files of a random sample of seven grants also determined the lack of documentation of such site visits, despite management claims that some visits were made. The department has no formal policies and procedures requiring site visits to grantees to inspect equipment bought using funds from Biofuel Green Island Corridor grants. Our review also revealed that the grant application form had no place for applicants to sign and date.

## **Recommendation**

The Department of Transportation should develop and implement policies and procedures requiring documented site visits by its staff (or by staff of other state agencies involved in regulating retail sales of vehicle fuel, like the Department of Agriculture and the Department of Environment and Conservation). These site visits should verify that equipment purchased by Biofuel Green Island Corridor grants has indeed been purchased and installed by the retail fuel stations mentioned in the grant agreements. The department should revise the application form for these grants to allow for applicants to sign and date the form. In addition, the Department of Transportation should continue to expand public access to E85 and B20 pumps through the Biofuel Green Island Corridor Grant Project to fully realize the benefits of alternatively fueled vehicles.

## **Management's Comment**

We concur with the recommendation that the department should better document its monitoring of grant recipients. As recommended, the department will develop and implement policies and procedures requiring documented site visits by staff to each grant recipient. As has been our practice to ensure that funds are spent appropriately, staff will continue to communicate with the regulatory staff of the Departments of Agriculture and Environment and Conservation and will continue to require documentation of equipment purchases and installations before reimbursing grantees and collect biofuel sales data from grant recipients.

Before the next grant solicitation, the department will revise the grant application form to require that applicants sign and date the forms. Staff will develop and implement policies and procedures for grant monitoring before awards are made from the FY 2013 grant solicitation.

As noted in the Comptroller's draft report, the department has not yet reached its goal of helping to establish publicly accessible biofuel refueling sites no more than 100 miles apart along designated corridors. We believe that providing greater access to domestically produced renewable fuels is important to Tennessee and to the department's efforts to promote cleaner transportation. The department plans to continue encouraging fuel retailers to install E85 ethanol and B20 biodiesel fuel storage and dispensing equipment through this grant program.

In regards to the table of biodiesel advantages and disadvantages in the draft report, we would like to note that some of the disadvantages in the table apply to the use of B100, which is used for blend stock and is not available for sale at retail fuel stations in the state. Tennessee fuel quality regulations limit the retail sale of biodiesel blends to a maximum of 20 percent biodiesel (B20), which can be used in most diesel engines. Both state regulations and national fuel quality standards for retail biodiesel blends include low temperature operating requirements for cold weather conditions. The U.S. Department of Energy's Alternative Fuels Data Center cites several advantages of biodiesel blends, such as improving the lubrication qualities of diesel fuel to help keep moving engine parts from wearing prematurely and improving fuel ignition.

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**DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

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**FINDING AND RECOMMENDATION**

- 10. The Department of Environment and Conservation should establish and implement adequate, formal policies and procedures for energy grant recipient monitoring, including standardized reporting requirements for grant recipients**

**Finding**

We reviewed two Department of Environment and Conservation renewable energy grant programs, focusing on grantee selection and monitoring: the Alternative Fuel Innovations Grant Program and the Clean Tennessee Energy Grant program. In 2006, the General Assembly approved \$4 million in state funding for alternative fuel initiatives, of which Governor Phil Bredesen set aside \$1 million to fund the Alternative Fuel Innovations Grant Program, designed to encourage local governments and public universities to assess opportunities to increase use of biofuels and to create new projects taking advantage of these opportunities. In July 2007, the department selected 14 grant recipients, representing a total of more than \$881,000 in funding. This grant program is no longer active.

In January 2012, the Department of Environment and Conservation announced that it was using funding from an April 2011 Clean Air Act settlement with the Tennessee Valley Authority to create the Clean Tennessee Energy Grant Program, with a total of \$26.4 million to be received over five years from the settlement. With approximately \$5.25 million being received each year, the department will use the money to fund clean air programs in Tennessee. Such programs can involve three project categories: cleaner alternative energy, energy conservation, and air quality improvement. (See Table 9 for specific examples in each area.) State agencies, local governments, municipalities, utilities, private businesses and non-profit organizations are eligible to participate in the grant. For the program's first year, the department selected 17 grantees in June 2012.

**Table 9  
Examples of Clean Air Programs  
Clean Tennessee Energy Grant Program**

<b>Project Categories</b>	<b>Examples</b>
Cleaner alternative energy	Biomass, geothermal, solar, wind
Energy conservation	Lighting, HVAC improvements, improved fuel efficiency, insulation, idling minimization
Air quality improvement	Reduction in greenhouse gases, sulfur dioxide, volatile organic compounds, oxides of nitrogen, hazardous air pollutants

Source: Department of Environment and Conservation.

Alternative Fuel Innovations Grant Program

The Alternative Fuel Innovations Grant Program used a scoring system to select grant recipients from its applicant pool. (See Table 10 for scoring criteria.) Applicants had to provide at least 20 percent matching funds. Payments to recipients were on a reimbursement basis.

**Table 10**  
**Scoring Criteria**  
**Alternative Fuel Innovations Grant Program**

<b>Scoring Criteria</b>	<b>Description</b>
Expected benefits to public health (20 points)	The grant application should describe how public health would be benefited by the proposed project.
Expected environmental benefits (20 points)	The grant application should describe how the environment would be benefited by the proposed project (e.g., reduction in ozone or fuel consumption to reduce vehicle emissions).
Viability for long-term program success (20 points)	Projects that have the greatest potential for long-term success will be given priority.
Expected benefits to at-risk communities (10 points)	The grant application should describe the proposed project’s public and environmental benefits for non-attainment (e.g., in regard to acceptable levels of ozone or particulate matter) areas of Tennessee.
Level of commitment to the project (10 points)	Projects should be undertaken by experienced and committed staff who can ensure that multiple levels of the organization support the project.
Commitment to communicate alternative fuel benefits to the public (10 points)	Grant applications should describe how alternative fuel use and its benefits will be imparted to the public.
Transferability and scalability of projects (10 points)	Projects that demonstrate transferability and that can be expanded so that other levels of government and/or the private sector might undertake similar projects will receive priority.

Source: Department of Environment and Conservation.

We reviewed the scoring documentation for all 14 successful applicants and tried to obtain documentation of monitoring visits for a random sample of 5 of these applicants. Department officials stated that such visits had been performed to confirm that funds were spent according to each recipient’s contract but could not provide such documentation. Department officials said that monitoring requirements in recipients’ contracts acted as the program’s policies and procedures for site visits. Specifically, the contracts state

The Grantee’s activities conducted and records maintained pursuant to this Grant shall be subject to monitoring and evaluation by the State, the Comptroller of the Treasury, or their duly appointed representatives.

Grant contracts also required recipients to report on progress of programs funded by the grants, but reporting requirements were vague and stated that: the recipient “shall submit brief, periodic, progress reports to the State as requested.” Our review found that reports from grant recipients were not standardized in detail and format, lacked dates, and did not clearly refer to specific contract requirements.

Clean Tennessee Energy Grant Program

Like the Alternative Fuel Innovations Grant Program, the Clean Tennessee Energy Grant Program uses a scoring system to select grant recipients from its applicant pool. (See Table 11 for scoring criteria.) Applicants must specify their match percentage as one of the following: 50 percent grant/50 percent match, 60 percent grant/40 percent match, or 80 percent grant/20 percent match. Payments to recipients for this grant program are also on a reimbursement basis.

**Table 11**  
**Scoring Criteria**  
**Clean Tennessee Energy Grant Program**

Scoring Criteria	Description
Energy efficiency (25 points)	<ul style="list-style-type: none"> <li>• Measurable</li> <li>• Savings (both energy and monetary)</li> </ul>
Air quality (30 points)	<ul style="list-style-type: none"> <li>• Overall emission reduction</li> <li>• Non-attainment area targeted</li> <li>• Sensitive populations targeted</li> </ul>
General public benefit (15 points)	<ul style="list-style-type: none"> <li>• Immediate results and project readiness</li> <li>• Long-term savings (energy &amp; costs)</li> </ul>
Protection of environment resources (15 points)	<ul style="list-style-type: none"> <li>• Utilizing existing resources (e.g., landfill conversion to methane use)</li> <li>• Conservation</li> <li>• Reduction in carbon intensity</li> </ul>
Creative / new technology (15 points)	<ul style="list-style-type: none"> <li>• Unique and emerging technology</li> <li>• Model for future projects</li> <li>• Renewable resources</li> </ul>

Source: Department of Environment and Conservation.

The Department of Environment and Conservation has yet to develop monitoring procedures for the Clean Tennessee Energy Grant Program, including site visits, to determine grant recipient compliance with program contract requirements. The department has also not developed the “annual report template” mentioned in the program’s *Application Manual* for the annual report “of energy conservation for five years following the project completion.”

## **Recommendation**

The Department of Environment and Conservation should establish and implement adequate formal policies and procedures for monitoring the Clean Tennessee Energy Grant program and any other energy grant recipients, including regular, documented site visits and standardized reporting requirements for grant recipients. These reporting requirements should involve specific time periods during and immediately after implementation of activities funded by the energy grants.

## **Management's Comment**

We concur. The Department of Environment and Conservation has created the annual report template for selected recipients use. This was provided to the recipients with their executed contract. The Department of Environment and Conservation provided the grant recipient with appropriate forms as well as what dates these forms are due to our department. One recipient has completed their project and department representatives visited the site and confirmed that all aspects of the project were met. This will be standard as other projects are completed. The department will also do routine visits with the recipients throughout the grant period. These recommendations have already commenced and are currently being done.

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## **UNIVERSITY OF TENNESSEE**

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### **OBSERVATION AND COMMENT**

#### **Status of Pilot Biorefinery Efforts to Use Switchgrass to Produce Ethanol**

In 2007, the University of Tennessee launched the University of Tennessee Biofuels Initiative to advance a commercial biomass energy industry in Tennessee, supported by Governor Phil Bredesen. (Biomass is any biological matter from living organisms.) The fiscal year 2008 state budget provided \$40.7 million to fund “a research-focused cellulose biorefinery.” According to the budget, the facility

will be part of an initiative that will help establish a new industry sector across the state that creates jobs, generates increased state and local tax revenues, and provides farmers with a new production crop. This facility is part of a comprehensive plan for Tennessee’s alternative fuel strategy, which includes research funding to increase switchgrass production, achieve efficiencies in cellulosic ethanol production, and to find other non-biomass alternative fuel sources. In addition, agricultural incentives will help Tennessee farmers tap into

the new farm-based fuels market and produce switchgrass in the quantities required to supply the pilot ethanol facility.

The initiative has four main objectives

- to demonstrate the establishment of a dedicated biomass energy crop supply chain with Tennessee farmers to supply a cellulosic biorefinery;
- to demonstrate the pre-commercial production of ethanol from Tennessee-grown switchgrass and other biomass feedstocks;
- to establish in Tennessee premier long-term research and development capability in bioenergy and bioproducts; and
- to develop a viable, sustainable, long-term path to commercialization of cellulosic biofuels and energy crops in Tennessee.

In 2008, Genera Energy LLC, a private, for-profit limited liability company created by the University of Tennessee Research Foundation, agreed with DuPont Danisco Cellulosic Ethanol to build and operate pilot plant demonstration cellulosic ethanol biorefinery facilities in Tennessee. (Genera Energy LLC, as part of its efforts to commercialize its structure, was in the process of changing its name to TennEra LLC during audit fieldwork in May 2012; however, the name Genera Energy will be used below as that was the company's name during our fieldwork.) Groundbreaking for the biorefinery, located in Vonore, occurred in October 2008, and the plant produced its first ethanol in December 2009. The Biomass Innovation Park, a 22-acre research campus opened in January 2012 located next to the refinery, is used by Genera Energy for converting biomass crops, like switchgrass, into a usable biorefinery feedstock.

### Cellulosic Ethanol

Cellulosic ethanol is ethanol, an alcohol-based fuel, made from cellulosic sources, specifically fibrous parts of plants, including leaves and stems. (Cellulose and hemicellulose are polymers made of sugars and major components of plant cell walls.) A major advantage of plants, like switchgrass, used as biofuel sources is that they can grow on marginal land less suitable for food crops, thus reducing the likelihood of a food versus fuel competition for land. In addition, switchgrass is a perennial plant (it does not have to be planted every year) and is noninvasive (it can easily be removed, if necessary). Compared to corn, which is commonly used in the U.S. to create ethanol from starch, switchgrass also contains more energy while needing much less fertilizer (a tenth that of corn).

The conversion of biomass, like switchgrass, at the biorefinery takes several steps that include the following:

- steam and pressure separate shredded biomass into cellulose, hemicellulose, and lignin;

- enzymes break down cellulose and hemicellulose into sugars (lignin is removed for other products);
- yeast turns the sugars to alcohol; and
- distillation removes water, increasing the alcohol's potency as fuel.

Lignin, which is a tough, glue-like substance that provides structure to plants, is a major barrier to making fuel from cellulosic sources, like grasses. Lignin, which cannot be fermented into alcohol, has to be separated from cellulose and hemicellulose during the refining process. (However, lignin can be burned to produce energy.) As of May 2012, the biorefinery was using corn stover (corn stalks, stems, leaves, and cobs) to make ethanol as it transitioned to switchgrass.

### Genera Energy and DuPont Danisco Cellulosic Ethanol

Genera Energy contributed \$36.7 million to building the demonstration biorefinery while Dupont Danisco Cellulosic Ethanol (DDCE) provided \$22 million. DDCE is responsible for all of the operating costs of the plant, in addition to any retrofits. Genera Energy owns 100 percent of the biorefinery, which DDCE leases. DDCE's ten-year lease started in January 2010, with the opportunity for extension.

Genera Energy owns all intellectual property pertaining to the conversion of biomass to ethanol up to where the biomass entered the biorefinery's property. This intellectual property includes processes involving field operations, located on farms Genera Energy contracts with to provide biomass (i.e., switchgrass), in addition to processes relating to operations at the Biomass Innovation Park, such as harvesting, storage, transportation, and preprocessing of biomass. DDCE owns all intellectual property involved with biorefinery operations.

The Associate Director of Oak Ridge National Laboratory's BioEnergy Science Center stated that the current "technology package" used by the biorefinery is a "good, solid one" and that the stakeholders had made "a good effort to assess technologies" for the plant. (The center has an indirect, consultative role with Genera Energy and DDCE.) The Associate Director mentioned that the requirements of the federal Renewable Fuel Standard helped Genera Energy's and DDCE's efforts to produce cellulosic ethanol. Under the federal Energy Independence and Security Act of 2007, the Renewable Fuel Standard requires the volume of renewable fuel in the U.S. to reach 36 billion gallons by 2022. The Associate Director also stated that it only costs an additional \$500 to manufacture a flex-fuel vehicle, which uses E85 (a blend of 85 percent ethanol and 15 percent regular gasoline) in addition to regular gasoline. (See Finding 9 for a discussion of E85's advantages and disadvantages.)

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## REVIEW OF PLANS FOR REDUCING THE USE OF PETROLEUM PRODUCTS

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Section 4-22-101, *Tennessee Code Annotated*, requires all state agencies, universities, and community colleges that have state-owned motor vehicle fleets consisting of ten or more motor vehicles to develop and implement plans to increase the state's use of alternative fuels, synthetic lubricants, and fuel-efficient or low-emission vehicles. Agencies were to submit an analysis of plan implementation by September 1, 2008, and annually thereafter, to the Comptroller of the Treasury. Under Section 4-22-103, the Comptroller is to forward a report analyzing plan implementation to the Environment, Conservation, and Tourism Committee of the Senate; the Conservation and Environment Committee of the House of Representatives; and the Government Operations Committees of the Senate and House of Representatives by November 1, 2008, and annually thereafter.

### *Statutory Requirements*

State law requires that each entity's plan have a goal of reducing or displacing at least 20 percent of current petroleum products consumed by each entity's motor vehicle fleet by January 1, 2010. If the entity has vehicles that have been modified for or used for educational purposes, emergency services, or public safety, the goal of reducing or displacing current petroleum products for these vehicles is at least 10 percent. All entities were to initiate plan implementation by January 1, 2008. The law specifies that reductions could be made in following ways:

- through the use of biodiesel, ethanol, synthetic oils or lubricants, or other alternative fuels;
- through the use of hybrid electric vehicles or other fuel-efficient or low-emission vehicles; or
- through additional methods that reduce harmful emissions as may be approved by the Department of General Services.

### *Despite Efforts to Reach Their Petroleum Reduction Goal, Many Entities Did Not Achieve This Goal*

The 2011 reports were submitted to the Comptroller of the Treasury by each of the state agencies subject to the law: The Department of General Services, Department of Transportation, Board of Regents colleges and universities, and the University of Tennessee system. The 2012 reports were submitted by the Department of General Service and the Department of Transportation. The University of Tennessee Transportation Services Department also submitted a 2012 report even though statute was changed in 2012 to exclude the universities from submitting the report. The auditors reviewed the plans to determine if the measures outlined in the reports were consistent with the goal of the statute and if the agencies had reported they had

met the statutory goal. Our review of these reports found that only two community colleges, Chattanooga State and Volunteer State, reportedly met the overall 20 percent reduction goal by January 2010. Department of General Services reported it met the 10 percent reduction goal for law enforcement and specialty use vehicles' traditional fuel usage and the 20 percent goal for oil used for maintenance purposes, but did not meet the reduction goal for traditional fuel usage for general vehicles. Many of the 2011 reports did not provide data on the entity's petroleum products reduction, but a review of the previous reports (2010) indicated that Cleveland State Community College and East Tennessee State University also met the 20 percent overall reduction goal while Walters State Community College achieved the goal for law enforcement and specialty use vehicles by January 2010.

Even though many of the entities did not meet the petroleum reduction goal, many reported continued efforts to reduce the use of petroleum, as summarized below.

#### *Department of General Services*

The Department of General Services, on July 31, 2011 and August 31, 2012, reported the strategies it has implemented to reduce petroleum usage:

- A new fuel card is available to expand access to E85 ethanol and B20 biodiesel fuel. (E85 is a gasoline blend containing up to 85% ethanol. B20 is a biodiesel blend containing 20% biodiesel and 80% petroleum diesel.)
- E85 ethanol and B20 biodiesel fuel were added to the statewide contract for bulk fuels effective February 1, 2009.
- The department purchases only flex-fuel, hybrid, or compact energy-efficient vehicles if available in a vehicle class. In the 2011 report the department reported it purchased 351 flex-fuel and 30 hybrid vehicles. In the 2012 report, the department reported it purchased 343 flex-fuel and 31 hybrid vehicles.
- The Purchasing Division's procurement process for future vehicles will include specifications for energy efficiency.
- Effective January 1, 2008, all vehicles are using synthetic-blend oil. Oil changes increased from 5,000 miles or every six months to 7,500 miles or every six months for regular vehicles and from 3,000 miles to 5,000 miles for police pursuit vehicles.
- The department developed guidelines for all agencies and departments to reduce engine idle time.
- Customers are assigned to the most fuel-efficient vehicle based on the specific needs of the customer (number of passengers, required cargo space, travel distance, etc.).

### *Department of Transportation*

The Department of Transportation (TDOT) submitted its 2011 report on September 1, 2011 and its 2012 report on September 12, 2012, and outlined the following strategies to reduce petroleum reduction:

- To help provide biofuels for state vehicles, the department has converted or installed infrastructure for E85 ethanol and B20 biodiesel storage in all regional TDOT facilities (Knoxville, Chattanooga, Nashville, and Jackson) and in Crossville. B20 biodiesel is also available at three district garages. The department plans to convert fuel storage and dispensing facilities for E85 and possibly B20 at two additional districts during the 2011-2012 fiscal year. In the 2012 report, the department did not indicate that this conversion took place.
- All other TDOT gasoline facilities except one have been converted to handle ethanol blends up to 10 percent ethanol and 90 percent unleaded gasoline (i.e., E10), which can be used in all gasoline-powered vehicles.
- The department provides access to biofuels for state vehicles and the public through the Biofuel Green Island Corridor Grant Program (see Finding 9). This program offers grant funding to encourage retail refueling stations to sell E85 and B20.
- The department established the Green Fleet Program in March 2010 to encourage all TDOT employees to use biofuels whenever possible. Aggressive biofuel use goals have been set for each TDOT work unit based on the availability of fueling locations across the state and the number of vehicles in each unit capable of using either E85 or B20.
- TDOT has undertaken a joint initiative with the Department of General Services to use synthetic blend motor oils and lubricants for gasoline-powered vehicles. TDOT requires that motor oils and lubricants used in gasoline vehicles contain at least 10 percent synthetic content.
- Whenever possible, TDOT purchases flex-fuel and hybrid-electric vehicles. The department reported in the 2011 report that approximately 77 percent of the department's light-duty fleet consists of flex-fuel vehicles and two percent of hybrid-electric vehicles. In the 2012 report, the department reported the percentage of flex-fuel and hybrid-electric vehicles in its fleet reached 99 percent.

### *University of Tennessee System*

The University of Tennessee Transportation Service Department is responsible for the procurement, operation, and disposal of motor vehicles for the University of Tennessee University-wide Administration, UT Chattanooga, UT Knoxville, UT Institute of Agriculture in Knoxville, UT Institute for Public Service in Knoxville, and UT Space Institute in Tullahoma. UT Martin and UT Health Sciences Center in Memphis are responsible for their own vehicles.

University of Tennessee Transportation Services, which submitted its 2011 report on October 14, 2011 and its 2012 report on September 18, 2012 has implemented the following strategies to reduce petroleum usage:

- Current plans are to increase the proportion of flex-fuel vehicles in the fleet to 43.6 percent in 2013 by purchasing 51 flex-fuel vehicles. Currently, 41.2 percent of its fleet are flex-fuel, electric, or hybrid vehicles.
- The department plans to make faculty and staff aware of the need to reduce the use of gasoline products and to purchase E85 when possible. Reductions in petroleum usage have been minimal even with more flex-fuel vehicles in the fleet due to the lack of availability of E85 fuel.
- In April 2010, an E85 fuel tank was installed in Knoxville. In fiscal year 2011, 36,865 gallons of E85 were used and 76,251 gallons have been used in fiscal year 2012.
- The department continues to incorporate campus transportation initiatives that reduce on-campus transportation needs. It plans to provide campus and institute business officers with annual vehicle use reports for campus-assigned vehicles to determine if the number of fleet vehicles can be reduced. A reduction in vehicles and use of alternative transportation options will reduce the use of petroleum products.

The University of Tennessee Health Science Center did not submit a 2011 report but sent an e-mail on September 30, 2011 listing the following strategies:

- Purchase five all-electric vehicles to replace golf carts and reduce use of light duty trucks by the maintenance and information technology departments.
- As the budget permits, the university will purchase hybrid and electric vehicles as replacements.
- Encourage university employees to use E85 ethanol fueling stations and ethanol additive pumps when available.

The University of Tennessee Martin also did not submit a 2011 report but sent an e-mail on September 12, 2011, stating that its current plan is similar to its 2010 plan. The university continues to purchase flex-fuel vehicles although the e-mail noted there were not stations offering E85 ethanol within 90 miles of the campus. UT-Martin is also adding golf carts for use on campus to reduce the use of fuel.

#### *Tennessee Board of Regents System*

The Central Office of the Tennessee Board of Regents (TBR) and colleges that are required to submit the fuel reduction reports submitted 2011 reports on September 1, 2011,

except for University of Memphis, which submitted its report on September 27, 2011. These 14 institutions and the Central Office have continued to implement the following actions:

- Replace vehicles with vehicles that use E85 ethanol or B20 biodiesel, hybrid vehicles, or electric vehicles.
- Use synthetic blend oil when changing oil of vehicles in its fleet.
- Encourage employees to use E85 when possible or where available.

### ***Recommendations for the General Assembly's Consideration***

Because the statutory goal date, January 1, 2010, for the reduction of petroleum use has passed, the General Assembly may wish to reevaluate certain aspects of this law or delete the law in its entirety.

One approach for the General Assembly is to update the goal date to a later date to allow the entities additional time to meet the petroleum reduction goals. In addition to updating the goal date, the General Assembly may want to consider whether the reduction goals are appropriate given the multiple factors that affect the achievement of this goal. As previously discussed, these factors include the availability of E85 ethanol and B20 biodiesel, the availability of funds to purchase energy-efficient vehicles, and encouraging employees to purchase biofuels when using state vehicles.

The General Assembly may also want to consider deleting the law entirely. During the 2012 legislative session, the effectiveness of the law was possibly diminished because the law was changed to exclude universities and community colleges from reporting their efforts to meet the petroleum reduction goals to the Comptroller of the Treasury. Since the majority of the entities to which the law applies are universities and community colleges, the Comptroller's analysis of petroleum reduction efforts and data would be limited only to the Department of General Services and the Department of Transportation, representing only a portion of the major users of petroleum products in state government.

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## RECOMMENDATIONS

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### LEGISLATIVE

This performance audit identified areas in which the General Assembly may wish to consider statutory changes to improve the efficiency and effectiveness of state agency operations.

1. The General Assembly should consider whether centralization of energy conservation activities is needed.
2. The General Assembly may want to revise the statutory language in Sections 13-19-101 and 4-3-734, *Tennessee Code Annotated*, in order to eliminate potential confusion about which published energy standard is the state's minimum building energy standard. The General Assembly also may wish to revise these statutes and Section 4-3-710(4), *Tennessee Code Annotated*, to reflect how building energy standards are currently established and enforced in the state.
3. Because the statutory goal date, January 1, 2010, for the reduction of petroleum use has passed, the General Assembly may wish to reevaluate certain aspects of this law or delete the law in its entirety. One approach for the General Assembly is to update the goal date to a later date to allow the entities additional time to meet the petroleum reduction goals. In addition to updating the goal date, the General Assembly may want to consider whether the reduction goals are appropriate given the multiple factors that affect the achievement of this goal. As previously discussed, these factors include the availability of E85 ethanol and B20 biodiesel, the availability of funds to purchase energy-efficient vehicles, and encouraging employees to purchase biofuels when using state vehicles.

The General Assembly may also want to consider deleting the law entirely. During the 2012 legislative session, the effectiveness of the law was possibly diminished because the law was changed to exclude universities and community colleges from reporting their efforts to meet the petroleum reduction goals to the Comptroller of the Treasury. Since the majority of the entities to which the law applies are universities and community colleges, the Comptroller's analysis of petroleum reduction efforts and data would be limited only to the Department of General Services and the Department of Transportation, representing only a portion of the major users of petroleum products in state government.

### ADMINISTRATIVE

1. For future energy conservation programs funded through loan or grant programs, the Energy Division needs to develop formal, written policies and procedures to ensure consistency and thoroughness in monitoring activities. Also, when such monitoring

policies are in place, management should ensure that program personnel comply with those policies.

2. For future state-funded energy loan or grant programs, the Energy Division should create a system to collect and review actual energy savings data in order to accurately determine the effectiveness of the programs.
3. If the Energy Division provides incentive payments to biodiesel manufacturers in the future, adequate and verifiable information should be obtained to ensure that any incentive payments follow the purpose of the Tennessee Biodiesel Manufacturer's Incentive Fund and that the amount of biodiesel used for incentive payments is accurate. Any information obtained regarding the amount of biodiesel produced should be corroborated, and any discrepancies should be reconciled. Any supporting documentation should be maintained by the Energy Division.
4. The General Assembly may want to revise the statutory language in Sections 13-19-101 and 4-3-734, *Tennessee Code Annotated*, in order to eliminate potential confusion about which published energy standard is the state's minimum building energy standard. The General Assembly also may wish to revise these statutes and Section 4-3-710(4), *Tennessee Code Annotated*, to reflect how building energy standards are currently established and enforced in the state.
5. The Department of General Services' State of Tennessee Real Estate Asset Management Division (STREAM) should develop and implement "a formalized monitoring and analyzing schedule for utility data from state buildings, including both costs and usage," as required by Section 4-3-1012, *Tennessee Code Annotated*. The monitoring system should include not only state-owned buildings but those buildings which are leased by the state. Such a system should take into consideration energy purchase and consumption data from the state's institutions of higher education, whose participation in state building energy management is required by Section 4-3-1017, *Tennessee Code Annotated*.
6. STREAM should also develop and implement, in conjunction with the utility monitoring system, "specific yearly conservation/energy management goals for state-owned facilities in coordination with the state architect's office and the state building commission," as required by Section 4-3-1012, *Tennessee Code Annotated*.
7. The Department of General Services' State of Tennessee Real Estate Asset Management (STREAM) Division should develop and implement a program to inform state agencies about their obligations in maximizing the efficient use of energy in state buildings under Sections 4-3-1017, 4-3-1018, and 4-3-1019, *Tennessee Code Annotated*. STREAM should also develop and implement a program of coordination among state agencies, including the use of agency liaisons, in the area of energy savings as required by these statutes. To facilitate this coordination, STREAM should consider using modern communications technology (e.g., e-mail "blasts") to facilitate this coordination in order to reduce time-consuming and costly face-to-face meetings. However, such technology should not preclude active participation of individuals appointed as liaisons by state

agencies, including face-to-face meetings to discuss well-developed, energy-savings proposals.

8. The Department of General Services, in cooperation with the State Procurement Commission, should develop and adopt rules and regulations that satisfy the requirements of Sections 12-3-605 and 12-3-606, *Tennessee Code Annotated*, concerning energy efficiency standards and life-cycle costs. In addition, the department should ensure that all major energy-consuming products purchased by the state meet Energy Star specifications regarding energy efficiency and life-cycle costs.
9. The State Building Commission, the Department of General Services' State of Tennessee Real Estate Asset Management (STREAM) Division, the Tennessee Board of Regents, and the University of Tennessee should ensure that mandatory review of renewable energy options by means of life-cycle cost analysis, as required by Section 4-3-1012, *Tennessee Code Annotated*, is performed for all designs of future state buildings. As part of this process, the State Building Commission should incorporate this mandatory review in the *Sustainable Design Guidelines'* Energy Efficiency and Atmosphere Protection section. The review should first determine possible viable renewable energy options (e.g., based on the building location and available technologies) and then perform life-cycle cost analyses to determine if these options should be incorporated in a building's design.
10. The Department of Transportation should develop and implement policies and procedures requiring documented site visits by its staff (or by staff of other state agencies involved in regulating retail sales of vehicle fuel, like the Department of Agriculture and the Department of Environment and Conservation). These site visits should verify that equipment purchased by Biofuel Green Island Corridor grants has indeed been purchased and installed by the retail fuel stations mentioned in the grant agreements. The department should revise the application form for these grants to allow for applicants to sign and date the form. In addition, the Department of Transportation should continue to expand public access to E85 and B20 pumps through the Biofuel Green Island Corridor Grant Project to fully realize the benefits of alternatively fueled vehicles.
11. The Department of Environment and Conservation should establish and implement adequate formal policies and procedures for monitoring the Clean Tennessee Energy Grant program and any other energy grant recipients, including regular, documented site visits and standardized reporting requirements for grant recipients. These reporting requirements should involve specific time periods during and immediately after implementation of activities funded by the energy grants.