



Department of
**Environment &
Conservation**

OFFICE OF ENERGY PROGRAMS
ANNUAL REPORT

About the Office of Energy Programs

Tenn. Code Ann. § 4-3-708(9) requires the Office of Energy Programs (OEP) to prepare an annual report to be submitted to the Governor, the Speakers of the Senate and House of Representatives, and the Chair of the Senate and House Committees on government operations, energy, and conservation, or their successor committees. OEP's Program Year runs on the Federal Fiscal year; thus, this report covers Federal Fiscal Year 2016: October 1, 2015 - September 30, 2016.

As the U.S. Department of Energy (DOE) designated State Energy Office for Tennessee, OEP is tasked with developing and overseeing programs and initiatives that promote a cleaner environment, , and a stronger economy. The bulk of OEP's efforts focus on energy efficiency, renewable energy, energy management, and alternative fuels and transportation options.

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List of Acronyms

ACEEE – American Council for an Energy-Efficient Economy
CESI – Clean Energy Solutions, Inc.
DG-IV – Distributed Generation – Integrated Value
DOE – Department of Energy
EE – Energy Efficiency
EEAP – Energy Efficiency Assistance Program
EECLP – Energy Efficiency and Conservation Loan Program
EELP – Energy Efficiency Loan Program
EERE – Office of Energy Efficiency and Renewable Energy
EESI – Energy Efficient Schools Initiative
EIA – Energy Information Administration
EM&V – Evaluation, Measurement & Verification
ESC – Emergency Services Coordinator
ESF-12 – Emergency Support Function 12
EMTAP – Energy Management Technical Assistance Program
EPA – Environmental Protection Agency
EV – Electric Vehicle
FMCSA – Federal Motor Carrier Safety Administration
HPOLA – High Performance Outdoor Lighting Accelerator
HVAC – Heating, Ventilation, and Air Conditioning
IEEN – Industrial Energy Efficiency Network
IPMVP – International Performance Measurement Verification Protocol
iREV – Initiative for Resiliency in Energy through Vehicles
IRP – Integrated Resource Plan
LEED – Leadership in Environmental and Energy Design
LLJ – Large Local Jurisdiction
MTAS – Municipal Technical Advisory Service
NASEO – National Association of State Energy Officials
NEED – National Energy Education Development Project
NGA – National Governors Association
PACE – Property Assessed Clean Energy
PEM – Professional Energy Manager
TDEC – Tennessee Department of Environment and Conservation
TEEI – Tennessee Energy Education Initiative
TEMP – Tennessee Emergency Management Plan
OEP – Office of Energy Programs
ORNL – Oak Ridge National Lab
PEV – Plug-in Electric Vehicle
QECB – Qualified Energy Conservation Bond
RIX – Renewable Information Exchange
SEO – State Energy Office
SEP – State Energy Program
SHOPP – State Heating Oil and Propane Program
SSEB – Southern States Energy Board

STEAB – State Energy Advisory Board
STEM – Science, Technology, Engineering, and Mathematics
TAEBC – Tennessee Advanced Energy Business Council
TCR – The Climate Registry
TDOT – Tennessee Department of Transportation
TEEN – Tennessee Energy Education Network
TEMA – Tennessee Emergency Management Agency
TEVAC – Tennessee Electric Vehicle Advisory Council
TLDA – Tennessee Local Development Authority
TREEDC – Tennessee Renewable Energy and Economic Development Council
TSP – Tennessee State Parks
TVA – Tennessee Valley Authority
USDA – U.S. Department of Agriculture
UT – University of Tennessee

Section I

U.S. Department of Energy State Energy Program Annual Funding Activities

A. The U.S. Department of Energy's State Energy Program

The U.S. Department of Energy (DOE) State Energy Program (SEP) provides financial and technical assistance to State Energy Offices (SEOs) through formula and competitive grants. SEP aids states in developing policies, strategies, and goals that address each state's energy needs and priorities. SEP works with SEOs to address the following long-term goals:



- Increase the energy efficiency of the U.S. economy*
- Reduce energy costs*
- Improve the reliability of electricity, fuel, and energy services delivery*
- Develop alternative and renewable energy resources*
- Promote economic growth with improved environmental quality*
- Reduce the nation's reliance on imported oil*

Specifically, SEP provides leadership to maximize the benefits of energy efficiency and renewable energy in each state through education, outreach, and technical assistance activities, as well as technology deployment, and by providing access to new partnerships and resources. In addition, SEP helps states prepare for natural disasters and improve the security of energy infrastructure through the preparation of energy emergency / energy assurance plans.

OEP spearheads and/or assists with the development of a variety of energy policy and strategy items, as well as the identification of and tracking of progress toward energy-related goals. In furtherance of the State of Tennessee's energy policies, strategies, and goals, OEP also designs and implements a variety of energy education, outreach, technical assistance, and financing (e.g., loans or bonds) or financial incentive (e.g., grants or rebates) programs. These State policy-based programs align with the aforementioned SEP goals and focus on the growth of energy conservation and efficiency measures, renewable energy generation, energy management practices, sustainable transportation, and increased energy assurance capabilities.

To meet Tennessee's energy priorities, goals, and objectives, and to align with the goals of SEP, OEP's work under SEP is broken into seven main areas of focus: (1) energy assurance planning; (2) planning and program development; (3) outreach (by way of the Tennessee Energy Education Initiative); (4) K-12 education (through the Tennessee Energy Education Network); (5) promotion of sustainable transportation, alternative fuels and advanced vehicle technologies, (6) technical assistance and support related to the "lead-by-example" EmPower TN strategy to reduce energy costs and consumption across State-owned and managed buildings; and (7) program management and administration. The activities as managed under these areas of focus are explained in greater detail in the following pages of this report.

OEP also develops and manages other, non-SEP energy-related programs and initiatives as funding sources and staffing capacity allow. These programs are detailed in the Leveraged Programs and Activities (Non-SEP Funded) section of the document.

B. Energy Assurance

OEP is responsible for enhancing Tennessee's preparedness for disruptions to the State's energy resources, particularly those related to transportation and home heating fuels. This work includes the ongoing development of the State's Energy Assurance Plan and Tennessee Petroleum Contingency Plan – in cooperation with other State agencies and private industry stakeholders – and responding to all Emergency Support Function 12 (ESF-12) activities under the Tennessee Emergency Management Plan (TEMP). ESF-12 related activities also involve attendance at DOE energy emergency planning seminars and serving as ESF-12 Emergency Services Coordinators (ESCs) to the Tennessee Emergency Management Agency (TEMA).

1. State Heating Oil and Propane Program

As participants in the DOE State Heating Oil and Propane Program (SHOPP), OEP collected weekly propane prices from a random sample of propane distributors across the State. This data is sent to DOE and published regionally for the purpose of assisting both government and private sector entities with monitoring propane markets during the winter heating season. Throughout the year, OEP staff also monitored fuel supplies and prices weekly by updating an internal petroleum tracking tool.

2. Emergency Response in Action

On September 9, 2016, Colonial Pipeline, supplier of 70% of Middle and East Tennessee's liquid petroleum fuel, announced that it had shut down its gasoline (Line 1) and distillate (Line 2) pipelines to investigate a system integrity issue. A leak, which was estimated to have released 250,000 to 330,000 gallons of gasoline, was identified in Line 1. Line 2 was restored to full service within 24 hours. Colonial began to construct a bypass of Line 1 and ultimately restored service twelve days later. In the interim, gas supplies in Middle and East Tennessee tightened. The Greater Nashville area experienced a "run on the pumps" on September 17, which resulted in weekend gasoline sales increasing 50 percent above normal. This shortage kept supplies low through September 30. In response to the resulting gasoline supply disruption, OEP's Emergency Services Coordinators (ESCs) began monitoring the situation. Throughout the disruption, OEP's ESCs communicated frequently with petroleum industry stakeholders and engaged with DOE's Energy Emergency Assurance Coordinators (EEAC) network on daily nationwide calls. These activities allowed OEP to keep its public sector partners, including the Tennessee Emergency Management Association (TEMA), the Tennessee Department of Agriculture, Tennessee Department of Transportation (TDOT), and various TDEC divisions (Office of General Counsel, Air Pollution Control, Emergency Services) apprised of the market supply across Middle and East Tennessee and resolve any first responder shortages. Some highlights of this energy emergency response include:

- Preparing twelve situational reports for the Governor's Office, TEMA, TDEC leadership, the Tennessee Department of Safety and Homeland Security, and the Tennessee Department of Agriculture.
- Collecting confidential information on gasoline inventories from private petroleum industry stakeholders and the Nashville airport.
- Coordinating response to private industry requests for:
 - Issuance of an Hours of Service Waiver for truck drivers providing fuel. On September 17, Governor Haslam signed Executive Order 56, declaring a State of

Emergency in order to waive the Federal Motor Carrier Safety Administration's hours of service limits for truck drivers providing fuel.

- Extension of Executive Order 56 until September 30.
- Waivers of U.S. EPA requirement to use RVP #7.8 "summer blend" gasoline on September 15 and to use RVP #11.5 "autumn blend" gasoline from September 15 to September 30.
- Prioritizing first responder needs during the fuel shortage by using the TEMA network of regional and county emergency management agencies to communicate any first responder concerns of fuel availability. OEP ESCs connected responder agencies with petroleum industry associations to prioritize deliveries.
- Sharing information with neighboring State Energy Offices including Alabama, Mississippi, Georgia, North Carolina, and Kentucky.

3. Education and Outreach

Throughout the year, OEP ESCs conducted training sessions for OEP staff and other TDEC employees on energy assurance topics such as natural gas and petroleum crude oil products. OEP ESCs also presented on energy assurance topics at two Energy Camps for K-12 educators. OEP staff monitored energy statistics from private sector stakeholders and the U.S. Energy Information Administration (EIA). To share updated data, case studies, and news items related to energy assurance, OEP also developed and began distributing a quarterly Tennessee Energy Assurance Newsletter.

4. Strategic Plans and Operating Procedures

In order to ensure optimal emergency response preparedness, OEP updated the Tennessee Energy Assurance Plan, the Tennessee Petroleum Contingency Plan, OEP's Standard Operating Procedures, checklists and other materials used for energy emergency response.

C. State Energy Planning and Program Development

OEP engages in a variety of efforts and activities that inform strategic planning, stakeholder engagement, and policy and program development in Tennessee. Below is an overview of these efforts.

1. Stakeholder Engagement

OEP regularly convenes and participates in meetings with federal, State, regional, local government, TVA, and other utility stakeholders to ensure that SEP activities, programs and policies are best aligned with the goals of the current State administration. OEP also engages with national stakeholders such as the National Association of State Energy Officials (NASEO) and the National Governors Association (NGA), to continue to leverage the resources of these organizations, particularly with regard to technical assistance, research and training opportunities. Through these meetings, OEP identifies areas for improved coordination, partnerships and leveraging of existing programs and resources to ensure optimal project and state plan development.

2. NASEO

OEP is an active and engaged participant in NASEO-related events and initiatives. OEP staff consistently participates in monthly committee calls, webinars, regional meetings, national conferences, and other activities to stay abreast of what is occurring on the national and regional levels. Additionally, OEP regularly contributes to NASEO publications, such as reports, memoranda, and white papers. The “best practices” and “lessons learned” that are gleaned from these interactions inform much of OEP’s programming.

3. Analysis and Planning

OEP provides policy support by evaluating proposed State legislation and by contributing to TDEC’s official comments on proposed rules and regulations, consent decrees, and draft environmental assessments and impact statements. Examples of this work include OEP’s coordination with the TDEC Office of General Counsel, Office of Policy and Planning and Division of Air Pollution Control to prepare TDEC’s comments in response to the proposed consent decree regarding partial settlements with Volkswagen for its violation of certain provisions of the Clean Air Act. Additionally, OEP worked with the TDEC Office of Policy and Planning to provide comments for draft National Environmental Policy Act environmental impact statements on several solar projects with TVA involvement and natural gas pipeline projects with Federal Energy Regulatory Commission oversight.

4. Collaboration with TVA

The Tennessee Valley Authority (TVA) provides electricity to 99.7% of the electricity service territory in Tennessee. As a result, OEP works closely with TVA to provide consistent feedback on existing and planned programs. Key highlights from this program year include:

- Continued participation in TVA’s Distributed Generation working group to assist the utility in assessing the benefits and costs associated with various forms of distributed generation.
- Continued participation in the Energy Efficiency Information Exchange, which has shifted its focus to policies and programs that provide greater access to low-income communities.
- TDEC OEP, along with the Tennessee Valley Authority (TVA) and the University of Tennessee’s Howard H. Baker Jr. Center for Public Policy, hosted a forum focusing on Energy Efficiency, Conservation & Low-Income Households. The forum highlighted key aspects of the topics from the viewpoints of consumer behaviorists, economic researchers, governmental agencies, non-profits, transportation specialists, and utilities through panel discussions, keynote presentations, and open dialogue. By bringing objective analysis and experience to the table, panelists and industry experts shared their insight on the subject, with the goal of informing policy development and program design efforts. In particular, the adoption of key financing alternatives, the construction of more efficient homes, and the incorporation of more grassroots education and outreach strategies to reach low-income populations were highlighted as considerations for programs that seek to make a lasting impact on these target communities.

D. Tennessee Energy Education Initiative

The Tennessee Energy Education Initiative (TEEI) provides training, tools, and educational events to promote awareness of energy efficiency, renewable energy, and energy management options to individuals and organizations throughout the state and to help individuals and organizations in Tennessee make better informed energy decisions. By connecting Tennesseans with the right resources, expertise, and potential funding options, TEEI provides a road map to successfully navigate the energy landscape.



1. External Communication, Outreach, and Education

External Communications: The TEEI communications platform, comprised of the TNEnergy.org blog as well as the TEEI monthly newsletter, is OEP's primary vehicle for disseminating information on energy efficiency, renewable energy, and energy management opportunities within the State and nationwide. The monthly newsletter, which is sent to a listserv of over 5,500 stakeholders, contains energy-related news, detailed information on upcoming events, and summaries of technical assistance or funding opportunities. Within the Program Year, OEP continued to dispatch TEEI related posts to the TDEC Twitter account, which boasts more than 2,100 followers.

Energy Hotline: In accordance with Tenn. Code Ann. § 4-3-708, OEP is responsible for providing "information and educational programs for local governmental units and the general public, including the operation of a toll-free energy hotline." As such, OEP maintains an updated overview of its programs on the OEP website and provides telephone and email-based technical assistance to internal and external customers by responding to energy-related inquiries received by email or on OEP's energy hotline. Within the Program Year, OEP handled 197 requests for energy-related information and resources. These general requests for technical assistance are in addition to inquiries that OEP receives regarding its specific programs and activities.

Professional Energy Manager (PEM) Program: During the year, OEP developed and launched a tuition-free, three-week workforce development/training program for employees of state or local government, K-12 schools, utilities, non-profits, and NGOs that focused on the principles of energy management, including the identification and implementation of no and low cost energy efficiency measures, and provided credentialing through a nationally recognized program, the Institute of Energy Professionals' Professional Energy Manager (PEM) designation. Twenty-six participants (comprised of representatives from state and local government, state higher education institutions, and public K-12 schools) completed the training, and each participant passed the exam. As part of the training, each participant was required to create a Strategic Energy Plan that could be implemented in a facility they oversee or for clients they serve. OEP plans to conduct this workforce development training program again in 2017.

2. Interagency and Non-profit Collaboration

A key component of TEEI is the multi-faceted work that stems from cooperation with external partners and organizations. Throughout the year, OEP continued to collaborate with TEEI's founding partners – Pathway Lending, Tennessee Renewable Energy and Economic Development Council (TREEDC), Tennessee Technology University's Industrial Assessment Center, and other statewide

energy resource providers – to support the execution of targeted outreach and improved programs across the residential, commercial, industrial, and public energy sectors. This resulted in the following key activities:

- OEP researched, gathered information, and prepared a response to the American Council for an Energy Efficient Economy's (ACEEE) request for information related to the organization's 2016 State Scorecard. OEP also sent related updates on Tennessee's energy-related financing programs to the Database of State Incentives for Renewables and Efficiency (DSIRE). To determine states' rankings, ACEEE considers the six policy areas in which states typically pursue energy efficiency: utility and public benefits; transportation; building energy codes and compliance; combined heat and power (CHP); state government-led initiatives around energy efficiency; and appliance and equipment standards. In the fall, the State of Tennessee came in at #25, tied with Florida as the top state in the Southeastern U.S. This represents a significant improvement for Tennessee, which was ranked #38 in 2014 and #46 in 2008.
- TDEC Office of Policy and Planning, OEP, and the American Council for an Energy Efficient Economy (ACEEE) convened a Low-income, Multifamily Housing workshop, for state, federal, utility, and NGO representatives. The workshop focused on best practices for design and implementation of energy efficiency programs for multi-family housing. The program included a discussion of research performed by ACEEE and TDEC on energy efficiency programs serving multifamily and low-income housing in Tennessee, a facilitated discussion on current practices in the Southeast region, and an opportunity to update participants on proposed or ongoing efforts.
- OEP collaborated with the Appalachian Electric Cooperative (AEC) and the Tennessee Electric Cooperative Association (TECA) to evaluate the U.S. Department of Agriculture's Rural Utility Services Energy Efficiency Conservation Loan Program (EECLP) and to craft the framework for a state co-op led energy efficiency PowerPlus program that will provide greater access to financed energy efficiency upgrades for low-to-moderate income homeowners.
- OEP continued to participate as a member of DOE's Outdoor Lighting Accelerator (OLA) initiative to assist at least three Tennessee communities with developing a roadmap to implement outdoor lighting upgrades. This work complements OEP's ongoing efforts under its 2013 State Energy Program Competitive award to facilitate investment-level energy efficiency in local jurisdictions, K-12 schools, and public housing authorities. Throughout the year, OEP consulted with the cities of Knoxville, Parsons, Somerville, Morristown, Elkton, Oak Ridge, Franklin, Trenton, Stanton, Columbia, and Lebanon on prospective outdoor street lighting retrofits.
- TDEC Commissioner Bob Martineau signed the partnership agreement for OEP to participate in DOE's Sustaining Water Infrastructure for the Future (SWIFt) Accelerator. This work will complement OEP's ongoing efforts under its 2015 State Energy Program Competitive award to advance energy efficiency in wastewater facilities and other underserved sectors. This program consists of a three-year commitment by DOE to:
 - Work with agencies engaged with Wastewater Treatment Plants (WWTP) in their jurisdiction to accelerate their pathway toward a sustainable infrastructure.
 - Leverage U.S. EPA's substantial portfolio of work, resources, and partnerships.
 - Catalyze the adoption of innovative and best-practice approaches to improve energy efficiency of WWTP operations.

- Develop best-practice energy performance tracking at participating WWTPs and track progress

3. Workshops, Presentations, and Speaking Engagements

Throughout the year, OEP staff presented at various workshops and conferences to promote programs, funding and technical assistance opportunities, initiatives, and DOE efforts. Examples of such events include the Tennessee Chamber of Commerce and Industry's 33rd Annual Environment and Energy Conference, the Tennessee Renewable Energy and Economic Development Council's (TREEDC) 2nd Annual Renewable Energy International Conference at Tennessee Tech University, the Tennessee Advanced Energy Business Council's (TAEBC) "Opportunities in Energy" meeting at the Howard Baker Jr. Center for Public Policy, and the TDEC Environmental Show of the South.

E. Tennessee Energy Education Network (K-12 Education)

The goal of the Tennessee Energy Education Network (TEEN) is to engage K-12 students in learning the science of energy, applying what they learn by using the school as a real world lab, and reaching out to the school, home and community with energy conservation. TEEN also seeks to build an interest in energy as well as content knowledge, especially as related to the science, technology, engineering, and mathematics (STEM) subjects, and encouraging students to pursue career paths in energy and related fields.

1. Energy Education Camps for K-12 Educators

OEP's 2016 Energy Education Camps for Educators were held at Montgomery Bell State Park and Pickwick Landing State Park. The Energy Camps were comprised of five-day training sessions and were offered free of charge on a first-come, first-served basis. The camps provided information and resources needed to teach the science of energy and energy conservation in the classroom, while helping students to become leaders in their schools and communities. In addition to addressing Tennessee science curriculum standards, the camps offered "team building" energy-related activities for teachers, such as energy bingo and the construction of solar ovens, model fuel cell cars, and energy houses. Special breakout sessions were conducted with grade-level clusters to ensure that all participating teachers left the Camps with ideas for their classrooms. Furthermore, participants received educational products to utilize in their energy-related education lessons, including Electric Circuits Kitbooks, a Tennessee-made educational tool, and Kill-A-Watt meters.

"This week long content-based conference has deepened my knowledge in the areas of science and energy. The activities and projects that the camp provided will allow me to share this knowledge more confidently and with a deeper understanding that can be transferred to my students."
 2016 Camp participant Devon Jones

2. National Energy Education Development (NEED) Project

OEP is the state coordinator for the NEED Project. The mission of the NEED Project is to promote an energy conscious and educated society by creating effective networks of students, educators, business, government and community leaders to design and deliver objective, multi-sided energy

education programs. NEED works with energy companies, agencies, and organizations to bring balanced energy programs to the nation's schools with a focus on strong teacher professional development, timely and balanced curriculum materials, signature program capabilities and turn-key program management.



Lipscomb Academy Wins 2016 National Primary School of the Year Award

During the program year, OEP selected the following schools as State NEED Project winners: Lipscomb Academy Elementary School (State Primary School of the Year); Michie Elementary School (State Elementary School of the Year); Volunteer High School (State Senior Rookie of the Year); and Fayette Academy (State Senior School of the Year). NEED presented Lipscomb Academy Elementary School with the *National Primary School of the Year* award, Volunteer High School with the *National Senior Rookie of the Year* award, and Fayette Academy with the *National Senior School of the Year* award. Fayette Academy also received a special recognition at the national level for the *Most Outstanding Energy Project in the Nation* for

their 7-year project that resulted in a campus-wide LED retrofit. The campus-wide LED lighting upgrade is estimated to reduce energy consumption by 77% and is estimated to save 500,000 kilowatts annually. Michie Elementary School was also named *National Elementary Runner Up*,

F. Sustainable Transportation

OEP engages in a variety of activities to promote and educate citizens about alternative fuels, sustainable transportation, and the reduction of harmful emissions from mobile sources within the State of Tennessee. In prioritizing sustainable transportation, OEP aims to generate benefits to air quality and to reduce our dependence on petroleum-based fuels.

1. Sustainable Transportation Awards and Forum

Throughout the program year, OEP coordinated planning and logistics for the second annual Sustainable Transportation Awards and Forum, which was held on May 12-13, 2016 at the University of Tennessee at Chattanooga, to coincide with Clean Air Month.

OEP, TDEC's Office of Sustainable Practices, TDOT, TDEC's Office of External Affairs, and the East Tennessee Clean Fuels Coalition (ETCF) staff assisted with event preparation and execution. This year's forum touched on a wide spectrum of subject areas and sectors, and included panel presentations on topics such as local government planning, off-road transportation, and innovations in fleets and fuels. The forum also featured a showcase of over 20 alternative-fueled vehicles, including Oak Ridge National Laboratory's 3D-printed natural gas and electric-powered utility vehicle, as well as a variety of electric, solar, natural gas and propane powered vehicles.

The Tennessee Sustainable Transportation Awards recognize outstanding initiatives to improve the efficiency, accessibility, affordability, and sustainability of transportation systems in the State, consistent with ongoing efforts to improve the health and well-being of Tennesseans, provide for a strong economy, and protect our State's natural resources. An awards luncheon was held on the second day of the forum, to highlight the following 10 awardees: Chattanooga Area Regional Transportation Authority, City of Athens's Green Ways Initiative, Clarksville-Montgomery County School System, Great Smoky Mountains National Park, JNJ Express, Inc., Nashville Metropolitan Transit Authority, RPM Transportation Consultants and the Metropolitan Government of Nashville Department of Public Works, Sharp Transport, Inc., TDOT Structures Division and Environmental and Planning Bureau, and Vanderbilt University. For detailed project descriptions, visit: <http://tn.gov/environment/article/energy-sustainable-transportation-awards-forum-2016-winners>.



Clarksville-Montgomery County School System Wins Sustainable Transportation Award for Use of Propane-Powered School Buses

The third annual Tennessee Sustainable Transportation Awards and Forum is scheduled to take place from May 23-24, 2017 in Nashville.

2. Tennessee Electric Vehicle Advisory Council (TEVAC)

This stakeholder group is comprised of members representing the public and private sectors, research entities, and other organizations that promote the deployment of plug-in electric vehicles (PEVs) and EV infrastructure across the State. Membership includes OEP, Oak Ridge National Laboratory (ORNL), TVA, TDOT, Nissan North America, the Electric Power Research Institute, and the DOE Clean Cities Coalitions in Tennessee. Meetings focus on issues related to electric vehicles, including market developments, infrastructure and usage in Tennessee. Within the Program Year, OEP organized and hosted quarterly TEVAC meetings and sent periodic news updates to the TEVAC listserv on topical stories involving electric vehicle related policy and developments nationwide.

3. Stakeholder Outreach and Collaboration

Throughout the year, OEP disseminated stories and news items related to sustainable transportation on the TNEnergy blog, in monthly newsletters, and on social media platforms. OEP also engaged with a variety of key stakeholders to expand outreach and technical assistance related to sustainable/alternative transportation initiatives. This resulted in the following key highlights:

- OEP collaborated throughout the year with East Tennessee Clean Fuels (a DOE Clean Cities Coalition) to launch DOE's Workplace Charging Challenge initiative in Tennessee. The website, www.driveelectrictn.org, was launched in August and was revamped in December.

Throughout the year, OEP also participated and provided updates on sustainable transportation initiatives at quarterly Clean Cities coalition stakeholder meetings.

- OEP contributed efforts to NASEO's Initiative for Resiliency in Energy through Vehicles (iREV) project, which supports state and local emergency management decision makers by providing customized tools, information, and strategies about alternative fuel vehicle technologies, infrastructure, and potential uses in emergency scenarios.
- Throughout the month of August, OEP convened a group of key stakeholders in the electric vehicle, natural gas and propane autogas industries to facilitate the gathering of information and the compiling of a response by TDOT to the Federal Highway Administration's (FHWA) solicitation for designation nominations of alternative fuel corridors. On August 22, TDOT submitted a nomination to designate I-40, which is the primary east-west corridor in the State of Tennessee, as an alternative fuel corridor for electricity, natural gas, and propane.

G. EmPower TN Strategy

The State of Tennessee spends an estimated \$192.5M annually in utility bills. Significant savings could be achieved with a disciplined focus on energy management, energy efficiency, and conservation across all State energy users. Launched in January 2015, EmPower TN is Governor Bill Haslam's statewide "lead-by-example" strategy to reduce energy costs and consumption across State owned and managed buildings and facilities by:

- measuring and controlling energy use,
- investing in improved energy efficiency,
- creating an operational environment of excellence, and
- promoting energy cost savings across the State through conservation and efficiency in local government and the private sector.

OEP played and continues to play a critical role in the development and delivery of the EmPower TN Strategy.

1. EmPower TN Energy Efficiency Projects

In April 2015, the Tennessee General Assembly approved \$37.5 million in FY2016 funding for energy efficiency projects in State buildings. Throughout the Program Year, OEP staff supported TDEC Tennessee State Parks' selected EmPower energy efficiency project by assisting with the identification of all exterior lighting within state parks. As a result of this project, 563 metal halide, high pressure sodium, and incandescent lights will be replaced with high efficiency exterior campus lighting at 31 state parks. The project is expected to generate \$33,877 in annual energy cost savings.

2. Utility Data Management (UDM) System

In April 2015, the Tennessee General Assembly approved \$6.2 million in FY2016 funding for the acquisition and implementation of a statewide energy management system. Following a competitive solicitation process, the State approved a multi-year contract with EnergyCAP, Inc., to provide Utility Data Management (UDM) software to all State owned facilities (97,000,000+ square feet), which includes benchmarking capabilities as well as consumption and cost dashboards. By the end of September 2016, OEP staff helped retrieve and upload one month of utility bills from every single State agency and higher education institution to an EnergyCAP site so that every utility account

could be identified. Approximately 10,000 utility bills were gathered from 22 general government agencies and 51 higher education institutions.

3. Energy Management Technical Assistance Program (EMTAP)

OEP's Energy Management Technical Assistance Program (EMTAP) provides no cost technical assistance to State agencies, public higher education facilities, K-12 schools, and local governments. EMTAP facilitates implementation of energy management, energy efficiency and renewable energy projects to meet the needs, budgets, and priorities of each participating entity. Eligible participants can access experienced and trained energy services advisors for onsite consultations at no-cost providing technical assistance and support.

During the Program Year, OEP staff conducted 27 level-one building energy assessments, representing a total of 853,973 square feet, and seven exterior lighting audits. OEP also began a program audit by following-up on previous EMTAP assessments to verify implementation of level-one energy conservation measure recommendations and assess the value of the program.

H. Program Management and Administrative Functions

This area of focus covers a variety of additional programs that (1) OEP directly oversees, administers, and/or manages under its SEP Annual formula award or (2) are leveraged, but not funded, by OEP's SEP Annual formula award.

1. SEP Programs and Activities

Qualified Energy Conservation Bond Program: Qualified Energy Conservation Bonds (QECBs) are low-interest federal bonds (via subsidy) available for issuance for qualified energy efficiency, renewable energy, and energy conservation capital projects. Tennessee's QECB allocation totals \$64,676,000. In 2012, as required by Federal law, the State notified Large Local Jurisdictions (LLJs) of the amount of their allocations, which was based on their proportionate populations. The total amount identified for these fifteen cities and counties was approximately \$36 million. LLJs choosing not to utilize their initial allocation were asked to reallocate their share to the State. These LLJ reallocations were combined with the State's original allocation of \$28.6 million for a total of \$46,543,739. This amount was made available for qualifying projects through a competitive sub-allocation process. Submissions will be accepted until bond capacity is exhausted. Entities eligible to participate in the program include all local government jurisdictions in Tennessee and public universities. A maximum of 30% of the aggregate bonds may be used to finance private activity projects.

OEP administers Tennessee's QECB program in collaboration with the Tennessee Local Development Authority (TLDA), the entity with authority to allocate Tennessee's QECB capacity. During the Program Year, OEP continued working with TLDA and the local jurisdictions that intend to or are utilizing their LLJ allocations and/or have been awarded suballocations through the State's Request for Proposal (RFP) process:

- **Memphis:** The City of Memphis combined its initial \$7,014,356 QECB allocation and its RFP suballocation of \$3,657,644 to support energy improvement projects under its Green Communities Program. The Crosstown Concourse issuance of \$8,316,000 closed on February 18, 2015. The Self Tucker/Universal Life and Knowledge Quest issuances, which had

allocations of \$2,015,300 million and \$340,700, respectively, closed on April 29th, 2015.

These three projects all focus on building energy efficiency retrofits:

- Crosstown Concourse: the redevelopment of a 1.5 million square foot former Sears distribution center into a mixed use vertical urban village;
 - Knowledge Quest: the redevelopment of a vacant apartment building into dormitory housing for an urban farming school; and
 - Universal Life Insurance Building: the redevelopment of a historic African American-owned insurance company building into a new office space.
- **City of Lebanon:** OEP recommended and TLDA approved a \$3.5M suballocation for the construction and installation of a waste-to-energy gasification unit. The City of Lebanon is working with PHG Energy on this project. Issuance on this project closed on April 24th, 2015. The system is expected to provide nearly 200kW of power (half the total load of the wastewater treatment plant) while diverting over 32 tons of waste (wood, tires, and biosolid sewer sludge) from landfills every day.
 - **Knox County:** OEP recommended and TLDA approved a \$12,500,000 suballocation for the installation of solar PV on 14 targeted sites across the county, notably on public school rooftops. Issuance on this project closed on June 30, 2015. Through September 30, 2016, all sites are now producing power.
 - **Clarksville:** The City of Clarksville utilized its LLJ allocation to finance a street light improvement project. Bond issuance for this project (\$1,240,000) closed on March 23, 2016.
 - Under the third RFP, which was released on March 18, 2015, the remaining QECBs funds have been made available for qualifying projects until bond capacity is exhausted. During the Program Year, OEP continued to field questions about the program by prospective applicants.



The City of Lebanon's waste-to-energy gasification unit

2. Leveraged Programs and Activities (Non-SEP Funded)

Tennessee Electric Vehicle Rebate Program: On May 21, 2015, OEP re-launched the Tennessee Electric Vehicle Rebate Program, which made \$682,500 in rebate funding available for customers that purchase or lease qualifying electric vehicles within the State. The rebate funds that were leveraged for this program were appropriated for electric vehicle rebates in 2009, and with the re-launch of the electric vehicle rebate program, OEP utilized the remainder of the dedicated funds. Within the program year, OEP continued to collaborate with the Department of Revenue and several auto dealerships in Tennessee to process rebate applications and payments for the \$467,500 in rebate funds that remained after the previous Program Year. The Tennessee Electric Vehicle Rebate Program funds were exhausted during the program year.

Tennessee Natural Gas and Propane Vehicle Grant Program: Throughout the Program Year, OEP developed the framework for the Tennessee Natural Gas and Propane Vehicle Grant Program, which will assist public, non-profit, and private Tennessee-based fleets with the investment in and purchase of natural gas or propane-powered medium- and heavy duty-vehicles. The program is expected to launch in October 2016.

OEP also conducted targeted outreach in order to notify key stakeholders of the program:

- In the summer, a cross-country compressed natural gas (CNG) vehicle road rally passed through Tennessee, making a stop at a natural gas refueling station in Trenton. The rally started in Long Beach, California and traveled through 13 media stops before ending in Washington, D.C. Sponsored by the American Public Gas Association and NGV America and organized by Tennessee's own Pat Riley, who is the General Manager of the Gibson County Utility District, the rally served to raise public awareness of the benefits of CNG and the abundance of natural gas refueling stations, proving that it is possible for vehicles to drive from the Pacific to the Atlantic on CNG alone. At the Trenton rally stop, OEP Director and TDEC Commissioner Martineau both received CNG Blue Diamond Awards, presented on behalf of the American Public Gas Association, NGV America, and the American Gas Association in recognition for our commitment to sustainable transportation efforts. Also at the rally stop, OEP Program Manager Alexa Voytek delivered comments announcing the soon-to-be-launched vehicle grant program.
- OEP Program Manager Alexa Voytek gave a presentation on OEP's CNG-related sustainable transportation initiatives at the Tennessee Gas Association Annual Meeting in Asheville, North Carolina. In particular, the presentation highlighted key aspects of the Tennessee Natural Gas and Propane Vehicle Grant Program.
- OEP developed a one-page fact sheet on the incentive program, detailing key program considerations and eligibility requirements. This fact sheet was distributed both at the Tennessee Gas Association Annual Meeting, as well as via email to a targeted group of stakeholders.

Pathway Lending Energy Efficiency Loan Program: The Pathway Lending Energy Efficiency Loan Program (EELP), a low-interest revolving loan fund, launched in 2010 to assist for-profit and not-for-profit, commercial and industrial businesses in implementing energy efficiency and renewable energy improvements. These improvements reduce operating costs, improve productivity, and make Tennessee businesses more competitive. Pathway Lending, a US Treasury certified community development financial institution, oversees the \$33 million revolving loan fund, which is comprised of loan capital provided by the State / TDEC OEP (\$14M), TVA (\$14M), and Pathway Lending (\$5M). Eligible projects under EELP include, but are not limited to: energy efficient equipment upgrades, lighting, building envelope retrofits, cool roofs, renewable energy installations, and co-generation. Throughout the reporting period, the program interest rate was 2% fixed rate for five-year term Energy Efficiency loans and 5% for 10-year term Renewable Energy loans. Qualifying entities can apply for loans between \$20,000 and \$5M.

During the program year, EELP expanded to include governmental and quasi-governmental entities. The expansion offers up to six years of financing at 2% interest for qualified energy efficiency and renewable energy projects to Tennessee local governmental entities including municipalities, counties, school districts and other similar public agencies. OEP worked with Pathway Lending to share the news of the expansion with potential applicants.

The EELP program obligated over \$3.5 million in new loans to 35 Tennessee businesses. Average estimated annual energy savings is \$19,704 per program participant.

Figure 1. Energy Efficiency Loan Program Closed Loans, Program Year 2015-16.

		10/1/15 - 12/31/15	1/1/16 - 3/31/16	4/1/16 - 6/30/16	7/1/16 - 9/30/16
Closed Loans	Total Loans (#)	11	6	11	7
		\$1,199,000	\$732,209	\$1,124,477	\$710,031
	East TN	2	2	7	4
	Middle TN	7	2	2	1
	West TN	2	2	2	2
	Women-Owned	1	1	0	0
	Minority-Owned	0	0	1	0
	Hispanic-Owned	0	0	0	0
	Jobs Created/Retained	293	826	701	759
	Building Retrofits	0	0	0	1
	Bundles	0	1	1	1
	Co-Generation	0	0	0	0
	Equipment	0	0	0	0
	HVAC	1	1	0	1
	Industrial Systems	0	0	0	0
	Lighting	8	3	7	4
	Renewables/Solar	2	1	3	0
	Avg. Annual Savings	\$19,624	\$23,328	\$10,627	\$25,238
	KWH Installed	2,034,657	976,113	1,111,270	1,766,642
	Avg. KWH/\$	1.70	1.33	.99	2.49
Therms Installed	69,426	33,305	37,917	60,379	
Avg. Therms/\$	0.06	0.24	0.32	0.34	
Number Paid In Full	3	3	2	2	
Amount Paid In Full	\$119,130	\$92,500	\$270,131	\$568,343	
Number Charged Off	0	0	0	0	
Amount Charged Off	\$0	\$0	\$0	\$0	

City of Bristol Energy Efficiency Assistance Program: In March 2014, TDEC provided a grant to the City of Bristol to design, develop and deliver the Energy Efficiency Assistance Program (EEAP), a grant initiative to provide qualifying low to moderate income homeowners with a free in-home energy evaluation, a customized implementation plan by the local utility, Bristol Tennessee Essential Services (BTES), and up to \$20,000 per home in financial assistance to install recommended energy efficiency upgrades. EEAP is funded by a Clean Air Act settlement agreement between King Pharmaceuticals, LLC, EPA, and TDEC. OEP managed the grant contract and project for TDEC. With a goal of customer-focused service, the Bristol Community Development Specialist, TDEC OEP and TDEC's Office of Sustainable Practices collaborated to ensure that a total of 47 homes were

upgraded and the entire budget of \$650,000 was spent by the close of the program on June 30, 2016. Under this program, a total of 442 windows, 84 doors, 21 refrigerators, and 8 carbon monoxide detectors were replaced. Electrical upgrades were completed on 24 homes, and 43 homes received new insulation. HVAC upgrades were completed on 30 homes. Energy Star Certified light bulbs were also offered to program participants.

Not only were environmental benefits gained from the energy efficiency projects, other environmental and health benefits will be recognized over time. For example, some homes did not have working HVAC units and residents were struggling in extreme heat and cold conditions to adequately control the temperature in their home before the needed upgrades. As a result, residents were able to discontinue the use of wood and coal stoves and kerosene heaters, which have direct negative air quality and human health effects.

Section II

U.S. Department of Energy State Energy Program Competitive Awards

A. State Energy Program 2013 Competitive Award

1. “Stimulating Energy Investment in Local Jurisdictions, K-12 Public Schools, and Public Housing Authorities”

In December 2013, OEP received an award under the U.S. DOE’s State Energy Program (SEP) 2013 Competitive Funding Opportunity Announcement to stimulate energy investments in the hard to reach public sectors of small local government jurisdictions and public housing authorities in Tennessee. Launched in July 2014 and continuing through January 2017, this project provides education, outreach and technical assistance to—and serves as technical assistance provider for—such public entities. The project hopes to fully engage at least 10 local governments and eight public housing authorities to drive demand for energy improvement investments of \$20 million in Tennessee with the goal of achieving annual savings of \$3 million for participants.

This project provides local officials with free technical assistance on the benefits of energy efficiency and cost-effective energy efficiency measures, which includes building energy audits, requests for qualifications development, collaborating with energy service companies, benchmarking, measurement and verification of energy savings, and procurement. The project also explores major financing options.

OEP sub-recipient Clean Energy Solutions, Inc. (CESI), serves as the project lead, in collaboration with expert consultants from Apollo Engineering and BLT Sustainable Energy. CESI is a leading energy consulting firm that works with local governments, nonprofits, businesses, foundations and utilities to design and assist early implementation of comprehensive energy efficiency, renewable energy and water conservation initiatives to reduce electricity demand and energy consumption across all sectors.

Through September 30, 2016, the following entities have signed letters of engagement with OEP to receive technical assistance:

- Blount County Schools
- Bradley County
- Bradley County Schools
- Chattanooga
- Cleveland Housing Authority
- Gallatin
- Huntingdon Housing Authority
- Knoxville
- Knoxville's Community Development Corporation
- Milan Housing Authority
- Montgomery County
- Murfreesboro Housing Authority
- Newbern Housing Authority
- Parsons-Decaturville Housing Authority
- Trenton Public Housing Authority
- Williamson County Schools

B. State Energy Program 2015 Competitive Awards

OEP received two awards under the U.S. DOE's State Energy Program (SEP) 2015 Competitive Funding Opportunity Announcement; both awards went into effect in January 2016. The following sections detail the project summaries and goals for both awards:

1. An Energy Efficiency Registry: A Flexible and Transparent Way for States to Track and Report Energy Efficiency

OEP is collaborating with the State Energy Offices of Georgia, Michigan, Minnesota, Oregon, Pennsylvania as well as The Climate Registry (TCR) and NASEO to develop model registry principles and operating rules, informed by a national consensus multi-stakeholder process. These rules will then be used to develop a roadmap with potential pathways for voluntary state adoption and implementation, and integration of the registry into broader state energy planning and policy.

Overarching objectives of this project include:

1. Provide states and energy efficiency implementers with a policy-agnostic tool for compliance with existing and future federal and/or state emissions regulations and energy objectives (e.g., economic development, resilience);
2. Ease the administrative costs and reporting burden associated with quantifying and verifying the benefits of some energy efficiency programs; and
3. Provide a mechanism for transparent attribution and ownership of energy savings to facilitate greater private sector investment and a more market-driven approach to energy efficiency and emissions reductions.

During the program year, the project team established a Steering Committee and multi-stakeholder working group, as well as an initial draft of the registry principles and operating rules. Research was conducted to identify and assess state, regional, and national energy efficiency tracking and reporting systems pertinent to the development of an energy efficiency registry. With regard to stakeholder outreach, a series of webinars and an in-person meeting were held to inform stakeholders of the project and to solicit feedback on the first draft of the principles and operating rules.

2. Advancing Energy Efficiency in Wastewater Utilities and Other Underserved Sectors in Tennessee and Alabama

OEP is collaborating with TDEC's Division of Water Resources and the Office of Sustainable Practices, TVA, University of Memphis, U.S. EPA Region 4, UT Municipal Technical Advisory Service (MTAS), Alabama Department of Environmental Management, and the Alabama Department of Economic and Community Affairs: Energy Division. This project drives adoption of energy efficiency projects and technologies in the wastewater sector as well as facilitates energy investment in other underserved sectors in Tennessee. To achieve these goals, OEP leads this team of experts to provide free technical assistance, which finds no-to-low cost, long-term process changes to manage energy use and cost. The team helps utilities implement these changes while maintaining environmental compliance. During this 30-month effort, OEP and its energy resource partners will engage at least 24 local governments in Tennessee and Alabama through free onsite energy



EPA Region 4 Staff explain their energy tracking tool at a workshop held at Fleming Training Center in Murfreesboro

assessments, technical workshops, and energy management implementation support. Through September 30, 2016, this project conducted eleven site visits, generated seven energy assessment reports, and conducted one workshop for wastewater treatment plants in Tennessee and Alabama. The workshop highlighted six speakers on financial assistance available to water and wastewater utilities for capital improvements and provided technical presentations by engineering professors from the University of Memphis and Tennessee Technical University.

This project is a continuation of the Tennessee Water and Wastewater Energy Efficiency Partnership, in which TDEC's Office of Sustainable Practices and Division of Water Resources worked in cooperation with EPA Region 4, TVA, the University of Memphis, and MTAS. Previous participants that implemented the no-to-low cost recommendations have saved an average of 19 percent in annual energy costs.

Section III

State of Tennessee Energy Profile and Statistics

A. Tennessee Quick Facts

TVA is the largest public power company in the nation and serves almost all of Tennessee (99.7%) and parts of six other states.¹ Although Tennessee produces limited amounts of crude oil, natural gas, and coal, the state has an important role as an electricity provider because of the TVA power generation facilities within the state.²

The following bullets highlight a few key facts about the energy sector in the State of Tennessee.³

- Almost half of the TVA service territory is in Tennessee. The TVA operates 19 hydroelectric dams, two large nuclear power plants, a pumped storage facility, and several other power generation facilities in the state.
- At almost 9.8 million megawatt-hours in 2015, Tennessee's net electricity generation from hydroelectric power was the third-highest among states east of the Mississippi River, and sixth-highest in the nation as a whole.
- The Watts Bar power plant has the nation's newest nuclear power reactor. Watts Bar Unit 2 entered service in 2016, becoming the nation's first new nuclear reactor in the 21st century.
- The Southeast's first major wind farm, located on Tennessee's Buffalo Mountain near Oliver Springs, began operating as a two megawatt (MW) facility in 2000. The wind farm's generating capacity has been expanded to 29 MW.
- Two utility-scale solar photovoltaic facilities in McNairy County are the largest in the State and have a combined capacity of 40MW. The state's largest industrial solar photovoltaic facility is an 8-MW installation at Volkswagen's Chattanooga assembly plant.
- Average site electricity consumption for Tennessee households is 33% higher than the national average and is among the highest in the nation. Spending for electricity is closer to the U.S. average because of relatively low electricity prices, according to the Energy Information Administration's Residential Energy Consumption Survey.
- Tennessee is the largest ethanol-producing state in the Southeast. The state, with its two ethanol plants, each capable of producing more than 100 million gallons of ethanol annually, is the 14th-largest ethanol producer in the nation.

¹ Tennessee Valley Authority: Our Customers. Retrieved from <https://tva.gov/Energy/Our-Customers>.

² TVA in Tennessee, Fiscal Year 2015 (October 2015-September 2016). Retrieved from <https://www.tva.com/About-TVA/TVA-in-Tennessee>.

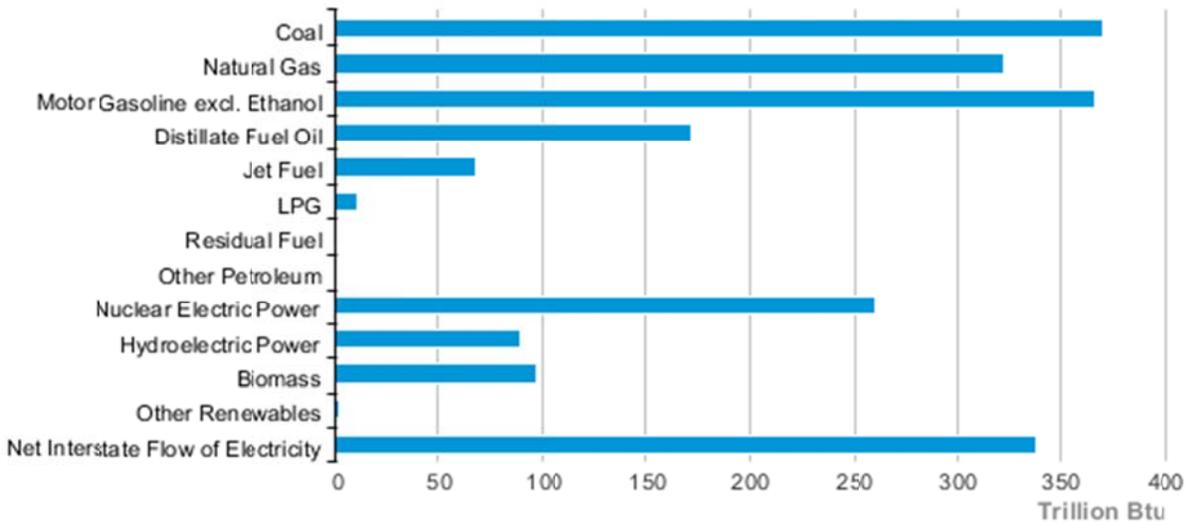
³ Tennessee State Profile and Energy Estimates. Retrieved from <http://www.eia.gov/state/?sid=TN>.

B. Tennessee-Specific Graphs

The U.S. Energy Information Administration (EIA) has some of the most comprehensive State-specific data on energy consumption, production, prices, and expenditures by source and sector. The following three graphs detail energy consumption estimates, energy consumption by end-use sector, and energy production estimates for calendar year 2015.⁴ For additional information and data on Tennessee, please visit: <http://www.eia.gov/state/?sid=TN>.

Figure 2.

Tennessee Energy Consumption Estimates, 2015

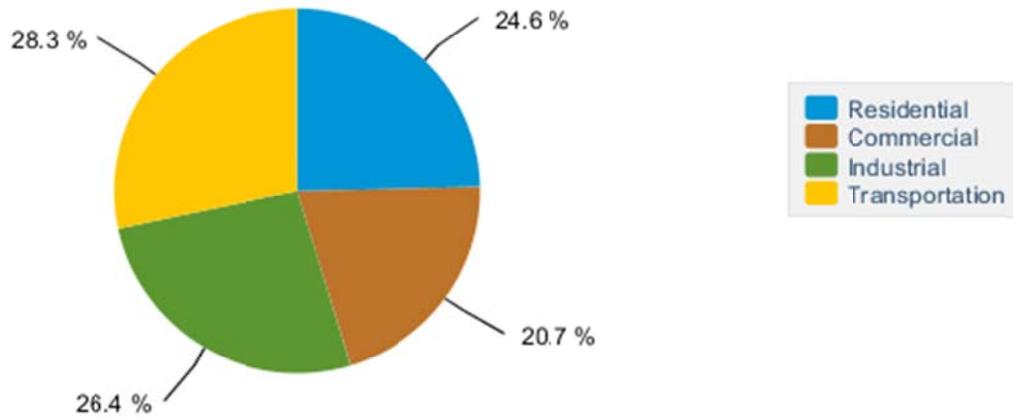


 Source: Energy Information Administration, State Energy Data System

⁴ Note: Data from two years prior is finalized by the EIA every July. This data production cycle is the federal standard, and can be found in more detail here: <http://www.eia.gov/state/seds/seds-data-changes.cfm?sid=US#2014>. The following three EIA graphs were retrieved from <http://www.eia.gov/state/?sid=TN#tabs-4> on July 31, 2017.

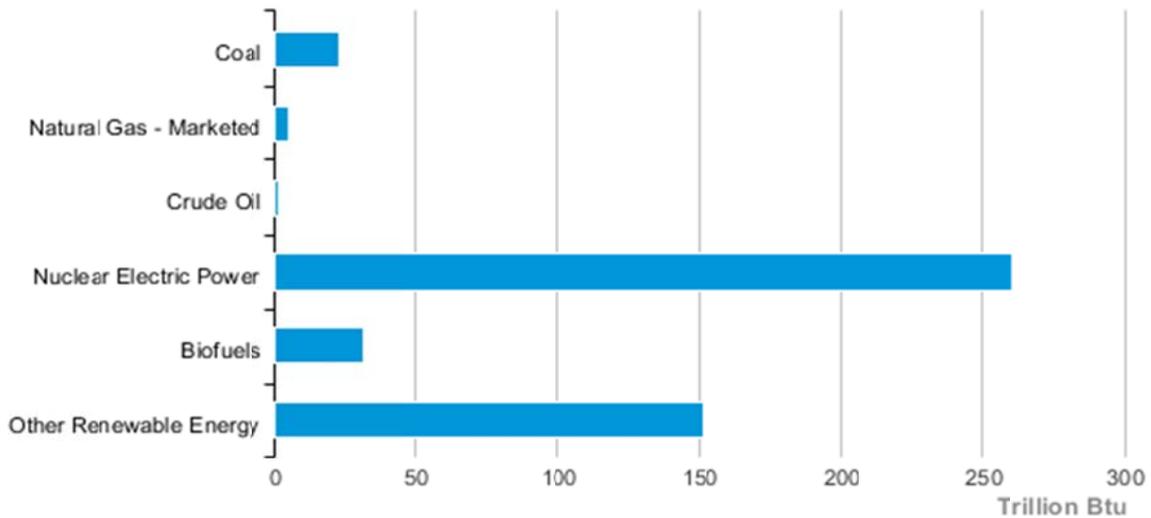
Figures 3 and 4.

Tennessee Energy Consumption by End-Use Sector, 2015



 Source: Energy Information Administration, State Energy Data System

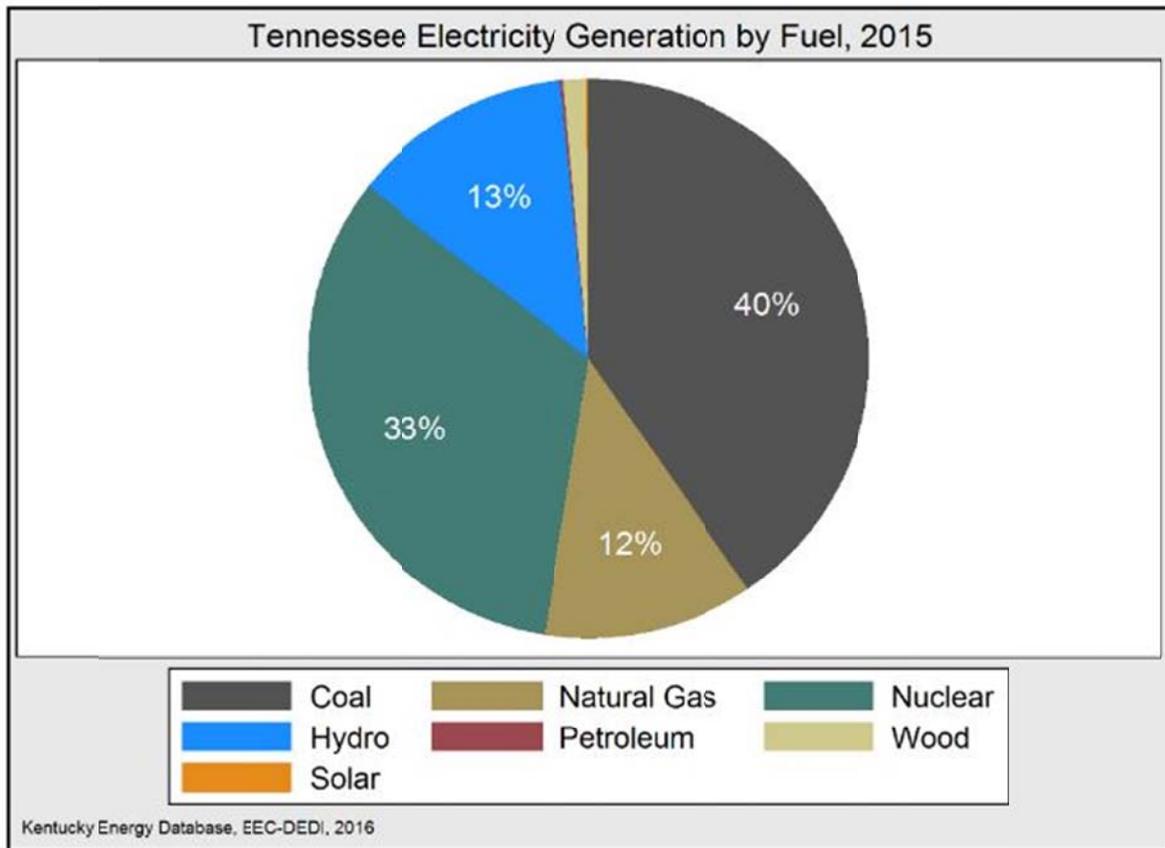
Tennessee Energy Production Estimates, 2015



 Source: Energy Information Administration, State Energy Data System

On a biennial basis, the Southern States Energy Board (SSEB) produces a Southern States Regional Energy Profile report, which is based on EIA data and analyzed by the State of Kentucky. The most recent report, released in July 2016, provides a snapshot of energy consumption and production data from 2015. The following two SSEB graphs illustrate a breakdown of Tennessee electricity generation by fuel and electricity consumption by sector in calendar year 2015. To access the report, please visit: http://www.sseb.org/wp-content/uploads/2010/05/REP_2016.pdf.

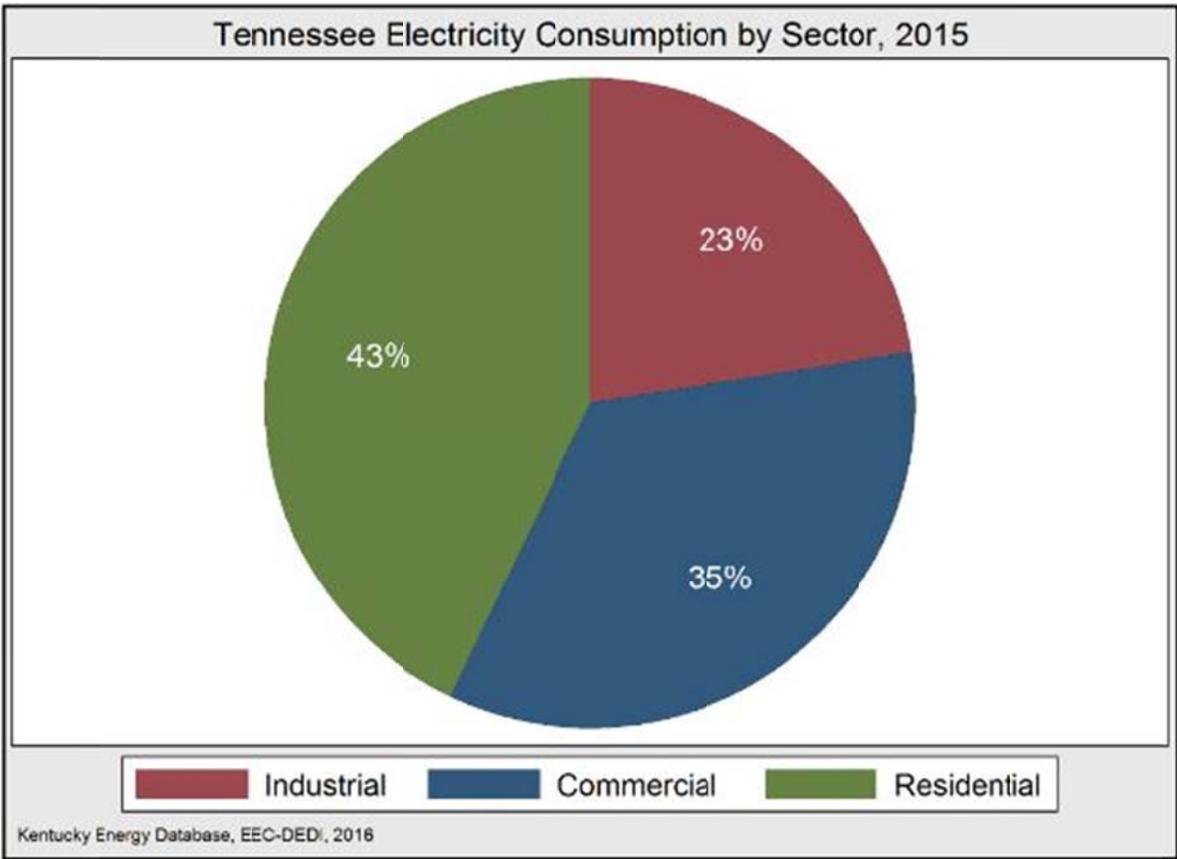
Figure 5.



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⁵ Tennessee Electricity Generation by Fuel (2015 Data). Southern States Energy Board. Southern States Regional Energy Profiles. (July, 2016). Retrieved from http://www.sseb.org/wp-content/uploads/2010/05/REP_2016.pdf on July 19, 2016.

Figure 6.



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⁶ Tennessee Electricity Consumption by Fuel (2015 Data). Southern States Energy Board. Southern States Regional Energy Profiles. (July, 2016). Retrieved from http://www.sseb.org/wp-content/uploads/2010/05/REP_2016.pdf on July 19, 2016.

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