

August 2015  
Issue

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**WORLD NEWS**

**Power in Your Palm: 'Smart Trees' Installed in Dubai to Offer WiFi and Phone Charging at the Beach**



Smart palm trees have been installed and are ready for use in Dubai this summer enabling beach goers and park visitors to have limitless power and internet access on their mobile phones.

Soaking up the sun during the day, these state-of-the-art trees store energy to be discharged in the evening.

On each tree, there are eight charging points and WiFi ranges for 100 metres in any direction.

Smart Palm is the company behind this ingenious endeavour and have so far set up two - one on Surf Beach and another in a park near the waterfront. The company plans to plant them in 103 locations around Dubai as part of a contract with the city. Towering at 20 feet high and with leaves measuring 18 square metres, the high-tech palms, understandably, are also equipped with screens and security cameras.

'For us, it was important to translate the important cultural identity of the date palm from being a plant that provided shelter, building materials, shade and sustenance, to our Smart Palm, designed to provide data, connectivity, energy and all in a sustainable manner,' says Viktor Nelepa, Smart Palm's founder, in a press release.

However, the cost to use the powerful palm has not yet been decided.

And while they may be useful to sneak some shade under during the day, it's at night that passersby will undoubtedly flock.

Best of all? The company insists that the trees can charge your batteries two and a half times faster than your home charger.

ACEEE National Conference on Energy Efficiency | September 20 - 22, 2015 | Little Rock, AR  
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International Conference on Green Energy & Expo September | 21-23, 2015 | Orlando, FL  
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World Energy Engineering Congress | September 30 - October 2, 2015 || Orlando, FL |  
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The First International Symposium on Sustainable Human-Building Ecosystems | October 5 - 7 | Pittsburgh, PA  
Click [here](#) for more.

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Perfect for a night out on the town.

## Will Buildings of the Future be Cloaked in Algae?

In the future, green buildings may actually be green. A gazebo, unveiled this month at the Expo 2015 world's fair in Milan, demonstrates how algae-filled plastic could serve as a living "skin" for buildings.

"This technology is really quite exciting for us because this is the first time we've got it to this scale," says Marco Poletto, co-founder of ecoLogicStudio, the London architecture and urban design firm that created the 430-square-foot gazebo. EcoLogicStudio calls the project the Urban Algae Folly, playing with the traditional meaning of "folly" as an extravagant garden structure.



The gazebo is made of [ethylene tetrafluoroethylene](#) (ETFE), a transparent plastic building material most famously used in the [Water Cube](#) aquatics center built for the 2008 Beijing Olympics. The ETFE's hollow interior is filled with water and [spirulina](#), a type of algae often used as a dietary supplement. The growth of the algae will depend on sunlight and temperature, as well as on input from digital sensors that detect the presence of people and change the algae flows to create different patterns. The more sun, the more the algae will grow and darken the gazebo, providing shade for the people beneath.

A portion of the algae will be harvested every week or two to use as food; in the future, similar structures could contain different types of algae to be used as biofuels. Algae are also highly efficient at absorbing carbon dioxide and producing oxygen—though trees get all the love, algae and other marine plants make [70 percent of the world's oxygen](#). The folly produces about 4.4 pounds of oxygen per day, Poletto says, enough oxygen for three adults in that time. And the structure can suck about 8.8 pounds of carbon dioxide from the air per day, he adds. A single tree [absorbs only about .132 pounds each day, or about 48 pounds](#) of carbon dioxide in a whole year.

The gazebo is part of the [Future Food District](#) in the Expo, an area of the fair dedicated to new food technologies. [Advocates of spirulina](#), which is high in protein but rather bland, hope it might one day be a sustainable meat substitute. Today, spirulina is mostly used as a dietary supplement, added in powdered form to juices or shakes.

"Many see it as an urban food of the future," Poletto says.

The team at ecoLogicStudio has been working on the technology for six years. They've consulted with a network of experts, including microbiologists, agronomists, ETFE manufacturers and computer systems engineers. Currently, the ETFE-algae structures cost about 1,200 euros (about \$1,308) to build, though the price will likely drop as the technology advances. Poletto hopes to implement the technology on a much larger scale in the future. Ultimately, entire buildings could be clad in algae-filled ETFE. These green "skins" would provide shade, give off oxygen and produce food or biofuel.

Florida Green School Awards: Celebrating and Recognizing Environmental Excellence in Florida's Schools and Districts| October 8, 2015| Streamsong Resort, Polk Co., Florida

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3rd Annual Go SOLAR & Renewable Energy Fest| October 9 - 10, 2015| Ft. Lauderdale, FL

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2015 Florida Energy Summit| October 14 - 16, 2015| Jacksonville, FL

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BuildingEnergy NYC 2015| October 15, 2015| New York, NY

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EcoLogicStudio has created a digital rendering of a multi-story building; Poletto says they're in talks with various partners to make this a reality down the road.

"[The *Folly*] is significant because the material technology that it utilizes is fit for large and permanent architectural scenarios," Poletto says. "This is the world first ETFE living and productive architectural skin. Now we only need investors with the vision to roll this out on a larger scale."

Poletto and his collaborators plan to observe visitors interacting with the gazebo during the six months it's on display at the Milan Expo. They then plan to take what they've learned and incorporate it into future designs.

There is some precedent for algae architecture. The [Bio Intelligent Quotient house](#), built in 2013 in the German city of Hamburg, is covered with 129 algae-filled glass bioreactors—an exterior that cost [\\$6.58 million](#). On sunny days, the algae's growth can generate enough heat to warm the building's floors and water. The algae is harvested once a week and taken to a nearby university to be converted into biofuel. Unfortunately the tanks make loud, rhythmic [pumping noises](#), annoying some tenants.

Algae have also been used in a number of other recent urban innovations. French biochemist Pierre Calleja created a prototype for a ["smog-eating" algae street lamp](#), which uses bioluminescent microalgae to light streets while absorbing carbon dioxide and producing oxygen. Last year, the Cloud Collective, a French and Dutch design group, built an [algae "garden"](#) in transparent tubes mounted to the side of a Geneva highway overpass. [Rooftop spirulina farming](#) has recently taken off in Bangkok as a form of urban food security.

Though these projects have shown promise and generated interest, the lack of larger scale implementation suggests the technology has a ways to go before "pond scum green" replaces concrete gray as the color of our cities. Poletto estimates buildings with algae façades will be common in the next five years.

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## Australian Utilities Cozy Up to Home Storage: "If We Don't Respond, Someone Else Will"

Australian utilities are moving to combat the threat of revenue loss from residential energy storage by opting to supply batteries themselves. Three companies -- Red Energy, Ergon Energy and ActewAGL -- announced trials offering Panasonic battery systems.

"Our customers are already showing interest in this technology, and if we don't respond to what our customers want, someone else will," said ActewAGL CEO Michael Costello.

The Australian Capital Territory utility, which already has more than 15,000 residential installations in its catchment area, expects to start offering the systems this October.



BuildingEnergy  
NYC 2015| October  
15, 2015| New  
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National Advanced  
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Conference & Expo|  
October 26-28,  
2015| Omaha,  
Nebraska  
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SmartGridComm  
2015| November 2 -  
5 | Miami, FL  
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Power Up Energy  
Expo | Fall 2015 |  
South Walton, FL  
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2016 Capitol Days|  
January 13, 2016 -  
January 15,  
2016| Tallahassee,  
FL  
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19th Annual EUEC  
2016| February 3 -  
5, 2016| San Diego,  
CA  
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"The trial will validate batteries as a product offering in the Canberra environment and evaluate the product functionality," Costello said.

He confirmed ActewAGL had been working with Panasonic for two years "on how to make a trial of battery energy storage in Canberra a reality."

Panasonic, which last year [won the contract](#) to supply Tesla's Gigafactory in the U.S., is said to be keen on using utilities and retailers as a channel to the residential market, rather than selling direct to homeowners.

The battery maker expects to [launch in Europe](#) with a similar model, beginning with Germany. For the Australian market, the company is offering a 2-kilowatt, 8-kilowatt-hour lithium-ion battery suited to 5-kilowatt solar arrays.

[As previously reported](#), there is growing interest in such systems across Australia, as a result of high electricity prices and problems with getting new grid connections. Some utilities have fought back by supporting measures to cut the spread of solar.

One of these is Ergon, which last year introduced large energy user [demand charges](#) that were viewed as a disincentive to install solar. For its residential customers, however, Ergon appears to have adopted an 'if you can't beat them, join them' approach with Panasonic.

At ActewAGL, the introduction of battery storage might be advantageous beyond simply keeping residential customers on the books.

"Battery storage will help minimize the capital investment required on our network to manage the few weather events that cause peak demand issues throughout the year," said the company in [a press release](#). "This will help reduce network charges and benefit customers through lower energy prices."

Costello is pretty clear that this is really about keeping residential customers happy, though. "There are many different benefits for our customers," he said. "First, they can generate their own renewable energy from the sun, without having to rely on coal-fired power. The other main benefit is customers will be able to access the full value from solar panels on their roof by storing excess generation for use at nighttime."

[A recent report](#) by the Australian Clean Energy Council stated that 1.4 million households in Australia now have solar power, although installations dropped 8.5 percent in 2014.

Last year was considered a particularly tough one for renewable energy in Australia, as the government moved to cut the country's targets for large-scale installations.

"The review of the RET stalled investment in large-scale renewable energy such as wind and solar power in 2014, with investment falling by 88 percent," said Clean Energy Council chief executive Kane Thornton in [a press statement](#).

Concern over the outcome of RET negotiations was put to rest this month after the opposition Labor Party agreed to a cut in the target, from 41 gigawatt-hours of annual renewable energy production to 33 gigawatt-hours by 2020.

The agreement has been credited with providing needed long-term stability to encourage further renewable energy investments, although the Australian Solar Council has come out against the cut.

“This is still a bad deal for Big Solar,” said the industry body. “The Solar Council calls on all political parties to commit to at least 50 percent renewables by 2030.”

Given that the RET is largely irrelevant to residential customers, these deliberations will likely have little impact on household solar installations apart from the impact they could have on grid electricity prices.

Australian utilities appear to be increasingly aware of this fact. What remains to be seen now is how much the lure of solar plus storage will entice homeowners to stay with their current energy supplier.

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## Chinese Company 'Builds' 3D-printed Villa in Less than 3 Hours

A pioneering 3D-printed house has popped up in Xian, China. Earlier this week, Chinese company ZhuoDa “built” a two-story villa in less than three hours. Made up of six 3D-printed modules, the house was assembled like LEGO bricks before a live audience who were then invited to explore the interior. The modular fireproof home can withstand a magnitude-9 earthquake and is made from a special construction material the company is keeping secret.



The company completed approximately 90 percent of the construction in an off-site factory before shipping the modular pieces to the installation site. This efficient and timesaving process dramatically reduces construction costs to just 2,500 - 3,000 yuan (\$400 - \$480) per square meter. According to An Yongliang, the developing engineer at Zhuoda, the 3D-printed villa only takes about 10 days to produce from initial construction to final assembly, while it typically takes half a year to build a traditional villa.

The house is capable of [withstanding high-magnitude earthquakes](#) because the modules, each weighing over 100 kilograms per square meter, bear weight independently. The steel-framed structure home can also be filled with heat-insulating materials. The Zhuoda Group has filed over 22 patents on their technology and is keeping their top-secret material under wraps. However, the company’s vice president Tan BuYong has revealed that the new material is sourced from industrial and agricultural waste, is fireproof and waterproof, and is free from harmful substances such as formaldehyde, ammonia, and radon.

After the structural framework was 3D-printed, the company applied decorative sheet textures to each module before final assembly. Homeowners will be able to choose

from a variety of decorative textures, such as jade, marble, wood, and granite. Herbs can even be embedded into the walls of the house for 'built-in aromatherapy.' The buildings can withstand wear for at least 150 years.

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## How Solar Sister is Fueling a Women-led Clean Energy Revolution in Africa

In rural Nigeria, a woman named Iniobong opened a maternity clinic to serve her community. It had no electricity, so she used candlelight or kerosene to deliver babies and care for mothers. One day, a woman named Blessing brought a solar light to her prenatal check-up. It sparked Iniobong's interest, so Blessing told her that she could sell it and other clean energy products herself if she became a "Solar Sister Entrepreneur."

Iniobong started out by buying solar lights and a better cookstove to use at her own clinic. Today, the money she earns as a Solar Sister entrepreneur goes into running her clinic and providing care for the women in her community.

"When it came time to bring Blessing's son into the world, there was still no electricity, but both the patient and nurse were armed with bright solar lights," said Caroline Mailloux, director of engagement for Solar Sister. "They successfully delivered Blessing's son into a bright room with no open flames or dangerous fumes."

[Solar Sister](#) is a nonprofit that is working to eradicate energy poverty by empowering women to be entrepreneurs. It's a women-run direct sales network that distributes clean energy technology such as solar lights, mobile phone chargers and clean cook stoves to communities across rural Africa.



The International Energy Agency estimates that 585 million people in sub-Saharan Africa lack access to electricity, and in some areas of the continent, off-grid households spend \$0.50-\$0.60 per day on kerosene lighting and basic charging costs. And according to Mailloux, many people are forced to utilize toxic, expensive alternatives like kerosene or paraffin, which can cause burns and respiratory illness, and also costs up to 40% of household expenditures.

Women are critical to the eradication of global poverty. [According to the World Bank](#), if all women had equal access to productive resources, up to 150 million fewer people would go hungry every day.

"Women are often overlooked and underserved by economic opportunity," Mailloux said. "Solar Sister's approach ensures that women's voices are heard and needs are met as we scale our impact."

Katherine Lucey, founder and CEO of Solar Sister, got the idea for the organization when she was on a trip to Uganda. While there, she met a rural farmer in Mpigi named Rebecca, who used three solar lights to completely change the lives of her family and community for the better. Katherine came back to the US and teamed up with Neha Misra to co-found Solar Sister.

Africa has one of the highest rates of female labor participation in the world, and women typically work more hours than men. Most of that, though, is unpaid housework or family work, which has become the norm. And those types of jobs—cooking, cleaning, teaching, and helping with family businesses, for example—often require the most light, energy, and power. So it stands to reason that women would be the most likely to use solar equipment for solutions to these energy problems.

The women buy the products in bulk from manufacturing partners in Solar Sister's country office headquarters in Uganda, Tanzania and Nigeria. It is then transported via bus or boat to the sales associates. First, women usually sell to their families, and then to others in the community. They make anywhere from \$10 to \$250 a month, which can supplement the family income and radically change their lives.

"The greatest surprise is the difference that one light and one empowered woman can make.," Mailloux said. "Cost savings, time savings, more hours of light to run a business - the ripple effect is truly impressive."

There are many stories of women like Iniobong. There's Theresia, from Mpigi, Uganda, who was recently asked to run for elected office after becoming an entrepreneur. There's Joan from Kitumba, Uganda, who recently bought her own plot of land with money she made from being a Solar Sister. There's Umoh Ebango, a poultry farmer from Nigeria, who started purchasing clean energy solutions for her farm because her sister was a Solar Sister entrepreneur. She decided to become an entrepreneur herself after she used solar equipment.

Then there's Grace Wakodo, from Uganda, who earns money as a Solar Sister entrepreneur to care for her 10 children—four her own, and six others adopted after their parents, her in-laws, died of AIDS. The money she earns has doubled the family's income, allowing them all to attend school and eat healthier.

These are just a few examples of the 1,500 women entrepreneurs in Nigeria, Uganda, and Tanzania. Most of money Solar Sister is from donations grants, but the organization is [generating more revenue](#) □% of its income came from commissions on sales last year, which is a big jump from the 8% in 2010. The organization is expanding and will be operating in Kenya in 2015, with plans to continue growing throughout Africa.



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"We receive inquiries every day from all over the world inquiring about our expansion into new communities and countries," Mailloux said. "In reality, to enter into a new country, Solar Sister must first put in place the necessary legal registrations and build the local team to provide this support."

Most African countries receive 325 days of sunlight a year, generating about 4 kWh and 6 kWh of energy per square meter. This provides immense opportunities for clean energy solutions, and worldwide, companies are jumping on the bandwagon. Recently, SolarCity led a \$7 million round into Off Grid Electric, and PIC, Africa's biggest money manager, just invested \$1.8 billion in South Africa solar projects.

Solar is experiencing a movement in Africa, as solar panel prices decrease and accessibility to clean energy solutions, the internet, and mobile payment systems increase. A critical aspect to its momentum, though, is through grassroots organizations like Solar Sister, which offer affordable, empowering financing models to help expand clean energy and sustainable economies throughout the continent.

"This is to the benefit of not only women, but society as a whole as women are most likely to re-invest the money earned into their families, thereby reducing poverty and best of all-inspiring the next generation of girls and women to achieve," Mailloux said.

## FESC HIGHLIGHTS

### **UF/IFAS Researchers Turn Seed into Jet Fuel for Navy and Crops into Cash for Farmers**

Imagine jet fuel made from a crop that's renewable, brings in income and can feed cattle. Researchers at the University of Florida Institute of Food and Agricultural Sciences have found a way to turn mustard seed into a winning solution for farmers and the United States Navy.

UF/IFAS plant pathologist Jim Marois is leading the effort to make the jet fuel from seed. "It's renewable, does not have to be blended as with other biofuels and it's not harmful to the environment," said Marois of the North Florida Research and Education Center in Quincy, Florida.

Marois and other researchers are using a grant from the United States Navy and the Florida Department of Agriculture and Consumer Services to study how to best grow Ethiopian mustard and determine which varieties work best in Florida. Florida, Canada and South Dakota are working to meet the Navy's 8-million-barrel goal by 2020.

Two years ago, IFAS researchers started out with 20 acres of Ethiopian mustard at the North Florida Research and Education Center. Last winter, they grew 3,500 acres; this winter they expect to grow 25,000 acres.

Studies show that fuel from the Ethiopian mustard seed produces half the black carbon (incomplete combustion) exhaust as fossil fuel, Marois said. Also, with its higher flash point, the fuel is safer for use on Navy ships where fires are a real threat, he said.

Local farmers benefit, too, Marois said, as the seed is a great winter crop that allows farmers to make money in the offseason. "The mustard seed not only brings in income, but also reduces erosion and creates better summer crops," he said. "The project benefits the Navy, local farmers and cattle, who are fed the crushed seeds. It's a win-win for everyone."

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## **UCF Receives Grant for Clean Energy Entrepreneurial Battle**

Clean energy entrepreneurs have a new way to raise money at University of Central Florida.

The school announced this week that it has received one of eight U.S. Department of Energy grants as part of the government agency's Cleantech University Prize, which supports clean energy innovation.

As part of the grant, the university will host a yearly competition for clean energy entrepreneurs, with the winning team set to take home \$50,000 in seed funding.

Megawatt Ventures will recruit 10 teams from the Southeast U.S.

"We are excited to be selected by the DoE to serve in a leadership role in driving clean-energy innovation," Thomas O'Neal, associate vice president at UCF's Office of Research and Commercialization, said in a release.

Jack Henkel, who is helping coordinate the program, said the school's experience in entrepreneurial programs will help organizers.

Teams will be aided by the school's resources to help commercialize any technology they develop.

Business coaching and investment pitch guidance will also be made available to the teams.

Details about the competition's deadlines and time frame were not released.

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## **Florida State University Receives EPA Funding to Improve Understanding of the Effects of Climate Change on Indoor Air Quality**

The U.S. Environmental Protection Agency (EPA) announced that Florida State University in Tallahassee, Fla. has received a \$500,000 grant to improve understanding of the effects of climate change on indoor air quality. The grant is a part of EPA's continued commitment to improving America's indoor air quality by providing almost \$8 million to fund nine institutions researching the impacts of climate change on indoor air quality and the resulting health effects.

"This research will help us better understand the effects of climate change on indoor air quality," said Tom Burke, Deputy Assistant Administrator for Research in EPA's Office

of Research and Development and the Agency's Science Advisor. "Gaining a better understanding of the interaction between air quality, climate, and energy in an indoor environment will help guide the design of buildings and provide knowledge to respond effectively to changes in indoor air quality that will better protect human health."

The research project, "Indoor Environment and Emergency Response Health Outcomes," will look at the relationship between indoor and outdoor temperature and humidity and the built environment, the link between indoor air temperature, humidity and extreme conditions of heat and cold. The data collected can help project future extreme heat disease burdens or influenza risk related to climatic and demographic changes. The study results aims to improve the health status of vulnerable populations and create adaptation strategies to these projected changes.

Grants have been awarded to the following universities:

- University of Colorado at Boulder, Boulder, Colo.
- **Florida State University, Tallahassee, Fl.**
- Illinois Institute of Technology, Chicago, Ill.
- Harvard College, Boston, Mass.
- Missouri University of Science and Technology, Rolla, Miss.
- Rutgers University, New Brunswick, N.J.
- Portland State University, Portland, Ore.
- University of Oregon, Eugene, Ore.
- Washington State University, Pullman, Wash.

Americans spend the majority of their time indoors and the impacts from a variety of indoor environmental pollutants and sources of pollution, including radon, mold and moisture, secondhand smoke, indoor wood smoke, and environmental asthma triggers are well documented. The connection between climate change and indoor air quality, however, is not well understood. Poor indoor environmental quality creates health problems and climate change may worsen existing indoor environmental problems and introduce new ones.

Climate change has the potential to affect human health in indoor environments directly through a number of variables. Some of these include changes in temperature extremes, changes in infiltration and ventilation, changes in outdoor and indoor allergen levels, pesticide use, and extreme weather. These changes are especially significant for vulnerable populations including children, those with certain medical conditions, and older people.

By understanding how climate impacts the quality of indoor air, this research can be used to help avoid the potential negative impacts of climate change and support a healthy indoor environment where most people spend their time.

## Could One Million Smart Pool Pumps Store Renewable Energy Better than Giant Batteries?

*Author - Sean Meyn, Professor of Electrical and Computer Engineering at the University of Florida.*

As more wind and solar energy comes online, the people who run the power grid have a problem: how do they compensate for the variable nature of the sun and wind?

California plans to spend billions of dollars for batteries to even out the flow of power from solar and wind, much the way shock absorbers smooth out bumps on the road. But do they need to? Not at all!

In my research, I've found that we can accommodate a grid powered 50% by renewable energy without the use of batteries.

Systems flexible enough to accommodate the ups and downs of solar and wind production can be made by adjusting the power at millions of homes and businesses on a minute-by-minute or even second-by-second basis. This approach requires no new hardware, some control software and a bit of consumer engagement.

### **Massive balancing act**

Already, electric power procured from the wind or sun is leading to large and small "bumps" in the energy fed to the grid.

For example, on a typical week in the Pacific Northwest, power can increase or decrease by more than one gigawatt in an hour. That's the equivalent of the output from one huge nuclear power plant able to supply a million homes.

This is an enormous challenge to grid operators in this region. Massive fluctuations in power require equally massive storage devices that can charge when the wind is blowing, and discharge during periods of calm.

Now, the balance of supply and demand for power is primarily done by generating more power rather than storage.

Grid operators draw on what is called the balancing reserves obtained from fossil fuel generators or hydro plants, when available. These power plants ramp up and down their output in response to a signal from a grid balancing authority. This is just one of many ancillary services required to maintain a reliable grid.

Many states are now scrambling to find new sources of ancillary services, and the federal government is also searching for incentives: Federal Energy Regulatory Commission (FERC) orders 745, 755 and 784 are recent responses by a government agency to create financial incentives for [responsive resources to balance the grid](#).

### **Are batteries the solution?**

Storage is everywhere, but we have to think beyond electricity.

Consider a [large office building](#). Will anyone notice if the fan power is reduced or increased by 10% for 10 or 15 minutes? This makes no demands on the comfort of occupants of the building, but the resulting deviations in power can provide a substantial portion of the needs of the grid. A building can be regarded as a virtual battery because of thermal inertia – a form of thermal storage.

What about for longer time periods? Residential pool pumps (as well as pumps used in irrigation) are a significant load in Florida and California – well over one gigawatt in each state – that can be run at different times of the day.

Through local intelligence – in the form of a chip on each device or a home computer for many devices – the collection of one million pools in Florida can be harnessed as massive batteries. Through one-way communication, each pool will receive a regulation signal from the grid operator. The pool will change state from on to off based on its own requirements, such as recent cleaning hours, along with the needs of the grid. Just as in the office building, each consumer will be assured of desired service.

Pools are, of course, just one example of a hungry but flexible load.

On-off loads such as water pumps, refrigerators or water heaters require a special kind of intelligence so that they can accurately erase the variability created from renewable generation. Randomization is key to success: To avoid synchronization (we don't want every pool to switch off at once), the local intelligence includes a specially designed "coin-flip"; each load turns on or off with some probability that depends on its own environment as well as the state of the grid.

It is possible to obtain highly reliable ancillary service to the grid, while maintaining strict bounds on the quality of service delivered by each load. With a smart thermostat, for example, indoor temperature will not deviate by more than one degree if this constraint is desired. Refrigerators will remain cool and reliable, and pools will be free of algae.

### **Where do we go from here?**

We first must respect the amazing robustness of the grid today.

This is the result of ingenious control engineering, much like the automatic control theory that brought the first human to the moon and makes our airplanes so reliable today. We cannot pretend that we can transform the grid without partnering with the control and power engineers who understand the mysterious dynamics of the grid. Instabilities and blackouts occur when we are too aggressive in attempting to balance supply and demand, just as they occur when we are too slow to respond.

We are certain that the engineering challenges will be largely solved in the upcoming years – it is an exciting time for power!

The next challenge is participation.

Today, about 750,000 homeowners in Florida have signed contracts with utility Florida Power & Light, allowing them to shut down pool pumps and water heaters in case of emergencies. How can we expand on these contracts to engage millions of homeowners and [commercial building operators](#) to supply the virtual storage needed?

Recent FERC rules that offer payments for ancillary services for balancing the grid are a valuable first step in providing incentives.

It is possible that little incentive is required since we are not subjecting consumers to any loss of comfort: it is the pool or fridge that provides flexibility, and not the homeowner.

A sustainable energy future is possible and inexpensive with a bit of intelligence and flexibility from our appliances.

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## **Cleantech Incubator Licenses UCF-developed Industry's First Single-module Three-phase Microinverter for Solar Energy Systems**

The industry's first single-module three-phase microinverter, developed by researchers at the Florida Power Electronics Center at the University of Central Florida (UCF), has been licensed to MaxHarvest Microinverters, LLC, a subsidiary of GreenTech Endeavors, a Miami-based cleantech garage/incubator. Through research funded by the Department of Energy, the UCF-developed microinverter technology has the potential to significantly increase the worldwide accessibility of solar energy by increasing the efficiency, reliability and scalability of the solar photovoltaics (PV) systems that generate electricity from solar energy.

UCF's Florida Power Electronics Center, at the College of Engineering and Computer Science, developed the groundbreaking technology under the leadership of Issa Batarseh, Ph.D. The University's Office of Technology Transfer facilitated the exclusive license agreement.

Energy organizations and market forecasters project the solar PV industry will exceed \$130 billion within the next 15 years. Twenty percent of the world's population lacks access to electricity, according to World Energy Outlook-2009 estimation.

[UCF's Florida Power Electronics Center](#), at the College of Engineering and Computer Science, developed the groundbreaking technology under the leadership of Issa Batarseh, Ph.D. The [University's Office of Technology Transfer](#) facilitated the exclusive license agreement.

Energy organizations and market forecasters project the solar PV industry will exceed \$130 billion within the next 15 years. Twenty percent of the world's population lacks access to electricity, according to World Energy Outlook-2009 estimation. As global-wide momentum continues to build for eco-friendly solutions, solar PV is positioned as a cleaner, more abundant and better distributed energy source than traditional technologies such as nuclear, coal, natural gas and hydro.

A crucial component of solar PV is the inverters that convert the direct current (DC) output of the solar cells to the alternating current (AC) used to power electric devices and deliver electricity to the grid. Traditional approaches have relied on large, central inverters that are expensive, require high-voltage wiring and introduce a single point of failure into the system. Microinverters have entered the market with improvements over the central inverters, but lack system scalability and full compatibility with the three-phase configurations used by the utilities that distribute electricity. In addition,

they are not designed for optimal one-to-one, single microinverter connected to a single solar panel, performance.

“Our team of University researchers has developed the technology to produce the industry’s first single-module three-phase microinverter that achieves the needed scalability, compatibility and single microinverter-to-solar panel performance to reduce the cost of solar energy while substantially boosting energy-harvesting capacity,” explained Dr. Batarseh. “Among its many other benefits, it also provides both high power conversion and light load efficiency.”

Under the MaxHarvest Microinverters brand, GreenTech Endeavors will continue to develop, test and invest in the technology as it prepares its market strategy. GreenTech Endeavors’ management team will also provide a variety of strategic business and marketing support activities.

“We are extremely excited on the potential benefits this technology has for consumers and overall impact it can have for communities and entire populations around the world,” said Will Perego, founder and CEO at GreenTech Endeavors, and CEO at MaxHarvest Microinverters. “In addition, the combination of the Department of Energy’s initial funding and the University’s innovative research is a shining example of the efforts needed for the United States to remain a major player worldwide in the development of clean, renewable energy.”

Perego launched MaxHarvest Microinverters in March 2015, one of 17 companies he has started since the 1980s. A visionary and entrepreneur dedicated to clean energy solutions, Perego is in the process of finalizing a funded R&D project and engaging several of the UCF students who worked on the initial research, a move that would bring in additional inside knowledge of the technology as his company refines it further.

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## Researchers from Israel and Florida Awarded Funding for Biogas

Ben-Gurion University of the Negev in Israel and University of Florida researchers have been awarded a United States-Israel Bi-national Agricultural Research and Development Fund (BARD) grant to improve the production of biogas that supplies farms' energy needs.



The goal of this project is to design guidelines for improved anaerobic digesters (biogas systems) for treatment in a wide variety of biomass feedstocks. Such digester designs will eliminate operational problems and enhance the use of a wide range of nutrient-rich feedstocks, thereby increasing farm revenues.

Farm-based biogas systems (or anaerobic digesters) have traditionally treated animal manure. The biogas produced is used onsite to supply a farm’s energy needs. But, manure by its very nature is a poor feedstock for anaerobic digestion.

Attractive renewable-energy credits in some countries have spurred tremendous growth in the number of digesters that co-digest manure with other feedstocks, such

as corn silage. Adding co-feedstocks enhances the volumetric biogas productivity from the digester, leading to increased farm revenues.

The researchers will simulate particle-level and flow simulations associated with this new technology for continuous, high-solids, leach-bed anaerobic digestion at UF. They will be used to describe the flow of wet and dry, fibrous, flexible particles characteristic of biomass. The model validation, which will be conducted at Ben-Gurion University, will then be employed to describe the multiphase flow behavior within the new digester technology.

Grant recipient Professor Haim Kalman of BGU's Department of Mechanical Engineering is a world leader in solids handling and particle transport. He has served as the international scientific chair for the International Conference of Conveying and Handling of Particulate Solids for a decade, and in May chaired the international conference on this topic in Tel Aviv.

University of Florida researcher Professor Jennifer Curtis heads a group with unique experience in simulating wet or dry, flexible, elongated fibrous materials. UF's Professor Pullammanappallil brings expertise and experimental facilities relevant to the anaerobic digestion process.

## FLORIDA ENERGY NEWS

### **Four Florida Teams Competing for \$2M in Prizes from the U.S. DOE 'Wave Energy Prize'**

The U.S. Department of Energy's (DOE) wave energy competition is moving toward the next phase with 92 teams. The Wave Energy Prize is a design-build-test competition encouraging the development of better innovations for wave energy conversion (WEC) devices that will double energy capture. When this is achieved, costs will be reduced making wave energy more competitive with established energy technologies.

The 91 American teams and one team from Denmark official will now begin working to double the energy captured from ocean waves and win a prize purse totaling more than \$2 million.

Florida teams competing to win the prize:

- ESI - Perpetuwave (Doral, Fla.)
- Etymol Ocean Power (Winter Springs, Fla.)
- Fetzer Wave (Palm Harbor, Fla.)
- Wizards of Energy (Dania Beach, Fla.)

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### **Florida's Solar Energy Initiatives Heat Up**

Solar hasn't historically been a hot industry in Florida, but short- and long-term efforts are underway statewide and locally that could pay huge economic and environmental dividends.

Florida ranks third in the nation for rooftop solar potential, but comes in 13th for cumulative solar capacity installed. That's according to the Solar Energy Industries

Association, a national trade association, which asserts that the state's solar policies lag behind many other states.

That's consistent with commentary on the website SolarPowerRocks.com: "There is hope for Sunshine State homeowners who want to go solar, but not because of much of anything the state has done to encourage it."

The site ranks the state 24th in the nation and gives it an overall "C" grade in its 2015 State Solar Power Rankings.

Hints of change are in the air, though, that could put Southwest Florida — and the state as a whole — on a brighter path.

### **'Big opportunity here is solar'**

Joe Simmons signed on in 2011 to be FGCU's chair of the Renewable Energy Institute. Nearly three years later, the governor signed legislation after intense lobbying to give the university a \$7 million grant to build the 25,000-square-foot Emergent Technologies Institute, which Simmons will direct.

The institute is being built on six acres within the privately owned Innovation Hub research park off Alico Road, south of the airport.

Simmons built one of the top solar programs in the nation while at the University of Arizona. He is dreaming big here, but reality keeps getting in the way.

"The excitement about solar isn't very high here," he said. "It's a big state that uses lots of electricity" but doesn't take advantage of its natural resources. "The big opportunity here is solar."

Simmons touts a long-term vision that could be a big economic driver for the state. People just have to begin to share the vision, he said, for major progress to occur.

"Solar can keep money here," he said, adding local labor could be hired to build solar plants. "We use so much electricity. It will take decades to build the fields we need. Why not start now?"

Simmons' reasoning goes like this: Utilities in the state spend about \$10 billion a year to buy fuel from outside the state. If one-tenth of that money could be diverted each year to spend on solar infrastructure efforts, less would have to be spent each year outside the state on natural gas.

Of course, getting that \$1 billion a year is easier said than done. Enough people have to be convinced, he said, to generate enough of a groundswell for substantial progress to occur.

Part of the goal is to develop talent that will stay here and help to diversify the region's workforce.

"We've got to increase the education," he said. "The growth here could be tremendous."

A lot of labor would be required to install the infrastructure necessary to develop a solar industry. FGCU could help to educate such a workforce.

"We're developing course work and training," Simmons said, including a master's degree in renewable energy and a bachelor's degree that would help to employ people in factories and to design the systems.

"Southwest Florida gets more sunlight than the rest of the state," he said, noting there is also less wind here compared to the east coast. Wind is not solar-energy's friend. "Southwest Florida could be the major center for solar development in Florida."

Simmons uses "could" a lot when talking about the future of the region and the state. The state could be a major solar supply hub to the Caribbean and Latin America. It could bring many high-tech jobs here.

So what's holding back the region and Florida? For meaningful change to occur, he said boldness needs to occur at the state level, most likely in the form of mandates that would force utilities' hands when it comes to renewable energy. That's what happened in Arizona. Today, solar generates as much as one-third of the electricity in Tucson, he said.

Florida seems content with "reasonably inexpensive electricity," yet it is missing out on an amazing long-term opportunity, he said.



Calyxo, a German company, has expressed interest in building a solar manufacturing plant in Fort Myers, but "I'm having trouble getting them started," Simmons said. "We're missing this opportunity completely."

So while he is still cautiously optimistic about what the future could hold, there is a trace of frustration in his voice, in what he has experienced here so far.

"They're not looking at the great big picture," he said, referring to politicians and people in power at state agencies. "They're looking at the small picture."

Developers of Babacock Ranch, however, have been looking at the big picture for a long time. Ground is finally expected to be broken later this year on what developer Syd Kitson has called the first "solar city" in the world. It is mostly in Charlotte County, but part of it is in Lee County.

Florida Power & Light plans to build a 75-megawatt solar powered generating facility, which is expected to allow the city to produce more energy than it is using. The community's 18,000 acres is expected to have 19,500 homes at buildout.

**'Reducing our use of fossil fuels'**

Dan Morrissey, owner of Cape Coral-based Fafco Solar Energy, has seen slow, gradual change during his 40 years in the industry.

"Solar pool heating has been the core of our business for a long time because it made economic sense right from the beginning," said Morrissey, who added that his father started the company in 1974.

Fafco Solar started doing photovoltaic solar panel installation in 1999, and the company today does installations "all the time," typically one a week. Photovoltaic, or PV panels, as they are known in the industry, convert sunlight directly into electricity.

"I'm all about reducing our use of fossil fuels," he said.

With that in mind, a grassroots citizens' effort called Floridians for Solar Choice — with supporters from across the political spectrum — is pushing the state to allow more homes and businesses to generate solar electricity.

Florida, it contends, is one of only four states to prohibit residents from buying electricity from companies that put solar panels on homes and businesses.

Floridians for Solar Choice is promoting a state constitutional amendment ballot initiative to change this, hoping to get it on the November 2016 ballot.

The amendment, in part, would allow businesses to generate and sell up to two megawatts of power to customers on the same or neighboring properties.

"I'm all for that," Morrissey said of the initiative. "I'm a small businessman and I support the homeowners and trying to get them to have more energy independence ... But I'm not against the utilities."

So for now, Morrissey will wait and see what happens with the industry. Business is good, with Fafco Solar employing about 20 people, and just hiring two people this past week.

"The industry is kind of controlled by policies and incentives," he said, noting there's just one incentive now for Floridians, a 30 percent federal tax credit that ends at the end of 2016. "If this amendment in Florida goes through, that's going to have an impact on the industry a great deal."

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## **Solar Firm Conergy to Move Headquarters to Miami-Dade**

Solar energy firm Conergy will move its U.S. headquarters from Denver to North Miami, where it will house 50 current and new employees.

The majority shareholder of Conergy is Miami-based Kawa Capital Management. Founded in 1998, its corporate headquarters is in Hamburg, Germany.

"There is no team like Conergy and no place like Miami," Conergy CEO Andrew de Pass said. "Conergy's employees are passionate people from all walks of life and corners of the globe. Miami is a unique, embracing melting pot, making it a perfect home for us. Miami is also a convenient geographic hub to support both Conergy's growing U.S. presence and our emerging markets in Latin America."

De Pass became CEO of Conergy in March after previously worked at Kawa Capital Management. Coming off a bankruptcy filing in 2013, Conergy posted nearly \$500 million in revenue in 2014, [according to an interview with de Pass at CNBC](#).

In a news release, the company said it expects the number of jobs in Miami to "increase significantly" in the coming year. It has employees in 15 countries.

Conergy divested its solar equipment manufacturing and distribution business and now focuses on the downstream side: the development, finance, construction and maintenance of solar power systems.

The company said it will introduce a global campaign later this year to combat climate change and promote local solar-related policies. That could have an impact in Florida, where environmental groups are pushing for a state constitutional amendment that would permit the leasing of solar panels to individual consumers and businesses, an initiative opposed by the state's utilities.

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### **Angel Investment Network Expands to Tallahassee: Bridges the Gap for Scalable Ventures to Gain Access to Capital, Resources and Networking**

(Orlando, Fla) - Promising new high-growth ventures now have an opportunity to connect with investors in the state's capitol region. News of the launch of the Tallahassee chapter of the Florida Angel Nexus (NEXUS) attracted nearly 60 potential investors and professionals, seeking to bridge the gap of financing early stage startups.

According to Blaire Martin, NEXUS Director, "The NEXUS is working with individual investors across the state and has received enough support and interest from the Tallahassee region to launch a dedicated chapter that will meet frequently - not only to evaluate opportunities from the Panhandle, but also to review scalable ventures from across the state." She adds, "By joining the NEXUS, individuals have access to a statewide network of opportunities. They can get the efficiencies of being in a large angel network and therefore reduce risk."



The Tallahassee Chapter is led by investors Matt Johnson and Jason Stamm. "What's been missing is the visibility and access to capital," said Johnson. "It's not that it's lacking entirely. There are many people in this community who fund companies and do a good job at it, but you don't always know who to contact to get access to those people."

Johnson added the chapter's newfound presence signals that investors believe there are enough high-quality companies to fund. "Nothing moves things forward like capital," he said. "You have to have these things to propel your business." Sophisticated angel investors also provide companies with mentorship and networking connections that can save them time and money while moving from the early stages through growth to exit.

One of the most underutilized resources in Florida is the accredited investor population. Many experienced entrepreneurs, executives and individuals - who could be investors have not had a marketplace to engage their peers and scalable ventures that may be of interest.

"Research shows that angel networks with more than 75 people build larger, more diversified portfolios. No current network exists in Florida with more than 75 people. The growing NEXUS community is addressing this by launching chapters across the state and collaborating with the FAN Fund. These are two significant steps in filling the gap," says O'Donnell.

For more information visit [www.floridaangelnexus.com](http://www.floridaangelnexus.com) or contact Blaire Martin at [blaire@floridaangelnexus.com](mailto:blaire@floridaangelnexus.com).

## U.S. ENERGY NEWS

### US South Getting its First Big Wind Power Farm Soon



On a vast tract of old North Carolina farmland, crews are getting ready to build something the U.S. South has never seen: a commercial-scale [wind energy farm](#).

The \$600 million project by the Spanish firm [Iberdrola Renewables LLC](#) will put 102 [turbines](#) on 22,000 acres (8,900 hectares) near the coastal community of Elizabeth City, with plans to add about 50 more. Once up and running, it could generate about 204 megawatts, or

enough electricity to power about 60,000 homes.

It would be the first large onshore wind farm in a region with light, fluctuating winds that has long been a dead zone for wind power.

After a years-long regulatory process that once appeared to have doomed the plan, Iberdrola spokesman Paul Copleman told The Associated Press that construction is to begin in about a month.

Right now, there's not a spark of electricity generated from wind in nine states across the Southeast from Arkansas to Florida, according to data from the American Wind Energy Association, an industry trade group.

But taller towers and bigger turbines are unlocking new potential in the South, according to the U.S. Department of Energy, and the industry is already looking to invest.

And with the electricity system in the region undergoing a period of change as coal plants are phased out, some experts believe the door is open for renewables like wind.

Federal energy researchers have found stronger winds at higher elevations that can be tapped by new towers and bigger rotor blades. New federal maps of onshore wind flows at higher elevations than were previously available indicate that this new technology significantly increases the areas that wind can thrive, especially in the Southeast.

"If you go higher, the wind is better," said Jose Zayas, director of the Wind and Water Power Technologies Office at the Department of Energy. "The question is how you get there responsibly and economically."

The average tower height now in the U.S. is about 260 feet (79 meters); the new technology allows turbines to mine air at 460 feet (140 meters).

The project in North Carolina was not viable just a decade ago, company officials said. But the new, larger turbines unlocked the area's potential.

Wind farms in 36 states already generate about 5 percent of U.S. energy — low compared to other countries like Denmark (28 percent), Portugal, Spain and Ireland (16 percent each). South Dakota and Iowa already derive about 20 percent of their electric energy from wind, according to the National Renewable Energy Laboratory.

The Energy Department believes the U.S. can generate 20 percent of the country's power with wind by 2030, and opening up the Southeast and other new areas is a key to achieving that goal.

There are hurdles: Utilities in most Southern states have not invested heavily in renewable energy. Also, only North Carolina has adopted a state law mandating utilities to increase their renewable energy portfolios.

But other factors are already forcing change in the region's energy market. Abundant natural gas, coal being phased out and aging nuclear plants are creating a potentially robust market for wind power as utilities seek the next best investment to add to their energy mixes, said Jonas Monast of Duke University's Nicholas Institute for Environmental Policy Solutions.

Still, without state renewable energy mandates like North Carolina's, the growth could be slow going, experts said.

Another issue facing wind farms in the Southeast is protecting the region's birds and bats.

The danger of wind turbines to birds like rare golden eagles and bats has plagued or derailed major projects in the West. Avian research is now factored into decisions on where to put wind farms, and can make or break a project.

Because no wind farms exist anywhere in the South, little research has been done on the issue. Researchers and developers will have to catch up.

## **Mapping How the United States Generates its Electricity**

Coal and natural gas are the most common sources for electricity in the country, but coal represents a declining share. The new Clean Power Plan seeks to accelerate that trend by requiring power plants to cut carbon pollution levels and rewarding states and companies that embrace clean sources of energy.

Click [here](#) to view the interactive maps.

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## The Perils of Platinum: Curtailing Precious Metal Use to Bring New Energy Storage and Production Online

Visions of dazzling engagement rings may pop to mind when platinum is mentioned, but a significant share of the nearly half a million pounds of the rare metal [External link](#) mined each year ends up in vehicle emission systems and chemical manufacturing plants. The silvery white metal speeds up or enhances reactions, a role scientists call serving as a catalyst, and platinum is fast and efficient performing this function.

Because of its outstanding performance as a catalyst, platinum plays a major role in fuel cells. Inside a fuel cell, tiny platinum particles break apart hydrogen fuel to create electricity. Leftover protons are combined with oxygen ions to create pure water.

Fuel cells could let scientists turn wind into fuel. Right now, electricity generated by wind turbines is not stored. If that energy could be converted into hydrogen to power fuel cells, it would turn a sporadic source into a continuous one.

The problem is the platinum – a scarce and costly metal. Scientists funded by the U.S. Department of Energy's Office of Science are seeing if something more readily available, such as iron or nickel, could catalyze the reaction.

But, earth-abundant metals cannot simply be used in place of platinum and other rare metals. Each metal works differently at the atomic level. It takes basic research to understand the interactions and use that knowledge to create the right catalysts.

At the Center for Molecular Electrocatalysis, an Energy Frontier Research Center, scientists are gaining new understanding of catalysts based on common metals and how they move protons, the positively charged, oft-ignored counterpart to the electron.

Center Director Morris Bullock and his colleagues showed that protons' ability to move through the catalyst greatly influences the catalyst's speed and efficiency. Protons move via relays -- clusters of atoms that convey protons to or from the active site of catalysts, where the reaction of interest occurs. The constitution, placement, and number of relays can let a reaction zip along or grind to a halt. Bullock and his colleagues are creating "design guidelines" for building relays.

Further, the team is expanding the guidelines to examine proton movement related to the solutions and surfaces where the catalyst resides. For example, matching the proton-donating ability [External link](#) of a nickel-based catalyst to that of the surrounding liquid, much like matching your clothing choice with the event you're attending, eases protons' travels. The benefit? Speed. A coordinated catalyst pumped out 96,000 hydrogen molecules a second -- compared to just 27,000 molecules a second without the adjustment.

This and other research at the Energy Frontier Research Center is funded by the DOE Office of Science's Office of Basic Energy Sciences. The Center is led by Pacific Northwest National Laboratory.

At two other labs, research shows how changing the catalyst's superstructure, which contains the proton relays and wraps around the active site, can also increase the speed of the reaction. Led by Argonne National Lab's Vojislav Stamenkovic and Berkeley Lab's Peidong Yang, researchers created hollow platinum and nickel nanoparticles, a thousand times smaller in diameter than a human hair. The 12-sided particles split oxygen molecules into charged oxygen ions, a reaction that's needed in fuel cells. The new catalyst is far more active and uses far less platinum than conventional platinum-carbon catalysts.

Building the catalysts begins with tiny structures made of platinum and nickel held in solution. Oxygen from the air dissolves into the liquid and selectively etches away some of the nickel atoms. The result is a hollow framework with a highly active platinum skin over the surface. The open design of the catalyst allows the oxygen to easily access the platinum. The new catalyst has a 36-fold increase in activity compared to traditional platinum-carbon catalysts. Further, the new hollow structure continues to work far longer in operating fuel cells than traditional catalysts.

These and other projects funded by the Energy Department answer questions vital to creating fuel cells that use platinum more efficiently and one day will lead to nickel, iron, or other common metals working in fuel cells to power cars, computers, and skyscrapers, while platinum rests, sparkling, in the wedding band section of jewelers' cases.

The Office of Science is the single largest supporter of basic research in the physical sciences in the United States and is working to address some of the most pressing challenges of our time. For more information please visit <http://science.energy.gov>.

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## **Battery Storage Breakthroughs Accelerate the Race to Renewables**

WASHINGTON, July 7, 2015 - Calling Tesla not just a car company but an "energy innovation company," Tesla's founder Elon Musk unveiled his cost-cutting Powerwall and Powerpack battery systems earlier this year, designed to "move the electricity grid off of fossil fuels and towards renewable energy sources."

While critics, including many utility companies, argue that renewables will never become reliable enough or cheap enough to replace coal and natural gas for generating electricity, Musk disagrees.

"Once we're able to rely on renewable energy sources for our power consumption, the top 50 percent of the dirtiest power generation resources could retire early," he said at the unveiling. "We would have a cleaner, smaller, and more resilient energy grid." He says Tesla's higher-power, lower-cost lithium ion rechargeable batteries give homes, businesses and utilities the ability to "store sustainable and renewable energy to manage power demand, provide backup power and increase grid resilience."

For electric utility companies, Tesla's battery systems provide up to four hours of continuous net discharge power. They offer on-demand distributed power generation, a buffer when power output from a large generation source is ramping up or down, instant power for blackouts or to transition output smoothly, improved power quality, avoidance of infrastructure upgrade costs, peak demand management, and support for self-sufficient micro-grids. Tesla's partners in developing storage include Southern California Edison and SolarCity, which forecasts that "every SolarCity customer will get a battery backup for their solar systems within five to 10 years."

Bottom-line benefits for utilities include reducing or eliminating the need to purchase high-cost power during peak demand periods. At utility scale, when Southern California Edison installed a battery in Orange, California, grid reliability improved and infrastructure investments were postponed. Small-scale beneficiaries include moviegoers in California, thanks to Southern California Edison installing Tesla batteries at two Cinemark Theaters.

Recent storage breakthroughs are also attracting attention on Capitol Hill. In Senate Energy Committee hearings in June, Chairman Lisa Murkowski, R-Alaska, Sen. Al Franken, D-Minn., and Department of Energy Under Secretary Lynn Orr agreed on the importance of energy storage.

Murkowski called energy storage "exciting." Franken said developing new systems to store electricity "will allow us to incorporate more renewables, it will give utility customers more control over their energy use, and will help them keep the lights on in case of a grid outage."

Pointing to storage research at Argonne National Laboratory and other DOE labs, Orr said DOE's breakthrough work on electro-chemistry and nano structures goes "beyond lithium ions" to develop batteries with greater energy density, greater power delivery and lower weight. The results, he said, will benefit "the cell phone right up to the grid, on a variety of time scales from the short-term variations of a wind turbine, to the day/night variations, or even to the winter/summer kinds of variations."



Orr described the Tehachapi Wind Energy Storage Project, which he called "one of the world's largest battery storage systems." The California project, funded by Southern California Edison and DOE, is operational. It uses a 32 MWh (megawatt hour) lithium-ion battery storage system to provide a host of benefits, including grid stabilization while decreasing transmission losses and diminishing congestion.

Other witnesses joined Orr in explaining that energy storage will become increasingly important as intermittent energy sources like wind and solar continue to increase their share of the U.S. energy supply. Bipartisan Policy Center board member Norman Augustine testified that "Few other technologies could be as much of a game-changer for the U.S. energy system and international technology leadership."

Still, the costs of many current storage systems will have to come down to be more economically attractive. A recent NREL report, "[Grid Integration and the Carrying Capacity of the U.S. Grid to Incorporate Variable Renewable Energy](#)," notes that "many available storage technologies have a higher capital cost relative to other options for flexibility currently available. In most power systems, further technology improvements will be needed for storage to be cost competitive with other flexibility options."

Little wonder, then, that some businesses would like to see the federal government do more to invest in new energy storage breakthroughs.

Karen Harbert, president and CEO of the U.S. Chamber of Commerce's Institute for 21st Century Energy, endorsed storage legislation proposed by Franken, [S. 1256, The Advancing Grid Storage Act](#). Harbert said that without a functional and cost-effective stationary storage component widely deployed throughout the distribution grid, "renewable power will never be baseload, limiting its potential use." She said Franken's bill "takes a step that DOE has not, making development of stationary storage a research priority and establishing a framework where commercialization is possible."

Franken's bill would provide \$50 million for DOE to supercharge its energy storage research and provide loans, grants and technical assistance aimed at improving the nation's electricity system. This would be accomplished through steps including "facilitating the use of renewable energy resources" and "strengthening the reliability and resiliency of energy infrastructure to the impact of extreme weather events, power grid failures, and interruptions in supply of fossil fuels."

Another bill that could become part of comprehensive energy legislation this year is [S.143, the Energy Storage and Deployment Act](#), introduced by Sen. Martin Heinrich, D-N.M. The bill would require utility companies to install enough storage to meet at least 1 percent of peak power demand by 2020 and 2 percent by 2024. Storage devices could be "pumped hydropower, compressed air, batteries or other electrochemical forms (including hydrogen for fuel cells), thermal forms (including hot water and ice), flywheels, capacitors, superconducting magnets, and other energy storage devices."

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## **G.M. and Nissan Reusing Old Electric Car Batteries**



For years, automakers have looked for ways to reuse the batteries from electric cars, which retain significant storage capacity even after they are no longer useful for transport.

Now, those efforts are beginning to bear fruit. On Monday, Nissan executives announced a partnership with

Green Charge Networks, an energy storage provider, to sell stationary systems built around used Leaf batteries to businesses. And on Tuesday, General Motors said it had a similar setup using Volt batteries that is helping to make a testing campus in Milford, Mich., practically energy independent. The company said it planned to sell its systems eventually.

“This system is ideal for commercial use because a business can derive full functionality from an existing battery while reducing upfront costs through this reuse,” said Pablo Valencia, senior manager for battery life cycle management at G.M. The batteries can retain as much as 80 percent of their storage capacity after coming out of the cars.

The announcements follow Tesla’s closely watched entrance into the stationary storage market last month with Elon Musk’s presentation of a line of battery packs aimed at homes, businesses and utilities, and a similar product line from Mercedes-Benz announced this month.

But those moves were focused on new batteries. Nissan’s and G.M.’s efforts are a reflection of the importance for manufacturers to find a way to harvest used batteries because batteries are expensive to produce and difficult to recycle or dispose of properly, said Karl Brauer, an analyst at Kelley Blue Book.

“The rest of the car can be recycled relatively easily, but that battery is going to be a much bigger deal to try to break down and turn into something else,” he said. By repackaging it as a stationary storage system, he added, “you’ve found a very effective, efficient secondary use of batteries that doesn’t require recycling.”

Still, he said, because sales of electric vehicles remain low, it is not clear when the supply would be large and consistent enough to create a significant market.

For the moment, the two car companies are focused on storage for themselves. In Michigan, G.M. is using five Volt batteries to help run a data center that is part of its testing facility, which has achieved net zero energy use on an annual basis, the company said.

A solar array and two wind turbines produce electricity while the batteries are available to either store or feed energy as needed, with excess power going into the grid. The batteries can hold four hours' worth of backup power for use in a failure.

The energy project grew from a partnership with ABB, a leading power and automation technology company, and is intended as a lab to help G.M. understand and develop storage systems for other businesses as well.

Nissan has embarked on a similar endeavor with Green Charge that the companies say is ready for the commercial market. They plan to install the first system, involving four car batteries, at a Nissan facility late this summer to help offset peak electricity demand.

"That really is a new development in this space where we're able to bring the Nissan Leaf E.V. into a role where it continues to deliver a sustainability component even though the vehicle and the battery have now been separated," said Brad Smith, director of Nissan's 4R Energy business in the United States.

Nissan estimates 80,000 Leafs are on the road in the United States, and plans to work with lessees to make sure there are enough batteries, which are guaranteed for eight years or 100,000 miles, to supply its potential second-life customers, executives said.

The companies predict that offering the batteries with intelligent systems management will prove particularly attractive for helping smooth out fluctuations in solar output at a lower price than is now available.

"This partnership is ultimately about power efficiency: reducing our carbon footprint, stress on the grid and energy," said Vic Shao, Green Charge's chief executive.

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## **Perovskite Solar Technology Shows Quick Energy Returns New Technology Beats Current Solar Panel Technology in Life-cycle Energy Assessment**

Solar panels are an investment -- not only in terms of money, but also energy. It takes energy to mine, process and purify raw materials, and then to manufacture and install the final product.

Silicon-based panels, which dominate the market for solar power, usually need about two years to return this energy investment. But for technology made with perovskites -- a class of materials causing quite a buzz in the solar research community -- the energy payback time could be as quick as two to three months.

By this metric, perovskite modules are better than any solar technology that is commercially available today.

These are the findings of a study by scientists at Northwestern University and the U.S. Department of Energy's Argonne National Laboratory. The study took a broad perspective in evaluating solar

technology: In what's called a cradle-to-grave life cycle assessment, scientists traced a product from the mining of its raw materials until its retirement in a landfill. They determined the ecological impacts of making a solar panel and calculated how long it would take to recover the energy invested.

Perovskite technology has yet to be commercialized, but researchers everywhere are excited about the materials. Most projects, however, have been narrowly focused on conversion efficiency -- how effectively the technology transforms sunlight into useable energy.

"People see 11 percent efficiency and assume it's a better product than something that's 9 percent efficient," said Fengqi You, corresponding author on the paper and assistant professor of chemical and biological engineering at Northwestern. "But that's not necessarily true."

A more comprehensive way to compare solar technology is the energy payback time, which also considers the energy that went into creating the product.

This study looked at the energy inputs and outputs of two perovskite modules. A solar panel consists of many parts, and the module is the piece directly involved in converting energy from one form into another -- sunlight into electricity.

Perovskites lag behind silicon in conversion efficiency, but they require much less energy to be made into a solar module. So perovskite modules pull ahead with a substantially shorter energy payback time -- the shortest, in fact, among existing options for solar power.

"Appreciating energy payback times is important if we want to move perovskites from the world of scientific curiosity to the world of relevant commercial technology," said Seth Darling, an Argonne scientist and co-author on the paper.

To get a complete picture of the environmental impacts a perovskite panel could have, the researchers also analyzed metals used for electrodes and other parts of the device.

One of the modules tested includes lead and gold, among other metals. Many perovskite models have lead in their active layer, which absorbs sunlight and plays a leading role in conversion efficiency. People in the research community have expressed concern because everyone knows lead can be toxic, Darling said.

Surprisingly, the team's assessment showed that gold was much more problematic.

Gold isn't typically perceived as hazardous, but the process of mining the precious metal is extremely damaging to the environment. The module in this study uses gold in its positive electrode, where charges are collected in the process of generating electricity.

The harmful effects of gold mining, an indirect impact of this particular perovskite technology, is something that could only be uncovered by a cradle-to-grave investigation, said Jian Gong, the study's first author and a Ph.D. student in You's research group at Northwestern.

The team hopes that future projects use this same zoomed-out approach to identify the best materials and manufacturing processes for the next generation of solar technology -- products that will have to be environmentally sustainable and commercially viable.

"Soon, we're going to need to produce an extremely high number of solar panels," You said. "We don't have time for trial-and-error in finding the ideal design. We need a more rigorous approach, a method that systematically considers all variables."

While this paper featured a thorough environmental assessment of different solar power options, further studies are needed to factor in economic costs. Before putting a perovskite panel on the market, scientists will likely have to replace gold and other unsustainable materials, for both environmental and economic reasons, Darling said.

In addition, extending the lifetime of perovskite modules will be important in order to make sure they are stable enough for long-term commercial use, You said. Despite a few necessary improvements, he said perovskite technology could be commercialized within two years if researchers use comprehensive analysis to optimize the selection of raw materials and manufacturing.

One of the motivations for this study, according to the authors, was the need to improve technology so that solar energy can be scaled up in a big way.

Global energy demand is expected to nearly double by 2050, and Darling said there's no question that solar power must contribute a significant fraction.

The real question, Darling said, is "How quickly do we have to get a technology to market to save the planet? And how can we make that happen?"

This research was conducted in part at the Center for Nanoscale Materials, a DOE Office of Science User Facility supported by the DOE's Office of Basic Energy Sciences.

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## California's Plan to Turn Distributed Energy Resources into Grid Market Players



Grid operator CAISO could let aggregated solar, storage, EVs and DR serve grid markets as soon as next year—with some limits.

California is already busy creating new regulations and market structures to integrate rooftop solar, behind-the-meter batteries, plug-in electric vehicles and fast-acting demand response systems into its grid. This week, California's grid operator took another step down this path -- one

that could allow these resources to tap the state's grid markets as a revenue-generating resource, possibly as early as next year.

On Wednesday, the California Independent System Operator (CAISO) published a proposal ([PDF](#)) for creating a new class of grid market players, known as distributed energy resource providers --

DERPs for short. In simple terms, the proposal sets rules for how DERs can be aggregated and dispatched to serve the same grid markets open to utility-scale energy installations today.

That's something that no other state has done, although some, including [New York](#) and [Texas](#), are working on similar plans. But California may be moving more quickly from concept to reality -- if only on a limited scale.

CAISO's board is set to vote on the draft final proposal at its July meeting, which would set the stage for requesting approval from the Federal Energy Regulatory Commission (FERC) for the changes needed to put the DERP classification of market participant into effect, Lorenzo Kristov, market and infrastructure principal at CAISO, said in a Wednesday interview. If that's forthcoming, "by the early part of 2016, parties could start using it," he said.

But to move this quickly, CAISO has put some constraints on this new class of grid player, he noted. These include caps on the size and scale of their aggregations, as well as a requirement that any serving more than a single grid pricing point must be limited to a single type of technology. These may limit the utility of systems that connect solar systems, batteries, EV chargers, smart thermostats, and other integrated energy assets.

California is full of companies eager to put their distributed energy resources to money-making use as grid resources. One well-known example is SolarCity, which is promising to share future grid revenues with customers installing Tesla Powerwall batteries alongside their rooftop solar systems. Battery-solar partnerships, like those SunPower has inked with Stem and Sunverge, are no doubt exploring the same possibilities.

Demand response companies like EnerNOC and Johnson Controls have been participating in CAISO's DERP proceeding, which makes sense, since California is in the midst of revamping its demand response rules in ways that could open up new business models and revenue opportunities. There's also potential for home automation platforms from companies like Nest or Alarm.com, or grid-responsive EV charging systems, to become pieces of the DERP puzzle.

But any company considering its future as a DERP will have to weigh the costs of networking and controlling customer-sited distributed energy resources against the potential benefits of earning grid market revenues from participation. Here's a breakdown of how CAISO has structured its plan, why it's set the limits it has on how DERPs can participate -- and how it's expanded some parts of its final proposal to meet stakeholders' desires for a more varied mix of resources to play a role.

## From ISO-metered to internet-connected: Merging distributed resources into a system built for central control

The first thing to know about CAISO's proposal is that it takes on some complex issues, arising from the move from single, large and transmission-connected resources like power plants, solar farms and utility-scale grid batteries, to a lot of resources scattered across the distribution grid.

CAISO's current rules require grid market-participating generators and loads to be at least 500 kilowatts in size. It also imposes strict telemetry and metering requirements for them to respond to its energy and ancillary services dispatch system.

But the DERP proposal would set up a simpler and less expensive way to meter and communicate with lots of smaller resources, and to allow any party that can aggregate at least half a megawatt of them to respond to CAISO's grid commands and get paid for it.

"We clearly see distributed energy resources playing a larger and larger role over time as part of the supply mix," Tom Flynn, CAISO infrastructure policy development manager, said Wednesday. CAISO has been working on the issue since 2013, when it held its first stakeholder meeting to discuss a key issue barring DERs from joining in grid markets -- telemetry and metering requirements.

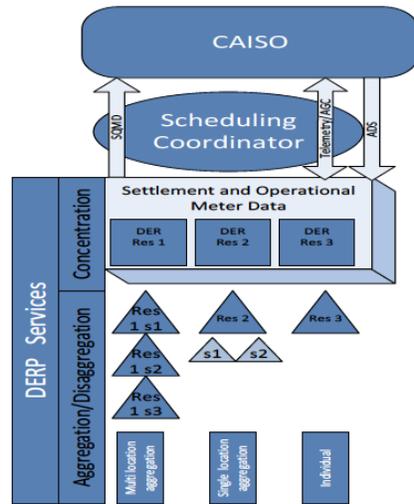
In a strict sense, "there's nothing that precludes you from aggregating resources today," he said. "But today's rules present some burdens for anyone trying to do that," and "one of those is that the underlying sub-resources have to be ISO-metered."

ISO-metered systems require a highly accurate measurement system with a real-time communications link between each grid connected resource and CAISO's operations center. That's possible with big power plants and other utility-scale resources, but it's far too expensive and complicated to do for individual DER-equipped homes and businesses.

To solve that problem, "we're proposing that these DERP aggregations are scheduling coordinator-metered entities, rather than ISO-metered entities," he said. A scheduling coordinator is an entity that's set up its own methods for metering and managing energy resources, and has had them vetted and approved by CAISO.

And under the DERP proposal, CAISO will allow these entities to connect their fleets of DERs via the Internet, using approved communications and security protocols. "That's a key advance, because it reduces some of the burden," he said.

This kind of approach is already being tested out in California, through demand response pilot projects that aggregate lots of homes and businesses to turn down power use to respond to grid



needs. These demand response projects will remain separate from the DERPs that could come into the market next year, but in both cases, “the scheduling coordinator has the responsibility of ensuring that those sub-resources are all metered, and that those meters comply with all applicable rules,” Flynn said.

As for telemetry -- the real-time communications link between CAISO and the grid resource -- the DERP proposal will not require it for systems under 10 megawatts in size if they’re seeking to play into energy markets only. For the more lucrative, but more technically rigorous, ancillary services markets, however, “a resource of any size is required to

provide and maintain real-time visibility, and in the case of regulation, respond to the ISO’s Energy Management System (“EMS”) control signal,” the proposal states.

## Sub-LAPs, PNodes, and the limits to mixing and matching different DERs as grid resources

Not all types of distributed energy resources will be able to join in the DERP mix willy-nilly, however. CAISO’s proposal has set some strict limits on how DERs will have to react to its commands, as well as what types of technologies can be aggregated across different parts of its grid network.

Discussing the limitations, Kristov explained that CAISO’s grid is akin to “a network of intersecting lines,” and that “every point where those wires intersect is a point where we have a price.” The same points are assigned to each spot where a generator connects to the grid, or where CAISO’s transmission system connects to the substations serving the lower-voltage distribution grids that carry electricity to end customers.

“Those things we call ‘pricing nodes,’” or PNodes, and there are 4,900 of them scattered across California, more densely clustered in the most heavily populated parts of the state. Here’s a map of a subset of major nodes, indicating the wide difference in power prices from point to point on a summer afternoon.



Any collection of DERs will correspond to one or more of them, depending on how broadly a DERP chooses to define the aggregated load it's making available as a resource. That creates a challenge for CAISO, because it won't necessarily know whether a DERP that's responding to a grid command is tapping resources connected to

one PNode or another one, or as the proposal puts it, how a CAISO signal will be "disaggregated or decomposed" by the DERP -- and not knowing that is a problem for grid operators.

"If you have a whole bunch of DER at a single network node, whatever its behavior, its impact will be only on that one location," Kristov said. "But if you have something that's spread across a dozen nodes, then we would give a dispatch," for example, requesting a bid for 5 megawatts of output, "but we don't know if it's going to be uniformly spread against those 12 nodes, or a predominance on one or two of those nodes -- and that unpredictability means we don't know the impact on the grid."

That led CAISO to cap the size of DERP aggregations across multiple PNodes to no more than 20 megawatts, and insist that all resources responding to a dispatch order move "in the same direction," either up or down, Flynn said. In other words, if a lot of batteries are bidding into a request for power, they all have to discharge at once -- DERPs can't allow some of them to keep charging up while others discharge.

But the most contentious limitation in CAISO's proposal is its insistence that DERPs do not combine different types of DERs within a single aggregation. In other words, batteries have to be combined with batteries, EV chargers with other EV chargers, demand response with demand response, and so on.

"There are some very complex reasons why we can't allow for that today," Flynn said. A big one is that CAISO's current software can't model the congestion relief impacts of having lots of different resources responding in an unpredictable fashion. CAISO's proposal ([PDF](#)) goes into greater detail on how "shift factors," "generation distribution factors," "load distribution factors," and other such technically precise matters limit its ability to model "heterogeneous" resources in the power flow calculations and contingency analyses it must run before it sends out dispatch orders.

So, as recently as last month, CAISO's proposal contained a blanket ban against mix-and-match DERs. But "the response from aggregators was, that's not a very popular element of the proposal," he said. "Many of them are thinking they'd like to aggregate rooftop solar, energy storage, batteries, demand response, and electric vehicle charging stations, because all of these things may exist in the home of the future -- and we were saying, you can't do that."





A new, first-of-its-kind report from Clean Energy Group tells the story of the early years of the resilient power movement – and as the movement spreads beyond the Northeast, states in other regions should be taking notice

In October 2012, Superstorm Sandy devastated the Northeast United States, disrupting electric service to more than eight million people

in 17 states. As traditional diesel-powered backup generators failed, critical facilities such as hospitals, first responders and public shelters, as well as vulnerable populations – the elderly, disabled and those in low-income neighborhoods – were severely impacted by the extended and widespread power outages. In some communities, the blackouts lasted for weeks.

In a rare example of a positive outcome from a natural disaster, several of the states hardest hit by Superstorm Sandy took action, using new policies and initiatives to promote the deployment of resilient power technologies. Resilient power uses clean energy systems, like solar PV combined with energy storage, to provide uninterrupted electricity to critical facilities during grid outages. As a bonus, resilient power systems can be configured to reduce electricity costs and provide valuable grid services year-round.

At this writing, most active state resilient power programs are concentrated in the Northeast. Massachusetts, New Jersey, Connecticut, New York, Maryland, Vermont, and a few other states have collectively committed more than \$400 million to create resilient power programs, incentives and funding institutions. These programs have largely been funded by system benefit charges, alternative compliance payments from utilities, and supportive federal solicitations and disaster relief funds.

Because of these state programs, 40 municipalities in the Northeast now have resilient power projects underway, which will support more than 90 critical facilities, at a likely capital cost of several hundred million dollars. In other words, larger resiliency goals have now been translated into real, on-the-ground community projects protecting communities with local, reliable, clean electric power that won't fail when the next storm knocks out the electric grid.

The resilient power movement represents a promising new path for clean energy deployment across the country. These early state efforts demonstrate that, when installed in combination and properly designed, renewables and energy storage technologies offer not only environmental and economic benefits, but can also save lives and protect vulnerable populations.

The new report by Clean Energy Group, *What States Should Do: A Guide to Resilient Power Programs and Policy*, profiles these leading state resilient power programs, and provides

recommendations for efforts in other parts of the country. The report is intended to help states establish new policies and support new markets to advance clean resilient power nationwide. You can read the full report here. An executive summary for policymakers is available here. Clean Energy Group will also be hosting a free webinar on this report in July – visit [www.cleangroup.org](http://www.cleangroup.org) or [www.resilient-power.org](http://www.resilient-power.org) for forthcoming details.

## FUNDING OPPORTUNITIES

FESC office tracks the energy related funding opportunities, shares them with faculty and industry partners, facilitates the submission of multi-faculty, multi-SUS university competitive proposals in response to solicitations for major research programs. The most recent funding opportunities are listed below. For a complete list please visit the [funding opportunities page](#) on the FESC website.

### DEPARTMENT OF ENERGY

**DE-FOA-0001329: SOLAR TRAINING AND EDUCATION FOR PROFESSIONALS (STEP)**

Application Due Date: 8/14/2015

**DE-FOA-0001202: Opportunities to Develop High Performance, Economically Viable, and Environmentally Benign Technologies to Recover Rare Earth Elements (REEs) from Domestic Coal and Coal Byproducts**

Closing Date for Applications: August 31, 2015

**DE-FOA-0001378: DOE Traineeship in Power Engineering (Leveraging Wide Bandgap Power Electronics)**

Closing Date for Application: September 3, 2015

**DE-FOA-0001380: GENERATORS for Small Electrical and Thermal Systems (GENSETS) (SBIR/STTR)**

Closing Date for Application: September 2, 2015

**DE-FOA-0001381: Intermediate Neutrino Research Program**

Closing Date for Application: September 2, 2015

**DE-FOA-0001268:**

**Concentrating Solar Power: CONCENTRATING OPTICS FOR LOWER LEVELIZED ENERGY COSTS: (COLLECTS)**

Closing Date for Application: August 25, 2015

**DE-FOA-0001204: FY 2015 Continuation of Solicitation for the Office of Science Financial Assistance Program**

Application Due Date: September 15, 2015 (or until replaced by a successor FOA)

**DE-FOA-0001358: FY 2016 Research Opportunities in High Energy Physics**

Closing Date for Application: September 17, 2015

**DE-FOA-0001359: National Spherical Torus Experiment - Upgrade: Diagnostic Measurements of Spherical Torus Plasmas**

Closing Date for Application: September 18, 2015

**DE-FOA-0001002: Innovative Development in Energy-Applied Science (IDEAS)**

Concept Paper Submission Deadline: September 28, 2015

Full Application Deadline: 9/28/2015

**DE-FOA-0001374:DOE Traineeship in Robotics**

Closing Date for Applications: September 30, 2015

**DE-FOA-0001375: Collaborative Fusion Energy Research in the DIII-D National Program**

Closing Date for Applications: Oct 2, 2015

**DE-FOA-0001313: Advanced Reactor Industry Competition for Concept Development**

Closing Date for Applications: Oct 5, 2015

**DE-FOA-0001386:Early Career Research Program**

Closing Date for Applications: November 19, 2015

**DE-FOA-0001282: Scientific Infrastructure Support for Consolidated Innovative Nuclear Research**

Application Deadline: Feb 18, 2016

**DE-FOA-0001281:FY2016 Scientific Infrastructure Support for CINR**

Letter of Intent Due Date: August 27, 2015 at 8:00 p.m. ET

Full Application Due Date: February 18, 2016 at 8:00 p.m. ET

**Berkeley Cleantech University Prize (CUP)**

Closing Date for Applications: TBD

**H2 Refuel H-Prize Competition**

Deadline: 10/31/2016

**DE-FOA-0001203 - Assisting Federal Facilities with Energy Conservation Technologies, Fiscal Year 2015 (RFI)**

Application Due Date: TBD

**SPOTIR-0000018: Technologist-In-Residence Pilot: Laboratory Call for Proposals**

Application Due Date: TDB

**NATIONAL SCIENCE FOUNDATION**

**NSF 13-594: Industry/University Cooperative Research Centers Program**

Applications Closing Date: September 25, 2015 Planning Grant and Full Center Proposal

**NSF PD 13-7607: Energy, Power, Control and Networks (EPCN)**

Full Proposal Window: October 1, 2015 - November 3, 2015

October 1 - November 1, Annually Thereafter

**PD-15-7644: Energy for Sustainability**  
October 1, 2015 - October 20, 2015  
October 1 - October 20, Annually Thereafter

**DEPARTMENT OF AGRICULTURE**

**USDA-NRCS-NHQ-RCPP-16-01- Regional Conservation Partnership Program**  
Pre-proposal Due Date: July 8, 2015  
Full proposal Due Date: Nov. 10, 2015

**OTHER**

**Oak Ridge Associated Universities - ORAU Faculty Travel Grants Program**  
Application Deadline: 9/1/2015

**The US-Israel Binational Agricultural Research and Development Fund (BARD)**  
Submission Date: Yearly, Mid September

**ABB Research Award in Honor of Hubertus von Grunberg**  
The application deadline for the first award is Jan. 29, 2016.

**N00167-15-BAA-01 - Energy Conservation Applications for the US Navy**  
Response Date: 11/30/2016

[Read more at our website>>](#)

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## UPCOMING EVENTS

### **Waste Conversion Technology Conference & Trade Show**

August 17 - 19, 2015  
San Diego, CA

The Waste Conversion Technology Conference & Trade Show (WCTC) provides a forum for informing the public and private sectors of the economic and environmental significance of converting waste materials to alternative fuels such as biodiesel and ethanol as well as renewable electric energy.

Click [here](#) for more information.

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## **CZEBS-iiSBE Net Zero Built Environment 2015 Symposium**

August 19 - 21, 2015  
Montreal, Canada

We would like to invite you to attend the CZEBS-iiSBE Net Zero Built Environment 2015 Symposium on Smart Net Zero Resilient Buildings and Communities being held at Concordia University, Montreal, August 19-21, 2015.

This international workshop will bring together Canadian and international experts to discuss the challenges and opportunities for the design of Smart Resilient Net-Zero Energy Buildings and Communities of the future. Net zero energy strategies are rapidly becoming the cornerstone of future building and community performance targets and are being extended to carbon and other emissions.

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## **ACEEE National Conference on Energy Efficiency**

September  
20-22, 2015  
Little Rock,  
AR



The ACEEE  
National

Conference on Energy Efficiency as a Resource is a biennial event that was first held in 2001. The conference is widely recognized as the premiere event for examining energy efficiency as a strategic and critical utility system resource. The program content will be specifically designed to focus on the issues related to utility-sector energy efficiency policies and programs. Industry leaders will gather to discuss the latest developments in the use of energy efficiency as a key resource for meeting customer and utility system needs and for addressing other critical economic and environmental objectives.

Click [here](#) for more information.

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## **International Conference on Green Energy & Expo**

September  
21-23, 2015  
Orlando, FL



We officially  
invite all  
participants  
across the  
globe to

attend the International Conference on Green Energy & Expo popularly known as Green Energy-2015, to be held during Sep 21-23, 2015 at Orlando, Florida USA. Green Energy 2015 will focus on usage of natural resources and a unique opportunity for scientists from all over the world to meet, share, and perceive new scientific interactions. The theme of conference is "Share & acquire knowledge on utilization of natural resources" which reflects the emerging progress from our resources and scientist as discoveries in the lab are translated into useful technologies in an increasingly targeted and precise manner.

Click [here](#) for more information.

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### **The Battery Show and Critical Power Expo**

September 15 - 17, 2015  
Novi, Michigan

Critical Power Expo is dedicated to connecting the buyers, operators and specifiers of critical power equipment and technology with a wide range of suppliers along with the whole supply chain - from manufacturers of batteries, power systems and products to UPS equipment and monitoring systems.

Taking place September 15-17, 2015, in Novi, Detroit, Michigan, the exhibition hall offers attending facilities managers, data center managers, IT managers and engineers a one-stop-shop for informing key stationary power technology decisions.

Click [here](#) for more information.

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### **World Energy Engineering Congress**

September 30 - October 2, 2015

Orange County Convention Center  
Orlando, FL

AEE is very pleased to bring the WORLD ENERGY ENGINEERING CONGRESS (WEEC) to Orlando for 2015. Now in its 38th year, the WEEC is well-recognized as the most important energy event of national and international scope for end users and energy professionals in all areas of the energy field.

WEEC's featured Opening Session speaker for 2015 will be Dr. Condoleezza Rice. Dr. Rice will focus her remarks on terrorism, energy, and economic security. She will also discuss challenges and opportunities we might face as a result of the ever changing geopolitical landscape.

Click [here](#) for more information.

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### **The First International Symposium on Sustainable Human-Building Ecosystems**

October 5 - 7, 2015  
Pittsburgh, PA

The Steering Committee of the NSF funded Research Coordination Network (RCN) on Sustainable Human-Building Ecosystems (SHBE), in partnership with the Carnegie Mellon University, cordially invites you to participate in the First International Symposium on Sustainable Human-Building Ecosystems (ISSHBE).

The symposium provides an opportunity to share cutting edge findings in the integration of human behavioral science, social and economic sciences with building design, engineering and metrology for better understanding of building energy performance, environmental impacts and occupant comfort.

Click [here](#) for more information.

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### **Florida Green School Awards : Celebrating and Recognizing Environmental Excellence in Florida's Schools and Districts**

October 8, 2015  
Streamsong Resort, Polk Co., Florida

With nearly 50 nominations of outstanding efforts to teach and live green, the 6th Annual Florida Green School Awards called upon a number of remarkable individuals to serve on the panel of judges. After an eligibility check by the Department of Education, each nomination was reviewed by three judges. Scores were tabulated and aggregated. The top three finalists were identified in each category. The highest scoring project in each category was selected as the state winner.

Click [here](#) for more information.

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### **Third Annual Go SOLAR & Renewable Energy Fest**

October 9 - 10, 2015  
Ft. Lauderdale, FL

Go SOLAR Florida will host the Third Annual Go SOLAR and Renewable Energy Fest at the Greater Fort Lauderdale/Broward County Convention Center, in Fort Lauderdale. This FREE event will feature the latest information on alternative and renewable energy. It is quickly becoming the premier event in South Florida to promote renewable energy and learn how to save money while using cleaner sources of energy.

Click [here](#) for more information.

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### **2015 Florida Energy Summit**

October 14 - 16, 2015  
Jacksonville, FL

This year the summit will be held in Jacksonville, Florida, to showcase how Northeast Florida is leveraging America's evolving energy sector to grow an economy that will serve its residents today and allow future generations to thrive.

Click [here](#) for more information.

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### **BuildingEnergy NYC 2015**

October 15, 2015  
New York, NY

BuildingEnergy NYC is a rapidly growing, cross-disciplinary conference that offers practical, hands-on solutions to the financial, environmental, legal, and maintenance challenges facing NYC building owners and practitioners in every neighborhood and borough. Conceived in 2012 and nearly doubling in size yearly, BuildingEnergy NYC sets itself apart as a place where members of New York's building industry come together to learn from each other how to make the buildings of this great city even better. This year BuildingEnergy NYC offers six tracks and 24 fully accredited sessions to start the conversations. We'll share the details on big energy savings in multifamily retrofits, the bigger picture on policy and where it's driving the building industry, and plans for the biggest Passive House yet, out on Roosevelt Island.

Click [here](#) for more information.

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### **National Advanced Biofuels Conference & Expo**

The 5th annual National Advanced Biofuels Conference & Expo will take place October 26-28, 2015, at the Hilton Omaha in Omaha, Nebraska.

Produced by BBI International, this national event will feature the world of advanced biofuels and biobased chemicals-technology scale-up, project finance, policy, national markets and more-with a core focus on the industrial, petroleum and agribusiness alliances defining the national advanced biofuels industry.

With a vertically integrated program and audience, the National Advanced Biofuels Conference & Expo is tailored for industry professionals engaged in producing, developing and deploying advanced biofuels, biobased platform chemicals, polymers and other renewable molecules that have the potential to meet or exceed the performance of petroleum-derived products.

Click [here](#) for more information.

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### **The 6th International Conference on Smart Grid Communications (SmartGridComm 2015)**

November 2-5, 2015  
Miami, FL

The Organizing Committee is pleased to invite your participation in 6th IEEE International Conference on Smart Grid Communications (SmartGridComm 2015). This conference seeks to bring together researchers and practitioners around the world who are leveraging and developing Information and Communication technology for the Intelligent Grid with attendant economic, environmental, and societal benefits.

We look forward to sharing the innovative technologies and approaches being used to enable two-way energy and information flow, faster fault isolation and power outages restoration, renewable energy integration and consumer energy optimization tools as well as other smart grid applications.

SmartGridComm 2015 will be held in Miami Florida , USA on November 2-5, 2015. Miami is a major crossroads of multiple continents, rich in cultural diversity and offering many opportunities for leisure and exploration. IEEE SmartGridComm 2015 will feature a technical program centered around four thematic symposia, namely Communications and Networks to Enable the Smartgrid, Cyber Security and Privacy, Architectures, Control and Operation for Smart Grids and Microgrids and Data Management, Grid Analytics, and Dynamic Pricing.

We warmly invite you to participate in the IEEE SmartGridComm 2015 program of activities. We are confident that you will find the program to be enriching, enlightening and rewarding.

Click [here](#) for more information.

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### **Power Up Energy Expo**

Fall, 2015  
South Walton, FL

The Premier Energy Conference along the Gulf Coast, Power Up offers a great opportunity to network with peers and develop qualified leads for your business.

Click [here](#) for more information.

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### **2016 Capitol Days**

January 13, 2016 - January 15, 2016 @ All Day  
FSU Turnbull Conference Center  
Tallahassee, FL

Reserve your space to attend the Florida Chamber's Capitol Days and kick-off the 2016 Legislative Session with Florida's top business executives, legislators and state leaders with an event that focuses on:

- Florida's Business Agenda - The business communities 2016 legislative priorities,
- Securing Florida's future through private-sector job creation and economic development,
- Innovation, lawsuit abuse reform, healthcare, regulatory reform, talent supply, and water,
- State-of-the-State Update and more.

Register today and be a part of the conversation to secure Florida's future.

Click [here](#) for more information.

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## **EUEC 2016: ENERGY, UTILITY & ENVIRONMENT CONFERENCE**

February 3, 2016 - February 5, 2016 @ All Day  
San Diego, CA

The 19th Annual EUEC 2016, is USA's largest professional networking & educational event of its kind, with 2,000 attendees, 200 exhibits, and 400 speakers in 10 tracks.

Click [here](#) for more information.

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### Note from the Editor

Thank you for reading Florida Energy Systems Consortium Newsletter and sharing this newsletter with your colleagues. We try to highlight developments in renewable energy technology and research all across Florida and the world. If you have any news you would like to see featured in the Newsletter, or events you would like to announce, feel free to e-mail [floridaenergysystems@gmail.com](mailto:floridaenergysystems@gmail.com) for posting in the next newsletter and on the **FESC website**: [www.floridaenergy.ufl.edu](http://www.floridaenergy.ufl.edu)