

TENNESSEE Clean Fuels Advisor



A quarterly publication from the partnership between the Clean Cities coalitions in Tennessee and the state of Tennessee.

Bringing alternative fuels, higher fuel economy vehicles and advanced transportation technologies to the forefront in Tennessee.

eTec & Nissan Supercharge Tennessee

eTec and Nissan have set the stage in Tennessee for a great kickoff to full-speed electric vehicles thanks to some U.S. Department of Energy (DOE) funding. The team received \$99.8 million in "Transportation Electrification" American Reinvestment and Recovery Act (ARRA) funding this summer.

eTec was the grant recipient and will be spearheading the project and providing a significant amount of the recharging infrastructure. Nissan is the other principal partner and will provide the vehicles—the full-size, full-speed Nissan LEAF—as a part of the project. Here is the list of cities that are partners in the project:

- Arizona - Phoenix, Tucson
- California - San Diego
- Oregon - Corvallis, Eugene, Portland, Salem
- Tennessee - Nashville, Knoxville, Chattanooga
- Washington - Seattle

Up to 4,700 LEAFs will be sold during the project, which will last three years until 2013. The main goal of the project is to get these vehicles in use and to use funding to put the necessary recharging infrastructure in place to support the vehicles' operation. The vehicles will be purchased by business and individuals, but the recharging infrastructure will be provided at no cost to the vehicle buyers through the grant. A total of 11,210 recharging systems will be deployed during the project including 10,950 Level 2 (240V) chargers and 260 Level 3 fast-chargers. The project team will work with many partners in each location to educate the local population about electric vehicles and to build the first steps of community transportation electrification for light-duty vehicles.

Nissan will be manufacturing the first models sold through the project in Japan, but will begin building the LEAFs in Smyrna, Tennessee in late 2012. Additionally, Nissan will build a lithium ion battery production facility near the vehicle production facility in Smyrna. This is a huge boon to Tennessee especially as alternative fuel interest grows thanks to elevated discussions across the nation about uncertainty in the oil price market and



a growing awareness in the American public about our transportation, environmental, and economic security problems as we seek to become an energy independent country.

What may be most interesting about the project is the vehicle itself. "Nissan believes the only true path to curbing CO2 emissions is to not produce them at all," said Mark Perry, director, product planning and strategy, Nissan North America. "We are bringing the solution with the Nissan LEAF, an all-electric, zero-emission car. With room for five passengers, an affordable price, and a 100-mile range on a full charge, the LEAF promises to be a smart, satisfying, and environmentally friendly choice." The LEAF's 100-mile range is impressive as it is 60 miles past what the Chevrolet Volt is expected to go on pure electric (although the Volt is different as the batteries are smaller, and it will use a small ICE). Also, the LEAF is not only technologically advanced but also practical as its hatchback opens opportunities to carry larger loads due to the smart placement of the batteries under the seats.

For the infrastructure, there are 3 power levels. Charge times are dependent on the level of charge. Level 1 charging (or recharging) simply means 120 volt, household-type plug and is a slow charging voltage (overnight). Level 2 charging uses 240 volts and reduces the

"refueling" time by approximately 50 percent. Level 3, or fast charging, uses high voltage to reduce charge time to less than 30 minutes.

One of the project partners is TVA. James Ellis, manager of the TVA Electric Transportation program, noted, "This project provides a backdrop to fully understand how to effectively integrate vehicles and the power grid. TVA is providing the fuel, Nissan the vehicle, and eTec the charging infrastructure."

As part of the Nissan LEAF Zero Emission Tour, the LEAF will be coming to Tennessee in January. It will be a great opportunity to learn more about the LEAF and the benefits of zero-emission driving. Look for the LEAF in Knoxville/Chattanooga on January 16 and in Nashville from January 19-21.

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U. S. Department of Energy



Links to Clean Fuels/Energy in Tennessee

- East TN Clean Fuels - www.ETCleanFuels.org
- Genera Energy (Vonore) - www.generaenergy.net
- TN Clear the Air Program - www.cleartheairtn.org
- Tennessee 25x25 - www.25x25.org
- TN State Energy Office - www.state.tn.us/ecd/CD_office_energy_policy.html
- Nissan LEAF Information & Tour Website - www.nissanusa.com/leaf-electric-car/
- Clean Cities of Middle Tennessee - www.tennesseecleanfuels.org
- Southern Alliance for Clean Energy - www.cleanenergy.org
- Knoxville Electric Vehicle Assoc. - www.KnoxEV.org
- Southeastern Fuels Fix Ezine - www.FuelsFix.com
- West TN Clean Cities - www.wtccc.com
- TN Solar Energy Assoc. - www.tnsolarenergy.org



Anybody for a Heavy-duty Hybrid?

Partnering with the East Tennessee Clean Fuels Coalition, Terex Corporation, a major US-based manufacturer of heavy equipment, is looking to put heavy-duty (HD) hybrids on the street. The group wants to put Terex's new HyPower™, Plug In Electric Hybrid system in use in Tennessee utilities, municipalities and any other fleets that use bucket trucks or appropriate service vehicles.

What is the HyPower™? A traditional heavy-duty hybrid vehicle focuses on the movement of the vehicle. The HyPower™ concentrates on the job that our customers actually want – lifting people into the air. A normal utility type service vehicle uses the diesel engine to power the hydraulics of the unit so the operator can work. This is called parasitic or PTO (power take off) power. Many of these types of vehicles spend 6 hours per day sitting in a single location, operating the engine for PTO power.

The HyPower™ is a simple but sophisticated device that uses a battery powered electrical system instead of the diesel-powered PTO system. The engine of the vehicle is used only for emergency recharging during long durations of boom operation. The unit also provides power for other systems on the vehicle such as air conditioning, heating, lighting, and exportable power, the latter of which can be up to 3.8 kW in electrical load or capacity.

The unique HyPower™ system can be installed

as part of a new vehicle build or can be retrofitted onto an existing chassis and can be installed at the White House, Tennessee location (the Tennessee location offers a wide range of services from Parts Distribution, Rental, Service, and Used vehicle sales). Because the system uses the standard PTO connection on the chassis, it is simple to install, easy to service, and does not reduce towing capacity. The system can be mounted on a variety of chassis types.

The HyPower™ electrical/battery system is recharged at the end of the day at its home location rather than recharging the batteries from the diesel engine as a traditional hybrid does. The unit can be recharged nightly using off-peak energy from the power grid by simply plugging into a standard, level 1, 120 volt electrical outlet. Overnight charging produces 6 to 8 hours of operating time.

Each hybrid system's use can save at least 1,500 gallons of diesel fuel per year, which equals 13 metric tons of CO2 per year.

The ETCFC and Terex are gearing up to potentially submit for U.S. DOE Clean Cities funding next year and want to talk to any Tennessee fleet that is interesting in purchasing new units that this system can be installed on or retrofitting current ones. Contact Jonathan Overly with the ETCFC or David Hanks with Terex (david.hanks@terex.com or 615-616-1288) for more information.



Terex's HyPower™ system on a heavy-duty distribution line-type truck (top) and medium-duty service/trouble truck.

East Tennessee's Electric Vehicle Show

ETCFC partnered with Knoxville Electric Vehicle Association and City of Knoxville to sponsor East Tennessee's first ever Electric Vehicle (EV) Show.

The show was held in downtown Knoxville on Thursday, October 22. Over 15 vehicles that are already in use were available for people to see including low speed electric vehicles, Plug-in-Hybrid-Electric Vehicles, a customized full-speed electric automobile, electric motorcycles, an electric lawn mower, a solar-powered electric-drive boat, and various personal transporters.

While some vehicles were custom-built, several were manufactured and readily available to consumers today. To explain how vehicles could be powered and recharged, representatives from two charging station

companies, Clipper Creek and Coulomb Technologies, demonstrated their products and explained how they would work.

The event promoted education and awareness of energy usage, focusing on electric vehicles, and provided information regarding upcoming initiatives in Tennessee including the eTec/Nissan project. At the information tent, people could answer

trivia questions to obtain bean bags to play cornhole and a chance to win a prize. Throughout the afternoon, event-goers were able to get a first-hand

look at electric vehicles and some were even able to test ride or drive an EV. The event successfully increased EV visibility, allowing people to interact with electric vehicles.



Tom Miceli of North Carolina presents his Senior Design Project, the ION Sportbike.

Left Photo: TVA's PHEV Escape, EPRI's Scion "eBox", & David Hrivnak's personal PHEV Avalanche conversion.

Right Photo: A WheeGo medium-speed EV refueling using one of Coulomb Technologies's ChargePoint units.





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Tennessee State Fair Goes Green

Every year, thousands of people visit the Tennessee State Fair, which boasts one of the largest cattle competitions in Tennessee and the second largest goat competition in the nation. While the fair, held September 11-20, offered its usual attractions, this year's event also focused on being green.

The Tennessee State Fair featured a "Green Energy Expo" where people could learn about the latest environmentally friendly technologies as well as solutions and initiatives from companies and organizations throughout the state. Students from neighboring universities were also present to showcase their research in green technology and agriculture. Furthermore, the expo included interactive displays explaining solar, wind, and alternative fuel sources that demonstrated ways Tennessee families can save energy and better the environment.

Beyond the exhibit, the 2009 fair included its own sustainable initiatives. In previous years, the manure from the nearly 13,000 animals brought to the fair was hauled to a landfill, but this year the estimated 360 tons of biomass was brought to a local

farm for composting, saving the fair nearly \$20,000. To further reduce waste at the fair, the Metro Beautification and Environment Commission along with the Middle Tennessee Council of the Boy Scouts assisted in cardboard and plastic recycling, food waste composting, and used cooking oil recycling.

To run the event, the Tennessee State Fair worked with the Tennessee Valley Authority (TVA) and Nashville Electric Service to utilize green power as part of TVA's Green Power Switch initiative, which works to produce electricity from renewable sources. To power the rides and service equipment, the fair relied on bio fuels that included biodiesel made from recycled fryer oil.

"We are encouraged by the emphasis on sustainability at this year's Tennessee State Fair," said Tennessee Department of Environment and Conservation Commissioner Jim Fyke. "Fair goers will benefit from being able to experience a variety of innovative technologies that support great energy efficiency and the use of clean, renewable power on the farm and in their neighborhood."



The Biodiesel Logic system that Clarksville has installed has a small carbon footprint. Shown here are the production system, some of the raw materials, and the finished product storage tanks.

Clarksville Saving Dollars with Biodiesel

Thanks to a \$45,000 federal grant, the City of Clarksville purchased a biodiesel processing unit and implemented a program where local restaurants and residents can donate their used oil to Clarksville Gas and Water, which has set up a processing site at the city's wastewater treatment facility. For restaurants, the city also provides a pick-up service. The oil is then "transesterified" (processes in the new equipment), and within hours biodiesel is created and used to power the city's buses.

The program is mutually beneficial for all. Restaurant owners no longer need to find ways to dispose of their used oil, and they can proudly know that what was a waste item is no longer disposed of but reused as a fuel for the city's public transit system. The city has already identified 95 local restaurants that can donate 1,300 gallons of oil a week. For the city, the cost savings are significant. "We can make this

product for less than a dollar a gallon. We've got it figured from \$0.92 to \$0.95 per gallon," said Tommy Williams, assistant superintendent of Clarksville's Wastewater Treatment Plant.

Beyond the economic benefits, there are also environmental improvements. By using biodiesel, each bus will emit 75 percent less greenhouse gases than their diesel counterparts (if using B100). Also, other cities have reported that their wastewater operational costs have decreased by as much as 10 percent since fewer people are pouring used cooking oil into drains and clogging sewer lines.

By purchasing a biodiesel processing unit and establishing a renewable energy program, the City of Clarksville is an example of how sustainable practices are viable and profitable in Tennessee. For more information on how to donate your used oil, call Clarksville Gas and Water at 931-645-2565 ext. 1403.



Charging Station in Downtown Nashville's Fulton Parking Garage

Nashville Begins EV Future

On July 1, as part of Mayor Karl Dean's Green Ribbon Committee on Environmental Sustainability, Coulomb Technologies installed two electric vehicle (EV) charging stations in a 700-space parking garage in downtown Nashville.

Green Power Technology is the primary local distributor for Coulomb Technologies who manufactures the charging stations. The ChargePoint™ Networked Charging Stations are already in use in municipalities, utilities, green office buildings, and parking garages in many places in the U.S. (locate charging stations by visiting www.mychargepoint.net and click "Find Stations").

The recent addition makes the Metropolitan Government of Nashville and Davidson County

the first municipality in Tennessee to install the ChargePoint charging stations for plug-in electric vehicles. While the charging stations are currently reserved for government fleet use only, more stations will likely be installed and expanded for public access. This is just the first step in providing infrastructure for Nashville by securing a convenient charging location in Davidson County. These preparations will soon encourage individual consumers and fleets to purchase electric vehicles.

Already, Nashville is supporting the Tennessee Clean Energy Future Act of 2009, which was signed by Governor Phil Bredesen earlier in 2009, to develop EV infrastructure and help prepare the city to be an EV-friendly area.



State Agencies Work Toward Cleaner Transportation

By Alan Jones of the Tennessee Dept. of Transportation.

In our complex and rapidly changing world, more and more institutions and individuals are choosing to be green. They are taking action to reduce the environmental impact of their activities, and looking for opportunities to do their part to improve environmental quality and conserve natural resources.

Two state agencies in Tennessee, the Tennessee Department of Environment and Conservation (TDEC) and the Tennessee Department of Transportation (TDOT), are implementing initiatives that will reduce air emissions, save fuel and money and reduce our dependence on petroleum.

Through the Idle Smart Clean Diesel Grant Program, TDEC is offering small trucking companies a rebate for up to half the cost (a maximum of \$4,000) of purchasing and installing auxiliary power units (APUs) on Tennessee-registered trucks. APUs provide power for heating and air conditioning and allow truckers to turn the engine off and stay comfortable in their truck cab. Some APU models will run for 24 hours on a single gallon of diesel fuel. An idling heavy-duty diesel engine uses about one gallon of fuel per hour. The rebate program is open to companies with 30 or fewer tractors, and fleets with five or fewer tractors will be a priority. The U.S. Environmental Protection Agency (EPA) provided TDEC with \$1.73 million in American Recovery and Reinvestment Act (ARRA) funds to support this on-the-vehicle idling reduction strategy.

To provide other opportunities for reduced idling, TDOT is offering grants to truck stops along interstate corridors to purchase and install truck stop electrification (TSE) technology. TDOT received a competitive grant from EPA for \$2 million in ARRA

funding. TDOT plans to fund 6 to 10 truck stops and install TSE technology at 175-200 truck parking spaces. This technology will allow truckers to turn their engines off and still obtain heated or cooled air as well as other services such as Internet access. The trucker will save fuel and money and reduce emissions.

Idling reduction programs have many benefits, in that they conserve fuel, save money and reduce emissions of a wide range of pollutants. Simply turning the engine off will reduce emissions of nitrogen oxides (NO_x) that form ozone, PM-2.5 (microscopic particles), a wide range of toxic substances and greenhouse gases such as carbon dioxide (CO₂).

TDOT has also launched an air quality outreach and education campaign. Clear the Air Tennessee (www.cleartheairtn.org) encourages citizens to improve air quality by changing their transportation habits. One campaign theme is built around the six letters in the word "SIMPLE." Each letter stands for a change in transportation behavior that will help reduce emissions. "S" stands for watch your Speed, while "I" stands for Idle less, etc. Funding for the campaign was provided by the federal Congestion Mitigation and Air Quality Improvement (CMAQ) program, which is limited to air quality nonattainment and maintenance counties.

Finally, TDOT, in the Green Islands program, continues to offer grants to fuel stations to purchase and install storage and fuel dispensing technology for biofuels, including B20 biodiesel and E85 ethanol. There are currently 60 biofuel pumps along state highways and interstates, with 8 more likely in the near future. All state agencies are working to increase the use of biofuels in state vehicle fleets.

Idle Smart
Tennessee's
APU Rebate Program



TDEC's Idle Smart program logo. To access the program brochure or grab the application, visit: <http://www.state.tn.us/environment/recovery/der.html>.

ETCFC Helps Build Natural Gas Toolkit - www.NGToolkit.net

Natural gas (NG) is one of the cleanest vehicle fuels currently available in the United States. With this fact in mind, the Natural Gas Toolkit was designed and built to help fleets perform a first-cut cost analysis of transitioning part of their fleet to using compressed natural gas (CNG). The project was funded by the Department of Energy (DOE) and built by the ETCFC and Virginia Clean Cities.

The major components of the toolkit and the Website are Resources, "The Calculator," Call-a-Fleet, and a contact page. The Resources page helps fleets find incremental vehicle cost and fuel price differential information, then the "calculator" takes that information and provides a simple Return On Investment (ROI) based on those numbers. The calculated ROI can also include grant amounts (with that information inputted by the user). The contact page provides information about representatives at Clean Cities coalitions and other organizations that will be able to assist fleets, and the Call-a-Fleet page provides information about and contact information for fleet managers across the U.S. that have substantial experience using natural gas as a transportation fuel.

Some of the other benefits of the toolkit are that it is easily revisable to analyze numerous vehicles or scenarios depending on funding opportunities, and that it consolidates information for easy preparation of potential funding opportunities in the future.

The Toolkit does not calculate cost differences for items such as vehicle maintenance, facility changes to accommodate maintenance and equipment storage, or refueling infrastructure, which can be expensive.

The toolkit can be found at <http://www.NGToolkit.net>.

Jackson Energy Authority

Jackson Energy Authority (JEA) in Jackson, TN has already given the Natural Gas Toolkit a try. "The NG toolkit was easy to use and verified our own analysis on the cost and payback of converting our fleet," said Scott Dahlstrom, Senior Manager of Business Analysis at JEA. Through their research, JEA is currently seeking to convert some of their vehicles to natural gas, looking at both dedicated and bi-fuel applications. Dahlstrom stated, "Our goal is to be a model for surrounding businesses and their fleets. By showing others how this fuel is both viable and cost-effective, we will encourage others to also make the switch to environmentally responsible alternatives."



ETCFC + PTP Looking For Unique TSE Site

Through a collaboration with the Plateau Travel Plaza (PTP) in Crossville and ARRA funding through EPA Region 4, the ETCFC is now completing a truck stop electricicitation (TSE) project to eliminate unnecessary heavy-duty engine idling in Crossville.

PTP owner Don Demko came to the ETCFC wanting to respond to EPA Region 4's Diesel Emissions Reduction Act funding announcement that was released last spring. The ETCFC submitted a proposal, which was awarded, for \$589,000 to provide plug-in capability to 50 spots and conditioned air to most of the spots at the plaza.

Overly of the ETCFC put out an RFP in September and five responses were received by the end of the month. The team is currently selecting a final equipment vendor or vendor team, and the



project is aiming to have all construction completed by April 2010.

What could make the site unique would either be a vendor partnership, where more than one vendor's equipment would be onsite, or a solar-powered TSE site. The benefit of two vendors would be to satisfy more truckers if they happen to like one system over another; the benefit of solar is clear as it could turn an emissions reductions project into an emissions elimination project.

The two systems shown at left are Shorepower (left) and an AireDock tower (right). Shorepower mainly focuses on electric power; and thus, their system is smaller. The top image shows the outlets you see under the covered tower, which is shown in the bottom image. The AireDock tower provides both conditioned air and 110 volt outlets to power in-cab equipment or other truck accessories.

East Tennessee - Jonathan Overly



The "O-Zone"

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Local Government Fleet Meetings Get Started

The ETCFC has started quarterly meetings for our local government (city and county) fleets in East Tennessee. Since municipal and county fleets are such a large part of our network, we decided these new meetings would better serve and connect our fleets.

The first meeting was held September 9, 2009 at the Copper Cellar in Knoxville with 10 fleet representatives attending. While that meeting consisted of municipal fleet representatives only (since we have more participation by cities), one of the key outcomes, which we had hoped for, was their decision to invite county fleet representatives as well.

The second outcome was to lay a basic groundwork for what we will discuss in future meetings. These meetings will likely be held in Knoxville over lunch (11:30 am -1:00 pm) in the second or third month of each quarter.

The plan is to share information on projects between fleets, look for opportunities to collaborate on grants, and bring in presenters and vehicle or technology demonstrations.

For more information on meeting times or to inquire about presenting, please contact Jonathan Overly.

Now Funded, the I-75 Biofuels Corridor Begins

Lucky to be one of the handful of non-ARRA projects funded this year, the I-75 Biofuels Corridor project kicked off on October 1. Partners from the states that I-75 traverses are working together to make it possible for any B20 or E85 AFV driver to travel from Sault Ste. Marie, Michigan all the way down to Hollywood, Florida on their alt fuel with pumps no greater than 200 miles apart.

Because the current locations of E85 and B20 pumps along I-75 are not equally dispersed, some states are adding more E85 pumps, while others are adding more B20 pumps. The project expects to create at least 10 more public E85 pumps and 15 B20 pumps, including a truck stop in Wildwood, FL that will add class 8 tractor trailer refueling with B20.

The project's total budget is \$1,836,271 with \$818,091 being funded by the grant; cost sharing is provided by all the involved entities and covers nearly 59 percent of the total.

Here's a quick breakdown of what we expect to add in each state:

- MI - 3 B20 pumps
- OH - 2 B20 pumps
- KY - 2 E85 pumps and 1 B20 pump
- TN - 1 E85 pump and 2 B20 pumps
- GA - 2 E85 pumps and 3 B20 pumps
- FL - 5 E85 pumps and 4 B20 pumps

Florida has the only combined fuel stations at this time with 3 locations that will offer both fuels, in Hollywood, Venice and Fort Myers.

The Clean Cities coordinators and/or related staff in these states are the Corridor Leaders that are helping with the project. Additionally, a slew of project partners are helping out with the work and include GM, NBB, Clean Fuels Development Coalition, Clean Emission Fluids, AAA of East Tennessee, FFV Club of America, Protec Fuel Management, and several state energy offices.



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Just email jgoverly@utk.edu and say “*sign me up for the Advisor*” and provide your mailing address.

09-10 ET Education Program

Emily DeVillers is the ETCFC's AmeriCorps member lead for the 2009-2010 scholastic year and is off with a bang, working toward reaching 3,000-4,000 students this year in East Tennessee with a message of transportation sector energy change.

Presentations are provided to any grade level and are catered to the audience. For most middle and high schoolers, “Clean Fuels Jeopardy!” is played to put the students in a fun and competitive learning environment. For the 1st and 2nd graders, we have a program that involves all of the five senses to immerse the students in the topic and get them seeing, hearing, smelling, tasting, and feeling “clean fuels” during the visit. Sound different? Call Emily to find out more about these presentations! Contact her at 865-974-1880 or ed.cleantfuels@gmail.com.



DOE's Alternative Fuels Tools For You



A great resource with access to the complete collection of tools, database searches, calculators, and interactive maps is available on the Alternative Fuels and Advanced Vehicles Data Center Webpage. Locating alternative fueling stations, browsing fleet experience stories, and searching the U.S. incentives and laws database are just a few of the things you can do on the site. There are even mobile applications for you to use on-the-go!

See all of this info, and more:

- Petroleum Reduction Planning Tool
- TransAtlas - an interactive zoom-able national map displaying alternative fuel and vehicle data
- Truck Stop Electrification Locator
- Fuel Properties Search
- Light and Heavy-Duty Vehicle Searches
- Natural Gas Vehicle Cost Calculator
- Flexible Fuel Calculator
- State Assessment for Biomass Resources
- Publications Search
- State Information Search
- Clean Cities Coalitions Location Map
- Mobile Applications - including Alternative Fueling Station Locator, FuelEconomy.gov, and Truck Stop Electrification Locator

>>> <http://www.afdc.energy.gov/afdc/applications.html> <<<