# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table of Contents</td>
<td>i</td>
</tr>
<tr>
<td>Office of Energy Programs</td>
<td>ii</td>
</tr>
<tr>
<td>Annual Report Requirements</td>
<td>ii</td>
</tr>
<tr>
<td>Tennessee's State Energy Office</td>
<td>1</td>
</tr>
<tr>
<td>Energy Security Planning, Preparedness, and Response</td>
<td>2</td>
</tr>
<tr>
<td>K-12 Energy Education</td>
<td>5</td>
</tr>
<tr>
<td>Energy in Transportation</td>
<td>7</td>
</tr>
<tr>
<td>Clean Energy Financing</td>
<td>15</td>
</tr>
<tr>
<td>Stakeholder Collaboration and Outreach</td>
<td>18</td>
</tr>
<tr>
<td>State Facility Utility Management</td>
<td>21</td>
</tr>
<tr>
<td>Tennessee's Energy, Emissions, and Employment Profile</td>
<td>26</td>
</tr>
<tr>
<td>Energy Consumption and Production</td>
<td>27</td>
</tr>
<tr>
<td>Energy Sector Emissions</td>
<td>29</td>
</tr>
<tr>
<td>Energy Sector Employment</td>
<td>30</td>
</tr>
<tr>
<td>Acknowledgement and Disclaimer</td>
<td>1</td>
</tr>
<tr>
<td>Image Attribution</td>
<td>1</td>
</tr>
</tbody>
</table>
OFFICE OF ENERGY PROGRAMS

The Tennessee Department of Environment and Conservation's Office of Energy Programs (TDEC OEP) provides education, outreach, technical assistance, and/or funding and financing opportunities for the following:

- energy efficiency;
- energy management;
- renewable energy;
- energy security planning, preparedness, and response; and
- energy in transportation.

OEP is comprised of two sections: the State Energy Office (SEO) and the State Facility Utility Management Section (SFUM). Through its activities, OEP promotes the efficient, effective use of energy to enhance the environmental and economic health of the state. Learn more about OEP at http://www.tn.gov/environment/energy.

ANNUAL REPORT REQUIREMENTS

Tenn. Code Ann. §§ 4-3-510(9) and 4-3-1012(b)(5) require TDEC OEP to submit annual reports 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. TDEC OEP's Program Year runs concurrent with the Federal Fiscal year; thus, this combined report covers the period from October 1, 2019 through September 30, 2020.
TDEC OEP serves as the Governor-designated SEO for the State of Tennessee. The SEO is tasked with developing and overseeing energy-related programs and initiatives that promote a cleaner environment and a stronger economy. The SEO’s activities fall into five main areas of focus: energy security planning, preparedness, and response; K-12 energy education; energy in transportation; clean energy financing; and stakeholder collaboration and outreach.

The SEO receives the majority of its funding from the U.S. Department of Energy (U.S. DOE) State Energy Program (SEP). SEP provides funding and technical assistance to states, territories, and the District of Columbia to enhance energy security, advance state-led energy initiatives, and maximize the benefits of decreasing energy waste.
Pursuant to Tenn. Code Ann. §4-3-510, OEP has the duty and responsibility to “promote state and local energy emergency preparedness in coordination with other appropriate state agencies, such as the military department.” Subsequently, OEP is responsible for coordinating Emergency Support Function 12 – Energy (ESF-12) activities related to transportation and heating fuels under the Tennessee Emergency Management Plan to enhance Tennessee’s preparedness for disruptions to the state’s energy resources.

This work includes the ongoing management of the State’s Energy Security Plan, the Tennessee Petroleum Shortage Response Guidance, OEP’s Standard Operating Procedures checklists, and other energy emergency response reference materials, in cooperation with other State agencies and private industry stakeholders. (Tennessee’s strategic plans and operating procedures are often cited by U.S. DOE as good resources for other SEOs across the country to reference and emulate.) ESF-12 activities also require OEP staff to attend U.S. DOE energy emergency planning seminars, participate in training exercises, and serve as the primary ESF-12 Emergency Services Coordinators (ESCs) for the Tennessee Emergency Management Agency (TEMA). In addition, OEP staff members serve as the State’s Energy Emergency Assurance Coordinators (EEACs) for the U.S. DOE’s Office of Cybersecurity, Energy Security, and Emergency Response. Under this program, EEACs act as points of contact in each state during energy emergencies.

State Heating Oil and Propane Program

As participants in the U.S. DOE State Heating Oil and Propane Program (SHOPPP), OEP collects weekly propane prices during the winter heating season from a random sample of propane distributors across the state. OEP shares this data with the Energy Information Administration (EIA), which publishes the data regionally to assist both government and private sector entities with monitoring winter propane markets.¹

Energy Security Planning and Preparedness

- In March, the OEP Primary ESC worked with TEMA to create a GIS map with petroleum terminal layers and flooding contours for the Cumberland River through Nashville. This map helps TEMA better understand vulnerable petroleum fueling facilities with regard to the region’s floodplain and design adequate response measures for severe weather and rainfall events.
- The team created the first Mission Ready Package for ESF-12 Energy, a suite of resources and templates that allows responders to quickly request mutual aid from OEP for purposes of ESF-12 Energy staffing in other states, particularly during natural disasters or fuel shortages. The package also serves as a template for other SEOs who wish to offer their own ESF-12 Energy services in times of emergency.
- The Tennessee Energy Assurance Plan was revised to include a major reorganization of reference data into separate annexes by fuel type. State Energy Profile information was also updated to reflect data published by EIA in 2020.

Energy Security Education and Outreach

The OEP Primary ESC served as Energy Security Committee co-chair for the National Association of State Energy Officials (NASEO) and co-hosted national webinars, reviewed NASEO documents, trained energy

¹ EIA makes this data available through its Winter Heating Fuels website, which is updated weekly during the winter heating season (October 1 through March 31): https://www.eia.gov/special/heatingfuels/#/US-TN/propane-week. For additional information, EIA releases its “This Week in Petroleum” report every Thursday: https://www.eia.gov/petroleum/weekly/index.php.
security staff in other states, participated in U.S. DOE's State Energy Security Training Working Group, and served as the State, Local, Tribal, and Territorial (SLTT) representative for FEMA's Mitigation Framework Leadership Group (MitFLG).

Additionally, OEP engaged in several awareness efforts on the topic of energy security:

- **Outreach:** OEP distributed an Energy Security Quarterly Newsletter to stakeholders in the public and private sectors. The newsletter shared data, case studies, and news items related to energy security, and included information on cybersecurity, EIA's short-term energy outlook, seasonal weather concerns, and more. OEP ESCs also prepared several articles on energy resilience for the TDEC Green Star Partnership quarterly newsletter, which was distributed to industrial and public sector stakeholders across the state.

- **Workshops:** OEP ESCs conducted energy security workshops and webinars on a variety of topics, including fuel supply, cybersecurity, hazard mitigation, energy data analysis, data use best practices, and the protection of critical infrastructure information during energy emergencies. The team worked with partners TEMA, NASEO, U.S. DOE's Cybersecurity and Infrastructure Security Agency (CISA), Tennessee Technological University's Industrial Assessment Center, and the Tennessee Department of Safety and Homeland Security to conduct these training sessions.

- **Stakeholder Education:** OEP also participated in targeted engagement and education activities, including the preparation and presentation of situation briefs for energy security stakeholders (e.g., CISA, TEMA) on the TN Energy Security checklist, Energy Security Plan, Petroleum Shortage Response Guidance, fuel supply chain, pending pipeline and terminal projects, and the State's response to the COVID-19 pandemic.

### Energy Security Preparedness and Training Exercises

OEP ESCs participated in several training exercises and energy security briefings with industry personnel, including the following:

- A GridEx exercise conducted by the Tennessee Valley Authority (TVA) in Chattanooga. During the exercise, the OEP Primary ESC observed how the Agency Coordination Center functions, as well as how various operations units within TVA interact during an emergency.
- An annual State Emergency Operations Center (SEOC) training, including a TVA Nuclear Plant Integrated Training drill, TVA Nuclear Plant Emergency training, and a U.S. DOE Oak Ridge Reservation emergency exercise.
- A training from the Tennessee Department of Military ESC to gain secure access to the Defense Department Awareness and Assessment Response Tool (DDART).
- ExxonMobil Pipeline Terminal tabletop exercises for the Nashville and Memphis terminals.

- A National Association of Regulatory Utility Commissioners Cybersecurity Training for state public utility commissioners and staff.

### Emergency Response

In October and November 2019, severe flooding across Tennessee resulted in official emergency activation, during which OEP ESCs monitored fuel and power outages and provided energy updates to the SEOC Direction and Control Officer. OEP ESCs also worked with petroleum industry stakeholder associations and large fuel distributors in Tennessee to track propane and gasoline supplies, due in part to a winter propane shortage that hit the Midwest in late 2019.

On March 3, 2020, a powerful storm system brought tornadic activity, heavy rains, hail, and destructive winds through the West and Middle regions of Tennessee. Confirmed tornados travelled through portions of Davidson, Wilson, and Putnam Counties. These tornados left a wide path of destruction with multiple fatalities reported, homes and businesses destroyed, widespread power outages, and significant damage to local schools. A Presidential Major Disaster Declaration was signed March 5.

As part of its response efforts, TEMA requested that TDEC OEP serve as the Infrastructure Branch Chief over the ESFs for Transportation, Communications, Energy, and Critical Infrastructure. Responders did not know then that this event would spark the longest continuous emergency activation in Tennessee's history.

Over 50,000 households were without power in Nashville alone, and Mt. Juliet suffered severe damage. TVA had multiple transmission towers down, including one that fell into the Cumberland River. A transmission line had also fallen across Interstate 40 near Mt. Juliet. TVA's ESCs contacted OEP for assistance in responding to these infrastructure losses.

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2. GridEx is a training exercise that simulates cyber and physical attacks on the North American electricity grid and other critical infrastructure. Led by the North American Electric Reliability Corporation, GridEx gives emergency management participants a forum to demonstrate how they would respond to and recover from coordinated cyber and physical security threats and incidents: [https://www.nerc.com/pa/CI/ESISAC/Pages/GridEx.aspx](https://www.nerc.com/pa/CI/ESISAC/Pages/GridEx.aspx).
To retrieve the submerged transmission tower, OEP coordinated with the U.S. Army Corps of Engineers to lower the Cumberland River and grant TVA access to the felled infrastructure. In addition, OEP coordinated with the U.S. Coast Guard to manage traffic on the river during recovery efforts. The Coast Guard had to create a nighttime window for fuel barges to travel through the work zone one-by-one, to restock a nearby Nashville fuel terminal.

With regard to the felled transmission line, TEMA, the Tennessee Highway Patrol, and OEP coordinated with the Tennessee Department of Transportation (TDOT) to shut down Interstate 40, one of Tennessee’s highest traffic corridors. This effort allowed TVA to secure and replace the fallen transmission line using helicopters along the roadway. The Tennessee Department of Military became involved to deconflict the operations with other major recovery flights over the area.

The tornado response continued past March 11, the day on which the World Health Organization declared COVID-19 a global pandemic. Governor Lee declared an emergency for the pandemic on March 12. OEP ESCs became heavily involved in assisting the private sector with questions regarding essential businesses and essential workers. In short order, the country shut down in compliance with stay-at-home orders, and fuel began to back up in pipelines and at terminals as Americans ceased road and air travel. OEP ESCs worked with private sector fuel stakeholders and the Tennessee Department of Agriculture, which issued a Reid Vapor Pressure (RVP) waiver to allow use of winter blend fuel until depleted from storage.

Two weeks later, more severe weather produced tornados that struck metropolitan Chattanooga and caused thousands of power outages across the city. The impact to the Electric Power Board’s smart grid in Chattanooga was unprecedented and created additional challenges to restoration. This smart grid runs a fiber optic cable and power line to every house and business in the local power company’s service area. While powerlines are routine to replace, fiber cable was found to be more difficult to splice and restore service on a large scale. OEP ESCs tracked power outages and restoration as well as assisted nursing homes in obtaining backup generators from the Tennessee Department of Health for use.

On May 3, Middle Tennessee was again hit by a line of thunderstorms, known as a derecho, that delivered winds registering 71 mph at the Nashville airport. The storms knocked out power to over 260,000 Tennesseans at its peak. According to Nashville Electric Service, the derecho caused the worst power outage since the historic 1994 ice storms and resulted in over half the city losing power. After the event, OEP ESCs reported to the SEOC to field requests and track power outages.

Since the start of emergency activation in March, OEP ESCs have continued to share Infrastructure Branch Chief responsibilities for TEMA, which involves the preparation of daily infrastructure branch Situational Reports and updates to TDEC leadership, participation in Branch Chief meetings and Around the Room briefings, and the development of infrastructure branch goals and objectives. As of the close of the Program Year, more than 200 days has passed in the ongoing emergency activation.
OEP has a long history of supporting K-12 Energy Education through professional development and student learning opportunities. OEP's offerings for the Program Year included energy education workshops for both educators and students, participation in energy education outreach events, and continued support of the National Energy Education Development (NEED) Project. These offerings connect the broad topic of energy to science, technology, engineering, and math (STEM) subjects and provide educators and students with the knowledge and resources necessary to teach energy concepts.

OEP strives to provide energy education opportunities to schools across the state, prioritizing schools in economically distressed or at-risk counties (as defined by the Appalachian Regional Commission) and/or schools whose low-income student population is greater than 60% of the total student body (as determined using data from greatschools.org).

OEP hosted sixteen K-12 energy education events throughout Tennessee during the Program Year, including nine in-person energy education workshops/outreach events that occurred prior to the onset of the COVID-19 pandemic. The remaining seven events were held virtually in response to social distancing practices. These combined energy education efforts reached more than 3,200 students and educators in 19 counties, including one distressed county, three at-risk counties, and four schools whose low-income student population is greater than 60% of the total student body.

K-12 Energy Education Workshops & Outreach for Students and Educators

OEP's workshops and outreach events allow participants to explore energy concepts through hands-on, interactive demonstrations on topics such as energy transfer, electric circuitry, chemical and radiant energy, and solar and wind power. Early in the Program Year, OEP hosted several in-person demonstrations for schools and students across the state, a few of which are highlighted below:

- **Millington Middle School**: OEP hosted two workshops for 98 Millington Middle School students and educators, partnering with the Nashville-based Science Guys program to provide demonstrations regarding energy-related topics, including transfer of energy, potential energy using Bernoulli's Principle, electric circuitry, and radiant energy. According to greatschools.org, more than 60% of this school's population is comprised of low-income students.

- **John Sevier Middle School**: OEP traveled to John Sevier Middle School, which serves both Sullivan County and Hawkins County, to host an activity booth for the school's first annual STEM Night. More than 100 students, educators, and their families engaged in hands-on energy experiments and were provided with free energy education activities and take-home materials. Hawkins County is one of 24 at-risk counties in Tennessee, as defined by the Appalachian Regional Commission.
Tennessee STEAM Festival: OEP partnered with the Tennessee STEAM Festival to bring science, technology, engineering, art, and math (STEAM) to the public. Approximately 100 Tennesseans of all ages and backgrounds attended the festival at Rock Island State Park. OEP and the Science Guys presented a hands-on, energy-related show and booth, which provided lessons on solar and thermal energy, chemical reactions, rockets, and more. Rock Island State Park is in Warren County, one of 24 at-risk counties in Tennessee.

In response to the COVID-19 pandemic and the implementation of social distancing measures, OEP designed energy education curriculum for use in the online school setting. OEP again partnered with Science Guys to host a summer schedule of Virtual Live Energy Education shows. Each 40-minute show featured over a dozen energy experiments.

OEP also partnered with the Creative Discovery Museum in Chattanooga to offer virtual learning opportunities to Tennessee students. These virtual lessons were taught live or through a View It and Do It format, allowing teachers and students to experience exciting, hands-on science lessons either in the classroom or at home. Schools that select the View It and Do It format were provided a video of science educators performing a variety of experiments (View It) and activity kits for students to use to conduct their own experiments after watching the lesson (Do It). Lesson offerings included the science of sound; forces and motion; electricity; biofuels as solutions for a cleaner tomorrow; and bioenergy and bioproducts.

National Energy Education Development (NEED) Project

OEP is the State coordinator for the NEED Project, which promotes energy education among students, educators, and civic leaders through the design and delivery of energy education programs. NEED works with energy companies, government agencies, and community 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.

NEED honors schools across the country through its NEED Project Youth Awards for Energy Achievement, a competition in which teachers take their energy education programs beyond the classroom and encourage students to engage in school and community outreach to share what they have learned about energy efficiency and conservation. To participate in the NEED Youth Awards competition, schools compile their energy education activities for the year and submit an electronic scrapbook of their efforts. Tennessee’s state winners are selected by OEP and are submitted for consideration at the national level. Tennessee schools have been recognized nationally every year since the program’s inception.

In June, Michie Elementary was named the NEED Project Youth Awards’ National Elementary School of the Year; Michie Elementary’s middle school team was also recognized as a National Junior Rookie Finalist. At the state level, the teams were named the Tennessee Elementary and Junior School of the Year, respectively. To view Michie Elementary’s project, “Reduce, Reuse, Recycle,” click here. To view the Junior High project, “Conservation of Energy,” click here. Learn more about the NEED Project Youth Awards here.

“Thanks again for providing a live performance from the Science Guys to our Library!!! Our kids and parents remarked about how “Great and exciting” the performance was. It was also great that they were able to broadcast with other children throughout the state.”

– Dana Bilbrey, Lebanon-Wilson Public Library
According to EIA, the transportation sector is the largest energy consuming end-use sector in Tennessee, representing 28.8% of Tennessee’s total energy consumption in 2018. To address this critical energy sector, OEP promotes and educates Tennessee citizens about alternative fuels, advanced vehicle technologies, and sustainable transportation options. By prioritizing and educating citizens regarding the aspects of energy use in transportation, OEP seeks to reduce energy costs within the transportation sector, increase the energy efficiency of the transportation sector, enhance resiliency and emergency preparedness through diversification of available fuels, and promote economic growth with improved environmental quality.

Tennessee Sustainable Transportation Forum and Expo

The Tennessee Sustainable Transportation Forum & Expo (STF&E) is an annual conference, coordinated and hosted by OEP, TDOT, the TDEC Office of Policy and Sustainable Practices (OPSP), the TDEC Office of External Affairs (OEA), and the East Tennessee Clean Fuels Coalition (ETCF). STF&E allows attendees to share and discover projects that can reshape what is possible in transportation and mobility. The research, technology, planning, and policy developments shared at STF&E aim to improve transportation efficiency, reduce vehicle emissions, and address the mobility needs of all. Panelists and speakers from across the country highlight best practices to transform transportation systems efficiently, affordably, and sustainably. Learn more about STF&E at www.sustainabletransportationforum.com.

OEP coordinated with its STF&E partners to complete planning and logistics for the fifth annual STF&E, which was held on October 1-2, 2019 at the University of Tennessee Conference Center in Knoxville. Staff from each of the organizing agencies assisted with event preparation and execution. The forum featured new research and technologies that improve transportation efficiency, reduce vehicle emissions, and address the mobility needs of all Tennesseans. Guest panelists and speakers from Vanderbilt University, Oak Ridge National Laboratory, Denso, VanHool, State and local government agencies, sustainability-focused nonprofits, and more highlighted innovative solutions and implementation best practices for a more sustainable transportation future.

In addition to the forum, the 2019 STF&E provided the following offerings:

- A poster session highlighting projects or research focused on the implementation of sustainable transportation and enhanced mobility solutions; and
- An alternative fuel vehicle and equipment showcase and, new in 2019, an alternative fuel vehicle ride and drive.

STF&E concluded with a luncheon to honor winners of the Tennessee Sustainable Transportation Awards (TSTAs). Hosted by TDEC and TDOT, the TSTAs 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 the state’s natural resources. Summaries of the award-winning projects can be accessed here: http://www.tn.gov/environment/TSTA.

The luncheon also honored new inductees to the Tennessee Green Fleets program, coordinated by ETCF to recognize local fleets that have leveraged alternative fuel technologies to decrease petroleum consumption and achieve associated vehicle emissions reductions.

Middle-West Tennessee Clean Fuels

U.S. DOE's Clean Cities program advances the nation's economic, environmental, and energy security by working locally to advance affordable, domestic transportation fuels and technologies. A national network of nearly 100 Clean Cities Coalitions brings together stakeholders in the public and private sectors to deploy alternative and renewable fuels, idle-reduction measures, fuel economy improvements, and new transportation technologies, as they emerge. In Tennessee, there are two U.S. DOE-designated Clean Cities Coalitions: the Middle-West Tennessee Clean Fuels Coalition (MWTCF) and the East Tennessee Clean Fuels Coalition (ETCF). The website for these two Coalitions, known collectively as Tennessee Clean Fuels, may be accessed at http://www.tncleanfuels.org/.

As Coordinator for MWTCF, OEP provides technical assistance and targeted outreach, within the Coalition's territory, to raise awareness and foster a greater understanding of alternative fuels and advanced vehicle technologies. Additionally, OEP tracks, validates, analyzes, and reports on critical information and performance metrics necessary to gauge consumer acceptance and track the growth/adoption of technologies and practices in the marketplace.

In compliance with eligible activities and U.S. DOE grant deliverables, OEP staff conducted the following key activities on behalf of MWTCF:

- Identified and tracked alternative fuel station opening and closing information and kept U.S. DOE abreast of any refueling site openings, closings, and status changes;
- Organized several stakeholder meetings and events to disseminate Clean Cities and alternative fuel vehicle information;
- Filmed and distributed alternative fuel vehicle and associated emissions reduction calculation videos, both for use in the K-12 classroom as well as for education of the general public via a newly launched Alternative Fuel Demonstration Library;
- Conducted targeted outreach to fleets, fuel providers, and consumers regarding the use of alternative fuel vehicles and advanced vehicle technologies.
Throughout the year, MWTCF provided technical assistance to Tennessee State Parks (TSP) to evaluate biofuel adoption within its fleet. Of note, MWTCF coordinated a site visit with TSP staff to Great Smoky Mountains National Park to inspect the park’s biodiesel infrastructure, ask questions of fleet maintenance, procurement, and operations staff, and view the other alternative fuel infrastructure available onsite (propane and electric). MWTCF also assisted TSP in conducting a “tank survey” by using GIS to identify tanks to prioritize for a first-stage infrastructure pilot (in parks that currently utilize the most diesel fuel). MWTCF is now working to develop a five-year alternative fuel fleet strategy for TSP, which could include biodiesel as well as other solutions (e.g., electrics, hybrids, etc.) for implementation. A draft of this strategy is expected to be completed in 2021.

MWTCF staff also supported the University of Memphis in compiling information on FHWA Buy America compliant vendors to inform implementation of a TDOT-funded project focused on the procurement of propane refueling infrastructure, the conversion of vehicles to run on propane, as well as the installation of two electric vehicle DC fast chargers on the university campus. MWTCF will continue to support the implementation of this project in 2021.

**Annual Reporting to U.S. DOE**

Each year, MWTCF reaches out to fleets and alternative fuel stations that the Coalition has engaged with or supported during the year to request data on alternative fuel usage and/or sales; data is then compiled and submitted in an Annual Progress Report to U.S. DOE. This report was completed in March of 2020 and covers activity by 26 fleets and 14 fueling station owners in Middle-West Tennessee for calendar year 2019. Key findings from this report are shown in the figures below.

**MWTCF’s Calendar Year 2019 Impact:**

10.7M gallons of gasoline equivalent reduced

1,700 lbs. of PM reduced

428K lbs. of NOx reduced

**Alternative Fuel Corridors**

Section 1413 of the Fixing America's Surface Transportation (FAST) Act required the U. S. Department of Transportation (U.S. DOT) to designate national alternative fuel corridors (AFCs) for electricity, hydrogen, propane, and natural gas with the purpose of improving passenger and commercial alternative fuel vehicle mobility across the United States. To designate the corridors, U.S. DOT solicited nominations from State and local officials, who worked with industry stakeholders to incorporate existing fueling infrastructure and plans for future infrastructure into their AFC nominations. To date, the Federal Highway Administration (FHWA) has designated portions/segments of 119 interstates and 100 U.S. highways/State roads as AFCs; these routes serve as the basis for a national network of AFCs spanning across 49 states and over 145,000 miles, enabling intercity, regional, and national travel with lower-emission, alternative fuels.

In June 2020, FHWA designated portions of I-81 and I-26 as either “corridor-ready” or “corridor-pending” AFCs for publicly accessible electric vehicle DC Fast Charging (DCFC) and compressed natural gas (CNG) refueling. These TN highways join I-24, I-75, and I-65 (designated in 2018 as AFCs for DCFC and CNG) as well as I-40 (designated in 2017 as an AFC for DCFC, CNG, and propane autogas (LPG)). Every mile of TN’s major interstate roadway is now designated as either “corridor-ready” or “corridor-pending” for either DCFC, CNG, or LPG refueling.

MWTCF staff were key contributors to crafting AFC designation nominations for these highways, working in collaboration with TDOT, ETCF, and other alternative fuel stakeholders. MWTCF and ETCF also represent Tennessee on the Southeast Corridor Council, a group that provides a touchpoint for Clean Cities Coordinators and Department of Transportation staff in the Southeast to share progress updates for their respective states with regard to corridors and corridor signage, pose questions to one another, and share best practices for the region. Using feedback from the Southeast Corridor Council and TDOT signage personnel, MWTCF designed AFC identification signage recommendations for TDOT to implement along eligible corridors in Tennessee.

MWTCF was also a key participant in TDOT’s I-40 Alternative Fuel Corridor Deployment Planning Project. This project is a multi-state effort focused on the deployment of alternative fuel refueling and charging facilities to fill in “corridor-pending” gaps along the 1,907 mile east-west I-40 corridor, stretching from North Carolina to Oklahoma. MWTCF attended working group sessions and contributed to key deliverables, including a final project report published in November 2020, designed to aid in fueling station site host identification, recognition of supportive funding opportunities, and public/private stakeholder collaboration.

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4. MWTCF’s Calendar Year 2020 Annual Report will be released in Q2 2021, once U.S. DOE has verified and approved the data submitted by the Coalition.

5. According to FHWA’s 2020 Round 5 Request for AFC Nominations, an electric vehicle “corridor-ready” AFC must have public DCFC stations “no greater than 50 miles between one station/site and the next on [the] corridor, and no greater than 5 miles off the highway. Additionally, each [DCFC] site should have both J1772 combo (CCS) and CHAdeMO connectors.” A CNG “corridor-ready” AFC must have “public, fast fill, 3,600 psi CNG stations no greater than 150 miles between one station and the next on the corridor, and no greater than 5 miles off the highway. Additionally, each [CNG] site should have both 3,600 psi CNG stations no greater than 150 miles between one station and the next on the corridor, and no greater than 5 miles off the highway.”
Electric Vehicle Wide-Scale Analysis for Tomorrow’s Transportation Solutions (EV WATTS)

Throughout 2020, MWTCF participated in the U.S. DOE-funded EV WATTS project, a three-year, nationwide effort that is collecting real-time usage data from plug-in electric vehicles and charging infrastructure in multiple geographic areas and climates. Researchers will then validate, analyze, and summarize the data to create a comprehensive, national dataset, which can be used to inform future research, development, and deployment efforts. Throughout the Program Year, MWTCF conducted outreach to secure data-sharing commitments from Tennessee-based vehicle and infrastructure owners; associated data collection is expected to begin in 2021.

Volkswagen Diesel Settlement

In 2015, Volkswagen (VW) publicly admitted that it had secretly and deliberately installed a defeat device—software designed to cheat emissions tests and deceive federal and state regulators—in approximately 590,000 model year 2009 to 2016 motor vehicles containing 2.0 and 3.0 liter diesel engines. Under the ensuing Volkswagen Diesel Settlement (VW Settlement) First and Second Partial Consent Decrees, VW has agreed to: (1) dedicate $10 Billion to the recall of at least 85% of the affected 2.0 and 3.0 liter vehicles; (2) invest $2 Billion in zero-emission vehicle infrastructure and promotion (“Zero Emission Vehicle Investment Plan”); and (3) establish a $2.9 Billion Environmental Mitigation Trust (EMT) to mitigate the environmental effects of the excess nitrogen oxide (NOx) emissions from the affected vehicles.

In October 2017, the Court approved two Trust Agreements for Beneficiaries of the EMT: one for the 50 states, the District of Columbia, and the Commonwealth of Puerto Rico (“State Trust Agreement”), and one for the separate allocation for federally recognized Indian tribes in the U.S. The State’s initial allocation under the State Trust is $45,759,914.40.

Following the designation of TDEC as the Lead Agency for purposes of administering the State’s VW EMT allocation, TDEC formed a multidisciplinary Technical Advisory Committee (TAC) to develop a Beneficiary Mitigation Plan (BMP). The TAC is comprised of representatives from the following TDEC divisions: Air Pollution Control; OEP; OPSP; OEA; and the Office of General Counsel (OGC). On September 21, 2018, TDEC released a final BMP for implementing the State’s initial allocation under the EMT. The BMP noted TDEC’s plans to release separate project solicitations in the following order for each of the EMA categories that it has selected to fund, with percent of initial total funding allocation noted:

- Class 4-8 School Buses (~20%);
- Class 4-8 Shuttle and Transit Buses (~40%);
- Class 4-7 Local Freight Trucks (15%), Class 8 Local Freight Trucks and Port Drayage Trucks (10%); and
- Light Duty Zero Emission Vehicle (ZEV) Supply Equipment (15%)

The State’s BMP targets the largest contributors of mobile NOx emissions in Tennessee, including the on-road, diesel heavy duty sector and the on-road, non-diesel light duty sector. As NOx emissions contribute to the formation of ozone and particulate matter, reductions in emissions will assist in the State’s efforts to maintain compliance with the National Ambient Air Quality Standard (NAAQS) for Ozone and Particulate Matter.

As of September 30, 2020, OEP had obligated more than $14 million in VW Settlement EMT funding to 39 vehicle projects in Tennessee, under the School Bus and Transit and Shuttle Bus grant programs. Overall, 73% of funds have been obligated to alternative fuel vehicle projects, including propane, CNG, and electric. Additional funding obligations and grant programs will be announced in 2021.

Learn more about the VW Settlement at http://www.tn.gov/environment/VWSettlement. Access the State’s BMP at http://www.tn.gov/environment/VW_BMP.

VW Settlement EMT Funding Breakout in Tennessee

By the end of Program Year 2020, the State of Tennessee has obligated $14,021,687.44 in VW Settlement EMT funding to 39 School Bus, Shuttle Bus, and Transit Bus projects in Tennessee.

Overall, 73% of project funds have been obligated to support alternative fuel projects.

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<th>Total Funding Obligated by Fuel Type</th>
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<th>New Diesel</th>
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Transit and Shuttle Bus Grant Program

In September 2019, TDEC released its second solicitation for projects under the VW Settlement EMT to replace and/or repower transit and shuttle buses with new alternate-fueled or all-electric vehicles and/or drivetrains. In May 2020, TDEC announced that the following three entities would receive a total of $5,690,860.50 in grant funding to support transit bus replacement projects across Tennessee:

- Chattanooga Area Regional Transportation Authority
- City of Knoxville (Knoxville Area Transit)
- Memphis Area Transit Authority

The grantees will replace a total of nine engine model year 2009 or older diesel transit buses with six all-electric and three diesel-hybrid vehicles. These projects are expected to yield NOx emissions reductions of an estimated 17,027.46 pounds, or 8.51 tons, over the lifetime of the new vehicles. The nine transit buses funded will operate 70% or more of the time in former nonattainment areas for ozone and/or PM2.5 NAAQS and will collectively travel more than 400,000 miles each year.

Medium and Large Truck Grant Programs

In August 2020, TDEC released additional solicitations for projects under the VW Settlement EMT for the Medium and Large Truck Grant Programs. Under this solicitation, $6,177,588.45 in EMT funding was available for eligible class 4-7 local freight truck (medium truck) projects and $4,118,392.30 in EMT funding was available for eligible class 8 local freight truck and port drayage truck (large truck) projects. The grant programs will provide financial assistance to public, non-profit, and private fleets in Tennessee that replace and/or repower eligible medium and large trucks with new diesel, alternate fueled, or all-electric trucks and/or drivetrains.

Applications were due by October 30, 2020. TDEC will announce awards in early 2021 after conducting a comprehensive review and evaluation of all complete and eligible grant applications.

Light Duty Electric Vehicle Supply Equipment

Under the light duty ZEV supply equipment category (i.e., light duty electric vehicle supply equipment) category, the State may elect to fund a portion of the cost to purchase and install eligible charging infrastructure at multi-family dwellings (MFD) and at publicly accessible locations, including the placement of high power (DCFC) charging infrastructure along a corridor.

Although the State has not yet released a funding solicitation for this category, OEP worked throughout the Program Year to compile stakeholder feedback and infrastructure funding best practices, which will inform program and solicitation design. In November 2019, TDEC issued a Request for Information (RFI) to solicit feedback on the VW Settlement EMT light duty ZEV supply equipment category, potential priority areas, and related technologies. Over 20 organizations submitted feedback. The State expects to release a funding solicitation for the light duty ZEV supply equipment category in 2021.

School Bus Replacement Grant Program

Launched in the fall of 2018, the VW Settlement EMT School Bus Replacement Grant Program provides funding to selected projects that replace eligible diesel school buses with new diesel, alternate-fueled, or all-electric vehicles. Thirty-six grantees were selected to replace a total of 136 engine model year 2009 or older school buses with 67 new diesel, one all-electric, 65 propane, and three CNG school buses. These projects are expected to yield NOx emissions reductions of an estimated 112,751 pounds, or 56.37 tons, over the lifetime of the new vehicles. By the end of the Program Year, OEP reimbursed more than $3.5 million in grant funding to school bus grantees that have successfully purchased and put into service qualifying vehicle replacements. OEP will reimburse approximately $5 million more in grant funding under this program in the coming Program Years.

Of the school buses to be funded by the VW Settlement EMT, 26 will operate 70% or more of the time in former nonattainment areas for ozone and/or fine particulates (PM2.5) NAAQS; 42 will operate in FY 2019 economically distressed counties (as defined by the Appalachian Regional Commission).
The Oneida Special School District, located in an economically distressed county as determined by the Appalachian Regional Commission, is one of several grantees using funds under the School Bus Replacement Grant Program to adopt alternative fuel vehicles. In the pictures above, Zach Brown, Assistant Director of Schools, shows off a new propane school bus and the refueling infrastructure the school district installed onsite for easy driver access.

This project has without question provided our staff and our citizens with a safer and more environmentally friendly fleet. [We know that] our city’s population consists of economically challenged individuals (and) individuals with pathologies which make them especially vulnerable to adverse environmental conditions… [This school bus] project has directly helped those who need the most assistance: We are profoundly grateful.

– City of Johnson City

The transition to propane fueled buses has benefited HCS in many ways. The reduced fueling cost… [and] reduced maintenance and repairs have positively impacted our system… Community interest and support in the project has been high among HCS members and elected officials. This interest has prompted other county entities to explore the use of propane in departmental fleets.

– Hancock County Schools

The buses are more efficient in areas such as fuel mileage, maintenance costs, and reliability. [and] maintenance staff have less issues with down time due to [reduced need for] repairs. The driving staff appreciate the more reliable units that have adverse environmental conditions… They are low-maintenance, easier to start and pathologies which make them especially vulnerable to

– Obion County Schools

Per propane bus, we are expecting to save $27,825.08 over the life of the vehicle… They are low-maintenance, easier to start and warm up on cold mornings, more comfortable for both the driver and the students and, with reduced emissions, less noxious for the passengers. [The VW funds] have allowed us to purchase and replace more diesels than usual this year… [which] puts us ahead of the curve and allows us to redirect additional funds for student academic needs… We also established our own propane fueling infrastructure on the campus of the bus garage, which shares property with the county highway department. The highway department [is now] convinced of the benefits of propane and are pursuing... funding opportunities to begin their own conversion of several vehicles away from diesel. This domino effect will have a significant impact on the physical and fiscal health of our county.

– Weakley County Board of Education

Program Year 2020 Grantee and Project Information

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<tr>
<th>County School District</th>
<th>Propane Buses</th>
<th>Diesel Buses</th>
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Note: The numbers in parentheses indicate the year and type of grant received.
**Tennessee Natural Gas and Propane Vehicle Grant Program**

Launched in the fall of 2016, the Tennessee Natural Gas and Propane Vehicle Grant Program provided grant funding to minimize the incremental cost of more than 80 alternative fuel vehicle purchases and/or conversions. The Program incentivized the investment in and operation of natural gas or propane-powered light, medium, and heavy-duty vehicles by public, non-profit, and private fleets in Tennessee. Grantees from the first and second rounds include the following organizations:

- Knoxville Utilities Board purchased three dedicated natural gas Freightliner M2 112 trucks
- Piedmont Natural Gas purchased six dedicated natural gas Freightliner M2 112 trucks
- Sevier County Utility District purchased three dedicated natural gas trucks, including a Ford F650 dump truck, an F450 truck, and a Kenworth T880 refuse hauler
- United Parcel Service, Inc. purchased twelve dedicated natural gas Kenworth T680 trucks
- City of Kingsport converted twenty bi-fuel propane Dodge Chargers
- City of Parsons purchased five dedicated natural gas trucks, including Ford F-150 and F-250 models
- Great Smoky Mountains National Park converted six dedicated propane trucks, including Ford F-150, F-250, F-350, F-450, and Ranger models
- Greater Dickson Gas Authority purchased one dedicated propane Freightliner S2G, one bi-fuel propane Ford F-350, four bi-fuel natural gas trucks (including Ford F250 and F350 models), and two dedicated natural gas Ford F750 dump trucks
- Piedmont Natural Gas purchased three dedicated natural gas Freightliner M2 trucks
- Rockwood Water Sewer and Gas purchased three dedicated natural gas Ford F-150 trucks
- Sevier County Utility District purchased five bi-fuel natural gas Ford F-250 trucks
- Waste Management purchased seven dedicated natural gas trucks, including Autocar ACX64 and Peterbilt 356 models

Throughout the Program Year, OEP continued to manage first and second round grant contracts under this program, which included the disbursement of grant funding, oversight and coordination of grantee reporting, and the implementation of desktop and onsite monitoring visits of grant recipients.

**Drive Electric Tennessee**

Throughout 2018, a team of Tennessee stakeholders—including State agencies (such as TDEC OEP), utilities, local governments, universities, research institutions, electric vehicle manufacturers, businesses, and advocacy groups—developed a shared vision for electric transportation in the state. Together, these stakeholders comprise Drive Electric TN (DET), whose goal is to increase electric vehicle adoption in Tennessee from approximately 11,000 electric vehicles in 2020⁶ to 200,000 vehicles by 2028. In January 2019, DET released the first edition of its Electric Vehicle Roadmap, which identifies "Opportunity Areas" that will increase electric vehicle adoption across multiple Tennessee use cases and sectors.

Three Opportunity Area committees were launched during the Program Year to address various projects and initiatives highlighted in the Roadmap: Charging Infrastructure Availability, Policies and Programs, and Awareness. Each of these Opportunity Areas are co-chaired by OEP and MWTCF personnel, who guide and oversee DET efforts to complete projects that promote electric vehicle adoption. (A fourth Opportunity Area committee focused on Electric Vehicle Availability and Offerings is expected to launch by 2022.) The lists that follow note the committees’ accomplishments and current priorities:

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6. As of Q4, 2020, there were approximately 11,000 electric vehicles registered in Tennessee. This number is provided to OEP by the Tennessee Department of Revenue on a quarterly basis, based on actual vehicle registration data for the state.
• **Charging Infrastructure Availability:** 1) publication of a Statewide Electric Vehicle Charging Infrastructure Needs Assessment; 2) evaluation of funding opportunities and ownership models to support implementation of a public, statewide electric vehicle charging network; and 3) development of guides for charging station site hosts and site selection, including information on site prep, charging station installation, and planning for ongoing charging station operation.

• **Policies and Programs:** 1) creation of a Local Action Plan video series, for use by local governments seeking to accelerate transportation electrification; 2) development of an Electric Vehicle Workplace Charging Infrastructure Best Practices Guide, for use by Tennessee employers; and 3) creation of a statewide E-VIP or electric vehicle tourism program to connect electric vehicle drivers with electric-friendly driving routes and destination chargers.

• **Awareness:** 1) creation of electric vehicle charging station signage recommendations; 2) compilation of electric vehicle case studies for a variety of fleet types and applications; 3) promotion of a robust DET social media and website presence; 4) coordination of EV Chapters across Tennessee, to serve as local resources for electric vehicle education; and 5) development of educator training programs, both for electric vehicle ride and drive training as well as electric vehicle dealership education.

In November 2019, DET published a Statewide Electric Vehicle Charging Infrastructure Needs Assessment to evaluate the condition of Tennessee’s current electric vehicle charging infrastructure and to identify charging needs for the future. Whereas high demand electric vehicle charging sites can attract private investment (e.g., retail charging, community charging), the Needs Assessment found that lower demand electric vehicle charging sites (e.g., corridor charging, rural charging) are not as appealing for private investors and may require investment from public institutions and/or utilities. The Needs Assessment also concluded that electric vehicle charging infrastructure should be prioritized for highway routes and rural tourism destinations, to relieve range anxiety and connect rural and urban areas. Electric Vehicle Charging Infrastructure Opportunity Maps developed by TDEC OEP highlight key primary (interstates) and secondary corridors (select U.S. and State highways) for electric vehicle charging infrastructure development as well as existing fast charging infrastructure (DCFC), the location of State Parks, and Distressed and At-risk Counties.

The recommendations from the Needs Assessment led to the inclusion of a statewide, public electric vehicle charging network in TDEC’s 2020-2024 Strategic Plan. The network will connect rural and urban areas, and will improve transportation efficiency, reduce vehicle emissions, and strengthen the resiliency of the transportation sector. To connect new audiences to Tennessee’s natural, cultural, and scenic areas and promote pathways for sustainable tourism, electric vehicle chargers will be placed in and around Tennessee State Parks and other tourist destinations.

TDEC OEP is working to secure multiple funding sources that can be leveraged to support the development of the network. TDEC OEP plans to supplement existing public electric vehicle charging infrastructure to achieve what TDEC is calling “Fast 50” designation on these corridors, such that non-proprietary fast charging sites (with minimum power levels of 50 kilowatts or higher) will be located no more than 50 miles apart along a given corridor or route.

DET and partners will continue to address the above-mentioned priorities and projects in 2021. For more information on DET, visit www.DriveElectricTN.org.

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7. Click to access the DET Statewide EV Charging Infrastructure Needs Assessment Executive Summary and the Companion Presentation Slides.
8. For reference, all electric vehicles can charge at Level 1 (~4 miles restored to battery per hour at 120 V, 12A-15A) and Level 2 (~20-30 miles restored to battery per hour at 240 V, 32A – 80A) power levels. Level 1 and Level 2 chargers can be easily installed at home, a workplace, public retail locations, or public points of interest. Most long-range, pure battery electric vehicles can charge at a Level 3 / Direct Current Fast Charge (DCFC) power level, restoring ~40-300 miles to the battery per 15 minutes at 480 V or 50 kW – 350 kW. DCFC is best suited to sites along interstate or highway corridors or within communities with high electric vehicle populations.
Qualified Energy Conservation Bond Program

Qualified Energy Conservation Bonds (QECBs) are low-interest federal bonds (via subsidy) that were available for issuance for qualified energy efficiency, renewable energy, and energy conservation capital projects. Under Tennessee statute, OEP is tasked with serving as the coordinator and administrator of the State's QECB program in partnership with the Tennessee Local Development Authority (TLDA).

Tennessee's QECB allocation totaled $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. Entities eligible to participate in the program included all local government jurisdictions in Tennessee and public universities. A maximum of 30% of the aggregate bonds were eligible to be used for private activity projects.

On December 22, 2017, President Trump signed the Tax Cuts and Jobs Act (HR 1), which made widespread amendments to the Internal Revenue Code. Specifically, Section 13404 of HR 1 provided for the repeal of tax credit bonds, including QECBs. This amendment repealed QECB issuances effective after December 31, 2017.

TDEC OEP continues to collect and report on data related to previously issued QECB projects:

- **City of Memphis**—the City of Memphis combined its initial QECB allocation and suballocations to support building energy efficiency retrofits under its Green Communities Program: Crosstown Concourse ($8,316,000); Self Tucker/Universal Life ($2,015,300); Knowledge Quest ($340,700); and Southbrook Towne Center ($2,142,850).

- **Crosstown Concourse**—redevelopment of a 1.5 million square foot former Sears distribution center into a mixed use vertical urban village: QECB-related work was completed within the second calendar quarter of 2018. Crosstown's energy consultant, Trane, collected data to compare the current energy use with the original baseline. As a result of data entry into the online Portfolio Manager tool, the Crosstown Concourse has received an Energy Star Score of 87 for the year ending May 31, 2020. The Energy Star Score is a 1-100 assessment of a building's energy efficiency as compared with similar buildings nationwide, adjusting for climate and business activity. In addition, the facility's source energy use intensity, which accounts for total energy use and incorporates all transmission, delivery, and production losses, was measured to be 123 kilo-British thermal units (kBtu) per square foot, which is approximately 46% less than the national median source energy use intensity of 226.2 kBtu.

- **Knowledge Quest**—redevelopment of a vacant apartment building into dormitory housing for an urban farming school: Although all QECB-related measures were completed within the third calendar quarter of 2018, construction completion did not occur until the third calendar quarter of 2019. The organization was required, at minimum, to achieve a Home Energy Rating System (HERS) Index Score of 100 as required by local code enforcement for new construction. The lower the HERS Index Score, the more energy efficient the home. The organization achieved a HERS Index Score of 69 for the downstairs units.
and 76 for the upstairs units, far exceeding targeted energy efficiency standards. Due to school closure as a result of COVID-19, the building did not achieve full occupancy until the third calendar quarter of 2020; Knowledge Quest staff will report on energy-related consumption data in Program Year 2020-2021.

**Universal Life Insurance Building**—redevelopment of an historic African American-owned insurance company building into a new office space: the project was completed within the third calendar quarter of 2018. Throughout the Program Year, Self Tucker Properties provided OEP with energy consumption data for the entire building as well as for individual suites for the quarter. In June 2020, the Universal Life Insurance Building received a LEED gold certification. Additionally, Self Tucker Properties plans to apply for Energy Star certification and implement building automation solutions to provide their facilities team with the insight and data to drive more efficient operations.

**Southbrook Town Centre**—replacement of roof with an energy efficient roof system, an upgraded HVAC system, upgrade to the building’s electrical power grid: Although all QECB-related measures were completed within the fourth calendar quarter of 2017, construction completion did not occur until the first calendar quarter of 2019. During the Program Year, Southbrook began tracking the facility’s energy consumption to establish a baseline for benchmarking and to assess energy and water use against the baseline in Program Year 2020-2021.

**City of Paris**—sub-allocation to finance an energy savings performance contract that included the upgrade of street lights to LED technology, conversion of lighting within select City-owned buildings to LED lighting technology, the addition of intelligent thermostats on HVAC systems, the addition of energy-saving vending machine controls; and other upgrades: This project was completed within the second calendar quarter of 2018. A measurement and verification study was completed in 2020. The project realized an annual energy cost savings of $152,145, or $49,712 more than the guaranteed savings of $102,433. Over the 20-year life of the contract, the project is expected to save 1,586,575 kWh of electrical consumption, 10,332 kW of electrical demand, and 1,701 therms of natural gas and propane, and 5,062,930 gallons of water.

**Williamson County**—sub-allocation to finance the first of at least three phases of an energy savings performance contract: During the first phase, various energy conservation measures were performed within 13 Williamson County Schools. QECB-related work was completed within the first calendar quarter of 2019. A measurement and verification study was completed in 2020. Within the first year, the project realized an annual energy cost savings of $676,714, or $65,390 more than the guaranteed savings of $611,324. Over the 15-year life of the contract, the project is expected to save 6,426,574 kWh of electrical consumption, 10,332 kW of electric demand, 35,028 therms of natural gas and propane, and 5,062,930 gallons of water.

### Energy Efficiency and Renewable Energy Loan Program

The Pathway Lending Energy Efficiency Loan Program (EELP), a low-interest revolving loan fund, launched in 2010 to assist Tennessee for-profit and not-for-profit commercial and industrial businesses in implementing energy efficiency and renewable energy improvements. In January 2016, EELP was expanded to offer financing to local government entities, including municipalities, counties, school districts, and other public agencies. 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 ($14 million), TVA ($14 million), and Pathway Lending ($5 million). 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. Five-year term energy efficiency loans have a fixed interest rate of 2%, and ten-year term renewable energy loans have a fixed interest rate of 5%. Local government entities are eligible to receive up to six years of financing at a 2% interest rate for qualified energy efficiency and renewable energy projects. Qualifying entities can apply for loans between $20,000 and $5 million. EELP obligated approximately $8.5 million in new loans to 21 Tennessee businesses and organizations during the Program Year, with an average estimated annual energy savings of $28,066 per program participant.

### Example EELP Project:

**Trevecca Nazarene University**

- 18,000 lightbulbs replaced with LEDs
- campus boiler replaced with energy efficient upgrade
- 16,000 gallons of water saved per year


**“We're] already paying the loan back just with the energy efficiency savings. It’s helped us with cash flow and allowed us to put those saved dollars toward other areas.”**

- Glen Linthicum, Director of Plant Operations at Trevecca Nazarene University
## EELP Closed Loans, Program Year 2020

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<td>$58,667</td>
</tr>
<tr>
<td>kWh Installed</td>
<td>1,833,265</td>
<td>1,101,129</td>
<td>269,743</td>
<td>1,173,338</td>
</tr>
<tr>
<td>Avg. kWh/$</td>
<td>0.96</td>
<td>0.82</td>
<td>1.09</td>
<td>0.23</td>
</tr>
<tr>
<td>Therms Installed</td>
<td>62,551</td>
<td>37,571</td>
<td>9,201</td>
<td>40,035</td>
</tr>
<tr>
<td>Avg. Therms/$</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
<td>0.01</td>
</tr>
</tbody>
</table>
Interagency and Nonprofit Collaboration

A key component of OEP’s outreach strategy is the multi-faceted work that stems from cooperation with external partners and organizations. OEP collaborates with various stakeholders to support the execution of targeted outreach and improved programs across the residential, commercial, industrial, and public energy sectors. Key activities during the Program Year include the following:

- OEP worked with State agencies, educational institutions, and other entities to research, gather information, and prepare a response to the American Council for an Energy Efficient Economy’s (ACEEE) request for information related to the organization’s 2020 State Scorecard. To determine states’ rankings, ACEEE considers the five policy areas in which states typically pursue energy efficiency: state government initiatives; low income and carbon policy; building energy codes; vehicle and transportation system efficiency; and appliance and equipment efficiency standards. A final version of the 2020 State Scorecard was released in December.
- Tennessee ranked #29 in the 2020 State Scorecard, moving up from its 2019 ranking of #30 due to revisions in ACEEE’s scoring methodology (e.g., ACEEE gave credit to Tennessee for several energy efficiency and renewable energy programs and their ability to reduce energy consumption among program participants), in conjunction with improvements in other categories. Tennessee’s 2020 ranking represents a significant improvement for Tennessee, which was ranked #38 in 2014 and #46 in 2008.
- OEP supported the development of the 2020 U.S. Energy and Employment Report (USEER), which was compiled by NASEO, the Energy Futures Initiative, BW Research, and MG Strategy and Design. Since its initial publication in 2016, the annual USEER survey and analysis supplement federal Bureau of Labor of Statistics data to account for evolving energy market business models and to provide an independent, data-driven account of energy jobs in power generation and fuels; transmission, distribution, and storage; energy efficiency; and motor vehicles, including alternative fuel vehicles.

During the Program Year, OEP also participated in or supported collaborative applications to major U.S. DOE funding opportunities. With OEP’s involvement, these applications leveraged stakeholder partners, diverse cost share commitments, and the state’s strong research community to bring new, innovative energy programs to Tennessee.

First, Tennessee Technological University and the University of Texas at Austin submitted an application in response to U.S. DOE’s Advanced Vehicle Technologies Funding Opportunity Announcement in April. OEP provided a letter of commitment to participate in the project, which will develop a first-of-its-kind, medium duty electric truck demonstration testbed in both Tennessee and Texas and will evaluate the performance of Class 4-6 electric trucks in various applications, duty cycles, and end user segments. In July, U.S. DOE announced that the project had been selected for funding; the project is expected to begin in early 2021.
OEP then submitted an application in response to U.S. DOE's Building Technologies Proving Ground – Public Sector Field Validation Funding Opportunity Announcement in September. In January 2021, U.S. DOE announce that OEP is one of seven state and local government entities, and one of just two State Energy Offices, chosen to establish “proving grounds” for advanced building technologies by installing and evaluating promising building technologies and systems in commercial and multi-family buildings. OEP will partner with a Johnson City startup, Stone Mountain Technologies, Inc. (SMTI), the National Association of State Energy Officials, and the Tennessee Advanced Energy Business Council to validate SMTI's novel, thermally-driven heat pump technology for high efficiency heating applications. The project, dubbed “HEATER” (Highly Efficient gas Absorption Technology for Energy Reductions), will install a prototype Gas Absorption Heat Pump at a public facility in order to document and verify energy savings and demonstrate applicability in public buildings. Oak Ridge National Laboratory will serve as a technical advisor on the project. This award is a critical step toward commercialization and deployment of this Tennessee-developed technology.

Boards, Councils, and Working Groups

OEP engages with stakeholders from the federal, state, local government, and utility sectors, as well as with other SEOs and non-governmental organizations (NGOs), on topics related to strategic energy planning. This includes participating in various external stakeholder working groups, such as those convened by TVA (e.g., Energy Efficiency Information Exchange) and leveraging the resources of NASEO, the National Governors Association, and National Laboratories, specifically technical assistance, research, and training opportunities.

Staff also represent OEP on various boards, councils, and working groups:

- The OEP Director serves as Treasurer for the Executive Committee of the NASEO Board of Directors. The OEP Energy Programs Administrator for Energy Security / Critical Infrastructure serves as Co-Chair on the NASEO Energy Security Committee, the OEP Energy Programs Administrator for SEP / Energy in Transportation / OEP Communications serves on the leadership team for the NASEO Transportation Committee, the OEP Deputy Director serves on the NASEO Energy Equity Taskforce, and the OEP Senior Consultant for Strategic Energy Initiatives participates in the NASEO Grid Interactive Efficient Buildings Working Group.
- During the Program Year, the Transportation Committee hosted webinars on intra-state collaboration tied to energy-efficient transportation planning as well as rural transportation initiatives, programs, and funding opportunities. Recordings of the webinars may be accessed here: https://www.naseo.org/issues/transportation/committee/past-events.
- Additionally, the Energy Security Committee contributed to and provided review of NASEO's Enhancing Energy Sector Cybersecurity: Pathways for State and Territory Energy Offices guidance document for SEO emergency management personnel.
- The OEP Director serves as a “state advisor” for the NASEO / NACAA VW Diesel Settlement Working Group, which enables state-to-state communication on the VW Settlement Environmental Mitigation Trust.
- The OEP Director serves as the Governor's designee to the State Energy Policy Council, the TDEC Commissioner's designee to the Energy Efficient Schools Council, and as the SEO representative on the Tennessee Housing Development Agency's Energy Efficiency and Weatherization Advisory Board.
- The OEP Senior Consultant for Strategic Energy Initiatives participated on the evaluation committee for Innovation Crossroads’ fourth cohort semi-finalist pitch competition. Under this two-year program, supported by U.S. DOE’s Advanced Manufacturing Office and Tennessee Valley Authority, Oak Ridge National Laboratory provides assistance to the nation’s leading entrepreneurs in designing business strategies, completing market research and discovery, establishing commercial partnerships, and achieving long term startup financing for projects on advanced materials, clean energy, grid modernization, national security, neutron science, nuclear science, supercomputing, etc. The program accepted six winners into its fourth cohort, who will each take world-changing ideas from research and development to the marketplace.

Workshops, Presentations, and Speaking Engagements

OEP staff presented at various workshops and conferences to promote programs, funding and technical assistance opportunities, initiatives, and U.S. DOE efforts. Examples include the Tennessee Renewable Energy Economic Development Council’s Renewable Energy Summit, the TAEB Annual Meeting, and several other speaking engagements.

At a 2020 TAEB regional meeting, TDEC Commissioner David Salyers participates in a panel on behalf of OEP with TN Department of Economic and Community Development Commissioner Bob Rolfe, discussing energy trends and the acceleration of electric vehicle adoption.
Additionally, OEP assisted in planning, promoting, and executing the 2019 Tennessee Valley Solar Conference, hosted by the state chapter of the Solar Energy Industries Association, TenneSEIA. The event took place on October 16 in Franklin; as part of the event, OEP’s Senior Energy Consultant moderated a three-speaker panel on distributed energy resources, associated renewable energy, and energy storage opportunities in the state.

Communications

OEP curates and distributes two monthly newsletters, the Energy Edition and the Transportation Edition. These monthly newsletters are disseminated to a listserv of over 5,000 stakeholders and serve as the primary vehicle for OEP to announce timely news items, upcoming events, funding opportunities, and new resources. Additionally, OEP develops and maintains its own web content and continually improves the functionality of its website to create a better user experience. Visit OEP’s website at http://www.tn.gov/environment/energy.

OEP also works with communications partners to share energy-related content via social media, reaching individuals that may not already be subscribed to OEP’s mailing list. One partner, TDEC Communications, manages TDEC’s Twitter and Facebook accounts (@TNEnvironment). The accounts have 4,200 and 6,800 followers, respectively. Another partner, Tennessee Clean Fuels, maintains a social media presence on Twitter, Facebook, and Instagram (@TNCleanFuels), reaching approximately 3,000 additional followers. OEP pitches energy and transportation content to both partners for inclusion on their separate platforms.

In accordance with Tenn. Code Ann. §4-3-501(3), 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 technical assistance to internal and external customers by responding to energy-related inquiries received via email or through OEP’s energy hotline. During the Program Year, OEP handled 145 requests from the residential, government, utility, commercial, industrial, institutional, and other sectors for energy-related information and resources. These general requests for technical assistance are in addition to inquiries that OEP received regarding its specific programs and activities.

In Program Year 2020, OEP reached:

- 5,000+ email stakeholders
- 13,000+ social media followers

Visit OEP online at tn.gov/environment/energy.
To maximize utility savings opportunities for State facilities, the State building energy management statutory responsibilities for State-owned and managed properties (Tenn. Code Ann. §§ 4-3-1012 and 4-3-1017-1019) were transferred from the Department of General Services (DGS) to TDEC OEP via Executive Order No. 63 on January 1, 2017. A new section, State Facility Utility Management (SFUM), was formed under OEP.

SFUM strives to provide actionable utility insights to State facilities, enabling them to make informed decisions that optimize their facility energy consumption as well as their associated utility savings. To support this goal, SFUM administers several utility savings and building energy management initiatives, including the following:

- Development, maintenance, and end-user training for an online Utility Data Management (UDM) platform for approximately 72 General Government agencies and Higher Education campuses.
- Oversight of energy efficiency projects under the EmPower TN initiative, designed to reduce energy consumption and utility costs for participating State facilities through the implementation of energy conservation measures and/or energy efficient technologies.
- Provision of no-cost technical assistance to State agencies and public higher education facilities to promote the implementation of energy management, energy efficiency, and/or renewable energy projects that meet the needs, budgets, and priorities of participating entities.
Utility Data Management Platform Overview

The UDM platform is a uniform repository for utility costs and usage for approximately 8,000 State-owned and managed facilities (~105 million square feet) with integrated bill payment, utility tracking, and benchmarking capabilities. The platform houses several years’ worth of historical data and provides ongoing data feeds for all known and active State utility accounts (~8,893) and meters (~10,639) serving 72 General Government agencies and Higher Education campuses. For FY2020, the UDM platform has utility bill data for 99.1% of the utility meters that have been identified and captured in the UDM platform for General Government agencies and Higher Education campuses. The platform provides aggregated utility consumption and cost data analytics for these facilities, enabling fiscal personnel, SFUM team members, State facility and utility managers, sustainability professionals, and technical assistance providers to gain actionable insights into their utility data.

Summary of State Commodity Use Costs for Fiscal Year 2020*

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Use</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>1,263,385,572 kWh</td>
<td>$112,170,961</td>
</tr>
<tr>
<td>Water &amp; Sewer</td>
<td>31,522,027 Kgal</td>
<td>$33,074,859</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>1,362,774,270 THERM</td>
<td>$21,675,943</td>
</tr>
<tr>
<td>Chilled Water</td>
<td>16,716,520 Ton Hr</td>
<td>$4,133,479</td>
</tr>
<tr>
<td>Steam</td>
<td>181,500 MLB</td>
<td>$2,464,766</td>
</tr>
<tr>
<td>Propane</td>
<td>408,610 THERM</td>
<td>$349,169</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$173,869,177</strong></td>
</tr>
</tbody>
</table>

*Costs and usage for Fiscal Year 2020 are subject to change should additional billing data be obtained. These figures do not include all propane commodity use costs, as some agencies procure the fuel via purchase orders that are processed outside of the UDM platform.
The successful integration of the UDM platform into the General Government’s bill payment system, Edison, allows accounts payable (AP) users to employ the UDM platform for bill review, approval, payment, and reconciliation. As a result of this integration, the UDM platform supports the State’s Alternative Workplace Solution (telework) initiative and workplace flexibility for General Government agency AP staff, which has been of particular benefit during the COVID-19 pandemic. The platform allows access to utility data from any location and features automatic utility bill upload (as opposed to manual bill upload that requires employee receipt and scanning of paper bills in an office setting).

The SFUM team continues to perform internal quality control and provide ongoing, remote UDM trainings for new and existing platform users. Throughout the Program Year, the SFUM team conducted 14 in-person or remote trainings on the UDM platform for more than 150 facility managers, accounts payable personnel, and sustainability professionals. In conjunction with the trainings, the SFUM team created and published to the OEP website an updated FAQ guide, several step-by-step platform access guides, and a suite of resource videos to strengthen end-user familiarity and knowledge of the UDM platform and its capabilities. The UDM platform is currently utilized as a tool to bridge billing communications gaps and to promote collaboration between staff, providing a proactive approach for utility risk mitigation through bill review and a way to efficiently generate detailed utility data reports for analysis.

A report analyzing UDM platform data for FY2019 and FY2020 and highlighting the functionality of the platform will be released in April 2021. The report will be electronically available at www.tn.gov/environment/UDM.

**EmPower TN**

The Tennessee General Assembly appropriated $37.5 million in FY2016 funding for EmPower TN energy efficiency projects in State-owned and managed facilities. SFUM, in coordination with implementing agencies and campuses and the capital projects groups under the Department of General Services (DGS), the University of Tennessee (UT), and the Tennessee Board of Regents (TBR), is responsible for monitoring the progress of these projects and providing technical assistance to ensure successful completion.

As of October 2020, $37,498,200 has been obligated to 40 projects under the General Government, UT, and TBR real estate portfolios. The projects’ cumulative estimated annual energy savings is $4,402,458. The projects’ cumulative average simple payback (EmPower funding/total estimated annual energy cost saved) is 8.5 years. (The obligated dollar amount, estimated annual energy savings, and average simple payback are based on the projections from the original EmPower TN applications that were submitted to and approved by the State Building Commission for all 40 energy efficiency projects. Average simple payback based on actual spend / annual energy savings cannot be reported until all projects have been completed, closed out in Edison, and have gone through post-project measurement and verification).

The following bar chart highlights the progress of the EmPower TN projects through each phase of the capital project process and is current as of the end of the Program Year 2020. The left-hand side of the graph references the EmPower TN energy efficiency allocation of $37.5M, and each bar represents the total number of projects and the dollar amount for each phase.

All EmPower TN energy efficiency project savings are measured and verified. For certain projects, the SFUM team is working with TVA’s contractor, TRC Companies,
to determine energy usage baselines and create detailed energy surveys (DES). Each DES is specific to the individual project and energy conservation measure. Baseline physical conditions (energy consumption, control strategies, equipment inventory and conditions, occupancy, nameplate data, etc.) are identified through inspections, short-term metering activities, spot measurements, and surveys. The baseline conditions will be used to determine estimated savings by comparing the baseline energy use to the post-installation energy use. DES are in-progress or have been completed for the eight locations listed below.

- Tennessee Applied School of Technology Murfreesboro Campus
- University of Tennessee at Chattanooga, Mapp Building
- Department of Military, Henderson Readiness Center (RC)
- Department of Military, Johnson City Air Force Reserve Command (AFRC)
- Department of Military, Memphis Readiness Center (RC)
- Department of Military, Smyrna Volunteering Training Site (VTS) Building 250
- Department of Military, Smyrna Volunteer Training Site (VTS) Building 686
- Department of Military, Trenton Readiness Center (RC)

Additionally, post-installation measurement and verification site visits are in-progress or have been completed for the ten locations listed below.

- Middle TN Mental Health Office
- Department of Correction, Tennessee Prison for Women
- Department of Correction, Riverbend Maximum Security Institution
- Andrew Jackson Office Building Project A
- Andrew Jackson Office Building Project B
- Andrew Johnson Office Building
- Davy Crockett Office Building
- Porter Lab – Ellington Agricultural Center
- University of Memphis, Administrative Building
- University of Memphis, Site Lighting

### NES Enel X Demand Response Program

DGS, in collaboration with the Nashville Electric Service (NES), has continued to implement the Enel X Demand Response Program (previously known as EnerNOC) in ten major State office buildings. Each of these buildings has an Energy Management System that allows automation of Energy Conservation Measures (ECMs) to meet the target demand reduction. During a demand reduction event, these buildings reset space temperature set-points, shut off non-essential lighting, manually curtail select air conditioning units, and/or voluntarily shed non-essential loads, such as lighting, printers, etc.

The Enel X program not only saves the State money, but also serves as a revenue stream to help offset the cost of utility expenses. This program is a valuable introduction into automatic demand reduction. The figure below depicts the energy savings realized through November 2020 from energy reduction and continued participation in the Enel X Demand Response Program, as evaluated by the SFUM team.

### Existing Building Commissioning

Existing Building Commissioning (EBCx) refers to the commissioning process of system performance optimization to existing buildings, providing assessment of a building's current use and performance. Taking this data into consideration, operational optimization modifications, including controls-based ECMs for the existing HVAC and lighting systems, are then proposed, which can result in the avoidance of significant energy costs and the improvement of occupant comfort and productivity. All building systems suffer decreased energy efficiency performance due to age, unnoticed wear and tear, and potential change of facility function. Ongoing commissioning, as part of DGS’s facility maintenance budget, is expected to monitor HVAC and lighting trend data to identify maintenance issues and operational drift before these systems significantly deviate from the optimal operating standards. Monitoring these effects is an integral part of EBCx, which allows the State to maintain high building performance.

### Enel X Demand Response Program Savings

**State of Tennessee – Cumulative Savings Total: $42,144.89**

| Capacity Payments | $42,421.10 |
| Energy Payments | $1,892.13 |
| Adjustments | ($2,168.34) |
| **Total Payments** | **$42,144.89** |

(US only payments)

![Enel X Demand Response Program Savings Graph]
The William R. Snodgrass Tennessee Tower Office Building has participated in EBCx longer than any other State facility, dating back to January 2013. The building has received various energy efficiency upgrades, including the installation of LED lighting and controls and upgraded mechanical systems (e.g., the installation of energy smart digital valves with controls integrated into the building automation system, fan walls and high efficiency air handling units with heat recovery, etc.). EBCx was performed onsite to extend current equipment life and optimize the chilled water system, building automation system, lighting system, and overall energy performance. Although the building saw a doubling of its occupancy prior to the COVID-19 pandemic—from 1,000 employees in 2013 to 2,000 employees by early 2020—the building has realized substantial savings; its total estimated energy-related cost savings for the period of January 2013 through September 2020 was $3,554,748. Over the same period, approximately 29,000 megatons of CO2e emissions were avoided as a result of the installed ECMs and ongoing EBCx process. This cumulative total reduction in greenhouse gas emissions is equivalent to the annual removal of 6,103 cars from the road or the powering of 2,642 fewer homes for a year.9

**Example Project: William R. Snodgrass Tennessee Tower Office Building**

**EBCx Impact at William R. Snodgrass Tennessee Tower Office Building:**

29k megatons of CO2e avoided

$3.5M+ saved over seven years

**LED and LCS Projected Impact at Middle Tennessee Mental Health Institute:**

1.3M kWh less electricity consumed per year

$134K saved per year from lower electricity costs

**Middle TN Mental Health Institute Baseline and Post-Upgrade Energy Consumption**

9. These estimates come from an energy savings report, received by DGS for the William R. Snodgrass Tennessee Tower Office Building on a quarterly basis.
The following bullets highlight a few key facts about the energy sector in Tennessee.

- TVA operates 19 hydroelectric dams, four coal-fired power plants, seven combustion turbine sites, and a pumped storage facility, all with a combined generating capacity of more than 20,600 megawatts (MW).
- Unit 2 of the Watts Bar power plant entered service in 2016, becoming the nation’s first new nuclear reactor in the 21st century. Tennessee's two nuclear power plants provided 44% of in-state electricity in 2019.
- TVA's 1,616 MW Raccoon Mountain pumped storage plant, which began operating in 1978, is the third-largest pumped storage hydroelectric facility in the U.S.
- Tennessee is the largest ethanol-producing state in the Southeast and was the 14th-largest ethanol producer in the nation in 2020.
- The state's largest solar facility, a 53 MW installation in Millington, came online in December 2018. However, 2020 saw an unprecedented level of activity and preparation for future solar development, thanks in large part to TVA’s new Green Invest program and its leveraging of long-term agreements to build large-scale renewable energy installations in the Valley for some of the power generator's largest industrial and utility customers. Under this program, 778 MW of Tennessee-based solar contracts with TVA were announced in 2020, with projects ready for power generation and transmission by 2023.
- The average price for electricity across all sectors in Tennessee is below the national average, and the average price for the residential sector alone is among the lowest 10 states. About 6 out of 10 households in Tennessee use electricity as their primary energy source for home heating.
Energy Consumption and Production

EIA maintains some of the most comprehensive state-specific data on energy consumption, production, prices, and expenditures by source and sector. The following graphs detail Tennessee’s energy production estimates, energy consumption by end-use sector, and energy consumption estimates for calendar year 2018. For additional information and data on Tennessee, please visit [https://www.eia.gov/state/?sid=TN](https://www.eia.gov/state/?sid=TN).

2018 Energy Production Estimates in Tennessee

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>TRILLION BTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>5.9</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>4.0</td>
</tr>
<tr>
<td>Crude Oil</td>
<td>1.2</td>
</tr>
<tr>
<td>Nuclear Electric Power</td>
<td>378.2</td>
</tr>
<tr>
<td>Biofuels</td>
<td>30.5</td>
</tr>
<tr>
<td>Other Renewable Energy</td>
<td>163.4</td>
</tr>
</tbody>
</table>

2018 Energy Consumption by End-Use Sector in Tennessee

- Residential (24.9%)
- Commercial (20.7%)
- Industrial (25.6%)
- Transportation (28.8%)

10. Data from two years prior is finalized by the EIA annually, typically in the third quarter of the calendar year.
According to the 2020 Southern Regional Energy Profiles Report, published by the Southern States Energy Board, Tennessee is among the top 15 states in total electricity consumption for all sectors combined, and among the top five states in residential electricity consumption per capita. The report also contextualizes the state’s overall energy consumption performance:

- Long travel distances across Tennessee, combined with the state’s role as a logistics hub, contribute to the transportation sector accounting for about three-tenths of the state’s total energy consumption.
- Manufacturing is a leading component of the state’s economy; as such, the industrial sector uses only slightly less energy than the transportation sector. The industrial activities that make the largest contributions to Tennessee’s gross domestic product include the manufacture of chemicals; computers and electronic products; food, beverages, and tobacco products; motor vehicles and automotive parts; and petroleum and coal products.
- The residential sector, where both heating and air conditioning are widely used, accounts for almost one-fourth of the state’s total energy consumption.

Energy Sector Emissions

Statewide emissions data associated with energy consumption can be found through both EIA and the National Emissions Inventory (NEI).\textsuperscript{12}

\textbf{2017 Carbon Dioxide Emissions from Fossil Fuel Consumption in Tennessee}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{CO2_emissions.png}
\caption{2017 Carbon Dioxide Emissions from Fossil Fuel Consumption in Tennessee}
\end{figure}

\textbf{2017 NOx Emissions (Tons/Year) by Source Sector in Tennessee}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{NOx_emissions.png}
\caption{2017 NOx Emissions (Tons/Year) by Source Sector in Tennessee}
\end{figure}

\begin{itemize}
\item Non-road (6.92%)
\item On-road (56.19%)
\item Point (18.1%)
\item Events (Fires) (1.3%)
\item Nonpoint (17.49%)
\end{itemize}

\textsuperscript{12} Aggregated data from two years prior is typically finalized by EPA every three years. The NEI can be accessed at \url{https://www.epa.gov/enviro/nei-overview}.
Energy Sector Employment

According to the 2020 U.S. Energy and Employment Report (USEER), jointly compiled by NASEO and the Energy Futures Initiative, Tennessee’s energy sector employed more than 200,000 workers in 2019:

- Traditional Energy employed 54,953 workers (1.6% of all U.S. Traditional Energy jobs):
  - 12,143 workers in Electric Power Generation
  - 7,749 workers in Fuels
  - 35,061 workers in Transmission, Distribution, and Storage
- Energy Efficiency employed 53,916 workers (2.3% of all U.S. Energy Efficiency jobs)
- Motor Vehicles employed 104,279 workers (4.1% of all U.S. Motor Vehicle jobs)

Tennessee Employment by Major Energy Technology Application in 2018 and 2019

Tennessee Electric Power Generation Employment by Detailed Technology Application in 2019

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13. The next iteration of the USEER is expected to be published later in 2021. To access the 2020 USEER, please visit [https://www.usenergyjobs.org/](https://www.usenergyjobs.org/).
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IMAGE ATTRIBUTION

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