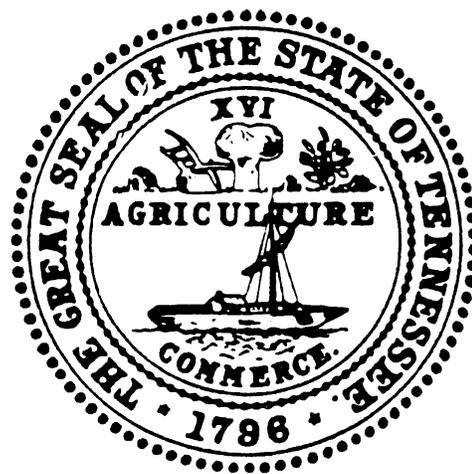


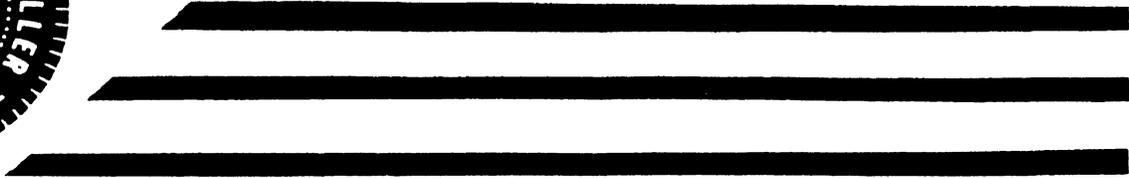
AUDIT REPORT

State Government Energy Conservation Efforts
January 2008



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COMPTROLLER OF THE TREASURY

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John G. Morgan
Comptroller

January 8, 2008

The Honorable Ron Ramsey
Speaker of the Senate
The Honorable Jimmy Naifeh
Speaker of the House of Representatives
The Honorable Thelma M. Harper, Chair
Senate Committee on Government Operations
The Honorable Mike Kernell, Chair
House Committee on Government Operations
The Honorable Frank Buck, Chair
House Conservation, Environment, and Tourism Committee
The Honorable Tommy Kilby, Chair
Senate Conservation, Environment, and Tourism Committee
and
Members of the General Assembly
State Capitol
Nashville, Tennessee 37243

Ladies and Gentlemen:

Transmitted herewith is the performance audit on State Government Energy Conservation Efforts. This audit was conducted pursuant to the requirements of Section 8-4-103, *Tennessee Code Annotated*.

Sincerely,

John G. Morgan
Comptroller of the Treasury

JGM/dww
07/110

State of Tennessee

Audit Highlights

Comptroller of the Treasury

Division of State Audit

Performance Audit
State Government Energy Conservation Efforts
January 2008

AUDIT OBJECTIVES

The objectives of the audit were to describe the history, context, and importance of state energy usage conservation in Tennessee and to determine the following: whether the Department of General Services and Department of Transportation manage their motor vehicle fleet in a manner that is consistent with energy efficiency statutes, policies, and best practices; whether the Department of General Services and Department of Transportation currently maximize alternative fuel usage in their motor vehicle fleets to the extent possible; whether the Department of General Services and Department of Finance and Administration appropriately collect, monitor, and analyze facility utility data to improve state facility energy efficiency; whether the Tennessee state agencies listed in Public Acts of 2007, Chapter 401, comply with or enforce their state energy usage conservation statutory mandates; and whether key, recent internal state energy conservation recommendations have been implemented.

FINDINGS

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

While the state has adopted a modified form of performance contracting to develop energy projects, it has not established a formal written description of the process to guide

agencies. While developing such formal written guidance, the state may want to require that the cost of post-project energy savings measurement and verification be built into the upfront project costs. Because savings measurement and verification contracts are currently funded by the individual agencies, not the Department of Finance and Administration, there has been some difficulty in securing these contracts. This could result in situations where the agencies cannot actually measure energy conservation efforts (page 20).

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

Although state law gives the responsibility of monitoring utility data to the Department of Finance and Administration, both the Department of Finance and Administration and the Department of General Services collect utility data and perform varying degrees of analysis. However, neither department has an adequate system for formally and regularly monitoring and controlling costs and measuring energy use. The departments need to work together to avoid duplicating work and ensure both cost and energy units are analyzed (page 23).

The State Building Commission Should Review Current Payback Period Practices and Develop Written Guidelines for Agencies to Follow When Seeking Project Approval

The State Building Commission does not have any written guidelines and/or policies concerning what criteria are used relative to the maximum amount of time it should take for an energy project to recover its up-front costs through its resulting savings, known as the payback period. However, the State Architect stated that the commission typically looks for a payback of five to eight years, with some exceptions. If the State Building Commission is only typically approving projects with a payback of five to eight years, there is a possibility that other deserving projects, which have longer payback periods and would improve energy efficiency, are being denied or not even considered (page 26).

The Department of Transportation Should Place More Priority on Improving Access to E85 Pumps Statewide

Although the state has invested significantly in alternative-fuel-compatible vehicles, state employees may not always be using alternative fuel (ethanol and biodiesel) in

those vehicles because there are relatively few alternative fueling locations in Tennessee. The state has taken measures through the Green Island Corridor Project to increase overall alternative fuel availability. However, because of the makeup of its flexible-fuel vehicle fleet, the state should specifically focus on improving access to E85 pumps statewide (page 29).

Weaknesses Exist in the Department of General Services' Compliance with State Laws Regarding Life Cycle Costs and Energy Efficiency Standards

Although the Department of General Services has taken steps to encourage the purchase of energy efficient products, the department has not established formal, statutorily mandated rules specifically requiring life cycle costs to be considered in the purchase of major energy-consuming projects. Similarly, while the department uses some life cycle cost information when developing motor vehicle purchase contracts, it does not use this information to the extent required by statute (page 38).

The General Assembly Should Consider Clarifying Several State Energy Statutes

The Departments of Economic and Community Development, General Services, and Finance and Administration's state energy statutes could be improved to clarify the General Assembly's intent, promote accountability, and fix problems created by prior statutory changes (page 42).

The Department of Finance and Administration Should Take Steps to Adhere to Other Statutory Energy Mandates

The state's energy efficiency code does not include a statutorily mandated review of renewable options by means of life-cycle cost analysis for future state buildings. As a result, the state may be missing potential energy savings. Also, the department has disseminated its annual report to some, but not all, statutorily mandated recipients (page 48).

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

Energy building codes have been adopted for private and public buildings as a part of *Tennessee Code Annotated*. However, current statutory language limits the state to implementing a specific, outdated model energy code for both private and public buildings. As a result, the General Assembly should consider revising *Tennessee Code Annotated* to allow the state to enforce adoption of updated energy building codes on an ongoing basis (page 50).

The Department of Economic and Community Development Has Failed to Prepare Statutorily Required Energy Impact Assessments

The department is statutorily required to submit an energy impact assessment on bills and resolutions which have a “significant” impact on specific energy topics. In order to

assist the department in meeting this statutory responsibility, the General Assembly may wish to consider clarifying the type and depth of information it expects the department to provide, as well as providing additional guidance on which bills and resolutions require an energy impact assessment (page 52).

General Services and the Board of Standards Do Not Comply With Statutes Regarding Energy Efficiency Standards

The Department of General Services is statutorily required to determine which products the state can procure according to energy efficiency standards. In turn, the Board of Standards is statutorily required to adopt such energy efficiency standards for major energy-consuming products. However, neither has occurred. As a result, the state may have missed opportunities to optimize its purchase and use of energy efficient products (page 53).

OBSERVATIONS AND COMMENTS

The audit also discusses the following issues: the Department of General Services’ compliance with Section 4-3-1109, *Tennessee Code Annotated*; and whether the Department of Environment and Conservation addressed energy efficiency recommendations made by a private consulting firm regarding Fall Creek Falls State Park kitchen facilities (page 15).

ISSUES FOR LEGISLATIVE CONSIDERATION

The General Assembly may wish to consider the following:

- Clarifying the type and depth of information it expects the Department of Economic and Community Development to provide in the Energy Impact Assessments mandated by Section 3-2-110, *Tennessee Code Annotated*.
- Providing additional guidance regarding which energy related bills, resolutions, and proposed rules it expects the Department of Economic and Community Development to assess under Section 3-2-110, *Tennessee Code Annotated*.

- Mandating the Department of General Services to create a dedicated energy management office and, if created, determining its relationship to the existing State Building Energy Management Program in the Department of Finance and Administration.
- Clarifying whether the Department of General Services or the Department of Finance and Administration is responsible for annual reporting about state energy efficiency activities to the General Assembly under Sections 4-3-1105(24) and 4-3-1012, *Tennessee Code Annotated*, including whether both agencies' activities should be reported.
- Updating Section 4-3-1105(17), *Tennessee Code Annotated*, (as addressed in Section 4-3-1012, *Tennessee Code Annotated*) to reflect that the Department of General Services currently supervises provision of utilities to state owned facilities, which is consistent with its overall functions. However, both the Department of General Services and Department of Finance and Administration should be jointly responsible for implementing a system for monitoring and controlling the cost and energy efficient use of such utilities.
- Resolving confusion between Sections 4-3-1105(19) and 4-3-1016(b), *Tennessee Code Annotated*. For example, the General Assembly could statutorily clarify which statutes it expects the Department of Finance and Administration's program to implement in the absence of an executive order authorized by *Section 4-3-1017(b)* mandating agencies to participate in the program. Similarly, the General Assembly could amend *Section 4-3-1017(b)* to clarify that some or all state agencies should cooperate with the State Building Energy Management Program absent an executive order expanding the program.
- Identifying and resolving statutory conflicts which developed as a result of 1999 statutory changes. For example, Sections 12-3-603(5) and 4-3-1104(3), *Tennessee Code Annotated*, refer to the office of energy management as being housed within the Department of General Services. However, Acts 1999, Chapter 457, Section 7, transferred the office to the Department of Finance and Administration.
- Revising Section 13-19-101 of *Tennessee Code Annotated* so that the state can enforce adoption of the most recent building energy codes released by standard-setting organizations such as the American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE).

Performance Audit

State Government Energy Conservation Efforts

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Performance Audit State Government Energy Conservation Efforts

INTRODUCTION

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, 2008, the Comptroller of the Treasury 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 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 shall report findings and recommendations.

OBJECTIVES OF THE AUDIT

The objectives of the audit were to

1. describe the history, context, and importance of state energy usage conservation in Tennessee;
2. determine whether the Department of General Services and Department of Transportation manage their motor vehicle fleets in a manner that is consistent with energy efficiency statutes, policies, and best practices;
3. determine whether the Department of General Services and Department of Transportation currently maximize alternative fuel usage in their motor vehicle fleets to the extent possible;
4. determine whether the Department of General Services and Department of Finance and Administration appropriately collect, monitor, and analyze facility utility data to improve state facility energy efficiency;
5. determine whether the Tennessee state agencies listed in Public Acts of 2007, Chapter 401, comply with or enforce statutory mandates concerning state energy usage conservation.

6. identify key recent, internal state energy conservation recommendations which have and have not been implemented.

SCOPE AND METHODOLOGY OF THE AUDIT

The State of Tennessee's statutorily mandated internal energy usage conservation activities as of June 2007 were reviewed. The audit was conducted in accordance with the standards applicable to performance audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States and included

1. review of applicable legislation and policies and procedures;
2. examination of the entities' records, reports, and information summaries;
3. interviews with staff of state agencies;
4. reviews of information and interviews with personnel from other states; and
5. review of energy related information available on the Internet.

EARLY HISTORY OF STATE ENERGY CONSERVATION EFFORTS

In 1973, energy customers faced electricity brownouts and rapidly rising fuel prices. The crisis escalated in October 1973 as the Organization of the Petroleum Exporting Countries (OPEC) brought an embargo which further cut into the supply of oil and elevated prices to levels previously thought impossible. Customers experienced lines and sometimes no fuel at gasoline stations. The supply and price of oil again became a topic of national conversation in 1979 as a result of the Iranian revolution. These national energy crises were the likely impetus for the Tennessee General Assembly's early efforts to create agencies for the purposes of energy research and policy.

Tennessee Energy Institute

Energy efficiency efforts in Tennessee date back to at least 1976. That year, the Tennessee Energy Institute was established to conduct research, experimental projects, and prototype developments in the area of energy production and supply. A 1984 Division of State Audit program evaluation found an inactive organization. The institute had only been involved in two energy projects and had failed to meet for the prior two years. Three vacancies on the institute's board had been left unfilled since 1980. Since its creation, the institute had received no funding from either state or federal sources, nor had it made any expenditures.

The institute's core problems included an Attorney General Opinion in 1982 stating that 6 of the 11 board positions were unconstitutional, and that many of the institute's core functions were already being carried out by the University of Tennessee Space Institute in Tullahoma. The institute was scheduled to terminate in 1986, but the General Assembly extended this deadline to allow time for legislative review. In 1987, the Comptroller recommended terminating the

institute, and even the University of Tennessee, which housed the institute, thought it was not needed. Subsequently, the General Assembly terminated the institute effective July 1, 1987.

Tennessee Energy Authority

A second early Tennessee energy initiative was the Tennessee Energy Authority, which was created by an act of the legislature in 1977. The Energy Authority was to be responsible for formulating, implementing, and administering the energy policy of the state and for coordinating energy related activities within the state. The Energy Authority was also to promulgate contingency plans for dealing with energy emergencies or shortages.

A 1980 program review, performed by the Comptroller of the Treasury, Division of State Audit, found the agency already struggling. The review cited abuses of the program by energy suppliers, failure to create a plan for energy emergencies, and failure to fulfill its research mandate among other problems.

The auditors presented the options of terminating the agency or moving the agency to the Governor's Office or the Department of Economic and Community Development. In 1983, the General Assembly abolished the Tennessee Energy Authority and distributed the responsibilities for conservation of energy, the study and production of alternative sources of energy, and maintenance of energy security to various agencies and departments of the state.

RECENT HISTORY

Energy Advisory Board – Department of Economic and Community Development

The Energy Advisory Board was statutorily created in 1983 under the Department of Economic and Community Development. The duties of the board were

- to advise and assist the commissioner to effect energy policy recommendations and to evaluate key policy decisions of federal agencies and others that may have a large effect on the state;
- to cooperate with and advise the Tennessee Valley Authority (TVA) on policy and programs, such as its nuclear power program, and decisions concerning the refitting, life-extension, or mothballing of its coal-fired plants, as well as other TVA decisions which have a direct impact on the economic well-being of the state;
- to solicit and evaluate proposals for a state coal research and technology center and to provide oversight for it once established (the center was never established); and
- to meet annually with the Governor and commissioner to report its energy policy findings, specifically TVA policies.

According to the 1999 performance audit of the Department of Economic and Community Development and Related Entities, the Energy Advisory Board reported to the

Governor at a yearly summit and advised the Tennessee Valley Authority through the Governor. The board did not provide written reports of its advice. The board hosted an energy forum every other year that brought together different energy industries for an exchange of information. The audit found that the Energy Advisory Board had very little activity and that statutory changes were needed. The General Assembly terminated the Energy Advisory Board through a bill passed on February 14, 2000.

Department of General Services 1995 Performance Audit

Many of the findings of a 1995 performance audit of the Department of General Services focused on energy. At that time, energy conservation functions were located in the Department of General Services, Property Management Services, Facilities Support Services Division.

The audit found the department was probably not meeting its goal of reducing state energy consumption and costs by 10% annually, but that analysis was difficult due to flawed data. The department was also not fully utilizing two potential funding sources, the Petroleum Violators Fund and the Energy Management Loan Fund, to maximize energy conservation efforts. Energy management training had not been developed and provided to targeted state employees as recommended in the department's 1991 energy management plan. Also, the department had not addressed all energy audit recommendations for state buildings by the University of Tennessee and therefore could not provide assurance that these recommendations had been implemented.

Energy Policy Work Group – July 2001

Governor Sundquist established the Governor's Interagency Energy Policy Work Group and Advisory Committee on July 24, 2001, by Executive Order 27. The Governor charged the work group, consisting of representatives of various state agencies, with developing a set of policy recommendations regarding energy use, supply, sources, technologies, and efficiency. In developing the recommendations, the work group requested comments from an advisory committee that included representatives of energy producers, distributors, local governments, environmental groups, business and industry, agriculture, and other concerned groups.

The Energy Policy Work Group issued a report in January 2002. The recommendations addressed the following areas related to various energy alternatives:

- reliability, availability, quality, price, and environmental effects;
- energy efficiency;
- transportation;
- new technologies and clean power alternatives;
- public education and information; and
- energy emergency planning.

The most relevant recommendations to this report were to:

- require all executive agencies, the Tennessee Board of Regents, and the University of Tennessee system to support and participate in the “Energy Action Plan for Tennessee Buildings”;
- initiate the development of life-cycle costing formulas for energy-using products purchased by state government that are not currently evaluated;
- take cost-effective steps to expand state vanpool and carpool programs, including procuring additional vans and seeking federal funds;
- provide an alternative-fuel facility in the Nashville area;
- support the use of geothermal exchange technology in state buildings and other facilities; and
- review and understand recent energy emergency plan updates that place the Tennessee Valley Authority, the Tennessee Regulatory Authority, and the Tennessee Department of Economic and Community Development as lead agencies.

Alternative Fuels Working Group – February 2006

A working group studying alternative fuels in Tennessee released a report on January 10, 2006, stating that increasing the production, distribution, and use of biofuels in Tennessee would give Tennessee the ability to transform energy and environmental challenges into economic opportunity, improved quality of life, and greater energy security. The report went on to recommend that the state provide proactive support to Tennessee’s emerging alternative fuels market.

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 is attached to the Department of Environment and Conservation. The group has focused its activities on promoting and supporting the production, distribution, and use of alternative fuels in Tennessee, primarily biofuels, such as ethanol and biodiesel.

The group also launched BioTenn to promote ongoing efforts. BioTenn is a statewide public education and outreach campaign with the goal of increasing citizen awareness and understanding of biofuels in Tennessee. The website, www.biotenn.org, was launched to support the state’s priority of expanding infrastructure for and availability of alternative fuels in Tennessee. At this site, citizens may access information on pump locations, press releases, manufacturing grants, etc., as well as the “Clean Fuels Advisor” newsletter produced by the Clean Cities Coalition of Tennessee and the State of Tennessee.

CURRENT STATE 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 Finance and Administration

Division of Real Property Administration

The Division of Real Property Administration develops the state's capital initiatives and real property assets and implements policies of the State Building Commission. Technical Services within this division has an energy management team that engages creatively in both energy reduction methods and energy-project financing for both new and existing state facilities.

State Building Energy Management Program

The State Building Energy Management Program (SBEM) is a part of Technical Services in the Real Property Administration Division of the Department of Finance and Administration. SBEM provides leadership in the implementation of the Tennessee Energy Initiative (TEI), which is the action phase of the 2001 "Energy Action Plan for Tennessee Buildings." The plan is designed to be self-funded by using the savings from facility modifications to provide investment capital required to fund projects and associated costs. The plan was developed and implemented through a strategic partnership between the SBEM, the U.S. Department of Energy, and the Environmental Protection Agency. (See Finding 1.)

Tennessee's plan is modeled after the U.S. Department of Energy's "Rebuild America Program" and complies with the Federal Government's "Energy Star Buildings Program." The broad objectives of the "Energy Action Plan for Tennessee Buildings" are to

- reduce energy consumption and utility costs in state buildings,
- fund program activities with accrued utility budget savings,
- reduce or eliminate deferred maintenance in state buildings,
- incorporate energy efficiency in the planning and design of new facilities, and
- recognize outstanding performance of facility managers who support the program.

Approximately 80% (54.8 million square feet) of state owned building space was committed to the "Energy Action Plan" as of 2006 according to the State Building Energy Program Status Report.

Department of General Services

The Department of General Services ensures that the primary state vehicle fleet meets federal alternative-fuel fleet requirements. There are currently 1,255 flexible-fuel vehicles

capable of burning E85 (an ethanol blend) in the Motor Vehicle Management fleet. According to the State Alternative Fuels Work Group report, *Alternative Fuels and Tennessee*, generally, the department exceeds the federal alternative fuel requirements mandated by the Energy Policy Act of 1992 to gain alternative fuel credits. (See Observation 1.)

General Services supervises public building maintenance and supplies furniture and fixtures to public buildings. General Services handles minor maintenance and works with the Department of Finance and Administration to identify needed major projects under Finance and Administration's authority. Purchasing energy efficient products is one of the initiatives General Services has taken into action. Vehicles, computers, printers, lamps, and ballasts (a device that maintains a constant current through a fluorescent light) are all products that have been studied to determine whether they are energy efficient, and energy efficient models are available for purchase. (See Finding 5.)

General Services studies state owned automobile usage and establishes rules and regulations for housing, repairing, and operating vehicles. The state has two motor vehicle fleets, excluding higher education. The Tennessee Department of Transportation (TDOT) manages its own fleet. General Services manages all other agencies' fleets. However, both TDOT and General Services procure vehicles through the statewide contracts developed by General Services. General Services is not responsible for housing, repairing, or operating TDOT vehicles.

General Services' statewide motor vehicle contracts include alternative-fuel vehicles. For example, the contract included hybrid vehicles starting in 2004. General Service's computer system, via the Fuelman card system, tracks each vehicle's preventative maintenance schedule and notifies the assigned driver/fleet manager when preventative maintenance comes due. This timely preventative maintenance helps maximize vehicles' energy efficiency. Additionally, General Services contracts for alternative-vehicle fuels. There are approximately nine E-85 fuel stations in the state. While General Services provides alternative-fuel vehicles, it realistically cannot mandate alternative-fuel usage because of the lack of alternative-fuel pumps.

The State Employee Transit Card (Swipe and Ride) Program is a pilot program funded for fiscal year 2007-2008. Employees working in Nashville may complete an application and receive a card which allows employees to ride an MTA (Metropolitan Transit Authority) bus for commuting to and from work Monday through Friday, at designated bus stops. The program was designed to help reduce traffic and reduce demand for parking in the downtown area, but can also be used as a way to help reduce fuel consumption. As of July 17, 2007, there were approximately 4,000 state employees who had applied for the Transit Card.

Additional statutes create more energy conservation duties, but it is not clear which apply to General Services and which apply to Finance and Administration. (See Finding 6.)

Department of Economic and Community Development, Energy Division

The Department of Economic and Community Development's Energy Division has been a major force in the development of Tennessee's three Clean Cities Coalitions. Nearly \$2 million has been committed to alternative fuels in Tennessee through the Energy Division, including a biodiesel infrastructure grant program to assist county fleets (especially school buses) in utilizing biodiesel. The grant program offers one grant per county for biodiesel fuel tanks and pumping equipment.

The purpose of the Energy Division is to promote sound economic development policies and programs to retain existing business and industry and to foster new investment and job creation throughout the state. The Energy Division receives grants from the U.S. Department of Energy to provide energy efficiency programs to business and industry, state and local governments, schools, and residential consumers. The division has several programs, detailed below, that focus on energy efficiency and cost savings measures.

The Energy Division has a Small Business Energy Loan Program that provides low interest loans of up to \$300,000 to qualifying small businesses to aid in upgrading the level of energy efficiency in their buildings and plants, and to improve their manufacturing process. To qualify, a company must have fewer than 300 employees or less than \$3.5 million in gross sales or receipts. The loans can be paid over a period of seven years and are offered at 3% interest, with a 0% interest option available for businesses in "Three Star Communities." The Three Star Program is designed as a road map to assist local communities in their effort to achieve excellence in community and economic development. Participating communities are guided through a comprehensive plan of essential criteria developed by local economic development professionals and a cooperative collaboration of various state agencies. A Main Street Community is a community participating in the Main Street Program. The program provides assistance to communities in revitalizing their downtown and central business districts, which are vital components of economic development and job growth.

There is also a Local Government Energy Loan Program. The program offers low interest loans to municipal and county governments for energy efficiency related projects in courthouses, administration buildings, schools, maintenance facilities, and any other building owned by the city and/or county. Local governments may borrow up to \$500,000 and repay the loan annually for seven years. For local governments located in all other communities, the loan is available at the rate of 3%. Free energy audits and technical assistance is available through the University of Memphis to all local government institutions regardless of whether they borrow loan funds.

The Tennessee Energy Education Network (TEEN) develops, disseminates, and implements energy education programs for K-12 schools statewide. The network provides classroom presentations, in-service training workshops for teachers, free materials, a bi-monthly newsletter, and annual contests and awards. The Public Outreach program targets small businesses, local governments, and residential energy users with information that helps them make informed energy decisions. Through the division's toll-free energy hotline number, users are able to find the resources to improve energy efficiency and conservation. The ENERGY

STAR program, which is a new program to the Energy Division, encourages energy efficiency in homes and businesses by the use of ENERGY STAR labeled products and by energy saving practices, saving consumers money on energy costs and at the same time cleaning up our environment. The ENERGY STAR program is a joint effort between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency.

The Clean Cities Program, sponsored by the DOE, was created to advance the use of cars and trucks powered by alternative fuels, and thereby reduce our nation's dependence on imported petroleum. The program promotes the purchase of alternative fuel vehicles (AFVs) and the expansion of the AFV-refueling infrastructure. The Tennessee Industrial Technology Program (ITP) follows the national mission of the DOE, Office of Industrial Technology. The program strategy develops partnerships with energy-intensive industry sectors (agriculture, aluminum, chemicals, forest products, glass, metal casting, mining, petroleum, and steel) to reduce energy and materials required for manufacturing. The bottom-line results improve energy efficiency, environmental performance, and productivity.

The Million Solar Roofs (MSR) Program is a DOE-sponsored initiative to promote the utilization of solar energy. The initiative focuses on two solar technologies—photovoltaics (solar electric cells which produce electricity from sunlight) and solar thermal panels (which produce heat for domestic hot water, space heating, or heating swimming pools). The initiative does not pay for the installation of solar energy systems, nor will it direct and control the activities at the state and community level. It does establish state and community partnerships that bring together business, government, energy industry, and community organizations to coordinate national and state resources and eliminate barriers to the use of solar energy. The Southern Alliance for Clean Energy is the department's contractor for the MSR initiative. Activities began in 2003, and the alliance has been involved in a variety of activities designed to increase the acceptance and utilization of solar energy.

Department of Transportation

The Department of Transportation (TDOT) is working to assist retail fuel station owners with infrastructure to dispense E85 (ethanol) and B20 (biodiesel). In November 2005, TDOT began using B20 in on-road diesel vehicles in Knoxville and Johnson City and hoped to expand the use of B20 in other TDOT regional facilities across the state, which has started as of December 2007. Based on the State Alternative Fuels Work Group Report published January 10, 2006, TDOT had purchased 718 flexible fuel vehicles, which made up almost 52% of the department's light-duty fleet. TDOT plans to obtain alternative fuel credits for use of biodiesel in its diesel fleet. Per Title 10, *Code of Federal Regulations* 490.201, certain state entities must ensure that a certain percentage of their annual vehicle acquisitions of light duty vehicles are alternatively fueled vehicles (AFV). For 2001 and newer model purchases, 75% of purchases must be AFV in metropolitan areas where the population exceeds 250,000 per 1980 census data. Per Title 10, *CFR* 490.502, when alternative fueled vehicle purchases exceed the number required by law or if an AFV is purchased prior to the date in the model year in which it is required, an alternative fuel credit is issued by the U.S. Department of Energy. Upon request, a credit may be used/allocated to supplement future years' required purchases.

TDOT's Biofuel Green Island Corridor Grant Project is part of the Governor's Alternative Fuels Working Group. TDOT awards grants to retail fuel stations to help with adding E85 ethanol and B20 biodiesel pumps as part of the emerging Green Island Biofuel Corridor Network across the state. (See Finding 4.)

Department of Environment and Conservation

The Tennessee Department of Environment and Conservation (TDEC) promotes alternative fuel use to protect public health and the environment, especially in conjunction with local governments in air quality nonattainment areas. TDEC and TDOT participate actively in a regional effort to expand the use of alternative fuels, and TDEC hosted a Regional Biofuels Workshop in 2005. The Division of Underground Storage Tanks has developed guidance to assist tank owners with the conversion or installation of underground storage tanks to accommodate biofuels. The Alternative Fuels Working Group is housed within TDEC for administrative purposes.

TDEC has several divisions which perform energy related functions, but these functions are not specifically related to state facility energy conservation. The Office of Environmental Assistance provides non-regulatory outreach and education on environmental issues to the private sector, local governments, schools, and individuals. The U.S. Department of Energy Oversight Division of TDEC is the state's primary liaison with the U.S. Department of Energy regarding federal cleanup of hazardous, radioactive, and mixed waste at the Oak Ridge Reservation. The Green Schools Program is a pollution prevention program, but only one of the six criteria for participation focuses on energy conservation.

Department of Agriculture

The Department of Agriculture works to recruit the development of biofuels production facilities across the state and participates actively in the establishment of a national fuel quality standard for low blends of biodiesel, especially for B20. The department is also responsible for monitoring the quality of petroleum products sold in Tennessee, including biofuels.

Tennessee Regulatory Authority

The Tennessee Regulatory Authority (TRA) was created in 1996 to monitor the changing telecommunications and utility environment. The TRA is responsible for setting rates and service standards of privately owned telephone, natural gas, electric, and water utilities. The Tennessee Regulatory Authority has no statutory mandates or any activities regarding state energy usage conservation. Rather, TRA's energy related activities focus on setting rates and standards for privately owned telephone, natural gas, electric, and water utility companies.

Department of Human Services, Low Income Home Energy Assistance Program and Weatherization Assistance Program

The Low Income Home Energy Assistance Program (LIHEAP) is 100% federally-funded through a grant from the federal Department of Health and Human Services. LIHEAP provides funds to the states to help meet the utility costs of low-income eligible elderly and disabled adults. The program is administered through contracts to a network of 19 established non-profit and local government agencies experienced in providing energy assistance programs. Eligibility is based on established federal poverty guidelines. Services are available in all 95 counties and to more than 60,000 Tennessee households each year. The program assists households by supplementing home energy costs related to heating and cooling in the form of a direct payment to the utility company or home energy provider. The Department of Human Services has no statutory mandates and no statutory authorizations or activities related to state energy usage conservation.

State Building Commission

The purpose of the State Building Commission is to oversee the construction of state buildings; authorize improvements to state real property; coordinate the demolition of buildings; and manage the acquisition, disposal, and lease of real property.

The State Building Commission does have an interest in making the state energy efficient. According to the 2006 *State Building Energy Management Program Status Report*, the State of Tennessee spent approximately \$72 million for energy to operate the approximately 72 million square feet of state-owned buildings in 1988. Currently, 11 executive branch agencies, the Tennessee Board of Regents, and the University of Tennessee System own and/or operate more than 6,640 buildings. As of June 30, 2006, those executive branch agencies and the Tennessee Higher Education Commission actually spent more than \$129 million on energy for 92 million square feet of space, reflecting a 79% increase over 19 years. According to the 2006 *Status Report*, significant increases in energy costs to the state were experienced in the latest reporting period. While annual costs have been escalating at a fairly consistent annual rate of 2.2%, the latest year for which data was available saw total energy costs rise by a rate of 12.5%. Interestingly, the report also notes that the U.S. Energy Information Administration projects that energy costs will be essentially flat through 2011, after which time costs are expected to escalate at an increasing annual rate.

THE IMPORTANCE OF TENNESSEE'S ENERGY CONSERVATION EFFORTS

Introduction

There are a wide variety of reasons for supporting energy conservation and the development of alternative fuels. Protecting the environment, preventing global warming, stimulating the economy, and reducing reliance on foreign oil are all common reasons given for supporting energy initiatives. A reason on which most people agree is saving money. There are many ways the State of Tennessee can reduce its energy expenditures; some are immediate and

certain, while others are long-term and speculative. Legislation and department initiatives have identified reducing energy costs as a priority, but it is unclear exactly how much the state spends on energy or how much could be saved. Therefore, we cannot determine whether implemented energy initiatives are effective. (See Finding 2.)

The State of Tennessee spent approximately \$72 million for energy to operate state-owned buildings in 1988. In 1998, that annual bill grew to between \$80 and \$90 million and was projected to hit \$120 million in the next ten years. The Energy Policy Work Group and the Alternative Fuels Work Group have both issued reports detailing the importance of energy initiatives in Tennessee. According to the Energy Policy Work Group, reliable and affordable energy is the foundation of Tennessee's economy. Sound energy management produces both economic and environmental benefits. The Energy Policy Work Group asserts that the state must assess current use and future demands because of stricter federal clean air standards and continued population growth and economic expansion that could lead to even greater future energy challenges.

Energy Demand

National energy demand has increased significantly over the last 25 years, and in some areas of the country, this has resulted in significant price increases, interrupted service, and regional spot shortages. Tennessee has not experienced significant problems yet, but continued population growth and economic expansion could lead to future energy challenges. The Energy Policy Work Group believes it is important that Tennessee address these challenges now in order to avoid market volatility and take advantage of future economic opportunities.

Energy Efficiency

The Energy Policy Work Group states that energy conservation must be a cornerstone of any long-term energy policy in Tennessee. Improved energy efficiency helps achieve conservation, increases industrial competitiveness, contributes to community development, and reduces business and household costs. In addition to strengthening local economies, energy efficiency is one of the most effective ways to meet short-term increases in energy demand. It is important that Tennesseans continue to seek new and more efficient ways to produce goods and services, heat and cool buildings, and power vehicles because of the tremendous economic and environmental benefits improved energy efficiency can bring.

Transportation

New transportation technologies, such as alternative fuel vehicles and improved petroleum products, along with advanced engines and automobile components can have a dramatic effect on the efficiency and emissions of vehicles. Transportation techniques, such as telecommuting, intelligent transportation systems, mass transit, and alternative transportation strategies, can help reduce emissions and energy use by decreasing the number of vehicle miles traveled. While emissions per vehicle have decreased over the last 30 years, an increase in miles driven has resulted in an overall increase in the amount of discharged pollutants. The

transportation sector, the state's second largest energy consumer after the industrial sector, accounts for 28% of Tennessee's energy consumption.

New Technologies and Clean Power Alternatives

Research and development in clean energy technologies offer a long-term energy strategy that recognizes the interdependence of energy, environment, and the economy. The continued development and application of new technologies and clean power alternatives offer tremendous economic and environmental advantages to Tennessee. For example, clean coal technologies expand electric power generation options, reduce emissions, and contribute to the use of America's most plentiful energy resource. Distributed generation, powered by combustion gas turbines, fuel cells, wind turbines and other technologies, is another alternative that has the potential to achieve both economic and environmental benefits.

Alternative Fuels

Increasing the production, distribution, and use of biofuels in Tennessee would give our state the ability to transform energy and environmental challenges into economic opportunity, improved quality of life, and greater national security. Nurturing the growth of biofuels in Tennessee will help the state become a leader in the use of cleaner, renewable energy resources. The Alternative Fuels Working Group believes that biodiesel and ethanol are the two alternative fuels with the greatest potential for Tennessee. Pure biodiesel is a non-toxic, biodegradable, renewable fuel. The most important production source for biodiesel in Tennessee is soybeans. Pure ethanol is a water soluble, biodegradable, renewable fuel produced by fermenting organic materials, such as corn, which is the most important source for ethanol in Tennessee. Biodiesel and ethanol are typically blended with petroleum diesel and conventional gasoline. The blends typically used and that generate the greatest benefits for the state are B20 (20 percent biodiesel and 80 percent petroleum diesel) and E85 (85 percent ethanol and 15 percent gasoline).

The Alternative Fuels Working Group, in its report published on January 10, 2006, outlined several advantages to B20 and E85 divided into Economy, Energy, and Public Health categories.

Economy

- Construction and operation of biofuel production facilities would have significant economic impact in rural counties. The capital investment, for example, of a 13-million-gallon biodiesel production facility using soybean oil is approximately \$18.8 million.
- In 2004, Tennessee farmers cultivated approximately 1.2 million acres of soybeans, with a yield of 48.4 million bushels, and 615,000 acres of corn, with a yield of 86.1 million bushels. Increased demand for biofuels could increase corn prices by as much as \$0.20 per bushel and soybean prices by \$0.35 per bushel.

- The federal Energy Policy Act of 2005 increases the requirements for renewable fuels in the U.S. fuel supply. Increasing in-state biofuels production will allow Tennessee to capture a share of this growing market as federal renewable fuel requirements take effect.

Energy

- Local production of fuels using domestic crops and other raw materials as feedstock reduces our dependence on imported oil.
- Increased production and use of biofuels will increase the state's ability to withstand future fuel supply disruptions and spikes in fuel prices.

Public Health

- Twenty-three Tennessee counties have not met federal EPA air quality standards. More than half of the state's population lives in these areas. Mobile sources, such as cars, SUVs, trucks, barges, trains, and construction equipment, are significant sources of air pollution.
- Biofuels represent an important and feasible strategy for reducing harmful emissions from mobile sources. Both E85 and B20 reduce emissions of most mobile source air pollutants.
- Biodiesel use reduces emissions of particulates and toxic substances and can thereby significantly reduce health risks to sensitive populations (e.g., children on school buses).

This report also stated that renewable fuels will not replace petroleum as a fuel source, but they can provide a significant impact on reducing dependence on imported oil, thereby improving energy security.

Conclusion

State government can safeguard Tennesseans against rising energy costs and heightened energy security concerns by reducing its own energy consumption. The development of alternative fuels is a second method of reducing energy risks. Besides the possibility of being more environmentally friendly, alternative fuels reduce the risk of shortages and concerns over foreign imports.

OBSERVATIONS AND COMMENTS

The topics discussed below did not warrant a finding but are included in this report because of their effect on the operations of the State of Tennessee and on the citizens of Tennessee.

THE DEPARTMENT OF GENERAL SERVICES ALREADY COMPLIES WITH SECTION 4-3-1109, *TENNESSEE CODE ANNOTATED*

Section 4-3-1109, *Tennessee Code Annotated*, implemented in 2007, requires that 30% of newly purchased passenger motor vehicles purchased by state government be energy-efficient motor vehicles. The law also requires the Commissioner of General Services to file an annual report with the Governor and the General Assembly concerning compliance with the law. Per Section 4-3-1109(c)(1), an “energy efficient motor vehicle” means a passenger motor vehicle that is:

- a. an alternative fuel vehicle as defined by the Energy Policy Act of 1992;
- b. a flexible fuel vehicle (FFV) utilizing ethanol, biodiesel, or any other commercially available alternative fuel approved by the United States Department of Energy;
- c. a hybrid-electric vehicle (HEV); or
- d. a vehicle powered by unleaded gasoline that has a United States Environmental Protection Agency estimated highway gasoline mileage rating of at least 25 miles per gallon or greater for the model year purchased.

Per Section 4-3-1109(c)(2), *Tennessee Code Annotated*, “passenger motor vehicle” means a motor vehicle designed for carrying six or fewer adult passengers and used for the transportation of persons; provided, that vans, including cargo vans, trucks, sport utility vehicles and police pursuit vehicles shall not be considered “passenger motor vehicles.”

In fiscal year 2007, General Services purchased 821 new vehicles. A total of 423 of these were “passenger vehicles” that can use flex fuel; 215 were police sedans; and 183 were trucks, vans, or other heavy duty vehicles that do not qualify under Section 4-3-1109(c)(2). Since all of the department’s new passenger vehicles can use flex fuel, the department is in full compliance with the law.

Additionally, the motor vehicle fleets of the Department of General Services and the Tennessee Department of Transportation (TDOT) are required to comply with the 1992 Energy Act. The 1992 Energy Act requires that 75% of all vehicle purchases for metropolitan areas with populations over 250,000 as of the 1980 census be flexible or alternative fuel vehicles. These metropolitan areas are Memphis/Shelby County, Nashville/Davidson County,

Chattanooga/Hamilton County, Knoxville/Knox County, and the Tri-Cities area/Sullivan, Washington, and Johnson Counties.

Both General Services and TDOT have accrued credits with the Department of Energy for their compliance with the Energy Act, which means these departments have purchased more than the required number of flexible fuel vehicles in a given year. For example, in 2006 General Services purchased 357 vehicles; 326 were required. TDOT purchased 240 vehicles; 140 were required. These credits may be used in future years to offset a deficiency in the number of flexible fuel vehicles purchased.

The information on page 17 shows the breakdown of General Services' and TDOT's fleets. We used the data provided by General Services and TDOT to calculate the percentage of light-duty vehicles in both metropolitan and non-metropolitan counties that are flexible fuel, hybrid, or biodiesel. Currently, 35% of the Department of General Services' fleet of light-duty vehicles are flexible fuel, hybrid, or biodiesel vehicles, which complies with Section 4-3-1109, *Tennessee Code Annotated*. TDOT's light duty fleet consists of 60.7% flexible fuel, hybrid, or biodiesel vehicles, which also complies with Section 4-3-1109. Heavy-duty vehicles are not required to comply with Section 4-3-1109. However, we calculated that 28.5% of General Services' and 93.5% of TDOT's heavy-duty vehicles in both metropolitan and non-metropolitan counties are biodiesel.

Breakdown of General Services' and Department of Transportation's Fleets

	<u>General Services</u>	<u>TDOT</u>
<u>Metropolitan Areas</u>		
<u>Light-Duty Vehicles</u>		
Flex Fuel	792	457
Regular Fuel	804	293
Hybrid Vehicles	19	11
Biodiesel Vehicles	-	-
Total Metropolitan Light-Duty Fleet	<hr/> 1,615	<hr/> 761
% of Metropolitan Light-Duty Fleet Using Alternative Fuel or Hybrid Vehicles	50.22%	61.50%
 <u>Heavy-Duty Vehicles</u>		
Flex Fuel	-	-
Regular Fuel	386	51
Hybrid Vehicles	-	-
Biodiesel Vehicles	69	552
Total Metropolitan Heavy-Duty Fleet	<hr/> 455	<hr/> 603
% of Metropolitan Heavy-Duty Fleet Using Alternative Fuel or Hybrid Vehicles	15.16%	91.54%
 Total Metropolitan Fleet	 2,070	 1,364
 <u>Non-Metropolitan Areas</u>		
<u>Light-Duty Vehicles</u>		
Flex Fuel	463	424
Regular Fuel	1,581	285
Hybrid Vehicles	-	-
Biodiesel Vehicles	3	-
Total Non-Metropolitan Light-Duty Fleet	<hr/> 2,047	<hr/> 709
% of Non-Metropolitan Light-Duty Fleet Using Alternative Fuel or Hybrid Vehicles	22.77%	59.80%
 <u>Heavy-Duty Vehicles</u>		
Flex Fuel	-	-
Regular Fuel	478	38
Hybrid Vehicles	-	-
Biodiesel Vehicles	275	736
Total Non-Metropolitan Heavy-Duty Fleet	<hr/> 753	<hr/> 774
% of Non-Metropolitan Heavy-Duty Fleet Using Alternative Fuel or Hybrid Vehicles	36.52%	95.09%
 Total Non-Metropolitan Fleet	 2,800	 1,483

Source: Unaudited General Services data provided by the Director of Motor Vehicle Management from the same system used to provide EPAAct data to the U.S. Department of Energy. Unaudited TDOT data provided by the Purchasing Director from multiple, decentralized fleet databases.

HOW FALL CREEK FALLS STATE PARK ADDRESSED RECOMMENDATIONS OF A PRIVATE CONSULTING FIRM REVIEW OF THE PARK

As part of our audit, we were asked to determine how the state addressed recommendations made by a private consulting firm, Folsom & Associates (at no charge to the state), based on an energy management survey for Fall Creek Falls State Park. As noted below, park management stated that they had implemented the recommendations that could be accomplished with little or no cost. However, due to budget constraints and other pressing needs, there is no plan to implement the remaining recommendations.

The survey focused on the kitchen facilities at the park to identify methods to increase energy efficiency and reduce operating costs. According to Folsom & Associates, kitchen facilities are often overlooked in energy reviews, but there are numerous cost-saving opportunities available in food service areas. The survey was compiled into a report and the consulting work was provided to the state at no cost in hopes the firm could generate future business from the state.

The report identified over \$25,000 in potential cost savings, detailing specific areas where improvements could be made including

- water heating;
- dish washing;
- refrigeration;
- lighting;
- steam cooking equipment;
- ranges and griddles;
- food warmers; and
- broilers, fryers, and ovens.

According to management of the Fall Creek Falls Inn, all of the low- or no-cost maintenance items in the report have been implemented at the park. These items included cleaning of all filters and evaporator coils on coolers and freezers, repairing heat strips for the walk-in freezer, and replacing the ice machine and convection ovens. The park was also able to install a new dish washing machine, which was transferred to the park from the Andrew Jackson Building in downtown Nashville. In addition to the items listed, the park has replaced lighting with low wattage, compact fluorescent bulbs. Although there is no official data illustrating the actual savings from these changes, a representative from the park stated they estimate, based on the estimated cost savings listed in the Folsom & Associates report, an annual savings of \$1,000.

The park has consulted with outside companies about the prospect of installing a metering system that would allow the facility to track and monitor energy usage. The metering system is estimated to cost approximately \$60,000, and park representatives have stated that funds are not available in the current budget. The park also lacks money for maintenance projects so any other recommended projects would be on hold until funds are available. A park

representative stated that the park has critical needs related to guest facilities and services and that these needs would take priority over other non-critical projects.

In addition to the items previously mentioned as being addressed at Fall Creek Falls, the report also suggested additional upgrades that could offer cost-saving opportunities:

Recommendations for Restaurant Foodservice Facilities at Fall Creek Falls

Project	Cost	Annual Savings	Payback Period
Spray Valves and Nozzles for Sinks	\$600	\$2,058	0.30 years
Magnetic Switch and Buzzer for Fly Fan	\$200	\$220	0.90 years
XDX Refrigerant System for Walk-In Freezers	\$3,000	\$955	3.20 years
Replace Freezer Gasket	\$100	\$65	1.40 years
Installation of Magnetic Door Closers (Hot Food Cabinet)	\$225	\$230-245	0.98 years
Repair Exhaust Hood System	\$3,000	\$3,100	1.00 years
Install New Hood System (Fryers)	\$30,000	\$4,600	6.60 years
Install New Hood System (Convection Ovens)	\$30,000	\$4,350	6.90 years
New Fryers w/ Wiring and Installation	\$8,740	\$950	9.20 years
New Deep Fryers and Installation	\$20,020	\$3,598	5.60 years
New Electric Ovens	\$14,690	\$2,280	6.40 years
New Propane Ovens	\$12,593	\$1,435	8.80 years
New Stacked Electric Ovens	\$11,690	\$2,100	5.60 years

As funding becomes available, the Department of Environment and Conservation, which manages state parks, could consider the results when designing new and renovating existing state park kitchens.

FINDINGS AND RECOMMENDATIONS

- 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**

Finding

The State Building Commission (SBC) and State Building Energy Management Program (SBEM) should continue to evaluate the energy savings performance contracting model introduced in the state's 2001 Energy Action Plan, developed by the Department of Finance and Administration's Division of Real Property Administration, and the State Building Energy Management Program in conjunction with the U.S. Department of Energy's Rebuild America program and the U.S. Environmental Protection Agency's Energy Star program. Also, the SBC and SBEM should develop a written standard process for performance-based contracting for energy related projects that includes a mechanism for acquiring measurement and verification contracts.

A factor that is unique to energy projects is the introduction of energy savings performance contracts. In 2001, the state's Energy Action Plan listed six major objectives:

- Reduce energy consumption
- Retrofit 60 million square feet of state-owned space in 15 years
- Maintain current energy budget levels to fund program activities
- Provide performance incentives to agencies and service providers
- Reduce or eliminate current deferred (unaccomplished) maintenance
- Incorporate energy efficiency in the planning and design of new facilities

The Energy Action Plan incorporated the use of Energy Savings Performance Contracts and stated that these types of contracts are "perhaps the most significant tool available to the State in implementing this plan." The plan also stated that the performance contracts "can effectively guarantee successful accomplishment of the plan's goals and objectives." According to the plan, the State Building Commission has approved standard documents as well as a standard process to be used in creating and executing performance contracts.

The Department of Finance and Administration provided a copy of the standard contracting language, referred to as the "Energy Savings Performance Contracting" guide, that contains information detailing some aspects of the contract process, standard request for proposal language, and delivery checklists. However, the guide is not widely disseminated to all agencies.

While the guide provides information on the overall contract process, there should be guidance available for agencies who have not yet procured a contract and need a standard process to follow. This type of guidance should be readily available to any agency needing the information.

According to the Energy Action Plan, performance-based contracting was also being used by other states including Florida, Ohio, Maryland, and California. The basic idea of performance-based contracting is that a third-party energy services company (ESCO) will provide a service or group of services that would typically include activities such as engineering, installation, and maintenance of energy-saving capital improvements. As a result of the energy-saving improvements, the state would be able to use the resulting energy savings to pay for the improvements rather than having to fund the project at the beginning.

Although the performance-based contracting model proposed in the Energy Action Plan recommended that energy projects be funded with the savings that resulted from the implementation of those projects, the state has chosen to adopt a modified approach to performance contracting. Full-approach performance based contracting involves the contractor fronting the cost of work, to be reimbursed from actual savings from the project. Under the modified approach, the state fully funds the project up front rather than the contractor. According to the director of the State Building Energy Management Program in the Department of Finance and Administration, the decision to adopt this modified approach may have been made because the state’s bond rating could have been favorable enough to allow the state to borrow funds through the normal capital process. After a competitive bid process, the state awarded contracts to Siemens and Johnson Controls to provide energy services related to the implementation of energy savings performance contracts.

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-efficiency motors
Boiler modernization	Chiller modernization
Commissioning services	Advanced utility metering

The performance-based contracting approach requires a measurement and verification (M&V) mechanism. This mechanism serves as a monitoring device to determine whether savings proposed by the contractor were met upon project completion. As part of M&V, there is a five-year performance period during which the M&V contractor analyzes the project. The contractor must guarantee the savings and will be held accountable to the guarantee as part of the performance evaluations conducted through M&V. Furthermore, the contractors will be obligated to make up any difference in actual savings and estimated savings if the actual savings are less than the estimates. The M&V contracts are funded by the agency and, according to the

director of the State Building Energy Management Program, this has posed a problem in securing the M&V contracts since they are single-source contracts that are not procured through the normal contract process. As of December 2007, the state has two projects with an M&V contract in place. One contract is for an energy efficiency retrofit of the Andrew and Rachel Jackson state office buildings. The first M&V performance evaluation for the project was released in October 2006. The original projected total savings for this project were \$4.5 million. Per the performance evaluation, \$545,343 and \$891,402 were saved in fiscal years 2005 and 2006, respectively. The other contract is for the energy retrofit of the James K. Polk state office building; although the contract is in place, the evaluation has not yet been performed. According to a representative for the Department of Finance and Administration, the Department of Correction has a project in progress that requires an M&V contract. However, since the M&V contracts are funded by the agency, the department has experienced difficulty in securing the funding for the contract. Due to the difficulty of securing measurement and verification (M&V) contracts, agencies may not be able to secure the contracts, resulting in situations in which the agencies cannot actually measure energy conservation efforts.

Recommendation

The members of the State Building Commission, including the Commissioner of Finance and Administration who is responsible for the State Building Energy Management Program, should determine whether the energy savings performance contract model that was proposed in the 2001 Energy Action Plan should be adopted. If adopted, the State Building Commission members and the State Building Energy Management Program should develop a written standard process for performance-based contracting. If adopted, the SBC members and the SBEM could consider using the guide for performance-based contracting developed by the U.S. Department of Energy. The process should include written documentation such as guidelines for writing requests for proposals. The SBC members should review the process for not only procuring the performance contracts but also the process for procuring the measurement and verification (M&V) contracts that is part of the five-year performance evaluation period for this type of contract. The members of the SBC should determine whether the M&V contracts are to be required as part of the energy savings performance contract model. If the management and verification contracts are required, the SBC should have a process in place that enables agencies to have the funds and authority to procure such contracts as needed. This process could include considering cost estimates for the management and verification contracts during the initial energy project proposal.

Management's Comment

Department of Finance and Administration:

We concur that the State Building Commission and State Building Energy Management (SBEM) should continue to evaluate the Energy Savings Performance Contract Model and SBEM will work with the State Building Commission and staff to address this issue.

- 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**

Finding

Monitoring and controlling the cost of utilities in state-owned buildings is a responsibility of the Department of Finance and Administration. Under Sections 4-3-1105 (17) and 4-3-1012, *Tennessee Code Annotated*, the department's statutory responsibilities for utilities are 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.

Although state law gives the responsibility of monitoring utility data to the Department of Finance and Administration, both the Department of Finance and Administration and the Department of General Services collect utility data and perform varying degrees of analysis. However, neither department has an adequate system for monitoring and controlling costs or measuring energy use. The following describes how each department gathers data, how the data are used in analysis and decision-making, and the limits within each department that prevent complete energy-cost-and-use analysis.

Department of General Services

The Department of General Services' Office of Financial Management pays many, but not all, state utility bills. For example, General Services does not directly pay for some leased facilities' utilities because the landlord has agreed to pay for utilities within the contracted rental costs. The department does gather data from the utility bills; however, the only data gathered are the actual dollars spent on utilities, not the energy units billed and/or used. The assistant director of the Property Services Management Division stated the division looks at the cost per square foot as part of the analysis of the utility data rather than usage per square foot. The department does not track the state's natural gas usage.

The assistant director stated that the department does not conduct any regular analysis of the utility data. Instead, data are compiled into a spreadsheet on an ad-hoc basis or if a special request is made for information. The department assigns a Facility Administrator to most state buildings who would be responsible for investigating any fluctuations in energy usage.

According to the assistant director of Property Services, the department does have a computer system that shows live data, such as temperature, for each wireless thermostat in a building. The system is referred to as the Energy Management System (EMS) and can be accessed from any Internet connection. The system is set up to control the Tennessee Tower, James K. Polk Building, State Library and Archives, and the Governor's Residence, all located in Nashville. The system can also control other state buildings in Nashville including the Andrew Jackson, Rachel Jackson, and Cordell Hull buildings, in addition to the department's satellite offices in Chattanooga, Knoxville, Memphis, and Jackson; however, these locations have reduced system capabilities. The system is capable of having more building sites added for a cost of \$1,000 per site. The system can be programmed to automatically make changes in the building such as turning the lights off in the building under certain conditions. The system can also be programmed to automatically adjust the inside temperature based on the outside weather conditions. The assistant director stated that the department does not use the system because very few, if any, staff are trained to use it.

Department of Finance and Administration

The Department of Finance and Administration's responsibility to monitor utility data is assigned to the State Building Energy Management Program (SBEM) housed within the department. The SBEM obtains utility data directly from utility providers. The Director of SBEM stated the program lacks the resources to review energy usage for every state building. The department has to gather its own data because it cannot use the same data used by General Services. SBEM needs energy units used for its analysis, and the data used by General Services only contains dollar amounts.

The utility data used by SBEM are obtained from various sources including Nashville Electric Service, the District Energy System in Nashville, and the Department of Finance and Administration's Office of Business and Finance. Nashville Electric Service (NES) only serves Davidson County and thus can only provide data pertaining to state-owned buildings within the county. The Office of Business and Finance produces a report on energy usage; however, the report only provides dollars spent. The District Energy System provides energy data for the chilled water and hot air used by state buildings in downtown Nashville. SBEM is unable to access utility data for all state-owned buildings but does have access to facilities that are part of the Facility Revolving Fund. However, buildings such as state prisons are not part of the fund.

Utility cost data is collected annually by SBEM for the report to two legislative committees as required by statute. Aside from this purpose, the utility data gathered by SBEM is not analyzed on a formalized, regular basis. While the department states that the data are reviewed regularly, most analysis is done on an ad-hoc basis. The department does compare state

buildings to determine energy usage per square foot, and there are national standards available that the department can use as benchmarks. National standards are produced by the U.S. Department of Energy as well as Oak Ridge National Laboratory. The data are also used for one-time projects.

Per the United States Environmental Protection Agency's Energy Star program, many organizations periodically review current and past energy use to improve energy performance by evaluating energy use for all major facilities and functions in the organization. Collecting, tracking, and evaluating energy performance is necessary for establishing baselines and managing energy use and requires information concerning how, when, and where energy is being used. Maintaining a tracking system enables organizations to assess necessary steps, formulate corrective actions, and identify successes in meeting energy goals. The Energy Star program states that collected data must be complete and accurate and has identified key steps for collecting data. These include

- determining the appropriate level and scope of data collection;
- taking an inventory of all energy purchased and generated on-site (electricity, gas, steam, waste fuels) in physical units (kWh, mMBtu, Mcf, lbs. of steam, etc.) and on a cost basis;
- documenting all monthly energy uses by assembling energy bills, meter readings, and other use data covering at least two years of data; and
- collecting facility and operational data to be able to normalize (for changes in weather, shifts in usage, etc.) and benchmark.

Because neither agency formally and regularly monitors utility data, the state could be missing opportunities to identify areas for immediate improvement. Additionally, focusing solely on energy costs is contrary to Energy Star recommendations. While energy cost is related to energy efficiency, energy usage is the most important measure for monitoring and improving energy efficiency. Therefore, the state should monitor both cost and energy units consumed to identify opportunities for improvement.

Recommendation

The Department of Finance and Administration and the Department of General Services should continue their efforts to collect and monitor utility data for state-owned buildings. The departments should work to develop a formalized monitoring schedule for utility data, that includes both utility costs and usage, and ensure that data are analyzed. The departments should also work together to ensure there is no duplication of efforts in the monitoring and collecting of utility data. The state should also use the Energy Management System (EMS) as a way to monitor and manage utility usage in state buildings to increase monitoring capabilities.

Managements' Comments

Department of Finance and Administration:

We concur with the basic premise that utility data including both cost and usage needs to be collected and analyzed as a collaborative effort between DGS and F&A as well as other departments that pay their own utility bills.

We concur that SBEM has limited access to detailed utility data including usage (as differentiated from cost) and that currently available resources within SBEM preclude evaluation of energy usage for every building state-wide. It is anticipated that implementation of the EDISON project will enable acquisition of the required data.

SBEM will lead the effort to collect and monitor cost and usage.

Department of General Services:

We concur. William Bauer, Department of Finance and Administration Energy Management Group, and Blaine Hodge, Department of General Services, Director of Property Services Management, have agreed to issue a joint report on a monthly basis including cost and usage for electric, gas and water. Review of trends will also be included in the report. This report will start in January 2008 and will initially only include the state-owned buildings in the downtown Nashville area. Throughout the year, the report will be expanded to include all state-owned buildings. This report will be used to identify specific opportunities for improving energy efficiency.

The Department of General Services is also in the process of training staff on the Energy Management System to increase monitoring capabilities. As staff is trained on the system, more building sites will be added.

3. The State Building Commission should review current payback period practices and develop written guidelines for agencies to follow when seeking project approval

Finding

The State Building Commission (SBC) has the responsibility of overseeing all construction of state buildings as well as authority over the acquisition, disposal, improvement, and demolition of all real property owned by the state. The State Building Commission consists of seven ex-officio members:

- the Governor,
- the Secretary of State,

- the State Comptroller of the Treasury,
- the State Treasurer,
- the Commissioner of Finance and Administration,
- the Speaker of the Senate, and
- the Speaker of the House of Representatives.

The SBC works with three procurement agencies: the University of Tennessee (UT); the Tennessee Board of Regents (TBR); and Real Property Administration (RPA). Any project not included in the UT or TBR system is approved through Real Property Administration, a division of the Department of Finance and Administration.

Projects have an Energy Service Contractor who evaluates buildings to determine what measures would make buildings more energy efficient. Some examples of measures being implemented to increase energy efficiency are geothermal systems, energy efficient lighting, water heaters, and routine maintenance activities. After evaluating the project, the contractor prepares a payback analysis to determine how long it would take the project to recover the initial investment in the project through cost savings. The payback analysis is presented to the SBC as part of the information submitted for project approvals.

The SBC does not have any written guidelines and/or policies concerning what criteria are used relative to payback periods as part of the project approval process. The State Architect stated that the commission typically looks for a payback of five to eight years, although there are times when a project with a longer payback period is considered for approval. However, without any written guidelines or policies, the procurement agencies (UT, TBR, and RPA) have no prescribed basis on which to prepare project documents for approval from the commission.

If the State Building Commission is only approving projects with a payback within five to eight years, there is a possibility that other deserving projects, which have longer payback periods and would improve energy efficiency, are being denied or not even considered. If energy projects are being denied and/or delayed, the operation and efficiency of state buildings could decline to a condition that such projects could become a critical maintenance issue, and the state would miss out on any energy savings that were available when the project was originally proposed.

The State Architect stated that the payback period of five to eight years for performance contracts is based on the contract terms relating to the durations of the five-year contracts (with options for two one-year extensions) with Siemens and Johnson Controls, the two energy service companies the state awarded contracts to in 2003 for energy services after a competitive proposal process. (See Finding 1.) Also, performance contracts have a measurement and verification (M&V) mechanism that is based on a five-year performance evaluation period.

At the June 2004 meeting of the State Building Commission's Executive Subcommittee, members discussed payback periods of energy-related projects. Comptroller of the Treasury John Morgan explained that the original intent of Energy Savings Performance Contracts was for

short-term projects to pay for themselves. Comptroller Morgan also explained that a good payback range would be five to seven years. He added that care needs to be taken that performance contracting is not used as a way to do construction work without bidding projects through the normal capital process. The concern was that using longer payback periods could create an avenue for the “normal” process to be circumvented, not that energy projects should have a particular payback period.

The Department of Economic and Community Development uses paybacks as part of its Local Government and Small Business Energy loan programs. As part of the programs, energy audits are conducted at no cost to a local government or business that is interested in having such an audit done. The energy audit outlines recommendations for ways the entity can improve its facility’s energy efficiency; these recommendations are used to determine the loan amounts that will be awarded. The energy audit also requires that the auditor compute a simple payback for the project by dividing the estimated annual savings into the total estimated cost of the project. The auditor also calculates a Net Present Value analysis for the project. The loan program will offer loans for projects that have a payback of seven years or less. However, even if the project has a payback of more than seven years, if the Net Present Value analysis shows a positive value, then the project will be considered for funding.

The State Building Commission could also consider the useful life of an object as part of determining the appropriate payback for a project. For example, if an agency is proposing a renovation of an existing state building, the commission could hear from the agency what the expected useful life of the building will be once renovations are complete. While there are no standard guidelines for determining useful life, governments can use (a) general guidelines obtained from professional or industry organizations, (b) information for comparable assets of other governments, or (c) internal information. Examples of internal information include property replacement policies for equipment or vehicles, property disposal records, and budget documents.

Lacking any written guidelines or policies regarding payback periods, the procurement agencies (UT, TBR, and RPA) have no prescribed basis on which to prepare project documents for approval from the State Building Commission. If energy projects are being denied and/or delayed based on a subjective payback period, the operation and efficiency of state buildings could decline to the point that these projects would become required maintenance and the state would miss out on any energy savings that were available when the project was originally contemplated. The SBC and State Building Energy Management Program may want to consider including longer-term energy-specific projects in the normal capital project process but include contract requirements for contractors to use energy efficient products and measurement and verification components of energy cost savings.

Recommendation

The State Building Commission should review current payback period practices, including developing written guidelines for payback period criteria that are used to determine approval of energy projects. For example, the guidelines could provide guidance on calculating the payback period and what constitutes an energy project. (Defining an energy project can help ensure that competitive bidding rules are not circumvented.) The criteria should consider the nature of projects and factors such as the useful life. If a blanket policy for payback criteria is applied to all projects proposed to the State Building Commission, there is a possibility that viable energy-related projects could be denied or delayed. The State Building Commission should also consider including a policy addressing payback period criteria in the development of performance-based contracting.

Management's Comment

Department of Finance and Administration:

We concur in part. The State Architect and State Building Commission are in the process of developing guidelines for sustainable design for state facilities which will address energy efficiency during design and value engineering for systems. Adoption of these guidelines should address the intent of this finding.

State Building Energy Management will work with the SBC and follow their direction regarding the issue of payback.

4. The Department of Transportation should place more priority on improving access to E85 pumps statewide

Finding

While Tennessee has taken measures through the Green Island Corridor Project to increase overall alternative fuel (ethanol and biodiesel) availability, it should specifically focus on improving access to E85 pumps statewide.

Ethanol

Generally made in the United States from corn, ethanol is a liquid alcohol fuel that can be made from many biomass feedstocks, including agricultural crops, waste from agriculture and forestry, wastepaper, and municipal solid waste. As an alternative fuel, ethanol is most typically used as a blend of 85 percent ethanol and 15 percent gasoline, known as E85, which is appropriate for specially manufactured, light-duty vehicles. However, the most prevalent use of fuel ethanol in the United States is as an additive in gasoline, which is typically 10 percent

ethanol and 90 percent gasoline (E10), but is not considered an alternative fuel. In this instance, ethanol serves as an oxygenate to prevent air pollution from carbon monoxide and ozone, as an octane booster to prevent early ignition or “engine knock,” and as an extender of gasoline stocks. The most common type of vehicle using ethanol is the flexible-fueled vehicle (FFV), which operates on either ethanol or gasoline or any combination of the two fuels.

According to the U.S. Department of Energy (DOE), using ethanol means that we use a little bit less oil, a nonrenewable fuel, to make gasoline. Unlike gasoline, ethanol is nontoxic and biodegradable—it quickly breaks down into harmless substances if spilled. When small amounts of ethanol are added to gasoline, usually less than 10 percent, there are many advantages. Ethanol reduces carbon monoxide and other toxic pollution from the tailpipes of vehicles, making the air cleaner. It keeps engines running smoothly without the need for lead or other chemical additives. Because ethanol is made from crops that absorb carbon dioxide and give off oxygen, it has the potential to reduce greenhouse gas emissions and help maintain the balance of carbon dioxide in the atmosphere.

The lack of an adequate fuel supply system is a significant barrier to ethanol use, and so far, the use of E85 has been mostly limited to the Midwest. Now that there are a large number of ethanol vehicles in the marketplace nationwide, the success of increasing E85 use depends on making the cost of ethanol competitive with gasoline and building an E85 fueling infrastructure. The U.S. DOE recently awarded \$1 million to recipients of its “Bridge to the Corn Ethanol Industry” initiative. The DOE initiative is designed to help expand domestic ethanol production by bringing together the corn ethanol industry with newer technologies that produce ethanol from agricultural forest wastes and other biomass. DOE stated that the benefits would include “reducing the cost of domestic ethanol production, creating new markets for U.S. corn growers, encouraging the production of a clean-burning alternative to gasoline, and helping to reduce the United States’ dependence on imported oil.”

According to the U.S. Energy Information Administration, ethanol is the most widely used liquid biofuel in the world. Per the Annual Energy Review for 2006, produced by the Energy Information Administration, E85-capable vehicles and fuel use are increasing. Between the years 2000 and 2004, use of E85-capable vehicles increased approximately 142% and was projected to increase an additional 16% by 2005. Also between the years 2000 and 2004, E85 use increased approximately 155% and was projected to increase another 21% by 2005. Therefore, since FFV supplies and E85 usage appear to be increasing, it appears reasonable for E85 pump availability to follow suit.

Availability is especially important for Tennessee because the state’s fleet, maintained by General Services’ Division of Motor Vehicle Management and the Tennessee Department of Transportation (TDOT), has a significant number of FFV (currently 33% for General Services), or E85 compliant, vehicles. (See Observation 1.) Purchases of Flex Fueled Vehicles (FFV) have increased significantly since 2003. (See Table 1.)

Table 1
Tennessee Departments of Transportation and General Services
Fleet Totals*, FFV Purchases, and E85 Usage

Year	FFV Purchases		E85 Usage Gallons	
	<i>General Services</i>	<i>TDOT</i>	<i>General Services</i>	<i>TDOT</i>
2003	143	122	50	N/A
2004	179	71	1,171	331
2005	218	99	1,204	600
2006	357	170	2,258	823

*Based on information submitted by TDOT and General Services to the federal government.

Based on our review of publicly available pumps as of November 2007, there are only nine publicly available E85 stations in the state. (See Map, pp. 34-36.) Additionally, based on a comparison of publicly available E85 stations available through the Fuelman network, all nine pumps are part of the Fuelman network, the state's fleet card system for public fuel purchases.

Biodiesel

BioTenn (a project of the Alternative Fuels Working Group) reports that biodiesel is a clean-burning alternative diesel fuel produced from renewable sources, such as vegetable oils or animal fats. Blends of up to 20% biodiesel and 80% petroleum diesel, called B20, can be used in most diesel engines with little or no modifications. BioTenn asserts that biodiesel is simple to use, biodegradable, and nontoxic and using biodiesel significantly reduces unburned hydrocarbons, carbon monoxide, and air toxins compared to emissions when using diesel fuel. In fact, BioTenn reports that scientific research confirms that biodiesel exhaust has a less harmful impact on human health than diesel emissions, including decreased levels of cancer-causing compounds. According to the U.S. Department of Energy and the U.S. Department of Agriculture, biodiesel reduces net carbon dioxide emissions by 78% compared to petroleum diesel. The carbon dioxide released when biodiesel is burned is recycled by growing plants.

Biodiesel must meet strict industry specifications (ASTM D6751) in order to ensure proper performance. To determine compliance with these standards, the Tennessee Department of Agriculture Regulatory Services Division periodically inspects samples of B100 (100% biodiesel) used as blend stock and B20 being sold at the pump.

Per the Annual Energy Review for 2006 produced by the Energy Information Administration, biodiesel use is increasing. Between the years 2000 and 2004, biodiesel use increased approximately 298% and was projected to increase another 224% by 2005.

Table 2
Tennessee Department of Transportation
Fleet Totals*, Biodiesel Vehicle Purchases, and Biodiesel Usage

Year	Biodiesel Vehicle Purchases	Biodiesel Usage Gallons
2005	10	4,900
2006	70	8,194

*Based on information submitted by TDOT to the Federal Government.

Based on our review of currently available and planned publicly available pumps identified through national, local, and state lists, as of November 2007 there are 40 publicly available B20 stations in the state. (See Map, pp. 34-36.) Additionally, based on a comparison of publicly available B20 stations available through the Fuelman network, only 23 (57.5%) are part of the Fuelman network.

Conclusion

Due to the number of state-owned Flex Fuel Vehicles, continuing federal and state demands for increasing alternatively fueled vehicle fleets, as mentioned in Observation and Comment 1 on page 15, and the increased availability of flex fueled vehicles, the state should continue to expand public access to E85 and B20 to achieve a true statewide system. Due to the current make up of FFV totals, increasing access to E85 should be a higher priority than B20 pumps. Furthermore, the focus should be on areas with very limited or no access, such as the I-40 corridor in West Tennessee. Additionally, the state should promote the expansion of access to these pumps through the contracted Fuelman program to ensure that state employees using the state fleet have maximum access to alternative fuels. A successful supply infrastructure and comprehensive education of state employees by General Services will help increase the state's use of E85, which will hopefully extend to the public.

Increasing Access

As stated on page 10, the Department of Transportation (TDOT) is working to assist retail station owners with infrastructure to dispense E85 (ethanol) and B20 (biodiesel). The TDOT Biofuel Green Island Corridor Grant Project is part of the Governor's Alternative Fuels Working Group. The project awards grants to retail fuel stations to help with adding E85 ethanol and B20 biodiesel pumps as part of the emerging Green Island Biofuel Corridor Network across the state. However, the majority of the state's fleet are E85 capable, therefore the department should focus specifically on increasing E85 pumps statewide.

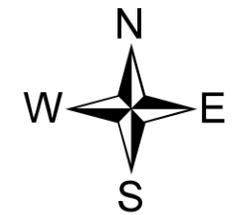
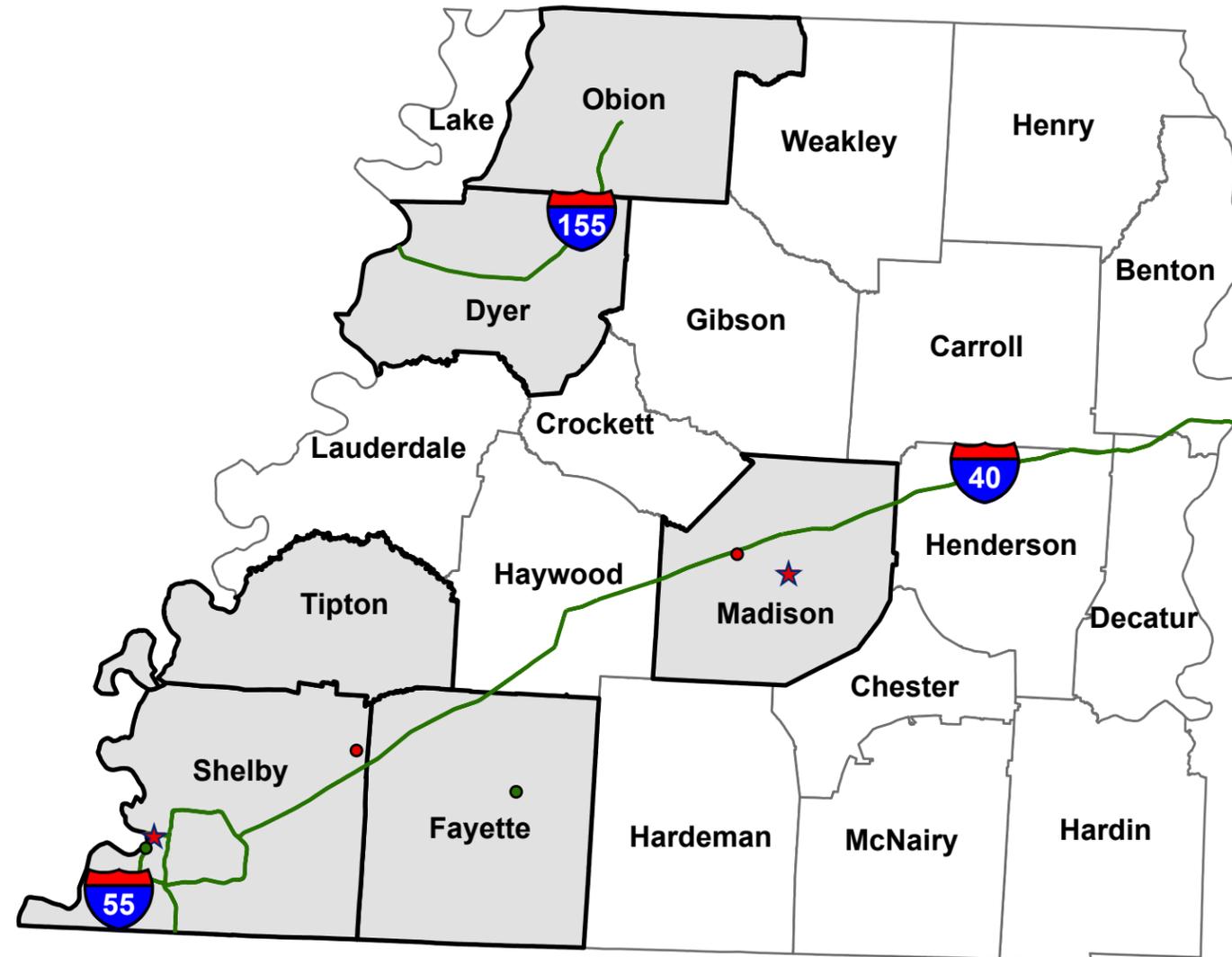
Recommendation

The Department of Transportation should continue to expand public access to E85 and B20 pumps through the Green Island Corridor Grant Project to fully realize the benefits of alternatively fueled vehicles. Specifically, due to the state fleet make up, higher priority should be given to improving E85 pump access statewide. Additionally, the Department of General Services should work with the Fuelman program to maximize state fleet access to alternative fuels, especially E85 fuel. Once the supply infrastructure is in place, the state can focus on educating state employees about the use of ethanol and biodiesel as well as expanding education to the public.

TENNESSEE BIOFUEL STATIONS

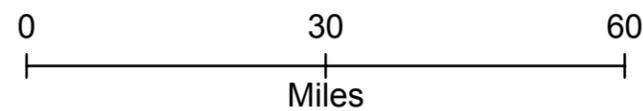
- West Region -

November 2007



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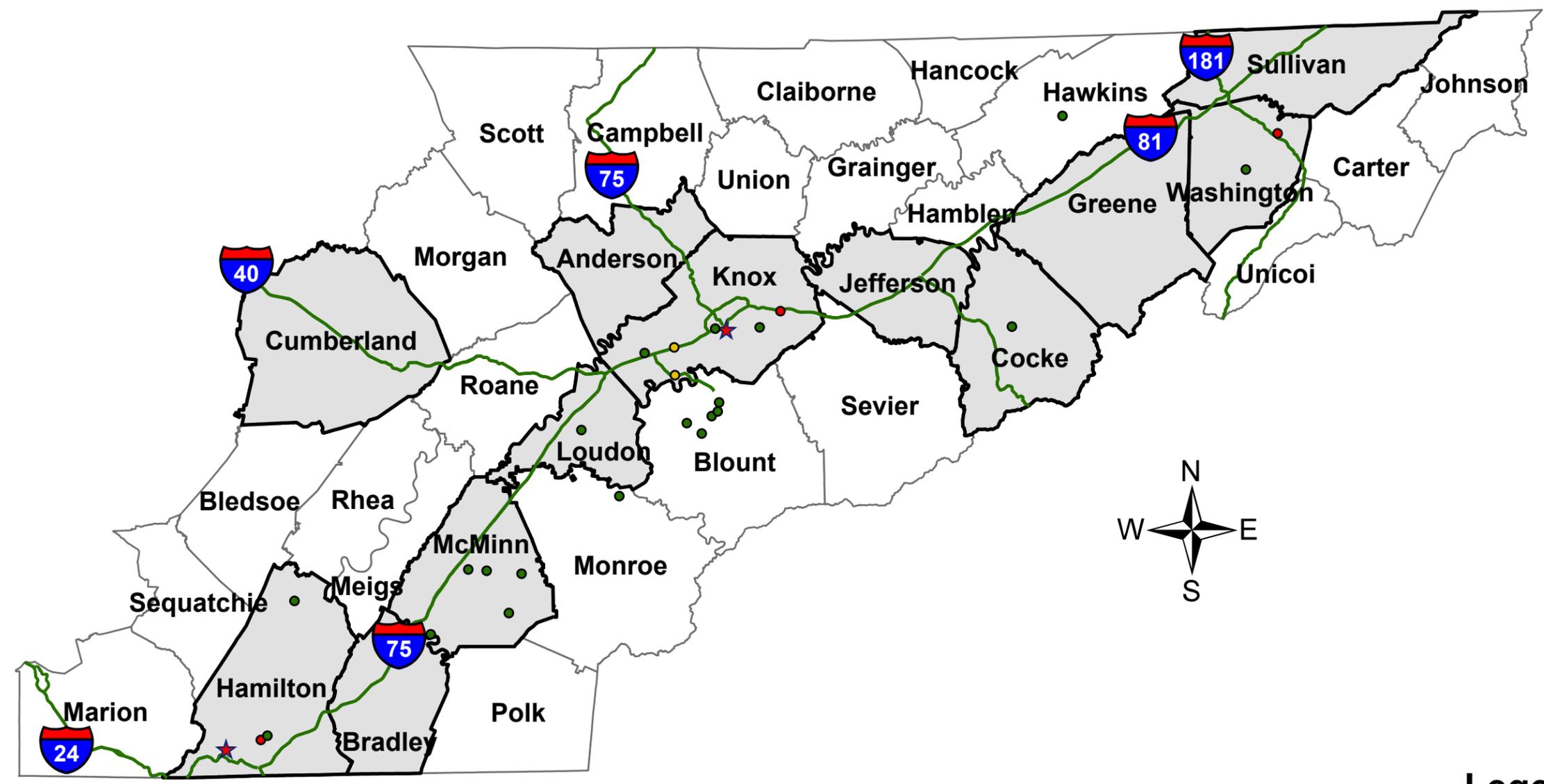
- E85 Stations
- B20 Stations
- TDOT Facilities with BioDiesel
- ★ Tennessee Dispatch Offices
- BioTENN Priority Counties



TENNESSEE BIOFUEL STATIONS

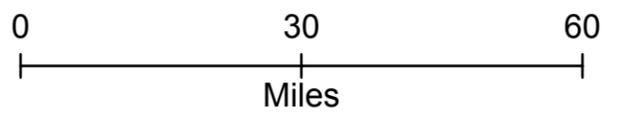
- East Region -

November 2007



Legend

- E85 Stations
- B20 Stations
- TDOT Facilities with BioDiesel
- ★ Tennessee Dispatch Offices
- BioTENN Priority Counties



TENNESSEE BIOFUEL STATIONS

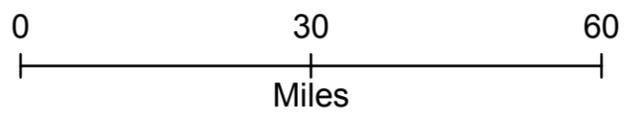
- Middle Region -

November 2007



Legend

- E85 Stations
- B20 Stations
- TDOT Facilities with BioDiesel
- ★ Tennessee Dispatch Offices
- BioTENN Priority Counties



Managements' Comments

Department of General Services:

We concur. The Department of Transportation has the authority and responsibility to increase E85 stations and add those stations to the Fuelman Network. As soon as the Department of Transportation increases the number of available E85 stations available through the Fuelman Network, the Department of General Services will update our fleet tracker system to ensure that every one of our customers is aware of the additional stations. We will also work with Fuelman to ensure that their network is updated to reflect all available stations. We have already contacted Fuelman in regards to stations that should be updated on their website as of November 2007 to reflect that all nine E85 pumps are available through the Fuelman Network instead of the six that is currently reflected on their website.

Department of Transportation:

We concur in part with Finding 4 in the draft audit report. TDOT concurs that Tennessee needs better access to E85 in all areas, and TDOT has taken steps to achieve that goal. To increase availability of biofuels, TDOT has invested federal CMAQ funds in biofuels refueling infrastructure. More recently, the Governor and the General Assembly provided \$1.5 million to TDOT for grants to establish biofuel green islands along interstate corridors and major highways. TDOT is working to establish at least one E85 pump and one B20 pump in each of 30 priority counties.

Two separate grant competitions have been completed, and TDOT is developing contracts for a number of additional E85 and B20 stations. The third grant competition has been publicly announced, and the deadline for applications is February 15, 2008. We will continue to work with fuel providers and stakeholders (e.g., Tennessee Oil Marketers Association, Clean Cities coalitions, local governments and farm co-ops) to establish more retail locations for E85 and B20. To complete the Biofuel Green Islands Corridor Network across the 30 priority counties, TDOT will need additional funding for biofuels refueling infrastructure.

We recognize that one of the objectives of the performance audit is to “determine whether the Department of General Services and Department of Transportation currently maximize alternative fuel usage in their motor vehicle fleets to the extent possible.” TDOT concurs that statewide availability of E85 is important to the state’s ability to use E85 in the many flexible fuel vehicles that have been purchased and will be purchased in the future for state fleets. However, the performance audit does not take into account TDOT’s charge under the Alternative Fuels Working Group and the Governor’s Green Island Corridor program. TDOT does not concur with the finding that TDOT should place a higher priority on improving access to E85 at the expense of meeting the state’s needs for publicly accessible B20 pumps. Increasing access to biodiesel is also important to the state’s biofuels strategic plan, and there are large gaps in biodiesel availability as well. There are many more diesel-powered engines in Tennessee than flexible fuel vehicles. Diesel emissions present greater risks to public health than emissions from gasoline-powered engines, and increasing the use of cleaner-burning biodiesel is an important

strategy for reducing harmful emissions from these vehicles. As a result, TDOT plans to continue placing a priority on establishing green island locations for both E85 and B20.

Providing wide availability to E85 is an important element in the state's goals to promote production and use of ethanol in Tennessee. In the future, if grant funds are available, we will consider additional ways to place a priority on retail stations willing to install E85 infrastructure.

The draft audit report correctly states that there are currently nine (9) E85 pumps in the state. However, all of these stations will accept the state Fuelman card. We expect seven (7) to nine (9) stations to begin selling E85 in the first half of 2008, and we anticipate that many, if not all, of these stations will accept Fuelman cards.

For biodiesel, the audit report indicates that there are 40 B20 pumps across the state. There are currently 28 B20 pumps open in Tennessee, with an additional six (6) stations set to open in the next few months. We have grant contracts signed for four (4) more B20 pumps and are working on several others. To date, those B20 stations that received state grants all accept Fuelman cards. A few stations have not yet opened. While the state has no influence on whether privately owned fuel stations choose to accept Fuelman cards, we will continue to work with Fuelman to expand the number of retailers who participate in the program. TDOT will also pursue changes in the state fuel purchase system (e.g., widely accepted credit cards) designed to provide state employees with greater access to biofuel stations.

Public education is also essential to help create demand for biofuels. The state needs to encourage fleets and citizens to use these fuels, and thereby generate sales for existing E85 and B20 stations. If we can demonstrate that existing biofuel stations are making a profit in selling biofuels, it will be much easier to convince other fuel stations to get started in the biofuels business. If we cannot build demand for these fuels, then it will be extremely difficult to persuade more fuel stations to invest in biofuels infrastructure.

Finally, the draft report refers to TDOT's use of B20 and indicates that TDOT "hopes" to expand B20 use beyond the Region 1 pilot. As of July 2007, we have converted or installed infrastructure for B20 in all four Region facilities and in districts in Johnson City, Cookeville and Arlington, and we are using B20 in TDOT diesel vehicles located at these facilities. We are currently assessing other districts to identify possible future conversions.

5. Weaknesses exist in the Department of General Services' compliance with state laws regarding life-cycle costs and energy efficiency standards

Finding

We reviewed Sections 4-3-1105(20-21), 4-3-1012, and 12-3-606, *Tennessee Code Annotated*, and found weaknesses in how the Department of General Services applies these requirements to its purchases.

Life-Cycle Costs

Sections 4-3-1105(20-21) and 4-3-1012, *Tennessee Code Annotated*, require the Department of General Services to provide state vehicle energy-management life-cycle (operational and maintenance) cost analysis; and define and implement an energy efficiency code for state procurement of equipment and appliances.

According to the Director of Motor Vehicle Management at the Department of General Services, the life-cycle cost calculation is based on the length of time in the fleet, condition of the vehicle, and mileage. Replacement of a vehicle is based on money in the budget. During our audit, we requested examples of the life-cycle cost calculation and any other information used in decision making for vehicle purchases. The Deputy Commissioner of General Services stated that life-cycle costs are not used in the evaluation process for purchasing a vehicle. It is purely low bid meeting the minimum specifications. Motor Vehicle Management uses three categories of life-cycle evaluation in calculating maintenance rates. These three categories are

1. Fixed Cost – includes depreciation, up-fitting, accessories, license and titles, overhead (fleet and administrative);
2. Variable or Operating Cost – includes repairs and maintenance, fuel and oil, tires, and unreimbursed damage repair; and
3. Incidental Cost – includes miscellaneous expenses such as car washes.

While the agency provided us with a formula for calculating complete life-cycle costs from the time of acquisition until salvage, no documentation was provided that actually showed this calculation for any vehicles in General Services' fleet; in fact, the example we were given related to air conditioners. The only document of costs that we were provided was a monthly report of average vehicle costs.

We interviewed fleet management officials in seven other states, including two different agencies from New York, regarding the use of life-cycle costing. Of the eight agencies we interviewed, five use some form of life-cycle cost analysis; however, one agency noted that it does not have enough money in its budget to base decisions on life-cycle costs. We asked each agency interviewed to provide the factors that go into its life-cycle cost calculation. Each agency that uses life cycle cost analysis uses different variables in their calculations. The next page lists the agencies we interviewed, if they use life-cycle costing, and the factors that go into their life-cycle cost calculation.

Interviews With Other States Regarding Use of Life-Cycle Costing

State	Department	<u>Life Cycle Costing?</u>		Some factors included in Life Cycle Costing
		Yes	No	
Alabama	Finance		✓	
California	General Services	✓		Cost per mile of operating a vehicle
Minnesota	Administration	✓		Miles per gallon and if the vehicle is flex fuel or not.
New York	Transportation	✓		Not enough money to base purchase decisions on life-cycle cost.
New York	General Services		✓	
North Carolina	Administration	✓		Total number of miles the vehicle will be used before being retired.
Ohio	State Fleet Administrator	✓		Miles per gallon, maintenance costs, salvage dollars, and fuel type.
Virginia	Office of Fleet Management		✓	

Source: Interviews with officials in states listed.

While General Services uses some of the life-cycle cost information, it appears that the department is not using this calculation as intended by the legislature.

Energy Efficiency Standards

Section 12-3-606, *Tennessee Code Annotated*, states that where energy efficiency standards are established, the Board of Standards shall 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.

We asked the Deputy Commissioner at General Services how the agency complies with the law above and to provide any documentation of its compliance. The Deputy Commissioner provided us with a section of the *Purchasing Procedures Manual* that references life-cycle costing. This section states,

Acceptable performance requirements may not establish long-term performance capability or value. A particular brand or item may be desired due to its established long-term performance. Whenever there is a probability of other brands meeting the minimum acceptable performance requirements and the long-term performance of the brand is unknown or questionable, a total cost specification design should be used. The Product Comparison Chart technique is uniquely suited to display life-cycle cost data. Life-cycle/total cost specification design should be applied to establish long-term performance capability or value (i.e., energy-efficient products). Examples of life-cycle costing can be found in formulas developed for the evaluation of bids for items such as window air conditioners and water heaters.

From the information we have reviewed and the information provided by the Deputy Commissioner of General Services, the agency has not established specific rules requiring life-cycle costs to be considered in the purchase of major energy-consuming products.

Recommendation

The Commissioner of the Department of General Services should review the requirements of Sections 4-3-1105(20-21) and 4-3-1012, *Tennessee Code Annotated*, and take immediate steps to determine whether the department is in compliance with the spirit and letter of the law. If the department is not complying with the laws, the Commissioner should designate a particular department official to be responsible for ensuring full compliance with these laws. Full compliance would include, at a minimum, the calculation and analysis of life-cycle costs and creating specific rules requiring life-cycle costs to be used in contracting for major energy-consuming projects.

Management's Comment

Department of General Services:

We concur. In an effort to comply with T.C.A. § 4-3-1105 (20) to “provide state vehicle energy management life cycle (operational & maintenance) cost analysis,” the department is scheduled to receive a new fleet tracker system that will perform operational and maintenance cost analysis of state-owned vehicles from the time of acquisition until disposal. This system implementation is currently in process and scheduled to be completed in early 2008.

The department is also in the process of purchasing software for testing of vehicle life cycle cost analysis procurement for comparison against vehicles currently being purchased under the competitive bid process.

To meet the requirements of T.C.A. § 4-3-1105 (21) to “define and implement an energy efficiency code for state procurement of equipment and appliances” the Division of Purchasing is

in the process of developing state-based energy efficiency standards to complement the current federal standards program. These standards will include not only identifying products that are currently Energy Star qualified, but also identifying products that have the greatest potential benefit to the state and developing state based standards for those products.

These standards will include establishing state procurement specifications for targeted energy efficient products. These specifications will also identify products where life cycle costs are to be utilized in the evaluation process.

T.C.A. § 12-3-606, requires the Board of Standards to adopt rules requiring life cycle costs to be used by the Commissioner in contracting for major energy-consuming products, where energy efficiency standards are established. The Department of General Services will work with the Board of Standards on the development of specific rules concerning life cycle costs, and begin implementing the rule once it has been adopted.

6. The General Assembly should consider clarifying several state energy statutes

Finding

The Departments of Economic and Community Development, General Services, and Finance and Administration’s state energy statutes could be improved to clarify the General Assembly’s intent in passing the laws, to promote accountability, and to fix problems created by previous statutory changes.

Department of Economic and Community Development Statutes

As discussed on page 52, the Department of Economic and Community Development is not fulfilling its mandate in Section 3-2-110, *Tennessee Code Annotated*, to provide “energy impact assessments” for “general bills, resolutions, and rules . . . which will have a significant impact” on specified aspects of “energy-related natural resources or the production or consumption of energy within Tennessee.” (See page 43.) To assist the department in meeting this mandate, the General Assembly may wish to consider clarifying the statutory terms “energy impact assessment” and “significant impact.”

Department management stated that they cannot meet the statutory energy assessment requirement, as currently interpreted by them, in a timely manner. Specifically, the department interprets the term “energy impact assessment” to refer to an in-depth study requiring months or years to complete. However, the statute requires the department to submit these assessments within seven days of an affected bill or resolution’s introduction or seven days before a committee’s consideration of an affected rule. Therefore, under the department’s interpretation, it would be unable to fulfill the mandate in a timely manner. As a result, the General Assembly may wish to clarify the type and depth of information it expects the department to provide in an “energy impact assessment.”

Tennessee Code Annotated
Section 3-2-110 Energy impact assessments

(a) Energy impact assessments shall be provided for all general bills, resolutions, and rules reviewed by a committee of the general assembly under the provisions of the Uniform Administrative Procedures Act, compiled in title 4, chapter 5, which will have significant impact on the cost, rate of extraction, processing, transport and use of energy-related natural resources or the production or consumption of energy within Tennessee.

(b)(1) Not more than seven (7) days following the introduction of any such bill or resolution, the division of energy of the department of economic and community development shall furnish to the chief clerk of the house or houses of introduction a statement of analysis of the energy impact of such bill or resolution, and shall prepare and distribute copies of the statement to members of the general assembly. Within seven (7) days following receipt of a request from a member of the general assembly for an energy impact assessment on any proposed bill or resolution requiring such assessment, the division shall prepare an energy impact assessment to accompany such proposal at the time of introduction. Within twenty-four (24) hours following a request by the sponsor of an amendment to any pending measure on which an energy impact assessment is required by this section, the division shall prepare for the sponsor an energy impact assessment showing what effect the amendment would have on the estimates made in the energy impact assessment which applies to the bill or resolution.

(2) No comment or opinion shall be included in the energy impact assessment regarding the merits of the measure for which the assessment is prepared; however, technical or mechanical defects may be noted.

(c)(1) At least seven (7) days before committee consideration of any rule under the provisions of the Uniform Administrative Procedures Act, compiled in title 4, chapter 5, the division shall furnish each member of the reviewing committee with a statement of the analysis of the energy impact of such rule.

(2) No comment or opinion shall be included in this energy impact assessment regarding the merits of the rule for which the assessment is prepared; however, technical or mechanical defects may be noted.

(d)(1) The division shall be furnished with copies of bills or resolutions requiring energy impact assessments by the office of legislative services at the same time such bills and resolutions are distributed to members of the general assembly.

(2) Copies of rules requiring energy impact assessments shall be furnished to the division at the same time and in the same manner they are distributed to the appropriate legislative committees as provided by the Uniform Administrative Procedures Act, compiled in title 4, chapter 5.

Similarly, state law does not define the potentially subjective term “significant” to describe which bills, resolutions, and proposed rules the department must address. Therefore, the General Assembly may wish to consider clarifying the term “significant” to help the department to identify which bills, resolutions, and proposed rules the General Assembly considers to be significant.

Energy Mandates for the Departments of General Services and Finance and Administration

The General Assembly may also wish to consider enhancing and updating the energy mandates of the Departments of General Services and Finance and Administration. First, the General Assembly may wish to consider whether the Department of General Services should be statutorily required to develop a dedicated energy management office and/or annually report its state energy efficiency activities. Second, the General Assembly may wish to consider clarifying or updating statutes and clarifying references to previously amended statutes.

Energy Management Office. Unlike the Department of Finance and Administration, the Department of General Services is not statutorily required to form an office to coordinate its energy management activities. The Office of Energy Management, including facility-related energy management responsibilities, was statutorily assigned to the Department of General Services prior to 1999. However, the Public Acts of 1999, Chapter 457, Section 7, transferred the office- and facility-related energy activities to the Department of Finance and Administration. The Department of General Services retained all other state energy-related functions, including motor vehicle fleet management. However, the Public Acts of 1999 did not provide for a coordinating office within the Department of General Services, unlike the Department of Finance and Administration, even though the Department of General Services retained significant energy-related responsibilities.

According to the United States Environmental Protection Agency's Energy Star program, appointing a dedicated energy director and energy team, such as through a dedicated energy office, is a key step to establishing a successful energy-management program. As a result, the General Assembly may wish to consider establishing an energy-management office within the Department of General Services. Similarly, the General Assembly may wish to clarify whether the two departments should continue to operate independently in terms of energy activities or report to a common manager or agency for these purposes.

Energy Efficiency Activity Reporting. Also, as a result of the 1999 changes to the law, it is not clear whether the Department of General Services or the Department of Finance and Administration is responsible for annually reporting about state energy efficiency activities to the General Assembly. Prior to 1999, Section 4-3-1105(24), *Tennessee Code Annotated*, clearly required the Department of General Services to prepare an annual report on all energy management activities, including the activities of the Office of Energy Management. However, when the Office of Energy Management and facility-related energy functions statutorily moved to the Department of Finance and Administration in 1999 via Section 4-3-1012, *Tennessee Code Annotated*, the reporting requirement was left embedded in the Department of General Services' statutes. As a result, it is unclear which department should issue an annual report. Currently only the Department of Finance and Administration issues an annual energy activity report, and that report only covers facility-related energy efficiency activities. Neither this report, nor any other report, focuses on the Department of General Services' energy activities. In order to enhance accountability, the General Assembly may wish to consider clarifying whether the Department of Finance and Administration, the Department of General Services, or both

departments should be required to issue an annual energy activity report. Also, if the General Assembly prefers to receive only one energy activity report, it may wish to consider clarifying whether that report should include both departments' energy activities.

Monitoring Utility Costs. The General Assembly may also wish to consider identifying and updating or clarifying other statutes. For example, Section 4-3-1105(17), *Tennessee Code Annotated*, may need updating to reflect current state practices. When combined with Section 4-3-1012, *Tennessee Code Annotated*, this statute requires the Department of Finance and Administration to supervise the provision of utilities to state-owned facilities it controls, as well as implementing a system for monitoring and controlling the cost of such utilities. However, the Department of General Services currently arranges and pays utilities for these buildings and monitors utility costs. In contrast, the Department of Finance and Administration acts as the state's energy efficiency expert and should also work with the Department of General Services to monitor state facilities' energy efficiency. This assignment of responsibilities appears consistent with the departments' overall agency functions of facility management and energy efficiency, respectively. Therefore, the General Assembly may wish to consider updating Section 4-3-1105(17), *Tennessee Code Annotated*, (as addressed in *Tennessee Code Annotated*, Section 4-3-1012) to clarify that the Department of General Services should be responsible for supervising the provision of utilities to state-owned buildings under its control, but both the Department of General Services and Department of Finance and Administration should be jointly responsible for implementing a system for monitoring and controlling the cost of such utilities.

Setting Energy Management Goals. The General Assembly may also wish to resolve apparent conflicts between Sections 4-3-1105(19) and 4-3-1017(b), *Tennessee Code Annotated*. Officials of the Department of Finance and Administration report that the department has not implemented several responsibilities assigned by Sections 4-3-1105 and 4-3-1012, such as defining and implementing specific yearly conservation/energy management goals for state-owned facilities, because state agencies which control buildings are not mandated to participate in the State Building Energy Management Program under Section 4-3-1017(b). This latter statute states that the program "may be implemented by the governor by executive order for all departments and agencies of the executive branch and for all state colleges and universities operated by the board of trustees of the University of Tennessee or the state board of regents." Because the Governor has not issued such an executive order, officials of the Department of Finance and Administration interpret that they are not bound to implement all of its statutory provisions, especially those tied to buildings which are not under its control.

The state may not be optimizing its energy efficiency because some of these functions are unfulfilled. For example, the United States Environmental Protection Agency's Energy Star program's "Guidelines for Energy Management" state:

Performance goals drive energy management activities and promote continuous improvement. Setting clear and measurable goals is critical for understanding intended results, developing effective strategies, and reaping financial gains.

Well-stated goals guide daily decision-making and are the basis for tracking and measuring progress. Communicating and posting goals can motivate staff to support energy management efforts throughout the organization.

Due to statutory conflict and/or confusion, the state may not be using all available best-practice tools, such as goal setting, to improve energy efficiency. Therefore, the General Assembly may wish to consider clarifying this situation. For example, the General Assembly could statutorily clarify which statutes it expects the Department of Finance to implement in the absence of an executive order authorized by Section 4-3-1017(b), *Tennessee Code Annotated*. Similarly, the General Assembly could amend Section 4-3-1017(b) to clarify that some or all state agencies should cooperate with the State Building Energy Management Program absent an executive order expanding the program.

Additional Statutory Changes. There is also language in several statutes which needs to be amended to conform to the 1999 changes. For example, Sections 12-3-603(5) and 4-3-1104(3), *Tennessee Code Annotated*, refer to the Office of Energy Management as being housed within the Department of General Services. However, as previously discussed, the Public Acts of 1999, Chapter 457, Section 7, transferred the office to the Department of Finance and Administration.

Recommendation

The General Assembly may wish to consider several statutory changes to clarify and/or better define terms and expectations. For example, the General Assembly may wish to clarify the statutory terms “energy impact assessment” and “significant impact” to aid the Department of Economic and Community Development in meeting its energy mandates. Additionally, the General Assembly may wish to consider clarifying, enhancing, and updating energy mandates for the Departments of General Services and Finance and Administration. The General Assembly may wish to assign staff to review statutes affected by the 1999 amendments to Sections 3-2-110; 4-3-1105(17), (19), and (24); and 4-3-1107(b), *Tennessee Code Annotated*, to ensure that the provisions of these laws are consistent with these changes.

Managements’ Comments

Department of Economic and Community Development:

We concur. The Department of Economic and Community Development’s stance is to be subject matter experts on all energy related topics and to efficiently and effectively provide public policy assistance. Clarifying the statute related to “energy impact assessments” and “significant impact” will provide a formal standard of the information needed from the Energy division. Currently, there is uncertainty if the assessment is similar in structure and intent to a fiscal note or is to be an in-depth analysis or study. *Tennessee Code Annotated*, Section 3-2-110, directs the department to perform the following:

Tennessee Code Annotated
Section 3-2-110 Energy impact assessments

(a) **Energy impact assessments** shall be provided for all general bills, resolutions, and rules reviewed by a committee of the general assembly under the provisions of the Uniform Administrative Procedures Act, compiled in title 4, chapter 5, which will have **significant impact** on the cost, rate of extraction, processing, transport and use of energy-related natural resources or the production or consumption of energy within Tennessee.

(b)(1) Not more than seven (7) days following the introduction of any such bill or resolution, the division of energy of the department of economic and community development shall furnish to the chief clerk of the house or houses of introduction a statement of analysis of the energy impact of such bill or resolution, and shall prepare and distribute copies of the statement to members of the general assembly. Within seven (7) days following receipt of a request from a member of the general assembly for an energy impact assessment on any proposed bill or resolution requiring such assessment, the division shall prepare an energy impact assessment to accompany such proposal at the time of introduction. Within twenty-four (24) hours following a request by the sponsor of an amendment to any pending measure on which an energy impact assessment is required by this section, the division shall prepare for the sponsor an energy impact assessment showing what effect the amendment would have on the estimates made in the energy impact assessment which applies to the bill or resolution.

(2) No comment or opinion shall be included in the energy impact assessment regarding the merits of the measure for which the assessment is prepared; however, technical or mechanical defects may be noted.

(c)(1) At least seven (7) days before committee consideration of any rule under the provisions of the Uniform Administrative Procedures Act, compiled in title 4, chapter 5, the division shall furnish each member of the reviewing committee with a statement of the analysis of the energy impact of such rule.

(2) No comment or opinion shall be included in this energy impact assessment regarding the merits of the rule for which the assessment is prepared; however, technical or mechanical defects may be noted.

(d)(1) The division shall be furnished with copies of bills or resolutions requiring energy impact assessments by the office of legislative services at the same time such bills and resolutions are distributed to members of the general assembly.

(2) Copies of rules requiring energy impact assessments shall be furnished to the division at the same time and in the same manner they are distributed to the appropriate legislative committees as provided by the Uniform Administrative Procedures Act, compiled in title 4, chapter 5.

This direction will help the department plan the use of its staff resources and provide the legislature with timely energy related information. Given the importance of energy conservation, clear guidelines can help the state save money, precious resources, and provide opportunity to effect policy changes where applicable. It should be noted, however, that the Energy Division is funded entirely by federal dollars from the U.S. Department of Energy (USDOE). As such,

USDOE may require the Energy division to obtain federal approval prior to the new activities being performed.

Department of Finance and Administration:

We concur that additional clarification should be provided and SBEM staff will gladly work with the appropriated parties to clarify the statutes.

Department of General Services:

We concur in part. We concur that the General Assembly should review all relevant statutes to ensure that all statutes affected by the 1999 amendments are consistent with the provisions of the current statutes as it relates to the roles and duties of the affected departments. The Department of General Services initiated Public Chapter 72 last session to delete certain references in the code to General Services regarding energy management as it relates to buildings. This was in response to statutes identified in the Performance Audit issued in April 2006.

We do not concur that the General Assembly should consider establishing an additional Office of Energy Management within the Department of General Services to address purchases of energy efficient products, equipment and motor vehicles. This would only add confusion with the existing office in Finance & Administration. The Department of General Services, Divisions of Purchasing and Motor Vehicle Management are working in concert to fully implement the requirements of the current statutes.

7. The Department of Finance and Administration should take steps to adhere to other statutory energy mandates

Finding

In addition to complying with previously discussed statutes, the Department of Finance and Administration needs to take additional steps to adhere to other energy mandates established in *TCA*, such as developing and implementing an energy efficiency code for future state buildings and submitting its annual report to all statutorily mandated recipients.

The Department of Finance and Administration has not complied with Sections 4-3-1105(22) and 4-3-1012, *Tennessee Code Annotated*, because the state's energy efficiency code does not include a review of renewable options by means of life-cycle cost analysis for future state buildings. *TCA* states that "this life-cycle cost analysis of renewable options shall be mandatory." The Director of the State Building Energy Management Program reports that the department cannot implement this mandate because the state energy building project process establishes an overall project budget through the General Assembly.

Because the department is not complying with this statute, the state may not be realizing additional energy efficiency savings that could be generated from a comparative life-cycle cost analysis for future state buildings. Furthermore, the Whole Building Design Guide website, sponsored by the National Institute of Standards and Technology, explains:

The purpose of an LCCA [Life-Cycle Cost Analysis] is to estimate the overall costs of project alternatives and to select the design that ensures the facility will provide the lowest overall cost of ownership consistent with its quality and function. The LCCA should be performed early in the design process while there is still a chance to refine the design to ensure a reduction in life-cycle costs (LCC).

In addition to possibly missing energy efficiency savings, the executive branch is not complying with the General Assembly's clear intent. Therefore, the Department of Finance and Administration should identify and implement ways it can define and implement an energy efficiency code for future state buildings that includes a mandatory life-cycle cost analysis early in the energy project process.

Additionally, the Department of Finance and Administration needs to disseminate its annual report to all of the recipients mandated in 4-3-1105(24), *Tennessee Code Annotated* (as assigned to the department by Section 4-3-1012). The department currently satisfies multiple statutory reporting requirements in one single annual report. However, it submits this report to some, but not all, of the required parties. Specifically, the department does not automatically submit the report to the Governor, Speakers of the Senate and House of Representatives, and Chairs of the Senate and House Committees on Government Operations (or their successor committees) as required by Section 4-3-1105(24), *Tennessee Code Annotated*.

Recommendation

The Department of Finance and Administration should define and implement an energy efficiency code for future state buildings that mandates life-cycle cost analysis at the beginning of the project. The department should also disseminate its annual report to all recipients as required by Sections 4-3-1105(24) and 4-3-1012, *Tennessee Code Annotated*. The department may also consider adding the annual report to its website to allow for greater access.

Management's Comment

Department of Finance and Administration:

We concur. An energy efficiency code for state buildings is in place. ASHRAE (American Society for Heating, Refrigeration and Air Conditioning Engineers) Standard 90.1-1999, Energy Standards for Buildings Except Low-Rise Residential, is incorporated into all capital projects managed by F&A, Division of Real Property Administration by reference in the

Designers' Manual and in the projects specifications. Updates are being considered as part of the sustainable design guidelines currently being developed under the direction of the state architect.

F&A currently provides copies of its annual report to the entities mandated by 4-3-1108. However, we will expand distribution of the annual F&A report to include all parties cited in 4-3-1105(24).

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

Finding

The General Assembly may wish to consider revising *Tennessee Code Annotated* to allow the state to adopt and update energy building codes since the current language of Section 13-19-101 limits the state to implementing the 1992 Model Energy Code.

Energy building codes for public and private facilities have been adopted as part of *Tennessee Code Annotated*. Enforcement of the use of these codes for both public and private facilities is a responsibility of the Department of Commerce and Insurance; the State Building Commission (SBC) also has concurrent jurisdiction for the enforcement of building codes for state buildings. Statutory requirements for the Model Energy Code can be found in Section 13-19-101, *Tennessee Code Annotated*:

The Model Energy Code, 1992 Edition, for energy conservation in new building construction, published by the Council of American Building Officials, is hereby adopted by reference as the minimum requirements for the effective use of energy in new buildings. Notwithstanding the provisions of the first sentence of this section, local jurisdictions shall have the option of adopting the 2000 International Energy Conservation Code with 2002 amendments, published by the International Code Council, as the minimum requirements for the effective use of energy in new buildings in that jurisdiction. However, any revisions or amendments to the above referenced codes shall become effective only upon approval by the general assembly or upon approval by the appropriate committee of the general assembly.

[Acts 1978, ch. 888, § 1; *Tennessee Code Annotated*, § 13-2501; Acts 1993, ch. 193, § 1; 1994, ch. 977, § 1; 2003, ch. 329, § 1.]

The Model Energy Code (MEC), published and maintained by the International Code Council as the International Energy Conservation Code, contains building guidelines that incorporate energy efficiency standards for both residential and commercial buildings, as well as renovations to existing buildings. For commercial buildings, the MEC incorporates the American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE)

standard 90.1 as part of the requirements for building code standards. The U.S. Department of Energy has developed a compliance tool set that will allow designers and builders to determine whether a building is in compliance with the appropriate standards.

According to the State Architect, the state follows ASHRAE Standard 90.1-1999 as the minimum requirement for state building projects. However, according to representatives for ASHRAE, the most recent standard published by their organization is Standard 90.1-2004. Furthermore, they plan to release the 2007 standard version in the near future. ASHRAE representatives stated that approximately 20 states have adopted the 2004 version of the standard as their statewide commercial code, either directly adopting the standard or adopting the standard as part of the International Energy Conservation Code.

The U.S. Green Building Council has developed a certification known as Leadership in Energy and Environmental Design (LEED). This certification is a nationally recognized benchmark that provides guidelines for the design and construction of green buildings and recognizes ASHRAE Standard 90.1-2004 as part of the certification process. The State Architect stated that LEED certification is being used as a guide for developing building designs; however, the State Architect does not plan on pursuing the certification for the state because of the administrative costs involved with maintaining the certification.

The current language of Section 13-19-101, *Tennessee Code Annotated*, limits the state to implementing the 1992 Model Energy Code as the minimum requirement for both public and private buildings. However, as previously stated, more recent energy building codes have been published that have more stringent requirements. According to the State Architect, the statute does not define how updates should be adopted, other than by a legislative amendment to the statute. The state can encourage the adoption of a more recent version of energy building codes, but there is no statutory language that would require contractors to comply with more current energy building codes. *Tennessee Code Annotated* should be written in a way so that the state can adopt and enforce energy building code updates as issued by standard-setting organizations.

Recommendation

The General Assembly may wish to consider revising the language in Section 13-19-101, *Tennessee Code Annotated*, so that the state can enforce adoption of the most recent energy building codes released by standard-setting organizations such as the American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE).

Management's Comment

State Building Commission:

We concur. Adoption of codes should be state-wide, applying to all buildings, public and private, for uniformity and lack of confusion among the design and construction community.

9. The Department of Economic and Community Development has failed to prepare statutorily required Energy Impact Assessments

Finding

Since 1983, statutorily required energy impact assessments have not been prepared by the Department of Economic and Community Development. Also, it appears that the definition of energy impact assessment may require revision by the General Assembly, as discussed in Finding 6.

Per Section 3-2-110(a), *Tennessee Code Annotated*, general bills, resolutions, and rules reviewed by a committee of the General Assembly under the provisions of the Uniform Administrative Procedures Act, that have a significant impact on the cost, rate of extraction, processing, transport, and use of energy related natural resources or the production or consumption of energy within Tennessee require an energy impact assessment. The Department of Economic and Community Development is tasked with providing a statement of analysis of the energy impact of such bill or resolution and preparing and distributing copies of the statement to members of the General Assembly within seven days after the bill or resolution is introduced [(Section 3-2-110(b)(1)]. Management within the Department of Economic and Community Development and legislative staff confirmed that the department is not fulfilling these requirements.

This statute, in Section (d)(1), also stipulates that the Office of Legislative Services (now called the Office of Legislative Information Services) is to furnish department staff with copies of bills or resolutions which require these assessments. Based on information from the Office of Legislative Information Services, it appears that bills and resolutions are available electronically and generally available for public view online on the General Assembly's website the same day. Therefore, due to technology advancements, physical delivery of bills and resolutions from the Office of Legislative Information Services is obsolete.

Energy conservation is a leading issue in Tennessee and has been since the late 1970s. (See introduction to the audit.) Without the energy impact assessments, the legislature may lack pertinent information regarding decisions affecting energy commerce, consumption, and conservation. As noted in Finding 6, the General Assembly may also need to clarify several energy related statutes, one being statutory definitions for Energy Impact Assessments.

Recommendation

Once Finding 6 is addressed, the Department of Economic and Community Development should work with the Office of Legislative Information Services to implement a process for identifying legislation involving energy as required by Section 3-2-110, *Tennessee Code Annotated*. The department should consider working with the Office of Legislative Information Services to determine how best to identify legislation requiring assessments. Additionally, the department's Energy Division should develop and implement a process to perform energy impact

assessments within the required time frame and document the submission of assessments to the legislature. The General Assembly may also consider posting these assessments online alongside fiscal notes. Overall, the General Assembly may consider deleting 3-2-110(d)(1) since all bills and resolutions are readily available electronically to the public, making the physical delivery of these documents obsolete.

Management's Comment

Department of Economic and Community Development:

We concur in part. The department recognizes the need to perform the energy impact assessments and adhering to this mandate is of utmost importance. In previous administrations, the department did not perform energy impact assessments per established *Tennessee Code Annotated* requirements. However, the department has responded to legislatively requested fiscal notes related to energy. As mentioned in Finding 6, clarification of the nature of an “energy impact assessment” and “significant impact” is essential and will help the department plan the amount of staff resources it will need to meet the General Assembly’s and state’s needs for energy conservation.

Moving forward, the department will work with the Office of Legislative Information Services to develop a systematic process to ensure that all statutory requirements are met in a timely fashion.

10. General Services and the Board of Standards do not comply with statutes regarding energy efficiency standards

Finding

Neither the Department of General Services nor the Board of Standards is complying with Sections 12-3-604 through 606, *Tennessee Code Annotated*.

Section 12-3-604, *Tennessee Code Annotated*, requires the Commissioner of the Department of General Services to determine which commodities and products the state can purchase according to energy efficiency standards, to the extent possible, and recommend those items to the Board of Standards for purchase by the state. In turn, Sections 12-3-605 and 12-3-606 require the Board of Standards, in consultation with the State Building Energy Management office’s director, to adopt rules and regulations relative to energy efficiency standards for major energy-consuming products to be procured by the state. However, neither step has been fully implemented.

Both the Department of General Services and Board of Standards have taken some steps, but not all, needed to ensure that the state purchases energy efficient products whenever possible. For example, the Department of General Services requires some purchased appliances to be

Energy Star certified or otherwise certified as energy efficient. However, because the Board of Standards has not formally adopted energy efficiency procurement standards, it may have missed opportunities to optimize the state's purchase and use of energy efficient products as well as failing to fully comply with statute.

Recommendation

The Department of General Services and the Board of Standards need to take steps to fully comply with Sections 12-3-604 through 606, *Tennessee Code Annotated*. By failing to address these statutes, the state could be missing opportunities to save energy and dollars.

Management's Comment

Department of General Services:

We concur. To fully comply with T.C.A. § 12-3-604, the Purchasing Division will submit to the Board of Standards for formal approval, proposed state energy efficiency standards that will include a listing of commodities and products that meet the Purchasing Division's energy saving specifications. The Purchasing Division will report regularly to the Board of Standards those contracts for major energy consuming products which the Purchasing Division has energy saving specifications.

The Department of General Services will work with the Board of Standards on adopting specific rules concerning life cycle costs to comply with T.C.A. § 12-3-606. We are in the process of identifying products where life cycle costs are to be utilized in the evaluation process.

RECOMMENDATIONS

LEGISLATIVE

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

1. The General Assembly may wish to consider several statutory changes to clarify and/or better define terms and expectations. For example, the General Assembly may wish to clarify the statutory terms "energy impact assessment" and "significant impact" to aid the Department of Economic and Community Development in meeting its energy mandates. Additionally, the General Assembly may wish to consider clarifying, enhancing, and updating energy mandates for the Departments of General Services and Finance and Administration. The General Assembly may wish to assign staff to review statutes affected by the 1999 amendments to Sections 3-2-110; 4-3-1105(17), (19), and (24); and 4-3-1107(b), *Tennessee Code Annotated*, to ensure that the provisions of these laws are consistent with these changes.
2. The General Assembly may wish to consider revising the language in Section 13-19-101, *Tennessee Code Annotated*, so that the state can enforce adoption of the most recent energy building codes released by standard-setting organizations such as the American Society of Heating, Refrigeration, and Air-conditioning Engineers (ASHRAE).
3. The General Assembly may wish to consider posting energy bill impact assessments (required by Section 3-2-110(a), *Tennessee Code Annotated*) on its web site alongside fiscal notes. Overall, the General Assembly may consider deleting Section 3-2-110(d)(1) since all bills and resolutions are readily available electronically to the public, making the physical delivery of these documents obsolete.

ADMINISTRATIVE

The following state agencies should address the following areas to improve the efficiency and effectiveness of state operations.

1. The members of the State Building Commission (SBC), including the Commissioner of Finance and Administration who is responsible for the State Building Energy Management Program, should determine whether the energy savings performance contract model that was proposed in the 2001 Energy Action Plan should be adopted. If adopted, the State Building Commission members and the State Building Energy Management Program should develop a written standard process for performance-based contracting. If adopted, the SBC members and the SBEM could consider using

the guide for performance-based contracting developed by the U.S. Department of Energy. The process should include written documentation such as guidelines for writing requests for proposals. The SBC members should review the process for not only procuring the performance contracts but also the process for procuring the measurement and verification (M&V) contracts that is part of the 5-year performance evaluation period for this type of contract. The members of the SBC should determine whether the M&V contracts are to be required as part of the energy savings performance contract model. If the management and verification contracts are required, the SBC should have a process in place that enables agencies to have the funds and authority to procure such contracts as needed. This process could include considering cost estimates for the management and verification contracts during the initial energy project proposal.

2. The Department of Finance and Administration and the Department of General Services should continue their efforts to collect and monitor utility data for state-owned buildings. The departments should work to develop a formalized monitoring schedule for utility data, that includes both utility costs and usage, and ensure that data are analyzed. The departments should also work together to ensure there is no duplication of efforts in the monitoring and collecting of utility data. The state should also use the Energy Management System (EMS) as a way to monitor and manage utility usage in state buildings to increase monitoring capabilities.
3. The State Building Commission should review current payback period practices, including developing written guidelines for payback period criteria that are used to determine approval of energy projects. For example, the guidelines could provide guidance on calculating the payback period and what constitutes an energy project. (Defining an energy project can help ensure that competitive bidding rules are not circumvented.) The criteria should consider the nature of projects and factors such as the useful life. If a blanket policy for payback criteria is applied to all projects proposed to the State Building Commission, there is a possibility that viable energy-related projects could be denied or delayed. The State Building Commission should also consider including a policy addressing payback period criteria in the development of performance-based contracting.
4. The Department of Transportation should continue to expand public access to E85 and B20 pumps through the Green Island Corridor Grant Project to fully realize the benefits of alternatively fueled vehicles. Specifically, due to the state fleet make up, higher priority should be given to improving E85 pump access statewide. Additionally, the Department of General Services should work with the Fuelman program to maximize state fleet access to alternative fuels, especially E85 fuel. Once the supply infrastructure is in place, the state can focus on educating state employees about the use of ethanol and biodiesel as well as expanding education to the public.
5. The Commissioner of the Department of General Services should review the requirements of Sections 4-3-1105(20-21) and 4-3-1012, *Tennessee Code Annotated*,

- and take immediate steps to determine whether the department is in compliance with the spirit and letter of the law. If the department is not complying with the laws, the Commissioner should designate a particular department official to be responsible for ensuring full compliance with these laws. Full compliance would include, at a minimum, the calculation and analysis of life-cycle costs and creating specific rules requiring life-cycle costs to be used in contracting for major energy-consuming projects.
6. The Department of Finance and Administration should define and implement an energy efficiency code for future state buildings that mandates life-cycle cost analysis at the beginning of the project. The department should also disseminate its annual report to all recipients as required by Sections 4-3-1105(24) and 4-3-1012, *Tennessee Code Annotated*. The department may also consider adding the annual report to its website to allow for greater access.
 7. Once Finding 6 is addressed, the Department of Economic and Community Development should work with the Office of Legislative Information Services to implement a process for identifying legislation involving energy as required by Section 3-2-110, *Tennessee Code Annotated*. The department should consider working with the Office of Legislative Information Services to determine how best to identify legislation requiring assessments. Additionally, the department's Energy Division should develop and implement a process to perform energy impact assessments within the required time frame and document the submission of assessments to the legislature.
 8. The Department of General Services and the Board of Standards need to take steps to fully comply with Sections 12-3-604 through 606, *Tennessee Code Annotated*. By failing to address these statutes, the state could be missing opportunities to save energy and dollars.