

What's Happening  
@ EERE

# Amped Up!

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U.S. DEPARTMENT OF  
**ENERGY** | Energy Efficiency &  
Renewable Energy

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**TRANSPORTATION**  
ISSUE

## A Message from Dave



Dear EERE Family,

Since President Obama took office, our dependence on foreign oil has dropped to an impressive 40-year low. Still, U.S. oil usage remains huge—representing one-fifth of the world’s total consumption—and we continue to import immense amounts of oil. In fact, we are still on track to spend about \$100 billion as a nation on imported oil this year alone. In addition, the U.S. transportation system continues to be a primary greenhouse gas emitter, contributing approximately one-third of the country’s carbon pollution.

The U.S. Department of Energy is hard at work on solutions to reduce our dependence on foreign oil, build a sustainable transportation system, and secure America’s energy future. At the Office of Energy Efficiency and Renewable Energy (EERE), we are leading the federal government’s efforts to innovate our way to a more sustainable American transportation future powered by dramatically more efficient vehicles that are fueled with

increasingly low-carbon and domestically-produced fuels.

And our strategic investments in sustainable transportation research, development, and demonstration projects are bearing fruit: we are improving the efficiency of gasoline and diesel powered vehicles, reducing the cost of plug-in electric and fuel cell vehicles, and dropping the production costs for low-carbon advanced biofuels and renewable hydrogen. Advanced vehicle technology achievements by EERE and its partners in leading American research institutions and private industry have cut the high-volume modeled cost of fuel cells by 50% since 2006 and helped spur the pioneering recent commercial introduction of fuel cell electric vehicles such as Toyota’s Mirai, which makes its commercial debut in California this fall.

Under the leadership of Deputy Assistant Secretary Reuben Sarkar, our Vehicle Technologies and Bioenergy Technologies Offices have launched an exciting new effort together—the Optima Initiative—focused on co-optimizing engines AND fuels together to simultaneously enable dramatic improvements in combustion efficiency and accelerated introduction of low-carbon liquid fuels.

One more vital part of our sustainable transportation work involves the EV Everywhere Grand Challenge to increase the number of PEVs on U.S. roads and bolster U.S. manufacturing leadership in electrified vehicles. EV Everywhere has the goal of making electric vehicle ownership just as affordable for the average American as a typical gas-powered vehicle by 2022. We are excited to welcome to EERE the first director of our EV Everywhere program, Bob Graham, who comes to EERE from senior EV leadership roles at both at the Electric Power Research Institute (EPRI) and Southern California Edison, one of the most forward leaning utilities in the EV area. I would also like to welcome David Friedman, who joined EERE as our new Principal Deputy Assistant Secretary in July. David most recently served as Deputy Administrator of the National Highway Traffic Safety Administration and has been an influential sustainable transportation and clean energy expert for more than two decades. He replaces Mike Carr, who left the post in July following 16 years of exceptional government service at the Energy and Interior Departments and on Capitol Hill. I would like to thank Mike for his many contributions to EERE successes in transportation and across the whole EERE portfolio.

In this issue, you will read about EERE’s vision and its many exciting activities for advancing sustainable transportation. I am excited by our progress, and I know you will be too. These accomplishments are only possible because of YOU: the people behind these innovations, programs, and partnerships.

Enjoy the read!

*Dave*

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## New Partnership Accelerates Electric Vehicle Use

Energy Secretary Ernest Moniz recently signed an agreement between the U.S. Department of Energy and Edison Electric Institute (EEI)—the largest association of utilities in the nation—in an effort to accelerate the use of plug-in electric vehicles (PEVs). Known as the [EV Everywhere Utility Partnership](#), this memorandum of understanding (MOU) builds off existing initiatives to advance PEV development and further advances the President’s goal to make PEVs competitive with gasoline-powered cars within a decade.

This collaboration reinforces efforts to increase the use of PEVs already underway in the Office of Energy Efficiency and Renewable Energy (EERE). The [EV Everywhere Grand Challenge](#) and [EV Everywhere Workplace Charging Challenge](#), along with EEI’s new [Employee PEV Engagement Initiative](#), will all work together to increase the economic, environmental, and national security benefits of electric transportation. In addition to promoting PEVs, the MOU will facilitate public education on PEV technology as well as analysis at our national laboratories on next-generation electric transportation. Finally, the agreement creates opportunities for utilities to engage with the Energy Department’s [Grid Modernization Laboratory Consortium](#) to better understand how electric vehicles impact the electric grid – a major priority of EERE Assistant Secretary Dr. David Danielson.

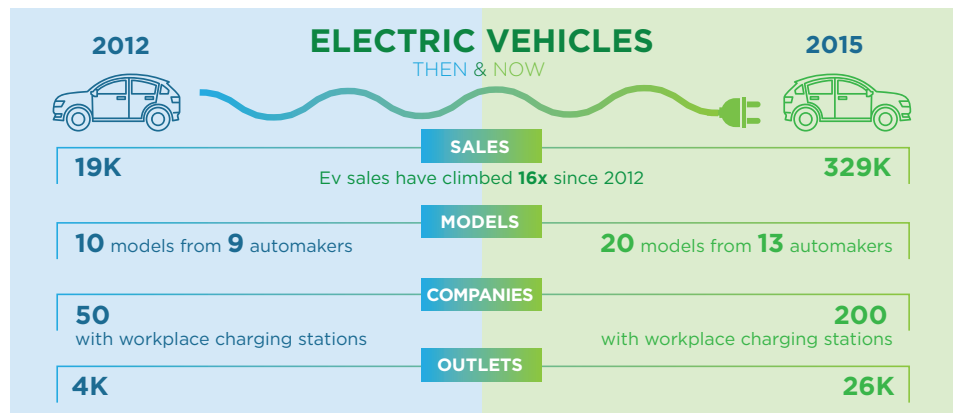
“The U.S. transportation system produces a third of the country’s carbon emissions, making it essential that we improve plug-in electric vehicle technology and increase their numbers on the road,” said Secretary Moniz. “The partnership also strengthens American innovation by fostering the collaboration needed to remain at the forefront of advanced vehicle technologies that reduce our emissions and provide safe, reliable transport for the American people.”



Tom Kuhn, President of EEI, and Secretary Moniz at the MOU signing on Monday, June 8 at Edison Electric Institute (EEI) Annual Convention in New Orleans, LA. Source: EEI

EEI’s collaboration with the Energy Department builds on its recent [fleet electrification initiative](#). Launched last year, this effort includes a commitment by EEI and its partnering member companies to invest at least 5% of its annual fleet budgets in plug-in vehicles and technologies.

The EV Everywhere Utility Partnership has the potential to influence millions of consumers. EEI represents all U.S. investor-owned electric companies, which provide electricity to more than 220 million Americans in all 50 states and the District of Columbia.



The industry has seen substantial growth since the creation of the EV Everywhere initiative at the Energy Department in 2012.

## Bob Graham Leads EV Everywhere Efforts

**A**s the first director of the U.S. Department of Energy's EV Everywhere effort, Bob Graham will steer education and outreach activities toward bold national transportation electrification goals, bringing to the table both his leadership and a drive to make a difference.

Graham traded retirement on the West Coast for the opportunity to promote initiatives supporting the use of plug-in electric vehicles (PEVs), including President Obama's 10-year vision for the United States to produce PEVs that are as affordable as a 2012 gasoline-powered vehicle. Reaching this goal will require collaboration between the private sector, government, national laboratories, universities, and consumers. That kind of leverage requires experienced hands at the wheel.

Graham has championed the expansion of PEVs, helping shape education, engagement, and policy in the marketplace through management roles at the Electric Power Research Institute and Southern California Edison. He has also promoted PEVs as a consultant and supported advanced vehicle technologies at the Federal Transit Administration. A two-time recipient of the Electric Power Research Institute's prestigious Chauncey Award, he was also named one of the top 50 most influential people in public transit in the last 100 years by Metro Magazine in 2004.

Graham is inspired by the commitment of his colleagues and the challenge to further the nation's vehicle electrification agenda. "There's a need and genuine interest in this department to make it happen. Everyone is focused and dedicated. So if I can help, then I think it's all good."

Graham sat down with the Amped Up team to discuss his vision for the program, the MOU with Edison Electric, and the current state of plug-in electric vehicles.

### What is your emphasis as the new director of EV Everywhere?

What you have to have is a paradigm shift. Education and outreach are really the main drivers that are still missing. We're going to try and provide our information and links to the other information that's out there and establish EV Everywhere as the go-to source for that level of analysis. With that, the public will get an unbiased look at what the market is so that they can look at the data and make the best decision that meets their needs.

### What type of information will you be focusing on?

We are going to focus on current real-world operating parameters so consumers can judge how that compares with their own needs. We also have to delve a little deeper in terms of finding the economic value of electrification and some of the key

investments in terms of infrastructure. How much do you need to make a wise investment? That's so cities can make a decision, workplaces can make a decision and you can make a decision at home.

### How does this MOU with EEI impact the sustainable transportation industry?

Eighty-five percent of the country is covered in this MOU. (EEI represents all U.S. investor-owned electric companies, which provide electricity to more than 220 million Americans in all 50 states and the District of Columbia.) The goal is to get utilities to be proactive in leading the

electrification of transportation. We want to use EEI salespeople as a conduit to a broader spectrum of customers. All commercial and industrial customers are theirs. If we can use them to reach out versus us trying to reach out, I think it will be helpful.

### Is there an area in the market place where electric plug-ins can improve?

There's a void in the marketplace for some products such as pickup trucks, minivans and large sports utility vehicles (SUVs) in terms of battery plug-in or hybrid technology. We want to expand our viewpoint beyond light duty vehicles and understand what needs to be done in that market that is not being done today. It's only a matter of time before they begin to migrate because the next generation Chevy Volt will have a higher energy density battery out of a smaller package at a lower cost. This same battery can be expanded to support an SUV when they are ready to do that.



## New State Policies Promote Adoption of Electric Vehicles

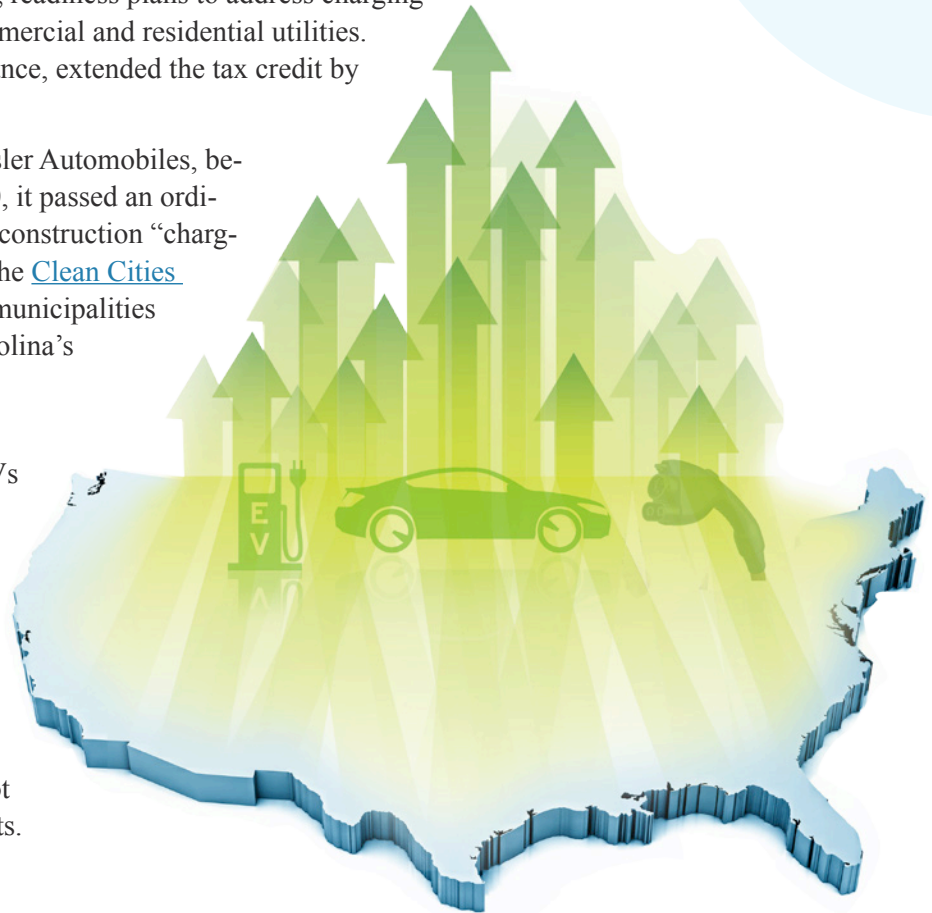
As more auto makers come out with plug-in electric vehicles (PEVs) and consumer interest increases, states and cities across the nation are creating new policies to encourage use of these vehicles. These policies have proven to be a powerful force for PEV adoption.

Some states are developing tax incentive programs for PEV buyers as others extend them. State and local governments are also developing readiness plans to address charging stations, costs, and policy changes for both commercial and residential utilities. One of the policy changes in Colorado, for instance, extended the tax credit by seven years, so that it now expires in 2021.

Auburn Hills, Michigan, the home of Fiat Chrysler Automobiles, became a frontrunner for the use of PEVs. In 2010, it passed an ordinance to encourage developers to make all new construction “charging ready.” The city has also collaborated with the [Clean Cities](#) coalition in Ann Arbor, Michigan to help other municipalities develop similar policies. Meanwhile, North Carolina’s Department of Transportation plans to construct charging stations at highway rest stops.

Other popular ways to promote adoption of PEVs include registration fee reductions and electric charging infrastructure tax credits. At least 20 states have considered legislation in 2015 to encourage the purchase and increased use of hybrids and PEVs, according to the National Council of State Legislatures.

Many places have even created parking spaces near charging stations just for PEVs. It’s best not to park your gasoline-powered ride in those spots. Fines can be hefty: in Arizona it’s \$350!



### TWENTY THOUSAND AND COUNTING

The U.S. Department of Energy’s [Alternative Fueling Station Locator tool](#) recently hit a milestone of more than [20,000 locations nationwide](#). The locator, which is part of the [Alternative Fuels Data Center](#), provides comprehensive and up-to-date information on fueling stations for biodiesel, compressed natural gas, electricity, E85, hydrogen, liquefied natural gas, and propane. It offers drivers several ways to search for and sort information by location or by vehicle technology.

The Station Locator is also available as a [mobile website](#) and [iPhone app](#).



Employees at the National Renewable Energy Laboratory can plug their vehicles into one of 36 charging stations provided in the parking garage. Source: NREL

# The Next Big Thing: Optima Initiative Fuels Combustion Engine Efficiency

With a growing push for clean, reliable transportation, Americans in the 21st century face the complex challenge of balancing a commitment to low-carbon emissions with performance and cost efficiencies. In tandem with our emphasis on electrification, the Energy Department is improving on current technologies to provide a balanced portfolio in sustainable transportation. Researchers over the last decade have identified new combustion strategies that—especially when optimized to run on new fuels—could achieve significantly higher efficiencies and greenhouse gas (GHG) reductions than current engines. Collaboration between industry stakeholders and our national laboratories has created the *Co-Optimization of Fuels and Engines (Optima)* initiative to introduce disruptive innovations both in new biofuels and engine performance improvements.



New fuels are under development at our national laboratories. Source: NREL

Building on more than a decade of ground-breaking research in powertrain technology, Optima’s phased approach will co-optimize low-carbon fuel blends with engine design to maximize performance at a lower price point and environmental impact.

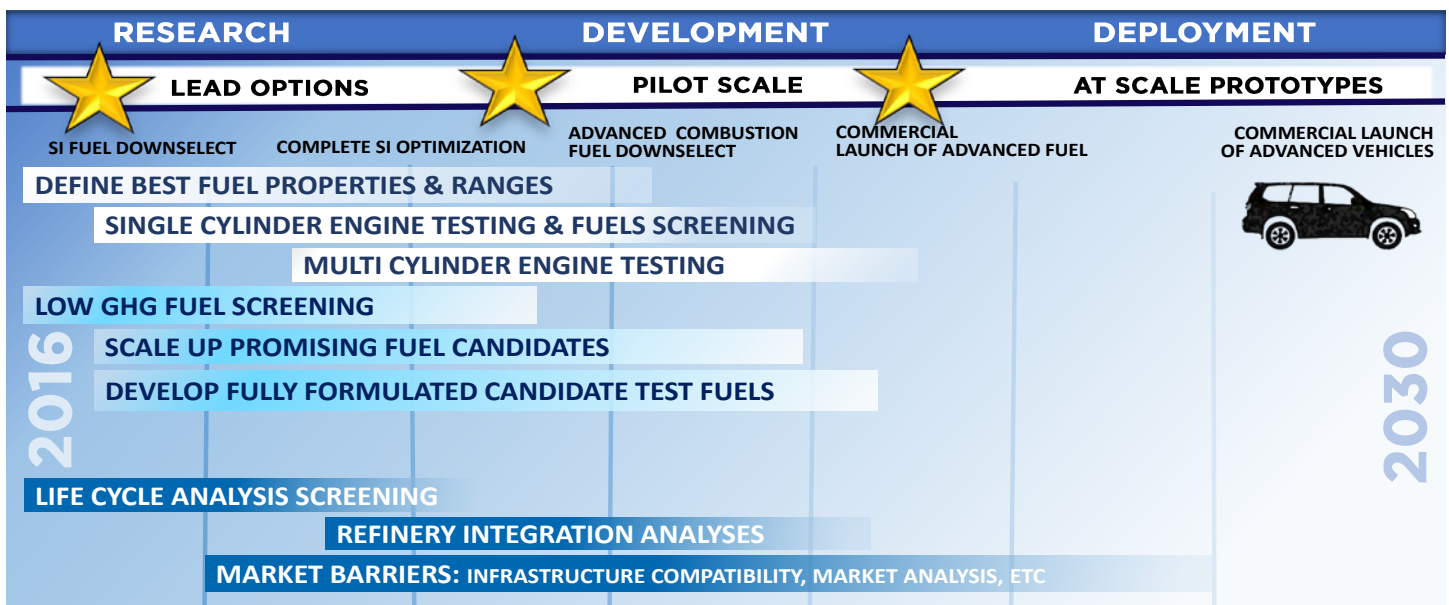
Optima has two goals: to bring new engines and fuels to market within a decade and to demonstrate new combustion technologies by 2030 with the potential for a 30% reduction in petroleum consumption nationwide. Optima brings the leverage necessary to create a commercial pathway to economical, sustainable, and scalable engines and fuels more

quickly than what would otherwise occur through conventional timelines. Once introduced, these break-through technologies will pave the way to an even greater pay-off as new vehicles penetrate the marketplace in subsequent years.

## NATIONAL LABS EYE CO-OPTIMIZED SOLUTIONS

Modern cars and trucks on the road today provide much higher fuel economy than earlier models. While improvements continue, an even greater impact on GHG emissions could be realized by tapping into sustainable biomass. Experts predict that the quantities of biomass available today could generate more than 20 billion gallons of advanced biofuel annually, to be blended with petroleum fuels.

Until now, biofuels research has not been fully integrated with combustion technologies. The EERE Optima initiative leverages the expertise of the Vehicle and Bioenergy technology offices to pursue innovative research partnerships with 10 national laboratories. The Energy Department has awarded \$32 million of initial funding in FY 16 to the National Renewable Energy Laboratory, Argonne, Idaho, Lawrence Berkeley, Lawrence Livermore, Los Alamos, Oak Ridge, Pacific Northwest, and Sandia National Laboratories.



As part of the Administration’s all-of-the-above energy strategy, the Energy Department’s transportation portfolio supports the advancement of electric vehicles, as well as new fuels and combustion technologies.

### **How/when did Optima get its start?**

When I first joined the Energy Department, we went to the automotive industry—the Big Three and others—and asked them how well aligned our portfolio was with automotive manufacturing. By and large, they thought everything in our portfolio was a good fit. There was just one thing missing: co-optimizing fuels and engines. About the same time, the Energy Department’s Big Idea Summit brought together our national labs on the importance of fuel economy gains from co-optimizing fuels and engines. First industry and now the labs were calling it out as a priority, and through those discussions, Optima got its start in early 2014.

### **How does Optima stack up against the balance of initiatives in the Energy Department’s Transportation portfolio?**

The goal of the Optima project is to get a new fuel on the market by 2025. By bringing together a set of portfolio activities, rather than creating a separate initiative, Optima adds value to what we’re already doing in biofuels, engines, and conventional fuels. Funding is split roughly 50/50 between the Bioenergy and Vehicle Technologies Offices. Optima constitutes a multi-year effort with substantial impact—a 9–14% GHG emission reduction across the nation’s fleet and then a 30% petroleum displacement nationwide.

### **In what timeframe do you expect Optima to bring real change to powertrain technologies?**

By 2018, we expect to know the direction we’ll be heading and the technical pathways to reach our goals. Ultimately, if we’re targeting new engines and new fuels by the year 2025, we need to have solutions in place five or more years ahead of that to get it to market. We also expect to see advanced combustion regimes built on top of that by the year 2030.

### **How does the technology differ from conventional engines?**

Optima is focused on liquid fuels and internal combustion. We want to get to electrification, and we think that will happen in the long run, but in the meantime, our efforts are aimed at optimizing these powertrains. The first phase of our program is to look at conventional spark ignitions for light-duty passenger cars and optimize fuels for those engines. The second phase will focus on what we call kinetically controlled combustion that takes the performance of an engine even higher than what you can get from conventional technologies.

Co-optimizing new fuel blends with high-performance engines is an attractive proposition to the auto industry. Because of the anticipated mass penetration of this new technology, auto makers are willing to invest the capital to retool their plants for high-performance engines.



*Deputy Assistant Secretary for Transportation Reuben Sarkar pauses to answer a few questions on the cross-cutting research that could ultimately take gasoline-powered vehicles to the next level.*

## EERE Plays Pivotal Role in FCEV Commercialization

Strategic research investments by EERE have sped innovations that are vital to the deployment of fuel cell electric vehicles (FCEVs) set for sale in the U.S. commercial market for the first time this fall.

Toyota’s Mirai (now available for lease and soon to be for sale) and Hyundai’s Tucson Fuel Cell sport utility vehicle (currently available for lease in California) were on display at the U.S. Department of Energy’s Sustainable Transportation Day on June 22 in Washington, D.C. Honda, General Motors, Daimler, Ford, Nissan, BMW, Volkswagen, and other manufacturers are also pursuing FCEVs.

Activities funded by EERE spanning a wide array of research, development, and demonstration projects have led to important advances in FCEV technologies, while hastening the development of hydrogen production, delivery, and storage systems needed to grow hydrogen fueling infrastructure.

EERE-funded research has helped cut the cost of fuel cells by 50% since 2006 and resulted in more than 500 patents, more than 40 commercial products, and an additional 65 products projected to be commercial in the next three to five years, said Dr. Sunita Satyapal, director of the Fuel Cell Technologies Office.

In addition, efforts managed by EERE have led to the demonstration of more than 215 FCEVs, 30 fueling stations and the world’s first [tri-generation](#) station—a combined heat and power system that produces hydrogen in addition to heat and electricity. FCEVs can typically cover up to 300 miles on one tank of hydrogen and refuel in less than five minutes. These vehicles hold vast promise as an affordable and safe transportation option that supports a sustainable, clean energy

future. View Energy [101 Fuel Cell Technology](#) video.

Active project management in the fuel cell arena has generated savings of \$3 million in program funds in 2014 and more than \$35 million in program funds over the last five years. Further achievements by strategic EERE investments have more than doubled the number of commercial products entering the market since 2007. These products include tube trailers, fuel cell systems, catalysts, and electrolyzers.

### The Fuel Cell Electric Vehicle (FCEV)

FCEVs are available now in southern California and coming soon to a neighborhood near you.

#### Hydrogen FCEV System

*FCEVs generate electricity via the chemical reaction of combining hydrogen and oxygen into water.*

#### Reduces Greenhouse Gas Emissions

Gasoline

50%  
H<sub>2</sub> from natural gas

90%  
H<sub>2</sub> from Wind

#### Refuels Rapidly

taking only a few minutes and using familiar technology

#### Can travel 300 Miles

between refills

#### Emits Only Water

from the tailpipe

#### Uses Domestic Fuel

- natural gas
- biomass
- water (electrolysis)
- waste products

#### Operates Efficiently

internal combustion: 20-30%

FCEV: 60%

Efficiency

#### Runs Quietly

even at highway speeds, since there are no mechanical gears or combustion

#### Hydrogen Fuel Cell

#### Scales Up Easily

as fuel cells can be added to the stack to increase power

Energy Efficiency & Renewable Energy  
 FUEL CELL TECHNOLOGIES OFFICE



## H2USA HELPS MAKE FCEVs A REALITY

**H**2USA is a public-private partnership formed by the Energy Department and stakeholders in 2013 to address hurdles to expanding the nation's hydrogen fueling infrastructure, which holds the key to the large-scale adoption of fuel cell electric vehicles (FCEV). The partnership now has more than 40 members, including auto makers, associations, fuel cell suppliers, materials and component manufacturers, energy companies, national laboratories, and private and public sector organizations.

There are currently 10 hydrogen stations covering regions in Northern California near San Francisco and Southern California near Los Angeles. California expects to have more than 50 hydrogen stations open in 2016, halfway to its goal of 100 stations by 2020. Plans are also underway for stations in Hawaii and the Northeast region, with other markets expected to develop as consumer demand increases.

The Energy Department also has taken steps to leverage capabilities of the national laboratories to speed deployment of hydrogen refueling stations with creation of the Hydrogen Fueling Infrastructure Research and Station Technology (H2FIRST) project. H2FIRST's technical goal is to develop and apply physical testing, numerical simulation, and technology validation to help create low-cost, high-performance materials, components and station architectures. It will also collect and distribute data supporting industry's efforts to reduce the costs of integrated fueling systems and networks.

Jointly led by the National Renewable Energy Laboratory and Sandia National Laboratory, the H2FIRST project directly supports the H2USA partnership. In April, the [Energy Department announced](#) the release of new analysis tools and reports—the [Reference Station Design Report](#) and the [Hydrogen Contamination Detection Report](#)—to help address technical and financial barriers to hydrogen fueling infrastructure deployment.



Opel HydroGen 4 Fuel Cell Electric SUV from Germany at the Michelin Challenge Bibendum in Berlin, Germany. Source: NREL/Keith Wipke



The first hydrogen fueling station in America, supplied directly from an active industrial hydrogen pipeline, provides hydrogen for demonstration fuel cell vehicle fleets in the Los Angeles area. The station is a collaborative effort among the Energy Department, Toyota, Air Products, Shell, and South Coast Air Quality Management District (SCAQMD). Source: NREL/Michael Penev



# SUSTAINABLE TRANSPORTATION DAY

Driving innovation, the U.S. Department of Energy hosted Sustainable Transportation Day 2015 on June 22. The Bioenergy, Fuel Cell, and Vehicle Technologies Offices showcased EERE's strategic investments in sustainable transportation technologies that are improving efficiency and advancing the use of alternative fuel vehicles.



Images, from top left: visitors take to the road at the Green Car Racing exhibit; a power take off device in the Toyota Mirai; the Chevy Volt PEV; opening remarks by Deputy Assistant Secretary for Transportation Reuben Sarkar; inspecting the Hyundai Tucson; the Shelby Cobra, constructed from 3D printing; Dave Howell, acting director of the Vehicle Technologies Office, joining Jonathan Male, director of the Bioenergy office, Sarkar, and Sunita Satyapal, director of the Fuel Cell office.

## SUSTAINABLE CARS GALLERY

Learn more about the specifications of each display vehicle by clicking the photo galleries below.



CHEVY VOLT



TOYOTA MIRAI



SUPERTRUCK



HYUNDAI TUCSON

## Ohio State Repeats at EcoCAR Competition

The U.S. Department of Energy and General Motors Co. (GM) announced The Ohio State University as the overall winning team for Year One of the EcoCAR 3 competition on June 4 in Seattle, Washington. This is the second victory for Ohio State in two years, topping 15 other North American universities.

EcoCAR 3 is a four-year collegiate engineering program that gives students the chance to redesign the 2016 Chevrolet Camaro to reduce its environmental impact and maintain its “muscle car” performance.

Ohio State demonstrated a highly mature software development process to earn the \$10,000 Year One prize. The team earned a total of 937 points out of 1,000



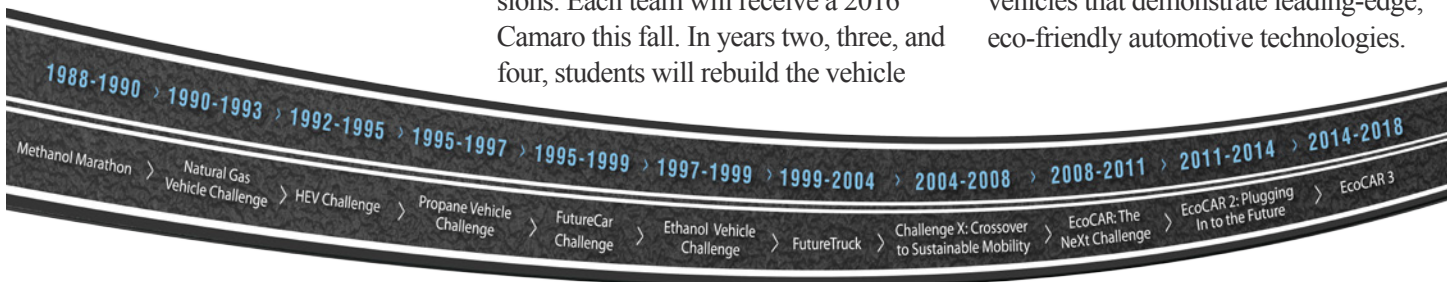
The Ohio State team won the EcoCAR3 Year 1 competition. Source: Advanced Vehicle Technology Competition Series

and also took first place in the Communications and Project Management categories.

The first year of EcoCAR 3 emphasized the use of math-based design tools and simulation techniques for designing vehicle architecture that reduces energy consumption and greenhouse gas emissions. Each team will receive a 2016 Camaro this fall. In years two, three, and four, students will rebuild the vehicle

based on their new architecture and continue to refine, test and improve the vehicle’s operation.

EcoCAR 3 builds on the successful 26-year history of Energy Department advanced vehicle technology competitions (AVTC) and gives engineering students the chance to design and build advanced vehicles that demonstrate leading-edge, eco-friendly automotive technologies.



## ADVANCED VEHICLE TECHNOLOGY COMPETITION HISTORY

In 1986, Phil Patterson, a data analyst for the Vehicle Technologies Office, made a proposal that was funded by EERE to start a program that challenged university students to design vehicles to run on alternative fuels. In collaboration with the Society of Automotive Engineers, Argonne National Laboratory, and the U.S. Department of Energy, the first Advanced Vehicle Technology Competition (AVTC) was born two years later.

Since then, more than 16,500 students and 93 universities in North America have participated in 11 AVTC competitions.



Click above to watch the history of the Advanced Vehicle Technology Competitions

## EERE Leads Charge on Solar Access to Low Income Communities

The National Community Solar Partnership unveiled by the White House in July hands EERE a leading role in a new national effort to speed solar energy access to low- and moderate-income communities across the nation.

The partnership, part of a sweeping initiative announced by the Obama administration on July 7, will bolster efforts in the public and private sector to expand access to community and shared solar for low- and moderate-income communities, tapping the technical expertise of the U.S. Department of Energy and its national laboratories.

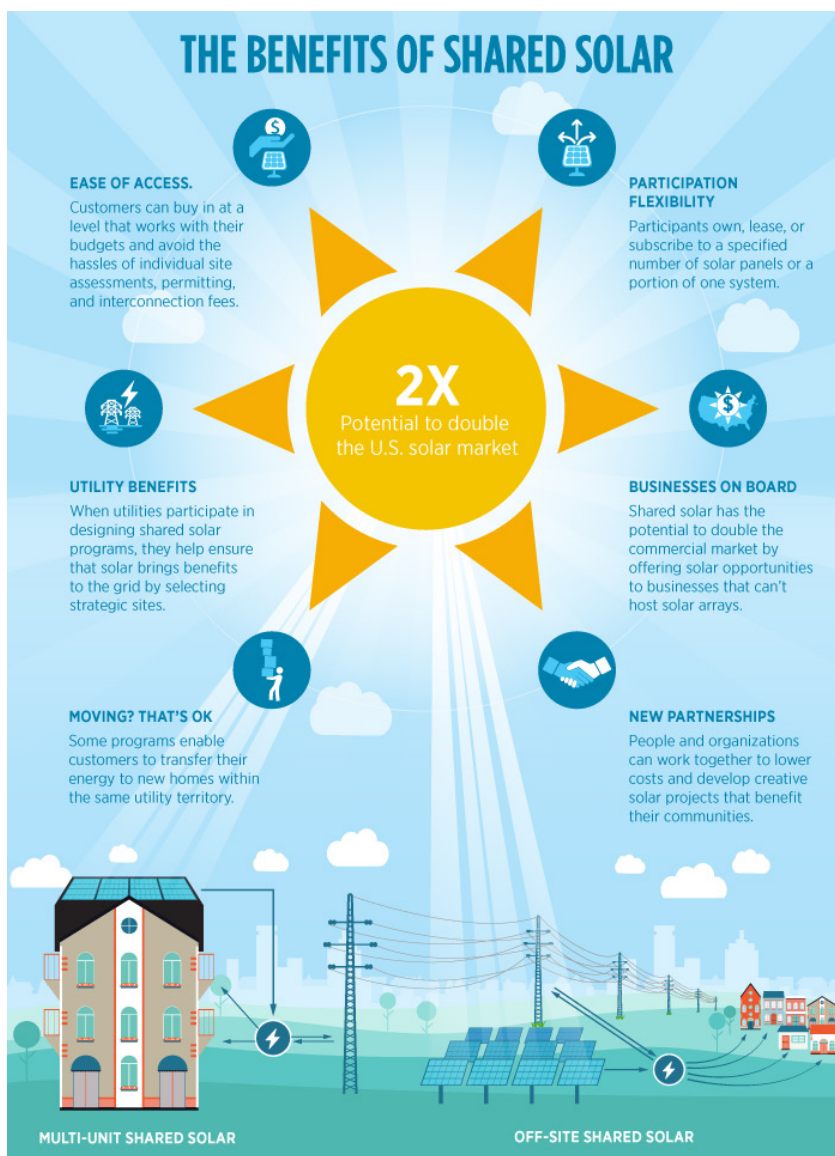
Through the SunShot Initiative, EERE already supports efforts by private companies, universities, and national laboratories to drive down the cost of solar electricity. The new solar partnership and executive actions launched by the White House last month aim to unlock access to consumers and businesses that have been unable to reap the benefits of solar energy for a variety of reasons. These consumers and businesses are often renters and lack the startup capital to invest in solar or a good site to install solar energy.

The National Community Solar Partnership's work will complement the National Renewable Energy Laboratory's (NREL's) Guide to Community Shared Solar, which provides a framework for the development of this model for solar deployment in communities. Besides helping individuals and businesses in underserved communities, strategically located shared solar arrays can help cities boost local economic development and help utilities by providing electric

grid benefits, such as responding to and meeting increased demand.

Nearly 50% of consumers and businesses are unable to host photovoltaic (PV) systems, according to a [recent report](#) from the Energy Department and NREL. By opening the market to these customers, community and shared solar could represent 32%–49% of the distributed PV market in 2020, thereby leading to growing cumulative PV deployment growth by 2020 of 5.5–11.0 GW, and representing \$8.2–\$16.3 billion of cumulative investment.

Community and shared solar could eliminate many of the barriers to going solar that currently exist for low- and moderate-income customers. These households incur electricity costs that make up a larger fraction of their monthly budgets compared with more affluent households. They also tend to have less suitable roof space and lower credit ratings, reducing their ability to install rooftop energy systems. With access to onsite or offsite arrays, these households could enjoy the benefits of solar without owning a solar installation themselves.



Source: Argonne National Laboratory

## SunShot's Solar Ready Vets Includes First Female Graduates

It's never too late to start over.

After serving honorably in the U.S. Army for almost five years, Sergeant Rozie Amenya was in search of a new career path. And at the age of 36, her timing was perfect as the Solar Ready Vets program was just starting up.

Amenya's new plan and career focus is renewable energy. She, along with 23 other transitioning service members and veterans, recently completed the Solar Ready Vets program at the Fort Carson Army Base in Colorado. They make up the second Fort Carson cohort in the [SunShot Initiative's training program](#)—the first to include female graduates.

"I heard about it through the community emails Fort Carson sent around," remembers Amenya. "They were blasting it around for a week, and I figured since this thing is following me around, I better sign up."

Amenya, who moved to the states from Kenya at the age of 17, took the six-week training course from Solar Energy International—a partner in SunShot's

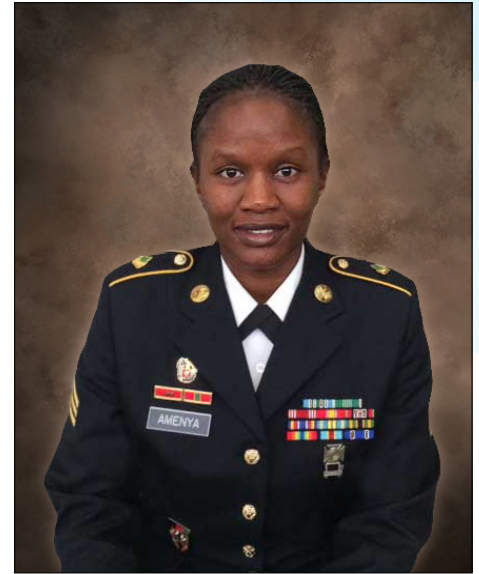
[Solar Instructor Training Network](#). She learned various skills in the solar industry, ranging from the basics of electricity to the fundamentals of grid-tied photovoltaic design and installation.

"This course really opened my eyes about renewable energy," said Amenya. "The instructors were outstanding. They really made sure that people who have never done any of this stuff left with enough knowledge to go out and be successful."

The U.S. solar industry is expected to become an important source of well-paid, highly skilled jobs for veterans like Amenya. According to the Solar Energy Technologies Office, the industry has seen steady and rising employment, up nearly 86% since November 2010. In 2014, employment rose nearly 22% and created [one out of 78 new jobs in the United States](#). Current projections suggest solar could add as many as 36,000 new jobs in the next year.

To tap into this market, Amenya and her colleagues interviewed on the final day of the program with SolarCity, Vivint Solar, SunRun, and SunEdison—some of the largest companies in the solar industry.

"Just going into those interviews, you felt more confident," said Amenya. "You have more informed answers because you actually know about the industry."



*Rozie Amenya has new career opportunities because of Energy Department training for veterans.*

Amenya, who worked for IBM and PricewaterhouseCoopers before joining the Army in 2011, has already heard back from three of the solar companies she interviewed with. She is focusing on project management and is currently taking courses to round out the experience she gained from the Solar Ready Vets program.

[SunShot](#) has helped train a total of 67 service members through Solar Ready Vets. The U.S. Department of Energy and Department of Defense plan to expand the program from four to 10 military bases.



*Transitioning service members and vets learn how to install solar panels at the Fort Carson Army Base in Colorado.  
Source: Solar Energy International*

# CHANGING OF THE GUARD

## Friedman Named New Principal Deputy Assistant Secretary

David Friedman joined EERE as the new Principal Deputy Assistant Secretary (PDAS) on July 20. He replaces Mike Carr, who stepped down last month after more than 16 years of service with the U.S. Department of Energy and federal government.

An influential expert in sustainable transportation and clean energy technologies for more than two decades, Friedman most recently served as Deputy Administrator of the National Highway Traffic Safety Administration. Prior to joining the Obama administration, he worked 12 years at the Union of Concerned Scientists in different capacities including senior engineer, research director, and deputy director of its clean vehicles program. In 2007, Friedman’s efforts on fuel economy led to the first legislative increase in Corporate Average Fuel Efficiency standards since its creation in 1975.

“David’s management skill will help build a more efficient and effective EERE,” said Assistant Secretary Dr. David Danielson. “His regulatory experience will bring fresh insights, and his policy and deployment experience will offer us the opportunity to be increasingly influential in these areas.”



David Friedman steps up as new Principal Deputy Assistant Secretary.



## Appreciation for PDAS Carr

EERE would like to thank Mike Carr for his outstanding service to the U.S. Department of Energy and federal government. Carr, who recently joined the private sector, was a devoted champion of EERE technologies and an outspoken advocate of its role in climate change mitigation efforts. His influence is evident on several White House clean energy initiatives in the Climate Action Plan, and his input and guidance have shaped many of the most promising investments EERE is making today.

Mike Carr moves on after outstanding work in EERE.



## SunShot Catalyst Prize and Demo Day

The SunShot Initiative hosted Catalyst Demo Day on May 14 in San Francisco, California, for the first round of its Catalyst prize competition, where 17 companies competed for \$500,000 in cash prizes. After all the finalists demonstrated their innovations, the panel of judges selected five winners: Gridmates, PVComplete, Savenia Solar Ratings, Solar Site Design, and UtilityAPI. Each of the five teams won \$30,000. [Click here to read more about the winners and their innovations](#) and [here to watch them pitch to the panel of judges](#).

Source: NREL

# SPLASH DOWN

## *Azura Launches First Wave Energy Device to Connect to U.S. Grid*

Azura, the nation's first grid-connected [wave energy converter](#), started feeding renewable electricity to Marine Corps Base Hawaii in June, following its launch at the U.S. Navy's Wave Energy Test Site, a 30-meter berth at Kaneohe Bay, Oahu. The achievement secures a major milestone for the emerging [marine and hydrokinetic \(MHK\) energy industry](#). Through U.S. Department of Energy investments, MHK technologies are harnessing energy from the nation's oceans and rivers with the potential to power millions of American homes.

Azura was designed by project partner Northwest Energy Innovations (NWEI) to maximize energy capture in a challenging ocean environment. The device converts energy from both the vertical heave and the forward surge of the wave. The test site will operate for 12 months in the open sea, where researchers will monitor and evaluate the long-term performance of the device. Independent third-party testing by the University of Hawaii will follow.

NWEI refined Azura based on a prototype it deployed in 2012 off the Oregon coast at the Northwest National Marine Renewable Energy Center. The pilot demonstration secured valuable performance data that could lower the cost of wave energy technologies in the future. Funding for both projects stemmed from collaboration between the Energy Department and the Navy.

In the next phase, NWEI will modify Azura with efficiency improvements through lessons learned in Hawaii. With [\\$5 million in additional funding](#), the company plans to test the newer design at even deeper berths of 60 to 80 meters over the next several years, to build a competitive MHK industry in the United States.

Watch our [Energy 101: Marine and Hydrokinetic Energy video](#), and learn more about the Energy Department's efforts to support [MHK research and development](#).



## Lab Impact Initiative Announces Lead Lab Selections

The U.S. Department of Energy recently announced the lead national laboratories that will participate in the [Small Business Voucher \(SBV\) Pilot](#). The competitive selections were released in July during the [Clean Energy Manufacturing Initiative's](#) (CEMI) Southeast Regional Summit in Atlanta, Georgia.



*Through the Small Business Vouchers Pilot, small businesses will be able to access tools and resources like the visualization lab at NREL's Energy Systems Integration Facility (ESIF). Source: Dennis Schroeder- NREL*

The SBV Pilot is part of EERE's [Lab Impact Initiative](#) and helps small businesses bring next generation clean energy technologies to the market faster by teaming with the Energy Department's national laboratories. The labs leading the \$20 million pilot are:

- [Oak Ridge National Laboratory](#)
- [National Renewable Energy Laboratory](#)
- [Lawrence Berkeley National Laboratory](#)
- [Sandia National Laboratories](#)
- [Pacific Northwest National Laboratory](#)

Later this summer, the chosen labs will utilize this federal funding to provide vouchers to more than 100 small businesses. These companies will gain access to world-class facilities, tools, and expertise at the national labs to develop clean energy technologies in sustainable transportation, renewable power, and energy efficiency.

## WHAT'S NEXT?

The **Small Business Central Assistance Platform**, a web-based communication tool, is expected to launch this August. It will be used to market the labs' core capabilities and accept applications from small businesses interested in participating in the SBV Pilot. Three cycles of competitions will be offered to businesses in 2015 and 2016. Vouchers will range from \$50,000 to \$300,000 per business and can be used to initiate collaborative research projects or to access technical assistance from the labs.

Small business leaders interested in pursuing a voucher may reach participating labs through the Lab Impact Initiative: [EERElabImpact@ee.doe.gov](mailto:EERElabImpact@ee.doe.gov).

## IACMI Officially Kicks Off in Knoxville

The Institute for Advanced Composites Manufacturing Innovation (IACMI), a consortium of 122 leading U.S. manufacturers, universities, and non-profits collaborating with the government to bolster U.S. leadership in clean-energy manufacturing, [officially launched](#) this June in Knoxville, Tennessee. The institute aims to lower

the overall manufacturing costs of advanced composites by 50%, advancing the President's vision for the National Network for Manufacturing Innovation.

The partners were selected through a competitive process led by the Advanced Manufacturing Office. IACMI includes founding research partners in Tennessee (University of Tennessee and Oak Ridge National Laboratory), Colorado (National Renewable

Energy Laboratory), Indiana (Purdue University, [which recently broke ground on a related materials research facility](#)), Michigan (Michigan State University), Ohio (University of Dayton Research Institute) and Kentucky (University of Kentucky).

[Watch the video on Advanced Manufacturing: Using Composites for Clean Energy.](#)



## Next Generation Technology to Unlock Wind Power Nationwide

Production of larger and more efficient wind turbines will pave the way for wind power to generate electricity across all 50 states, specifically in regions with characteristically low wind speeds, such as the Southeast.

The regions with the greatest potential for new wind energy development represent roughly one-fifth of the United States. These areas include large portions of the Southeast and Appalachia and areas west of the Rocky Mountains, according to a recent U.S. Department of Energy report, [Enabling Wind Power Nationwide](#).

Prepared by EERE's Wind and Water Power Technologies Office, *Enabling Wind Power Nationwide* builds on the comprehensive [Wind Vision Report](#) released in March, which quantified the economic, social, and environmental benefits of a robust wind energy future.

Wind generation in the United States has more than tripled in six years, exceeding 4.9% of the nation's end-use electrical demand. Advanced turbine concepts and hub heights of 110 meters will increase the technical potential for wind deployment to 4.3 million square kilometers, a 54% increase compared to current technology, the report says. By pursuing hub heights of 140 meters, growth has the potential to swell to 4.6 million square kilometers, yielding a 67% increase compared to current technology.

Next-generation technology featuring wind turbine towers of 110-140 meters and larger rotors can more efficiently capture the stronger and more consistent wind resources typically found at greater heights above ground level, compared with the average 80-meter wind turbine towers installed in 39 states in 2014.

Production of larger, more efficient wind turbines will enable the nation to deploy economical wind power solutions as a critical national resource, while offering reductions in both water consumption and greenhouse gas emissions to communities and regions with currently-untapped wind resources.

Increasing the amount of land suited for commercial wind development will generate local economic development opportunities in these regions, creating new jobs for installers, engineers, and other personnel. According to the report, domestic wind energy deployment supports an average of 73,000 jobs spanning more than 500 U.S. manufacturing facilities that currently operate in 43 states.

Advancements in wind technologies have already yielded cost-competitive wind energy deployment in locations with strong wind speeds. Strong wind states today include Illinois, Iowa, Kansas, North Dakota, Oregon, South Dakota, and Texas. Wind costs have decreased by more than 90% and wind rotor sizes have doubled since the 1980s. Market trends and technological innovations will continue to unlock cost-effective wind in regions with more moderate wind resources. The Wind Program plans to release two annual market reports, the *Wind Technologies Market Report* and the *Distributed Wind Market Report*, in early August. They will document the installation, price, cost, and performance trends of utility-scale and distributed wind in the United States.

View this [Energy 101](#) video to learn how wind turbines generate clean electricity from the power of wind.

## Better Buildings Partners Reap Energy Savings

Better Buildings Challenge partners have now saved a total of \$840 million in energy costs for companies and tenants since the program's launch in 2011.

The announcement of partner results, made during May's Better Buildings Summit in Washington, D.C., is just the latest example of how the U.S. Department of Energy is raising the bar on energy efficiency. On average, Better Buildings Challenge partners are saving more than 2% per year and are on track to meet their energy savings goals of 20% over 10 years.

Combined, these savings have cut energy use by 94 trillion British Thermal Units and avoided six million tons of carbon emissions—equivalent to one million cars.

Building on this success, the Better Buildings Initiative also announced new opportunities to engage as a Better Buildings Challenge partner:

- **New Focus on Water Savings:** Interested partners can work directly with the Energy Department to advance data collection and analysis and share more solutions to common water-saving barriers.
- **New Better Buildings Solution Center:** Launched in May, this online resource is designed

to help organizations easily find nearly 200 solutions tested and proven by partners.

As a cornerstone of President Obama's Climate Action Plan, the Better Buildings Challenge is aimed at achieving the goal of doubling American energy productivity by 2030 while motivating corporate and public-sector leaders across the country to save energy through commitments and investments. Across the country, partners have shared energy data for more than 32,000 properties and are reporting energy savings of 20% or more at 4,500 properties, and 10% or more at 12,000 properties.

Read more in the [2015 Better Buildings Progress Report](#).

## Energy Department Launches New Accelerators

During the Better Buildings Summit, the Energy Department announced the launch of two new Better Buildings Accelerators – bringing the total number of programs to seven. Each is a targeted, short-term, partner-focused activity designed to address persistent barriers standing in the way of greater efficiency. The new residential accelerators will help American families improve the efficiency of their homes, save money and foster more sustainable communities.

### BETTER BUILDINGS HOME ENERGY INFORMATION ACCELERATOR

This accelerator aims to develop an affordable and efficient approach that makes credible home energy information, such as a home's efficiency

certification or estimated energy usage, more readily available to potential home buyers and sellers through multiple listing service and other reports.

### BETTER BUILDINGS HOME ENERGY PROGRAM ACCELERATOR

This accelerator works to expand home energy upgrade programs and

bring more services to homes across the country by leveraging data management strategies that will minimize program costs while improving overall program effectiveness. By improving the processes used to manage and track home upgrades, review the quality of work, and evaluate savings, programs can reach millions of homes.

Read more about these new accelerators and efforts to advance the residential sector's energy efficiency [here](#).



*The Better Buildings Home Energy Program Accelerator helps to minimize program costs to expand home energy upgrades. Source: NREL*



### Renewable Energy Industry Forum

Assistant Secretary Dr. David Danielson delivers keynote remarks at the fourth U.S. – China Renewable Energy Industries Forum (REIF) in Washington, D.C. on June 3. [Three new partnerships](#) were recognized at REIF including a signed memorandum of understanding between BrightSource Energy, China Power Investment Corporation, and Shanghai Electric Group Co, Ltd. to develop the first commercial scale concentrating solar power plant in Qinghai, China. REIF brings together more than 150 government, industry and academic leaders from both countries to create jobs, drive economic growth, and address climate change.

Source: Josh Harmon



### National Clean Energy Business Plan Competition

The Hyliion team from Carnegie Mellon University celebrates after winning the 2015 National Clean Energy Business Plan Competition on June 24 in Washington, D.C. Hyliion took home \$50,000 for its SMART suspension add-on hybrid module that reduces fuel consumption for heavy duty trucks. In its fourth and final year, the competition will transition to next year's Cleantech University Prize, which will help commercialize promising new technologies that reduce carbon pollution and grow the clean energy economy.

Source: NREL



### Congressional Renewable Energy and Energy Efficiency Expo

Deputy Assistant Secretary for Renewable Power Doug Hollett speaks at the Congressional Renewable Energy and Energy Efficiency Expo in July. The 18th annual event featured exhibits from top environmental agencies, companies, and nongovernmental organizations as well as speeches from members of Congress and industry leaders.

Source: Energy Department



### Idaho National Laboratory Tour

Assistant Secretary Dr. David Danielson speaks to members of the media and researchers at the Idaho National Laboratory (INL), on June 30. Dr. Danielson emphasized the importance of public-private partnerships and clean energy technology commercialization. The Energy Department's [Lab-Corps](#) pilot program at INL demonstrates this new collaboration at work, as commercialization of new technologies accelerates.

Source: Chris Morgan

## Office Round Up

### TRANSPORTATION

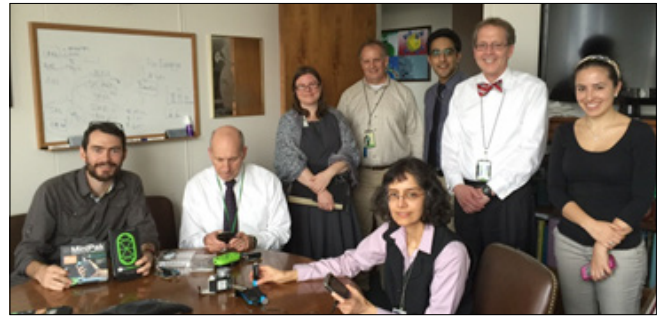
#### Vehicle Technologies Office

The [Vehicle Technologies Office](#) co-sponsored its Annual Merit Review with the [Hydrogen and Fuel Cells Program](#). The event was held June 8-12, in Arlington, VA. It was kicked off by plenaries from Under Secretary for Science and Energy Franklin Orr and Senator (retired) Byron L. Dorgan.

#### Fuel Cell Technologies Office

On April 7, a power outage affected most of Washington D.C., including the White House and U.S. Department of Energy headquarters.

Thanks to the handheld fuel cell systems in FCTO, the staff was able to charge Blackberries and iPhones as the rest of the city waited for power to return. Available for commercial sale, these handheld devices provide instant electricity by adding a cartridge that releases hydrogen. It can charge 2-5 USB-compatible devices at one time (depending on the power rating), all with zero emissions.



Director Sunita Satyapal (bottom right) and the rest of the FCTO team show off their handheld fuel cell chargers. Source: FCTO

#### Bioenergy Technologies Office

Students from Williamsburg High School for Architecture and Design in Brooklyn, New York earned first place in this year's *BioenergizeME Infographic Challenge* at [Bioenergy 2015](#), for excellence in conveying the benefits and considerations of cellulosic ethanol. Submissions for the next challenge will be accepted beginning September 30, 2015. Watch a new short documentary released at the conference, [Sustainability in Bioenergy: A Nation Connected](#).

### RENEWABLE POWER

#### Solar Energy Technologies Office

The SunShot Initiative's Solar Ready Vets program continues to thrive. Training for the first cohort at Naval Station Norfolk in Virginia began in July and finishes in August.

#### Wind and Water Power Technologies Office

##### WATER

A total of 92 teams have registered for the [Wave Energy Prize](#). The design-build-test competition encourages the development of wave energy conversion devices that would double the energy captured from ocean waves. To learn more about the teams competing for the \$1.5 million grand prize click on the [Wave Energy Prize team page](#).

##### WIND

Twelve teams will compete in the [2016 Collegiate Wind Competition](#). The competition challenges undergraduates to develop state-of-the-art wind energy solutions. Collegiate Wind Competition 2016 takes place May 23-26, in New Orleans, LA.



Boise State University, winners of the 2015 Collegiate Wind Competition, with Jose Zayas, director Wind and Water Power Technologies Office. Source: Boise State University

Continued from page 20

## Geothermal Technologies Office

The [FORGE initiative](#), GTO's flagship project, reached a major milestone in July, as all five FORGE projects began phase one. From these five teams, one site will be chosen as the permanent location for the initiative, which will enable cutting-edge research and technology testing on enhanced geothermal systems.

## ENERGY EFFICIENCY

### Federal Energy Management Program

Nine veterans will soon wrap up their summer internship with the Federal Energy Management Program. The internship is part of the U.S. Department of Energy Scholars Program and provides veterans a unique opportunity to see the various activities in which an energy office is involved.

FEMP also released the [FY 2014 comprehensive annual energy performance data](#), which illustrates federal agency progress towards energy and sustainability goals.

## STRATEGIC PROGRAMS

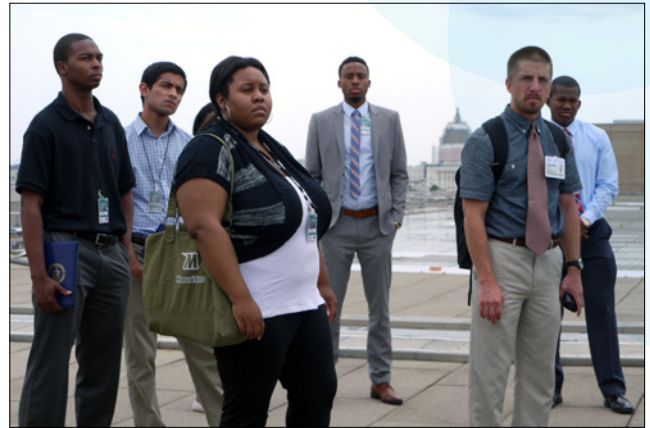
### Technology-to-Market

The [Energy Literacy video](#) collection recently won two prestigious awards. EERE's eight-video collection tells the story of the seven essential principles (of energy literacy) which won the spring 2015 Educational Visions [DV Award \(Digital Video Award\)](#). The team also won a [Telly Award](#) in online video for [Energy Literacy Principle Video #2](#).

## Communications Milestone

### EERE Facebook

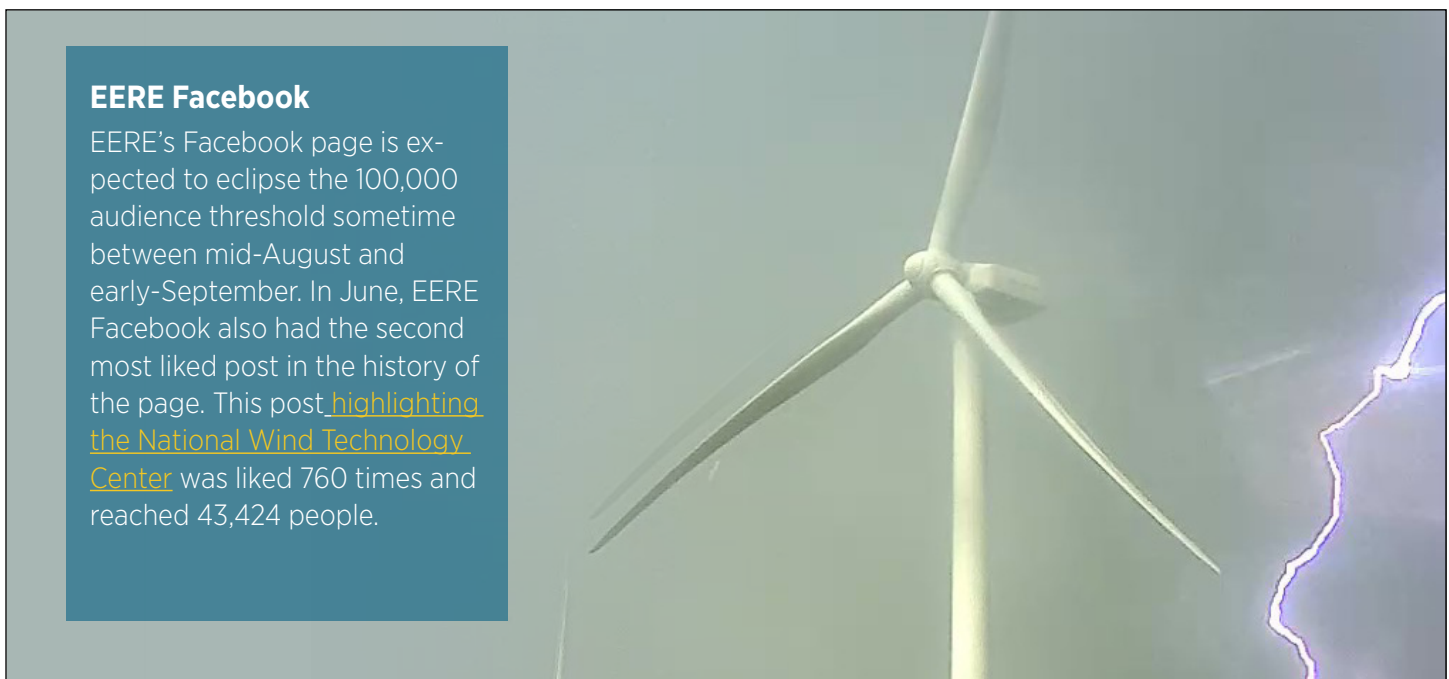
EERE's Facebook page is expected to eclipse the 100,000 audience threshold sometime between mid-August and early-September. In June, EERE Facebook also had the second most liked post in the history of the page. This post [highlighting the National Wind Technology Center](#) was liked 760 times and reached 43,424 people.



FEMP interns tour the solar rooftop panels at Energy Department headquarters in June. Source: EERE Communications



The Energy Literacy Principle Video #2 won a Telly Award in the Education category. Source: AGI



## Energy Savers

### SUMMER DRIVING TIPS

Consumer vehicles account for more than 40% of U.S. oil use. Using less gas saves money, reduces pollution, and improves energy security.

### DRIVING TIPS

- Drive sensibly and avoid aggressive driving, such as speeding, rapid acceleration, and hard braking. Aggressive driving can lower your highway gas mileage by up to 33% and your city mileage by 5%.
- Avoid high speeds. For every 5 mph above 50 mph, gasoline burns much less efficiently and is equivalent to the driver paying an additional \$0.19 per gallon of gasoline.

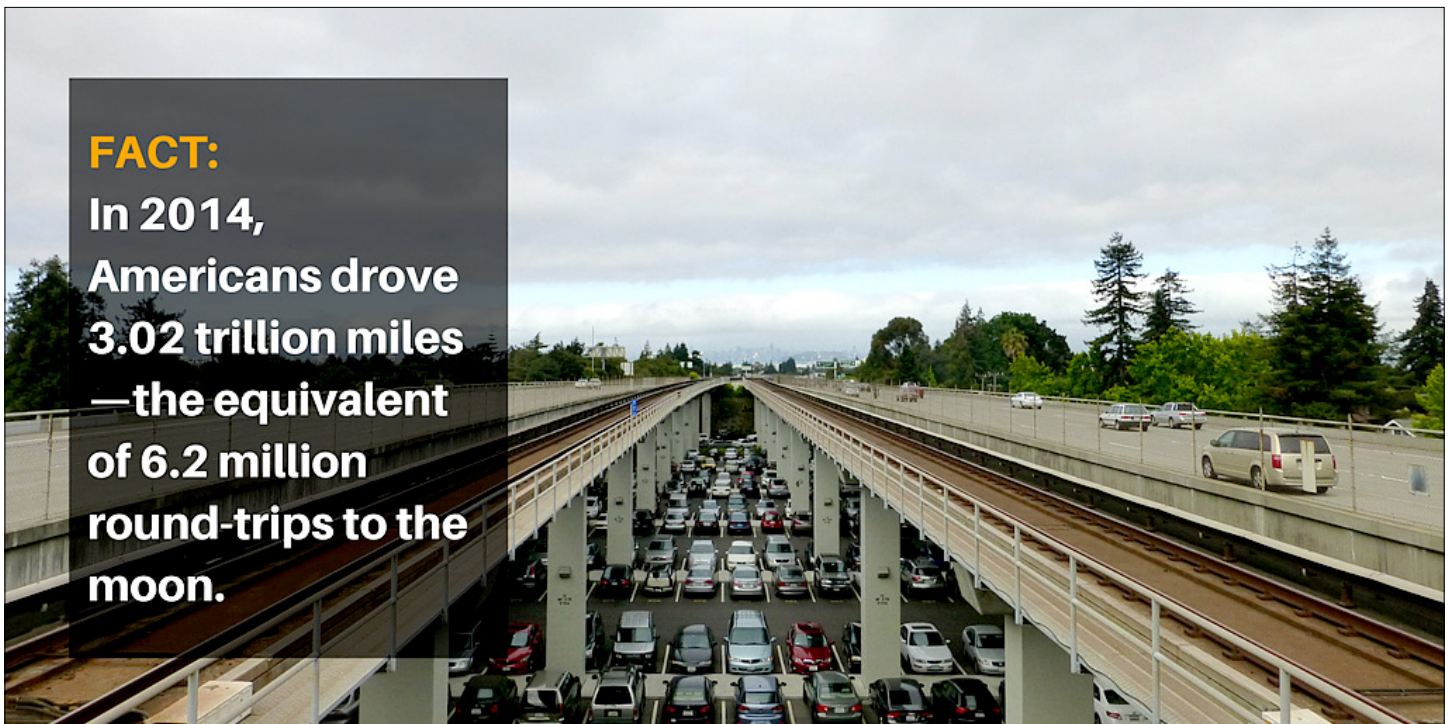
- Reduce drag by placing items inside the car or trunk rather than on roof racks, which can decrease your highway fuel economy by up to 25% and your city fuel economy by up to 8%.
- Avoid carrying heavy items in your car; an extra 100 pounds in your vehicle could increase your gas costs by up to \$.03 per gallon.
- Check into telecommuting, carpooling, public transit, and active transportation like bicycling or walking to save on fuel and car maintenance costs. Many urban areas provide carpool lanes that are usually less congested, which means you will get to work and home faster and more refreshed!

NOTE: All cost estimates assume an average price of \$2.69 per gallon. Source: [FuelEconomy.gov](http://FuelEconomy.gov)

### CAR MAINTENANCE TIPS

- Inflate your tires to the manufacturer recommended pressure.
- Get regular maintenance checks to avoid fuel economy problems. Fixing a serious maintenance problem, such as a faulty oxygen sensor, can improve mileage by as much as 40%.

Learn more fuel saving tips and other ways to save money on [FuelEconomy.gov](http://FuelEconomy.gov).



Source: NREL

## Just Ahead

### THE ROAD TO PARIS

With the United Nations climate change conference on the horizon, all eyes are on Paris this December, when nations around the globe will make their projected commitments to reduce greenhouse gas emissions. The Energy Department has played a substantial role in contributing to the President's intention to reduce greenhouse gas emissions by up to 28%. But EERE's influence extends much farther than our national borders.

Coming up in Issue 5, *Amped Up* will examine EERE's role in shaping America's climate goals. We'll hear from our International Programs office on how, by accelerating deployment of U.S. innovations worldwide, clean energy technologies are empowering nations to commit to reducing greenhouse gas emissions in preparation for one of the most anticipated climate conferences in recent history.

Source: *Tsitovskaya*



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