

CLEAN CITIES NOW



Capitalizing on
Core Strengths &
New Technologies
for Today's
Mobility Systems

INSIDE

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Alternative Fuels for the
Long Haul

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to a Pump Near You



Welcome

We hope you enjoy this latest edition of Clean Cities Now, the official newsletter of the U.S. Department of Energy's Clean Cities program. This semi-annual publication showcases program activities, accomplishments, and resources and highlights the successes of Clean Cities' nearly 100 coalitions as they work to cut petroleum use in transportation.

The Clean Cities program staff would like to thank those who attended the national Clean Cities Coordinator Training Workshop at Oak Ridge National Laboratory in September. As anyone who has attended before knows, the workshop presents a unique opportunity for coordinators and program staff to spend a week together discussing current challenges and opportunities, sharing expertise, and learning from one another. This workshop was especially important because it provided an opportunity to discuss the role emerging technologies and smart mobility strategies (page 8) might play in Clean Cities, and identify key areas for re-envisioning our program's mission (page 4) to continue making advancements in the marketplace.

The event also presented a chance to recognize coordinators who are truly going above and beyond to advance the Clean Cities mission. Please be sure to see page 13 to read about the two coordinators who were inducted into our Hall of Fame this year, and see page 14 to read about this year's winner of the Benjamin Watson Inspirational Award.

We appreciate hearing comments from readers. Let us know what you think at cleancities@nrel.gov.



Dennis A. Smith
National Clean Cities
Director



Linda Bluestein
National Clean Cities
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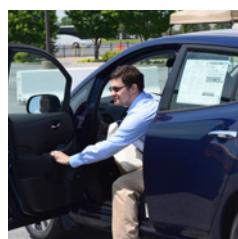
Photos (above, top) from DOE, NREL 17030; (above, bottom) by Trish Cozart, NREL 17004

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Photos (above, top) from Scott Minton/OnCue, NREL 39379; (above, middle) by Morgan Ellis/Delaware Clean Cities, NREL 39487; (above, bottom) courtesy of Alabama Department of Corrections, NREL 39643

Coalition Announcements

North Florida Designated as the Newest Clean Cities Coalition

North Florida Clean Fuels Coalition (cleancities.energy.gov/coalitions/north-florida)—based in Jacksonville, Florida, and led by Coordinator Wanda Forrest—was designated as the latest Clean Cities coalition in April 2016.



The Coalition became a member of Clean Cities after the culmination of many years' worth of hard work. North Florida Clean Fuels Coalition has more than 100 stakeholders, many of whom have made considerable investments in alternative fuel vehicles. For example, the Coalition has partnered with JEA, a municipal electric and water utility for the City of Jacksonville, to invest \$300,000 into a regional electric vehicle charging network. The Coalition is also working with the City of Jacksonville to convert its fleet to alternative fuels. The North Florida Transportation Planning Organization is the Coalition's host organization.

The Coalition estimates that it displaced nearly 2.5 million gallons of petroleum in 2014 mainly by increasing the use of natural gas, biodiesel, electricity, and propane among stakeholders.

D.C. Showcases Cutting-Edge Hydrogen Fueling Station Demo

The U.S. Department of Energy (DOE) partnered with the National Park Service (NPS) this past summer to launch a new demonstration hydrogen refueling station in Washington, D.C. (energy.gov/eere/fuelcells/motorweek-hydrogen-drive-video). The station—opened with assistance from the Greater Washington Region Clean Cities Coalition (GWRCCC)—is being hosted by NPS at its Brentwood Avenue maintenance facility for four years.

The station is demonstrating the ease of fueling with hydrogen and helping installers, operators, and end-users become familiar with best practices for the development and deployment of a hydrogen fuel station. The inter-agency collaboration also showcases cutting-edge hydrogen generation technology and provides opportunities to demonstrate fuel cell electric vehicles (FCEVs) at federal agencies and throughout the surrounding region.

The station incorporates DOE-funded electrolysis technology advancements, and is supported by Proton OnSite—a manufacturer of hydrogen generators and other gas products—and their corporate partners SunHydro and Air Products. The station, which was funded by a \$1.4 million DOE-funded award made to Proton OnSite in 2012, will produce roughly 30 kilograms of hydrogen per day. This amount of hydrogen is capable of fueling nearly six cars per day—enough fuel to provide about 300 miles of driving range per car. The station's performance is being documented and will be included in a validation study for hydrogen stations throughout the U.S.

GWRCCC will continue to be involved in the promotion of the station by identifying and supporting D.C. metro-area events that offer educational and outreach opportunities to stakeholders. Additionally, GWRCCC is working with DOE and NPS to provide the D.C. Department of Public Works (DPW) access to the station, while securing hydrogen vehicles for D.C.'s DPW.

Program Resources

- Review the newly updated **Biodiesel Handling and Use Guide** (afdc.energy.gov/uploads/publication/biodiesel_handling_use_guide.pdf) for the latest guidance on blending, distribution, and the proper and safe use of biodiesel and biodiesel blends in engines.
- Watch the new **CNG Tank Defueling, Decommissioning, and Disposal video** (youtu.be/vTxQPfsm8n0) which teaches transit agencies and others about safe practices for handling end-of-life issues for compressed natural gas (CNG) tanks.
- Visit FuelEconomy.gov to see the listing of federal fuel economy estimates for vehicles available in the new model year.
- See the recently released **Clean Cities 2015 Annual Metrics Report** (afdc.energy.gov/uploads/publication/2015_metrics_report.pdf) to view the program's latest petroleum reduction impacts. The report is derived from Clean Cities coalition data that characterizes energy and emissions initiatives, stakeholder membership, funding, alternative fuels and vehicles projects, fuel economy activities, and programs to reduce vehicle miles traveled.



The new hydrogen fueling station in Washington, D.C. Photo from DOE, NREL 40939

Clean Cities Explores Energy Efficient Mobility Opportunities

According to the U.S. Energy Information Administration, about 28% of energy consumed in the United States is used in transportation. From automated vehicle technologies to increasingly connected vehicles, rapid advances in the transportation industry have the potential to significantly impact how we move people and goods, as well as the amount of energy used by our mobility systems. To address this, Clean Cities is looking at ways it can expand its portfolio to best serve the future challenges of fleets and the wider transportation industry.

Since 1993, Clean Cities coalitions and stakeholders have reduced petroleum consumption in transportation by more than 8.5 billion gasoline gallon equivalents (GGEs). The program has also reduced greenhouse gas emissions by nearly 54 million tons. These accomplishments, coupled with Clean Cities' deep experience in helping fleets transition to alternative fuels and advanced vehicle technologies, lay a solid foundation for continued success in reducing emissions and energy use in transportation.

Historically, Clean Cities has been successful at tracking energy and emissions benefits that result from using alternative fuels and advanced vehicle technologies. With emerging transportation trends—like on-demand ride services—changing the way people travel, Clean Cities is also facilitating specific projects and coalition initiatives designed to track vehicle miles traveled (VMT) and reduce transportation-related energy use associated with these new transportation technologies. In fact, in 2015 nearly 70 coalitions reported nearly 400 VMT-reduction projects that collectively cut emissions by about 320,000 tons. These projects included ridesharing, mass transit, non-motorized transportation, route optimization, telematics, driver training, and other policy efforts. Looking to the future, Clean Cities will explore opportunities to expand these efforts, while taking advantage of emerging efficient transportation technologies that increase the country's energy independence. As part of this expanded effort, the program will work to leverage its strong relationships within the transportation sector and its ability to work with stakeholders at the local level, to complement broader efforts in deploying energy-efficient mobility systems (EEMS).

Last July, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy hosted the first ever Sustainable Transportation Summit. The event brought together transportation and mobility leaders to discuss the technology, policy, and market innovations that hold the potential to shape the transportation system of the future. At the summit, Clean Cities staff led a half-day session with program and smart mobility stakeholders to discuss opportunities to align Clean Cities activities for mutual benefit and respond to a changing market. Many of the conversations also centered on growing the Clean Cities portfolio to further reduce emissions and energy consumption. For example, participants asked how adding a more EV-centric or mobility data focused approach would impact emissions, and how a greater emphasis on EEMS would impact petroleum reduction and emissions. Clean Cities continues to evaluate these questions in the context of the program's strengths and opportunities.



Rapid advances in the transportation industry have the potential to significantly impact how we move people and goods, as well as the amount of energy used by mobility systems. *Photo from iStock 482680068*



NREL researchers are evaluating truck platooning, a strategy to reduce aerodynamic drag by grouping tractor trailers closely together on the highway. *Photo from Peloton, NREL 31237*

Clean Cities Efforts and Smart Mobility Initiatives Drive Emissions and Petroleum Reduction

Chances are, you have heard one of the recent transportation buzz words—connected and automated vehicles (CAVs), multi-modal transit, urban mobility, platooning, or transit on-demand. While many of these smart mobility concepts and technologies are relatively new to the Clean Cities space, they actually complement the alternative fuel and advanced vehicle technologies that have served as the backbone of the Clean Cities mission for more than 20 years. Together, smart mobility initiatives and the U.S. Department of Energy's (DOE) Clean Cities program promise to make even greater strides in reducing emissions, vehicle petroleum use, costs, and congestion around the United States.

Solidifying Common Goals

Recognizing this nexus, the DOE and the U.S. Department of Transportation (DOT) signed a memorandum of understanding in April 2016. The agreement aims to accelerate smart transportation strategies and alternative fuel technologies through the sharing of data, tools, models, research, and analytics. While Clean Cities serves as DOE's deployment program for these efforts, DOT's recent push in this area has focused on the Smart City Challenge. The Challenge is a \$40 million commitment from the agency—coupled with a \$10 million investment by Vulcan Inc.—to fund one city's plans to fully integrate innovative transportation system technologies. In June 2016, DOT announced that Columbus, Ohio, was chosen as the winning city among the seven Smart City Challenge finalists, out of an initial field of 78 applicant cities from across the country. See page 12 for examples of Clean Cities coalition involvement in these initiatives.

"DOT's activities are a natural complement to DOE's mission as it relates to technologies like connected and automated vehicles," said Reuben Sarkar, DOE's deputy assistant secretary for transportation, in a recent Energy.gov



DOT Smart City Challenge winner Columbus, Ohio, is working to reshape its transportation system and become part of a fully-integrated city—using data, technology, and innovation. *Photo from iStock 495513091*

article (energy.gov/eere/articles/energy-and-transportation-departments-commit-supporting-cities-future).

He continued, "These are exciting times for transportation. By working together to showcase what is possible through the Smart City Challenge, we hope to spark further innovation and identify

solutions to some of the world's most pressing challenges."

Defining Smart Mobility

So what is "smart mobility"? The transportation industry uses the term to describe a systems-based approach to address the transportation challenges of today. These challenges arise from the rapid growth of urban populations, combined with the demand for individual mobility solutions, often without the use of a personal vehicle.

A 2015 report (dupress.com/articles/smart-mobility-trends/) released by professional services firm Deloitte summarized smart mobility as the demand for "faster, greener, and cheaper transportation options." Established smart mobility solutions, such as rideshare and bicycle commuting, have been supplemented in recent years by on-demand ride services (e.g., Lyft and Uber), expanded multi-modal transit (i.e., a combination of driving, public transit, biking, or walking), and the promise of more advanced CAVs.

Focusing on CAVs

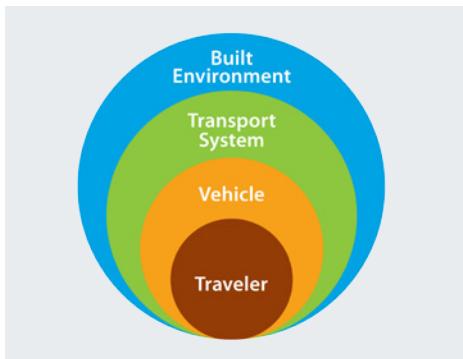
Original equipment manufacturers (OEMs) are developing CAVs with the aim to optimize safety and congestion, as well as improve the driving experience. While CAV technologies are often coupled, they actually describe different capabilities. Automated, or self-driving, vehicles use computer algorithms, sensors, and cameras to navigate the road without human assistance. Connected vehicles are equipped with devices that use communication technologies to transmit real-time data and information to the driver—and to other vehicles, charging stations, or other infrastructure.



Established smart mobility solutions, such as rideshare and bicycle commuting, have been supplemented in recent years by on-demand ride services, multi-modal transit, and the promise of more advanced CAVs. *Photo from iStock, 533243734*

Although fully automated vehicles are not available yet, many models on the road today offer semi-automated capabilities, such as lane-departure warnings or parallel-parking assistance. The National Highway Traffic Safety Administration (NHTSA) recently adopted SAE International's six levels of driving automation, in which vehicle automation increases from level 0 (no automation) to level 5 (full automation) (standards.sae.org/j3016_201401/). SAE's establishment of these standards indicates a growing interest in the technology by OEMs—and likelihood of progression to fully-automated vehicles.

Like automated vehicles, connected vehicle technologies are also progressing. For example, National Renewable Energy Laboratory (NREL) researchers are evaluating truck platooning, a strategy to reduce aerodynamic drag by grouping tractor trailers closely together on the highway. Using electronic coupling for simultaneous acceleration and breaking, test vehicles showed fuel economy savings of up to 6.4% in a recent study.¹



A whole-system approach to transportation involves the understanding of how travelers, vehicles, and transport systems all interact with the built environment.

While these technologies stand to revolutionize the automotive industry, additional research, demonstrations, and standards updates are still necessary before full commercialization. To address this, NHTSA recently released the

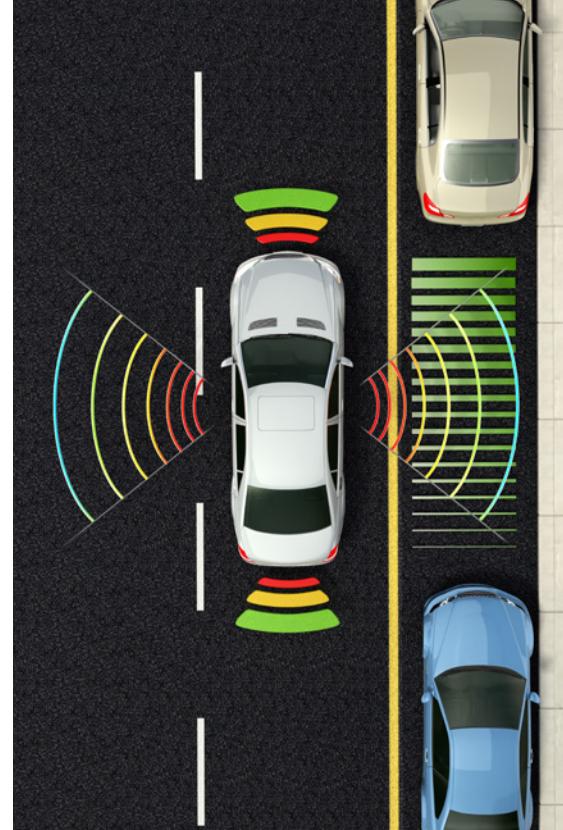
Federal Automated Vehicles Policy (transportation.gov/AV), a four-part set of proactive guidelines to ensure the safe design, development, testing, and deployment of automated vehicles. The document includes a 15-point safety assessment with best practices for vehicle manufacturers and developers, a model state policy for the regulation of automated vehicles, a compendium of available tools to ensure safe introduction of these technologies, and information on potential new tools, authorities, and regulatory structures. OEMs are also hard at work programming CAVs to deal with safety issues, such as unexpected travel conditions.

Additionally, analysts are in the process of determining the impacts that CAVs may have on fuel consumption and GHG emissions. While estimates for the effects of CAVs on energy use are highly uncertain, preliminary research² indicates that CAVs could reduce energy use by 40% in some cases. That said, if CAVs are able to travel more safely at faster speeds, drivers may opt to travel more, which could result in an increase of vehicle miles traveled. For these reasons, careful analysis and evaluation of CAVs is crucial as these technologies evolve, underlining the need for DOE and Clean Cities coalitions to have solutions in place to address the impacts of CAVs.

Employing Existing Research Capabilities

In January 2016, DOE convened a consortium of national laboratories to assess what it considers to be the five pillars of smart mobility—automation and connectivity, behavior and decision science, multi-modal transportation, urban systems, and vehicles and infrastructure. Researchers are focused on integrating all five pillars for a systems-level focus.

Argonne National Laboratory is heading the automation and connectivity



Automated vehicles use computer algorithms, sensors, and cameras to navigate the road without human assistance. Many models today offer semi-automated capabilities, such as parallel-parking assistance. Photo from iStock, 20606281

pillar, and Idaho National Laboratory is leading the vehicles and infrastructure pillar. The two labs have partnered with the University of Michigan to study the potential energy savings of CAV technologies, and will look at the day-to-day driving habits of 500 personal and fleet vehicle drivers, as well as their reactions to CAV technologies. Nearly all of the vehicles involved in the study are plug-in electric vehicles (PEVs) or hybrid electric vehicles (HEVs).

Oak Ridge National Laboratory's multi-modal transportation research includes modeling with new data to develop a baseline and understand how smart mobility will change freight movement in the future. As the laboratory leading the behavior and decision science pillar, Lawrence Berkeley National Laboratory's work comprises survey and data analysis to develop city-specific behavioral models and simulations of traveler behavior.

All of this complements the work being done at NREL, the laboratory leading the urban science pillar. NREL's Sustainable

¹ Assessing the Fuel-Saving Potential of Semiautomated Truck Platooning, <http://www.nrel.gov/docs/fy15osti/64133.pdf>.

² Stephens, T.S., Gonder, J., Chen, Y., Lin, Z., Liu, C., & Gohlke, D. *Estimated Bounds and Important Factors for Fuel Use and Consumer Costs of Connected and Automated Vehicles*, <http://www.nrel.gov/docs/fy17osti/67216.pdf>.

Mobility Initiative uses a whole-system approach to understand interconnections between travelers, vehicles, transportation systems, and the built environment to predict traveler behavior. As a result, researchers are identifying incentives and real-time feedback that will empower individuals to make efficient transportation choices.

Capitalizing on Clean Cities' Strengths

Clean Cities is no stranger to the transportation system efficiency strategies³ that have preceded more recent smart mobility solutions. In fact, many Clean Cities coalitions are already actively involved in projects that use data and technology to reduce vehicle miles traveled (VMT). These include ridesharing, mass transit, active transit, multi-modal transport, teleworking, and fleet solutions—such as route optimization, driver behavior changes, and rightsizing. In 2015 alone, Clean Cities saved 26 million gasoline gallon equivalents through VMT reduction programs.⁴ In addition, these initiatives are often tied into alternative fuel initiatives. For instance, San Diego Regional Clean Cities⁵ and Eastern Pennsylvania Alliance for Clean Transportation⁶ have teamed up with local PEV carsharing companies and other partners on efforts to install and utilize electric vehicle charging equipment.

Moving forward, Clean Cities will play a critical role in data measurement and



Transportation researchers study a map incorporating roads colored by traffic volume using data from the Federal Highway Administration Highway Performance Monitoring System. Photo by Dennis Schroeder, NREL 35360

collection, technical assistance, policy advancement, local outreach, and engaging fleets and consumers in advancing smart mobility efforts. For example, existing efforts to install telematics on fleet vehicles can be combined with CAV technology data collection to further the associated commercialization work. Many coalitions are also seeing the benefit of integrating PEV technologies with local smart mobility pilot programs and initiatives. As a result, coalitions around the country are developing stronger relationships with their state transportation agencies, metropolitan planning organizations, carsharing and ridesharing companies, and other new partners.

"Across the country, we have already seen Clean Cities coalitions tap into their networks and capabilities to offer smart mobility solutions," said Dennis A. Smith, national Clean Cities director. "Combined with the work that Clean Cities has done over the last 20+ years, the growth of smart cities efforts will transform the transportation market in the near future."

Telematics: An Early Smart Mobility Technology

Many fleet managers have already turned to telematics to improve efficiency and measure impacts of their investments in fuel-saving technologies and strategies. Telematics is a comparatively simple and cost-effective smart mobility solution to improve fuel-efficient driving behavior.

Through the use of Global Positioning System (GPS) and communication technologies, telematics provides fleet managers with data about vehicle location and engine status. These include necessary vehicle maintenance or idling episodes, as well as telematics that can provide real-time feedback to drivers on their behaviors. While collecting data through telematics is relatively simple, the insights that fleets gain and the resulting actionable steps are evolving and improving all the time.

³ "Transportation System Efficiency," Alternative Fuels Data Center, http://www.afdc.energy.gov/conserve/system_efficiency.html.

⁴ Johnson, C., & Singer, M. *Clean Cities 2015 Annual Metrics Report*. http://www.afdc.energy.gov/uploads/publication/2015_metrics_report.pdf.

⁵ "San Diego Prepares for Electric Vehicles in Multi-Unit Dwelling Communities," Alternative Fuels Data Center, <http://www.afdc.energy.gov/case/1503>.

⁶ "EV Charging Stations Spread Through Philly," Alternative Fuels Data Center, <http://www.afdc.energy.gov/case/624>.

Municipality with a Mission: Georgia Fleet Commits to Alternative Fuels for the Long Haul

When it came to adopting alternative fuels into its fleet, Georgia's Cobb County Government didn't stop at one or two types of fuel. Over the past 15 years, the County has made it its mission to utilize six different alternative fuels, based on mission needs, with the goal of saving money, reducing its environmental impact, and increasing employees' satisfaction (see timeline on page 11). Cobb County has successfully built an innovative fleet with a forward-looking focus, drawing upon its access to data, strategic partnerships, and information.

Implementing Diverse Solutions with Unified Results

Cobb County attributes much of its success to its focus on what Al Curtis, director of fleet management, refers to as "mission-specific fuel use." Simply put, Curtis says this type of approach boils down to having a deep understanding of the particular fleet, as well as the needs of the customer, before committing to a specific fuel or technology.

The County took this approach when it found a niche for plug-in electric vehicles (PEVs) in its light-duty fleet, he said. As a result, employees now have access to 23 leased Nissan LEAF PEVs. Bi-fuel propane F-150 pick-up trucks assist with some of the County's larger transportation needs, while flexible fuel vehicles (FFVs) make up the police fleet. As E85 is currently priced higher than gasoline and available at limited sites in Cobb County, the County strategically uses E85 when the price is reasonable.

Biodiesel is yet another fuel the County has successfully incorporated into its portfolio. After attempting to use ultra-low-sulfur diesel in 2007, fleet personnel began noticing issues related to the fuel's lubricity. They were able to solve the problem by switching to B5, a 5% blend of soy-based biodiesel certified to BQ-9000 standards for quality. As a result, the County became one of the first municipalities in Georgia to use biodiesel at the majority of its fueling sites. In addition to solving lubricity issues, Curtis estimates that by switching from conventional diesel to biodiesel, the fleet has reduced its life cycle greenhouse gas (GHG) emissions by more than 51.9 tons in the past five years. Cobb County's commitment



Cobb County Government's fleet now includes 23 plug-in electric Nissan LEAFs. Photo provided by Cobb County Government, NREL 39585



Cobb County police with one of their two Zero all-electric motorcycles. *Photo from Cobb County Government, NREL 39586*

to alternative fuel goes beyond its fleet; the County's Public Transportation Department demonstrated early success with compressed natural gas (CNG) in the early 2000s with transit buses.

It's clear that Cobb County's efforts have produced big results. With 21% of their 2,400 fleet vehicles capable of running on alternative fuels, the County has averted more than 450 tons of GHG emissions and is well on its way to meeting its goal of a 30%–40% alternative fuel vehicle (AFV) fleet. The County has also saved more than \$358,000 in fuel, maintenance, and ownership costs since the year 2000. Curtis said he expects to save an additional \$16,000 during the next two years as the fleet fully integrates new propane lawn mowers.

Turning Challenges into Opportunities

Despite its ultimate success, the process of incorporating alternative fuels and advanced technologies hasn't always been smooth sailing.

"Every success has had a challenge to overcome," Curtis said.

Cobb County first started working with Clean Cities back in 2008 when it began to convert some of its police fleet to propane. At the time, the County experienced setbacks with the conversion process and opted to decommission the project in 2010. However, Cobb County leaders realized the opportunity that propane could offer for cost savings and revisited the fuel in 2015 with improved conversion systems. Today, the County regularly runs 16 bi-fuel propane trucks that offer a 650-mile range with propane and gasoline combined. The vehicles have logged more than 90,000 problem-free miles and are projected to save the municipality \$120,000 during a four-year period. Curtis says the bi-fuel vehicles have been particularly helpful in the Code Enforcement, Parks and Recreation, and Property Management departments.

Leveraging Partnerships and Making Connections

Curtis is quick to point out that Cobb County's projects didn't happen in a vacuum; many years of collaboration with its local coalition, Clean Cities-Georgia, contributed to its overall success. For

Mission-Specific Motorcycles

In 2015, Cobb County purchased two Zero all-electric motorcycles for the police department's ranger division.

The motorcycles are used for patrol, as well as active searches. The bikes have quickly become a favorite among the officers, as they require little to no maintenance, quietly reach a top speed of 98 miles per hour, and have a range of 189 miles.

The benefits don't stop there. The public has expressed appreciation about the lack of tailpipe emissions and noise as they are enjoying local parks.

instance, Clean Cities-Georgia Coordinator Don Francis helped the fleet evaluate its options before investing any time and money in new fuels and technologies. He directed Curtis to the latest tools and calculators found on the U.S. Department of Energy's Alternative Fuels Data Center (AFDC) website (afdc.energy.gov) as an appropriate first step for their project.



Cobb County has successfully transitioned its light-duty fleet to PEVs. *Photo from Cobb County, NREL 40938*

More importantly, Francis said, "We are able to connect our stakeholders—like Cobb County—to our partners in order to get things done." For example, when Cobb County made its decision to pursue PEVs, Francis connected Curtis to a local residential, commercial, and public

PEV charging station company called Metro Plug-In. The company installed electric vehicle supply equipment (EVSE) at the County's facility. Francis was also able to assist Cobb County in securing a grant from the Georgia Environmental Finance Authority to help pay for the installation of 14 charging stations.

Curtis values the recognition and attention Francis and Clean Cities have drawn to his projects, as well as the network and partnership opportunities that they bring. In addition to Metro Plug-In, Cobb County now has strategic partnerships with Nissan, Georgia Power, Marietta Power & Water, Cobb Electric Membership Corporation, ChargePoint, Blossman Gas, Georgia Natural Gas, and Hanna Solar—all possessing the shared goal to expand alternative fuel use and save the county money.

"It is a municipal fleet manager's responsibility to be a good steward of the citizens that trust us to manage their tax dollars," he said.

Making the Case and Spreading the Message

In advocating for alternative fuels, Curtis has found fleet data to be invaluable. AFDC tools to calculate return on investment and emission savings have especially helped him make a compelling case to the county's management for AFV purchases.

"If you don't know where you are, then you can't know where you're going," he said.

In addition to having the approval of county officials, Cobb County understands the importance of AFV acceptance among vehicle end users. Cobb County uses a number of methods to educate and familiarize drivers with the vehicles, including ride-and-drive events with the local Nissan dealership. The County also hosts ongoing internal campaigns to inform employees about the environmental and economic benefits of AFVs. As a result, Cobb County departments are welcoming the vehicles with open arms, Curtis says. One of those

cases is within Cobb Senior Services, where Executive Director Jessica Gill says her team's enthusiasm for the department's Nissan LEAF is clear. While the staff had initial hesitations about the vehicle's all-electric range, she said they quickly came to appreciate the technology, performance, and ease of charging.

"Now, the staff fight over who is going to get to use the electric car," Gill said.

Cobb County's impressive achievements are making an impact on other fleets as well. Leaders within the County's fleet regularly receive invitations to speak at industry events and share the County's AFV successes and challenges with other fleets. Curtis attributes Cobb County's forward-thinking approach to keeping a finger on the pulse of the alternative fuel industry.

"As a fleet manager it's easy to put blinders on and get stuck in the day-to-day grind, but it is important to get out there and see what options are available to save your fleet money," Curtis said.

As a result, others have also taken notice of the County's effort. Since 2000, Cobb County has received numerous awards for its fleet leadership, including being ranked 19th in 2016's 100 Best Fleets in North America list and 20th in the Green Fleet

Awards list (the100bestfleets.com/100_winners_2016.htm). The County was also named a 2016 Notable Fleet by Government Fleet Magazine (government-fleet.com/article/story/2016/07/recognizing-the-2016-leading-fleets/page/2.aspx).

Looking Forward and Moving Ahead

Despite all of its accomplishments, however, Cobb County is not about to rest on its laurels. The County's fire department recently leased seven more Nissan LEAFs and installed seven EVSE units, making Cobb County the first municipality in Georgia to add zero emission vehicles to a public safety fleet. Following an initial effort in the early 2000s, Cobb County is also investigating compressed natural gas (CNG) into its refuse trucks.

With its knack for innovation, it's more than likely Cobb County will continue to turn challenges into opportunities and lead the way for alternative fuels in municipal fleets and its community.

"The County's alternative fuel adoption shows staff and citizens that they do not need to be afraid of new technology," Gill said. "Local government support signals to the community the value and importance of reducing the municipal carbon footprint through alternative fuel use."

Cobb County Alternative Fuel Integration

'00

Partnered with Atlanta Gas Light Company to install CNG infrastructure. Added 40 CNG cars and trucks into the fleet and introduced CNG transit buses to the County.

'08

Converted 30 police cars to use propane.

'14

Used Georgia Environmental Finance Authority funding to install seven dual-port Level 2 charging stations. Later installed an additional 27 Level 2 charging stations.

'16

Leased seven Nissan LEAFs for use by the fire department. Installed seven additional Level 2 charging stations.

'07

Began using soy-based biodiesel (B5).

'10

Purchased more than 80 flexible fuel vehicles.

Purchased eight hybrid electric vehicles.

'15

Installed a DC fast charger, donated by Nissan. Leased 16 Nissan LEAFs.

Purchased two Zero electric motorcycles for the police department.

Purchased three propane-powered mowers using a Propane Education & Research Council incentive.

Over the past 15 years, the County has made it its mission to utilize six different alternative fuels, with the goal of saving money, reducing its environmental impact, and increasing employees' satisfaction.

Involving Clean Cities in the Smart City Challenge

Clean Cities coalitions across the country were key partners in many of the initial vision statements submitted as part of U.S.

Department of Transportation's (DOT) Smart City Challenge. Here are three examples of this successful collaboration.

Clean Fuels Ohio

Columbus, Ohio, is leading the charge on smart mobility to address transportation challenges. As the winner of DOT's Smart City Challenge

Columbus, Ohio. Photo from iStock 459200923

funding, Columbus is receiving up to \$40 million from DOT and a \$10 million investment from Vulcan Inc., as well as the \$90 million that the city raised from private partners. In their proposal to DOT, Columbus set a vision for how technology can contribute to a more connected community. Sam Spofforth, Clean Fuels Ohio executive director, was pivotal in developing the Vulcan Inc. portion of the Smart City Challenge application. He leveraged the natural strengths of Clean Cities to bring together a diverse coalition of non-traditional stakeholders—from regional planning commissions to transportation network companies—to propose a plan that focused on fleet electrification, electrification of carsharing and other innovative mobility services, consumer PEV adoption, public electric vehicle charging, and grid decarbonization. Clean Fuels Ohio will also assist with project implementation.

To other coalitions interested in becoming involved with smart mobility solutions, Spofforth says, “Grab a seat at the table where the conversations are taking place. Use the strengths and resources that Clean Cities coalitions have to offer to make connections, develop projects, identify funding sources, and include a diversity of stakeholders. Stay focused on how all of this relates to the core mission of Clean Cities and define smart mobility broadly.”

Columbia-Willamette Clean Cities

By thinking out of the box, Portland, Oregon, is creating a culture of “complete communities” that support all forms of mobility.

“The Smart City Challenge encouraged our coalition and stakeholders to be creative and experiment with the newest technologies, such as CAVs, multimodal systems, electric assist bicycles, and carshare programs,” said Brian Trice, coordinator for Columbia-Willamette Clean Cities (CWCC).

Like Clean Fuels Ohio, CWCC assisted the City of Portland—a Smart City Challenge finalist—with the Vulcan Inc. proposal. Trice participated in planning meetings and provided fleet information and infrastructure analyses. Many CWCC stakeholders were also involved in proposal development, offering programs to expand workplace charging infrastructure and accelerate PEV adoption, particularly in low-income communities. Although Portland was not awarded funds, Trice says that local Smart City Challenge partners are moving forward with a smart mobility project and believes that efforts to create diverse solutions to improve transportation efficiency will continue.



Portland, Oregon. Photo from iStock 187925636

Kansas City Regional Clean Cities

Kelly Gilbert, Kansas City Regional Clean Cities program director, believes that interoperability among the first- and last-mile is a key notion of smart mobility.

“We are developing a simple way for people in our region to subscribe to and use a transit, bikesharing, or carsharing program through a single payment option,” Gilbert said.

Kansas City, Missouri, is also exploring smart mobility through vehicle, bicycle, pedestrian, and traffic-signal connectivity, as well as PEV integration. For the Smart City Challenge proposal, Gilbert provided PEV suitability data, developed content from EV Everywhere resources and the Kansas City Power & Light’s Clean Charge Network, and brought in key project partners. Gilbert suggests that coordinators interested in smart mobility should start by learning how local transportation systems are already using these technologies.



“Metropolitan planning organizations and state departments of transportation have worked on information technology systems for a number of years and will be able to share lessons learned,” she said.

Kansas City, Missouri. Photo from iStock 98921893

Two Coalition Leaders Inducted into Clean Cities Hall of Fame

Don Francis and Rick Price are 2016 Hall of Fame Award Winners

Coordinators Don Francis and Rick Price are the latest inductees into the U.S. Department of Energy's Clean Cities Hall of Fame, which recognizes outstanding contributions to the program's mission. Clean Cities Director Dennis A. Smith and Co-Director Linda Bluestein inducted the two coordinators into the Clean Cities Hall of Fame (cleancities.energy.gov/hall-of-fame/) on September 1, 2016 in Knoxville, Tennessee. Representatives from nearly 100 Clean Cities coalitions gathered from across the country for the 2016 Clean Cities Coordinator Workshop. Francis and Price oversee Clean Cities-Georgia (cleancities.energy.gov/coalitions/atlanta) and Pittsburgh Region Clean Cities (clean-cities.energy.gov/coalitions/pittsburgh) coalitions, respectively.

In 2015, the two coalitions saved more than 24.8 million gallons of petroleum combined, through use of alternative fuels, advanced vehicles, and fuel efficiency measures. Such savings led to emissions reductions that equate to removing more than 17,673 passenger cars from the road. These accomplishments have contributed to the Clean Cities program's ability to save more than 8.5 billion gallons of petroleum since its inception in 1993.

"Don and Rick are truly emissaries for the program—the type of leaders who you hold up to represent the program," Smith said. "They are people who know how to get things done."

Francis was recognized for the leadership he has demonstrated in helping the state of Georgia to become a national leader in the adoption of electric vehicles (EVs) and related infrastructure. Thanks in large part to his promotion of the state's wildly successful Electric Vehicle Rebate Program, Georgia experienced skyrocketing growth in EV registrations—from 1,469 to 10,482 in just 12 months (from March 2013 to March 2014), making the state second only behind California's 77,222 EVs.

"I'm very grateful for this distinguished recognition with the Clean Cities Hall of Fame," Francis said. "Our contributions in Georgia are the result of many individuals acting as tireless ambassadors for alternative fuels and reducing emissions."

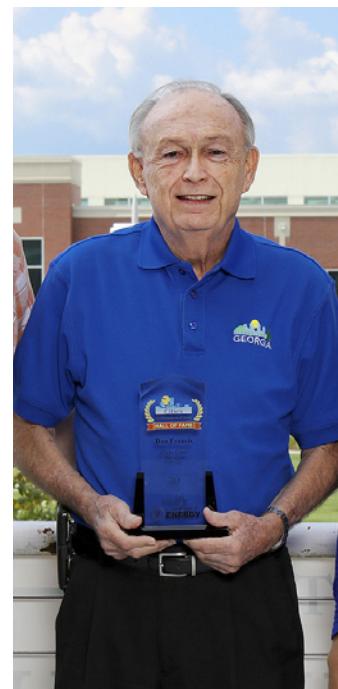
Price was acknowledged for his impressive skill in leading state-wide educational efforts. During his time as coordinator, Price spearheaded the inaugural Tri-State Alternative Fueling Expo



& Conference and Expo. The event was the first educational trade show and conference of its kind in the area to promote alternative energy sources and revolutionize the transportation industry while boosting local and national economies and protecting the environment. Additionally, Price created a successful partnership with the Community College of Allegheny County to provide alternative fuel vehicle training. He has also held workshops aimed at helping fellow coordinators secure project grants.

"It's such an honor to be inducted," Price said. "The most important part about this job is to have a passion for what you're doing. I believe in the mission of Clean Cities, and that's a big part of the success of our coalition."

Francis and Price will join a select group of 20 coordinators who have been inducted into the Clean Cities Hall of Fame since 2011.



Clean Cities-Georgia Coordinator Don Francis (left) and Pittsburgh Region Clean Cities Coordinator Rick Price (right). Photos by Jason K. Richards, ORNL

Profile of the 2016 Benjamin Watson Award Winner

Lee Grannis Recognized with Benjamin Watson Inspirational Award

Winners of the Benjamin Watson Inspirational Award are among Clean Cities' best in the nation, recognizing individuals who display passion and energy in their work for Clean Cities. Lee Grannis, coordinator of Greater New Haven Clean Cities Coalition (cleancities.energy.gov/coalitions/new-haven), most recently joined these esteemed ranks.



Clean Cities Director Dennis Smith, Co-Director Linda Bluestein, and Northeast Regional Manager Erin Russell-Story with Lee Grannis, Greater New Haven Clean Cities Coalition.

Photo by Jason K. Richards, ORNL

Grannis was honored on September 1 in Oak Ridge, Tennessee, where representatives from Clean Cities coalitions across the country gathered for the annual Clean Cities Coordinator Training Workshop. Peers and past awardees Sam Spofforth, Jonathan Overly, and Barry Carr presented the award to Grannis in Benjamin Watson's honor and memory.

"There's no one more deserving," said Spofforth,

coordinator of Clean Fuels Ohio. Carr, coordinator of Clean Communities of Central New York (Syracuse), added, "He's been an inspiration to all of us." The award is presented annually to a Clean Cities coordinator who provides inspiration and motivation to other coordinators and who strives to create a fun, engaging, and unified team spirit within the program.

Grannis has been the coordinator of Greater New Haven Clean Cities Coalition in New Haven, Connecticut, since he started the Coalition in 1995. Among other recognition, he was selected as the Northeast Region Clean Cities Coordinator of the Year in 2004 and 2008 and was inducted into the national Clean Cities Hall of Fame in 2012.

"Lee is a great person and a great example of the Clean Cities program," said Wisconsin Clean Cities Coordinator Lorrie Lisek. According to Christine Heshmati, coordinator of the Southeast Florida Clean Cities Coalition, Grannis (aka "the Colonel") travels extensively to assist other coalitions with their events. "His extensive knowledge of alternative fuel vehicles and his unwillingness to accept doing 'business as usual' makes him stand above others," Heshmati said. "Lee is always willing to help others, just as Benjamin Watson was many years ago."

Nominations for the Benjamin Watson Inspirational Award come directly from coordinators, in a process overseen by the Clean Cities Coordinator Council. Coordinators then vote to select the winner.

To learn more about Grannis' accomplishments, read his bio on the Clean Cities Hall of Fame page (cleancities.energy.gov/hall-of-fame).

2015 Southeast Diesel Collaborative Leadership Awards

Jonathan Overly Recognized with Visionary Champion Award

The Southeast Diesel Collaborative (SEDC) has been spotlighting leadership in the southeast region of the United States since 2008, recognizing industry groups, fleets, and individuals for demonstrated leadership in achieving diesel emission reductions. Founder and Executive Director of East Tennessee Clean Fuels Coalition (ETCF) Jonathan Overly was recognized at the 2016 awards ceremony as SEDC Visionary Champion of 2015.

"Overly's work on the I-75 alternative fuel corridor and leadership in driving multiple conversions of diesel engines

to alternative fuels resulted in significant diesel emission reductions over the past year," said Alan Powell, SEDC coordinator and mobile source coordinator with the U.S. Environmental Protection Agency (EPA).

Since Overly founded the ETCF in 2002, he has also established a number of strong working relationships with individuals, businesses, government entities, and nonprofit organizations—all of which have led to the rapid adoption of alternative fuels throughout East Tennessee.



Carol Kemker, EPA, and Richard MacDonald, Georgia Environmental Protection, with Jonathan Overly, ETCF. *Photo by Dale Aspy, EPA and SEDC*

Central Oklahoma Clean Cities

Natural Gas Stations Abound on Oklahoma's Interstate Highway System



Eric Pollard, Central Oklahoma Clean Cities. Photo from Eric Pollard

first-of-its-kind CNG corridor that's helping local, regional, and national fleets meet their alternative fuel goals."

"Today, Oklahoma has more public CNG stations than any other state in the country, per capita," Pollard added.



Publicly accessible compressed natural gas fueling station along I-35 in Goldsby, Oklahoma. Photo from Eric Pollard, NREL 39374

Setting and Reaching the State's Ambitious Goal

In 2011, Governor Mary Fallin presented her Oklahoma First Energy Plan, the state's first comprehensive energy plan. The plan included a request for help from private sector companies in building CNG infrastructure along Oklahoma's interstate highways. The first step was to install at least one CNG station every 100 miles along the state's interstate highways within four years.

In June 2016, Oklahoma's leading CNG retailers and OKCC stakeholders—including Love's Travel Stops, OnCue Express, Tulsa Gas Technologies, Oklahoma Natural Gas, and Sparq Natural Gas—joined Governor Fallin at the OnCue CNG station in Billings, Oklahoma, to celebrate the success of the goal.

Governor Fallin praised the project team for the accomplishment, adding that the state of Oklahoma has saved more than a million dollars in fuel costs since converting much of its fleet to CNG over the last few years.

"It takes a diverse public and private partnership team willing to work hard in order to achieve a bold goal like having a CNG station within every 100 miles on Oklahoma interstates," Fallin said.

Reaping the Economic Benefits

Since key CNG legislation was enacted in 2009, Pollard says that Oklahoma has seen a 920% increase in CNG fuel sales, increased demand for natural gas vehicles, and new jobs in the service and maintenance of natural gas stations and vehicles.

"The state's natural gas vehicle drivers have saved a total of nearly \$85 million by using CNG versus regular gasoline since the bill was adopted, and the state is projected to gain more than \$13.6 million in positive economic benefit from the natural gas vehicle industry during the next three years," he said.

"There is still a lot of work to be done, since many large Oklahoma communities still do not have CNG stations or are only served by one station," said Scott Minton, market development manager for OnCue Express. "The continued growth of CNG is a win-win, supporting an Oklahoma-produced fuel and advancing Clean Cities goals in the process."

OKCC is located in Oklahoma City, the "American Crossroads" of Interstate 35, which stretches from Laredo, Texas, to Duluth, Minnesota; Interstate 40, which stretches from Wilmington, North Carolina, to Barstow, California; and Interstate 44, which stretches from Wichita Falls, Texas, to St. Louis, Missouri.

Delaware Clean Cities

“Fueling the Future” Conference Draws a Packed House



(Top) Kathy Harris.
Photo from Kathy
Harris; (Bottom)
Morgan Ellis. Photo
from Morgan Ellis

The State of Delaware Clean Cities (DCC) coalition (cleancities.energy.gov/coalitions/delaware) hosted a filled-to-capacity alternative fuel conference—*Fueling the Future: Clean Transportation for a Greener Delaware*—this past May in Dover, Delaware. The conference—the first of its kind in the state—featured presentations and panel discussions that provided basic technical information about alternative fuels as well as their environmental and economic benefits. At the afternoon ride-and-drive, participants were given the opportunity to explore a wide variety of natural gas, propane, and plug-in electric vehicles available on the market today.

Bringing Stakeholders Together

More than 170 transportation professionals attended the inaugural event, including fleet managers, state planners, university researchers, vendors, and other interested stakeholders. Delaware’s Governor, Jack Markell, and Department of Natural Resources and Environmental Control Secretary, David Small, spoke about the importance of clean transportation in building a clean energy economy and reducing greenhouse gases in the state.

“Prior to this event, there was no venue for all of these people to get together and talk about clean transportation in Delaware—including the successes and remaining challenges,” said Kathy Harris, DCC’s co-coordinator. “The conference attracted a varied audience, from experts in the field to business owners who were entirely new to alternative fuels.

“Based on the popularity of this year’s conference, we hope to expand the event in the future to accommodate more participants and include break-out sessions that attendees can select based on their interests and prior knowledge,” Harris added.

Driving into the Future

Delaware may only be 2,500 square miles, but Delawareans logged more than 9 billion vehicle miles traveled in 2013. At the conference, attendees previewed what it might be like to

drive those miles in an alternative fuel vehicle. Nearly two dozen vehicles were on display, including school buses, a box truck, a service truck, pick-up trucks, and sedans. Additionally, vehicle-to-grid (V2G) technology pioneer Willett Kempton displayed a V2G-capable vehicle, which attendees took turns test-driving. V2G-enabled vehicles are currently being used for research and development pilot projects across national laboratories, industry groups, and research institutions.

“Alternative fuels are new to a lot of people,” said Morgan Ellis, DCC’s coordinator. “There can be uncertainty around investing in vehicles and infrastructure, and we aimed to assuage those uncertainties by getting people up close and personal with alternative fuels.

“Fueling the Future united experienced stakeholders in the alternative fuel realm with those interested in delving into it,” Ellis added. “We’ve also seen great interest from others since then. In fact, our coalition has been contacted by business transportation managers who attended the conference and are now interested in retrofitting or replacing their vehicles.”

The demand for alternative fuel vehicles in Delaware is clear—more than 200 Delawareans have purchased or leased electric vehicles in the last year alone. The state is also considering significant infrastructure growth over the next two to three years, including plans to install 12 new public DC fast-charging stations and new propane and compressed natural gas refueling stations.

When it comes to clean transportation, Delaware is a small state taking big action.



Delaware’s ride-and-drive event offered participants the opportunity to test drive a wide variety of alternative fuel vehicles on the market today. Photo from Morgan Ellis, NREL 39488

Alabama Clean Fuels Coalition

Alabama Prisons Adopt Propane, Establish Fuel Savings for Years to Come



Mark Bentley. Photo from Mark Bentley

Ever since Alabama Clean Fuels Coalition (ACFC) (cleancities.energy.gov/coalitions/alabama) hosted its annual Propane Road Show in 2012, the state's Department of Corrections (ADOC) officials have been inspired to see if the fuel could work in their own fleet. Thanks to the Coalition, ADOC officials said they came away from subsequent propane events with the resources necessary—such as industry contacts, educational information, and bi-fuel conversion kit recommendations—to confidently switch their fleets to propane.

"We were happy to offer our technical guidance and expertise to Alabama's corrections facilities, but also to help bring the right people together for the project," said Mark Bentley, Executive Director of ACFC. "When you have the right factual basis and the right people involved, you have a much greater chance of success."

Soon after the event, corrections officials teamed with ACFC to begin what would become a two-year pilot project that included the conversion of 10 conventional gasoline vans to propane at ADOC's Loxley Work Release Center. Before the Department launched the project in 2014, ADOC was spending more than \$1.3 million a year on gasoline to fuel a fleet of roughly 80 passenger vans. The Coalition conducted an assessment of the annual mileage accumulated by each van when traveling to and from their work release facilities. From that assessment, the Coalition projected that a switch to propane could offer significant savings, based on the cost of each vehicle conversion and the estimated miles per gallon (MPG) for both gasoline and propane vans.

ADOC has since seen savings of \$6,612 per year, per van that was converted from gasoline. Additionally, the Department has since added 55 more propane vans to its fleet, built new on-site propane fueling stations at ADOC facilities statewide, and contracted with propane marketers to serve the ADOC fleet in other areas throughout Alabama.

"Because of the seamless installation experience, and the quality of propane conversion kits we used, ADOC really saw no major challenges in equipment performance or operations," said Dr. Andy Farquhar, former Director of the Alabama Corrections Industries, who led the pilot project from its inception. Farquhar

added that propane, used as an on-road fuel, qualifies for the federal Alternative Fuels Excise Tax Credit—and with this credit, there were several days in 2015 when the Loxley Work Release Center's propane fueling costs balanced out to zero.

The fueling station and the first 10 Ford F-350 vans that were equipped with bi-fuel propane conversion kits were secured through a bid solicitation process with the state's Department of Finance-Purchasing Division. ADOC developed specifications for the vans and received assistance from the ACFC to develop specifications for bi-fuel propane conversion kits. When local dealership Stivers Ford won the bid, Stivers selected the ACFC member Precision Sales and Service to install ICOM conversion kits on each van. ADOC received information on fueling station specifications from the Propane Education & Research Council, as well as recommendations on infrastructure contractors from ACFC. By January 2014, the 10 propane-fueled vans and Loxley fueling station were ready for use.



Propane-fueled vans lined up at the Alabama Draper Correctional Facility. ADOC has seen fuel cost savings amounting to \$6,612 per year, per van converted from gasoline. Photo by ADOC, NREL 39581

ACFC confirmed the vans have since driven more than 1.4 million miles on propane, and the two years' worth of recorded fuel use and emissions benefits have provided valuable data beyond cost savings. The propane vans also helped the Department avert nearly 130 tons of greenhouse gas emissions during the two-year trial.

"Propane is a cleaner, inexpensive fuel that allows the Alabama Department of Corrections to reduce its dependence on imported oil," said Farquhar. "Additionally, the work release center staff and inmates like the convenience of having most of the propane fueling stations on-site, which reduces the amount of time that would be required to fuel vehicles at commercial gas stations."

With the successful investment in creating an alternative fuel vehicle fleet—and all the initial infrastructure costs accounted for—corrections officials are confident the Department will see continuous benefits for years to come.

Clean Cities Intern's Enthusiasm for Electric Vehicles Boosts Project Success

When Shauna Basques moved from Minnesota to Florida to embark on her internship at the Central Florida Clean Cities Coalition (CFCCC) (cleancities.energy.gov/coalitions/central-florida) in 2015, she brought with her a love for electric vehicles (EVs).

"I believe in alternative fuels. I believe in electric vehicles," Basques said. "In fact, when I graduated from college, I purchased a plug-in hybrid Chevy Volt, which I proudly show off at Clean Cities outreach events across the state."

Before moving to sunny Florida, Basques served at the Twin Cities Clean Cities Coalition through Minnesota GreenCorps. GreenCorps organizers often place AmeriCorps members with local governments, educational institutions, and nonprofit organizations to work on projects that help preserve and protect the environment.

"Working with Minnesota GreenCorps and the Twin Cities Clean Cities Coalition allowed me to stretch my environmental wings, so to speak," Basques said. "I got the chance to work with some terrific organizations and accelerate a variety of sustainability projects ranging from EV outreach and alternative fuel education, to developing case studies and researching potential funding sources for EV infrastructure."

Today, in addition to interning at CFCCC, Basques is pursuing a master's degree in non-fiction writing at the University of Central Florida. "When I graduate next year, I plan on pursuing employment in the electric vehicle realm—I definitely want to continue in this field," she said.

Since joining CFCCC, she has spent much of her time supporting the development of a new online tool that maps workplace charging locations in Florida to support the growth of EV ownership and associated charging infrastructure.

"One of our coalition stakeholder organizations—Drive Electric Florida, which we help staff—is driving the development of the tool," Basques said. "We've identified more than 100 workplace charging locations to date, and expect to launch the Drive Electric Workplace Charging Tracker Tool within the year."

"Along with spotlighting employers that currently offer workplace charging, the tool will help connect organizations interested in installing charging stations with organizations that have already done so and are willing to serve as an educational resource," she added. "The tool was developed as part of Drive Electric Florida's

pledge to be a local ambassador for the U.S. Department of Energy's Workplace Charging Challenge, and will evolve as workplace charging gains a sturdier foothold in Florida."

Basques also strives to enhance green tourism in the state through CFCCC's partnership with Drive Electric Orlando, which partners with the City of Orlando, Orange County, rental car agencies, major theme parks, and more than 35 hotels. Partner organizations provide charging infrastructure for EV renters, and benefits like free charging and parking for business travelers and vacationers.

"Drive Electric Orlando presents another opportunity to promote workplace charging. Our coalition's role focuses on stakeholder outreach and education," Basques said. "We provide information to businesses that have joined forces with Drive Electric Orlando, and promote the benefits they could see from providing EV charging for their customers and employees. We also collaborate with other coalitions in markets that feed the Orlando tourism industry."



Shauna Basques commandeers the electric drive moon rover during an Earth Day gathering at the Kennedy Space Center Visitor Complex (above) and charges her plug-in hybrid Chevy Volt (right). Photos from Colleen Kettles, NREL 39314 and 39322

Basques has also played a lead role in organizing and planning the Coalition's Train-the-Trainer workshop series. The workshops educate first responders and



other public safety officers about how to deal with alternative fuel vehicle accidents; provide safety instructions for vehicles that run on natural gas, propane, and electricity; and encourage participants to serve as trainers in their local communities.

"Recognizing an alternative fuel vehicle at the scene of a crash isn't always easy," she said. "And knowing how to handle such vehicles in a safe manner is vital for protecting the officers and the public from harm. Like conventional vehicles, alternative fuel vehicles require special handling in emergency situations."

What's next for Basques? "I've always been a strong believer in alternative fuel vehicles, but most people don't realize that getting such a vehicle is within reach. I love educating people about their options, particularly with so many affordable and reliable alternative fuel vehicles on the market today," Basques said. "My internships at the Twin Cities and Central Florida coalitions have only served to increase my interest in continuing in this line of work in the years to come."

Ask the Technical Response Service

Green Renewable Diesel: Coming to a Pump Near You

Q: What is renewable diesel? How is it different from biodiesel?

A: Renewable diesel, a “drop-in” renewable fuel made from a variety of biomass sources, is compatible with diesel engines and fueling infrastructure without any modifications. Renewable diesel is held to the same industry specifications as petroleum diesel and has the potential to replace conventional fuel in various applications, including medium- and heavy-duty trucks. Renewable diesel can be blended in any amount with conventional diesel, providing added flexibility. Other names for renewable diesel include green diesel, hydrogenation-derived renewable diesel, and hydrogenated esters and fatty acids diesel.

You might be thinking, *this sounds a lot like biodiesel!* However, renewable diesel is not biodiesel.

Like biodiesel, most renewable diesel is produced from vegetable oil, animal fat, and waste cooking oil. However, biodiesel is a mono-alkyl ester, which has different fuel properties than diesel—and a different fuel specification (ASTM D6751 for 100% biodiesel). Renewable diesel and petroleum diesel meet the same fuel quality specification ASTM D975.

Though they share the same feedstocks, renewable diesel and biodiesel are produced through very different processes. There are several methods to produce renewable diesel, but the most common is known as hydrotreating—which requires the feedstock to react with hydrogen and a catalyst. The process and equipment are similar to those used at oil refineries to reduce the sulfur in petroleum diesel. Biodiesel is produced via transesterification, which allows the feedstock to react with alcohol and a catalyst.

Q: Who is using renewable diesel?

A: California’s Department of General Services requires state agencies making bulk fuel purchases to buy renewable diesel rather than petroleum diesel for diesel vehicles in their fleets, if the fuel is available and competitively priced.⁷ Several California cities and counties, as well as Oregon’s City of Corvallis and Eugene Water & Electric Board already use renewable diesel in their fleets. Additionally, National Clean Fleets Partner UPS (cleancities.energy.gov/fleets/ups) recently announced its plan to replace conventional fuels with up to 46 million gallons of renewable diesel and other renewable fuels over the next three years.⁸

⁷ Diesel, Biodiesel, and Renewable Hydrocarbon Diesel Bulk Fuel Purchases,” http://www.documents.dgs.ca.gov/sam/SamPrint/new/sam_master/sam_master_file/chap3600/3627.pdf.

⁸ “UPS Makes Substantial Move to Renewable Fuels,” UPS Pressroom, <https://pressroom.ups.com/pressroom/ContentDetailsViewer.page?ConceptType=PressReleases&id=143811777421-236>.

Q: Is renewable diesel considered an alternative fuel?

A: Renewable diesel is considered an alternative fuel under the Energy Policy Act of 1992, as fuel “other than alcohol, derived from biological materials” (epact.energy.gov). It is eligible for Renewable Identification Numbers (RINs) based on feedstocks and production pathways approved under the federal Renewable Fuel Standard (RFS) (afdc.energy.gov/laws/RFS.html). Additionally, renewable diesel meets the U.S. Environmental Protection Agency’s greenhouse gas emission reduction requirements.

Q: Why consider using renewable diesel?

A: There are several benefits to using renewable diesel in transportation, including:

- **Engine and infrastructure compatibility**—Renewable diesel is nearly indistinguishable from its petroleum counterpart and meets the same ASTM D975 fuel quality specification. Therefore, compatibility issues are minimal with existing infrastructure and engines.
- **Flexibility and chemical properties**—In general, renewable diesel has a high cetane number (meaning it causes less ignition delay), low sulfur content, excellent stability, and zero aromatics—or zero hydrocarbons derived from petroleum. Producers, however, can change the fuel properties of renewable diesel based on market demand. This includes varying the cold flow properties during colder or warmer seasons, similar to what is done to conventional diesel products.

Q: How will I know it’s renewable diesel?

A: Renewable diesel is marketed under a variety of names, including NEXBTL, REG-9000/RHD, Biofene by Amyris, Green Diesel by Honeywell/UOP, and Diesel HPR. The Federal Trade Commission regulates retail fuel labeling and requires that any fuel with 6%–20% renewable diesel by volume be labeled with that range and any blends with more than 20% renewable diesel be labeled with the exact blend content. Producers generating RINs for RFS compliance have registered with the Environmental Protection Agency for both their feedstocks and pathways for renewable diesel production. The only reliable way to distinguish renewable diesel from its conventional counterpart is carbon dating by ASTM D6866 (astm.org/Standards/D6866.htm).

Q: What else should I keep in mind?

A: Major engine manufacturers typically approve fuels that meet ASTM D975, but they have not released warranty statements related to renewable diesel. Because it is considered an emerging fuel, the full effect of renewable diesel on the engine and fuel system is not yet known.

Renewable diesel is also currently expensive to produce. The fuel receives the same \$1 per gallon federal income tax credit given to biodiesel, however it is set to expire at the end of 2016. The National Advanced Biofuels Consortium (nabcprojects.org/), a U.S. Department of Energy-supported partnership of national laboratories, universities, and

corporations, is working to make renewable diesel and other renewable hydrocarbon biofuels technologies more cost-effective and sustainable.

Q: Where Can I Find Out More?

A: For more information about renewable diesel, see these resources:

- Alternative Fuels Data Center Hydrogenation-Derived Renewable Diesel page (afdc.energy.gov/fuels/emerging_green.html)
- Advanced Biofuels Association (advancedbiofuelsassociation.com/index.php)

UPS Delivers Big Results with Renewable Diesel

UPS, the world's largest package delivery service, is also one of the biggest users of renewable diesel in the United States. As a National Clean Fleets Partner (cleancities.energy.gov/fleets/ups), UPS has integrated a wide range of alternative fuels into its fleet, such as natural gas, propane, electricity, and biofuels. After a renewable diesel test was performed at the National Renewable Energy Laboratory (NREL) in April 2015, UPS announced its plans to purchase up to 46 million gallons of renewable diesel for use in its ground fleet operations over the subsequent three years.

To test the effects of renewable diesel on fuel economy and emissions, NREL conducted a series of chassis dynamometer tests of UPS vehicles. In preparation, NREL collected operations data from six UPS package vans and six UPS day cab tractors operating in the Houston area. NREL then used this data to design the chassis dynamometer testing cycles to be representative of UPS operations. For example, UPS package vans operated mainly in urban stop-and-go conditions, while the tractors operated in highway conditions. Using the designed testing cycles, NREL operated a UPS day cab tractor and package van on the chassis dynamometer with both conventional diesel and Solazyme⁹ algae oil-based renewable diesel. Tailpipe emissions and fuel consumption were precisely measured by laboratory equipment during all cycles.

NREL found that the algae oil-based renewable diesel used by UPS reduced tailpipe carbon dioxide emissions by 4.2% in both vehicle types and reduced nitrogen oxide (NOx) emissions by 4.1% in the package van. The NOx emissions that resulted from renewable diesel operation in the tractors were not significantly different from those of conventional diesel. Test cycles operating on renewable diesel produced slightly lower fuel economy compared to the conventional diesel test cycles, which can be attributed to the lower volumetric energy density of the test fuel. However, energy density in conventional diesel can also vary regionally and seasonally based on fuel blending and composition at local retailers.

UPS has since moved beyond the evaluation phase and used renewable diesel in its Texas and Louisiana fleets for more than a year. When renewable diesel efforts are combined with other alternative fuel investments, UPS anticipates displacing 12% of the fleet's on-road petroleum consumption. Additionally, UPS recently reached its goal of driving one billion miles in its alternative fuel and advanced technology fleet one year earlier than planned.¹⁰ Though the market for renewable diesel is still in the early stages, UPS is delivering good news to fleets interested in using the fuel!

9 As of March 2016, Solazyme discontinued its production of fuel and rebranded itself as TerraVia, a biotechnology company focused on healthy consumer products and algae-based foods.

10 "National Clean Fleets Partners Top Major Mileage Goals," *Clean Cities Blog*, August 17, 2016, <https://cleancities.energy.gov/blog/national-clean-fleets-partners-top-major-mileage-goals>.

Do you have any questions about alternative fuels, fuel economy measures, or advanced vehicles? The Clean Cities Technical Response Service (TRS) will help you find answers. For more information about the topics in this column or anything in the Clean Cities portfolio, email technicalresponse@icfi.com, or call 800-254-6735.



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