

July 2014 Issue

FESC Highlights

Florida Energy News

U.S. Energy News

Funding Opportunities

**Upcoming Events**

Midwest Energy Policy  
Conference | September 30-  
October 1  
| St. Louis, MO  
Click [here](#) for more.

[Add to  
GoogleCalendar](#)

USEA 7th Annual  
Energy Supply Forum |  
October 2nd |  
National Press Club,  
Washington, D.C.  
Click [here](#) for more.

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2014 International  
Workshop on  
Environment and  
Alternative Energy |  
October 21 - 24 | The  
Debus Conference  
Facility, Kennedy  
Space Center  
Click [here](#) for more.

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**WORLD NEWS**

**China Solar Projects Poised to Fuel Panel Price Rebound**



**1 An employee checks SunPower Corp. solar panels at the company's module manufacturing plant at Flextronics in Milpitas, California.**

[JA Solar Holdings Co. \(JASO\)](#) expects solar-panel prices in China to recover as developers scale up projects and government measures encourage developments.

“Current prices have bottomed and will rebound later” as Chinese orders rise, said Xie Jian, president of JA Solar, the world’s third-biggest solar-panel maker by production capacity. “Demand will be quite positive” from August, Xie said.

The expected recovery in China, which accounts for more than 60 percent of global solar panel output, offers an early sign that manufacturers are succeeding in soaking up supply by building their own projects. The government’s push to promote developments closer to regions where electricity is needed most -- so-called distributed solar projects -- may also spur orders.

Panel prices in [China](#) declined about 10 percent in the first six months of the year compared with the second half of last year, according to Bloomberg New Energy Finance.

Higher tariffs imposed in the U.S. have had the opposite affect to what’s happened in China. Panel prices have [increased](#) about 15 percent since early June when the U.S. decided to apply preliminary duties on Chinese solar equipment imports, according to a global measure of

## Upcoming Events (Cont.)

World Bio Markets USA | October 27 - 29 | San Diego, CA  
Click [here](#) for more.  
[Add to GoogleCalendar](#)

Canadian Bioeconomy Conference | December 1 - 3 | Toronto, ON, Canada  
Click [here](#) for more.  
[Add to GoogleCalendar](#)

Renewable Energy World Conference and Expo | December 9 - 11 | Orange County Convention Center, Orlando, FL  
Click [here](#) for more.  
[Add to GoogleCalendar](#)

panel prices.

The U.S. Commerce Department acted again on July 25, proposing expanded penalties on some Chinese solar-energy imports in a victory for the U.S. unit of SolarWorld AG, which accused China of shifting production to Taiwan after it lost an earlier case.

### Trade Friction

The latest U.S. finding is preliminary, like the one in June, and calls for duties ranging as high as 165 percent for some Chinese manufacturers and 44 percent for those in [Taiwan](#).

“Industry profit margins will drop a bit in the second quarter from the first” as prices fall, said Shanghai-based JA Solar’s Xie, who expects China to install 12 gigawatts of solar power this year.

In anticipation of more demand at home and elsewhere, China’s four biggest panel producers are expected to boost capacity by at least 30 percent by the third quarter compared with the end of 2013, according to data compiled by BNEF.

At the end of last year, China had 43 gigawatts of panel production capacity out of a global total of 63 gigawatts, according to BNEF data.

“Panel prices may hold at 57 cents a watt for a while and may rally” if there’s a rush by developers to install projects in the fourth quarter, said Sebastian Liu, director of [investor relations](#) at [JinkoSolar Holding Co. \(JKS\)](#) “The industry saw installations at a less rapid pace than expected, leaving some inventories in the first half,” which lowered prices, said Liu.

The world may add 45 gigawatts of solar power this year, 12 percent more than a year earlier, BNEF estimates. As of the end of June, China had installed as many as 4 gigawatts, or about 29 percent of the new subsidized capacity allowed by China this year, Xie estimated.

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Iain Wilson, Keith Gosman

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## Decarbonising the World Energy System Without Nuclear

Nuclear power advocates believe the technology is essential to building a fossil fuel free world energy system. In fact it is optional, writes David Elliott - and not even very helpful. Efficiency and the 'new renewables' can do the job faster, and at much lower cost.

Renewable energy is doing well around the world - supplying around 22% of global electricity.

In 2013, the world achieved 1,560 gigawatts (GW) of renewable electricity generation capacity - almost five times more than the 331 GW of nuclear generation capacity. And where nuclear power supplied 11% of the world's electricity, renewables about twice as much.

Hydro is the biggest electricity supplying renewable, with around 1,000GW of generation

capacity in place. Wind comes next at 318GW, while PV solar is at around 139GW globally. And on the heat side, along with biomass use, solar thermal is now at 326GW, [much of it in China](#).

Will renewables continue to grow? Globally, the recession hit all investment, and total global investment in 'clean energy' of all sorts fell 9% in 2013 to \$254bn, following a 9% drop in 2012, according to Bloomberg New Energy Finance.

### **Renewables take 72% share of new generating capacity**

But within that, renewables have held up quite well. The REN21 group says 2013 marked the sixth consecutive year in which renewables had the majority share of new electricity generating capacity, with a 72% share in 2013.



REN21 may be seen as partisan, but the International Energy Association is surely not. Its 2013 Medium Term Renewable Energy Market report says that wind, solar, bio-energy and geothermal use may grow 40% by 2018, twice the 20% rate in 2011, supplying 25% of global electricity by 2018.

Longer term, its new [Energy Technology Perspectives](#) report notes that global nuclear capacity "*is stagnating at this time*", while in its High Renewables Scenario, solar PV becomes the dominant electricity source by 2040, providing 26% of global generation by 2050'.

The similarly non-partisan World Energy Council (WEC), has a 2050 global energy market-led 'Jazz' scenario, in which the share of renewables in electricity generation is 31% and in a more policy-led 'Symphony' scenario, 48%.

In terms of the role that nuclear power may play, [WEC said that](#) while "*the share of renewable energy sources will increase from around 15% in 2010 [of primary energy] to almost 20% in Jazz in 2050 and almost 30% in Symphony in 2050, nuclear energy will contribute approximately 4% of total primary energy supply in Jazz in 2050 and 11% in Symphony globally - compared to 6% in 2010.*"

### **Nuclear nations will remain a minority**

Clearly, if they are right, some countries will still be using nuclear, but they will remain a minority. At present 30 or so countries, out of the 196 countries in the world, use nuclear at some level, whereas around 50 countries get most (over 50%) of their electricity from renewables (mainly hydro so far) some much more and for around a dozen of them near 100%.

And many more are joining them, while defections from nuclear continue: it seems to be stalled globally, with closures mostly wiping out new starts.

While that may allow more funding to flow to support renewables expansion, fossil fuels still dominate and receive a lot of subsidies - the IEA says around six times more than do

renewables. Unless that changes, and we also start cutting back on energy demand, there is a risk that, with weak carbon caps, fossil fuel use will continue to grow.

The IEA is keen to promote energy efficiency and clearly that should be a priority. Both Germany and France are now committed to cut demand by 50% by 2050. But however much you cut demand you will still need energy supplies.

### **How far can renewables expand?**

If we want to avoid a retreat to nuclear and don't think fossil fuel CCS will help much, or should be relied on, then, if emissions are to be cut rapidly, renewables will have to expand even faster than they are already. Can they?

In the short term IRENA, the [International Renewable Energy Agency, says that](#) by 2030, renewables could supply 30-36% of global energy, depending on the level of energy saving - which is much more than the WEC envisages even by 2050.

Looking at some equally optimistic projections for 2050, there have been a series of scenarios published which go well beyond what the IEA and WEC envisage. Some suggest that, given proper support, by then, renewables could supply near 100% of the EU's electricity and perhaps even all of its energy by 2050.

Others go even further and says renewables could supply up to 100% of the whole world's electricity - and perhaps even all of its energy by around 2050.

[More studies are emerging](#) covering Korea, Japan, China, India, all saying roughly the same thing: up to 100% (of power and maybe of all energy) is possible by 2050 with balanced systems.

They may all be overstated. Not all countries would want to or be able to accelerate to 100% by 2050. But the quite cautious Global Energy Assessment (GEA), produced by an international team led by the International Institute for Applied Systems Analysis, noted that the share of renewable energy in global primary energy could increase *"to between 30% to 75%, and in some regions exceed 90%, by 2050"*.

### **Nuclear uncertainties**

There is perhaps some room in there for nuclear, which some countries may wish to keep and even expand (Russia for example). [But GEA saw nuclear energy](#) *"as a choice, not a requirement"*.

Someone may eventually come up with a safe, technically and economically viable nuclear technology - but the most promoted technologies, such as the liquid fluoride thorium reactor (LFTR), or nuclear fusion, are surely half a century or more from commercial maturity.

And enormous technical hurdles remain to be overcome, for example the apparently simple question of what materials to build them with, capable of withstanding decades of intense neutron bombardment. Such investments are, shall we say, speculative and uncertain on any timescale.

By contrast renewables offer so much more and are nearly all much further advanced. That's not to say it will be easy to ramp them up fast. But their costs are falling rapidly, especially for PV, as rates of deployment rise.

### **Fossil fuels can be squeezed out by 2050**

Given the political will, coupled with serious attention to energy saving, it should be possible to squeeze most fossil fuels out of the system in many places by around 2050, in some later and in some places earlier.

That still leaves fossil fuels playing a role for some time ahead - but as renewables and energy savings bite, it will be a diminishing one. Fossil fuel fired plants will be needed for a while for balancing grids as variable renewables expand.

Combined Heat and Power (CHP) plants can use fossil gas more efficiently and, linked to heat stores and district heating networks, can help with grid balancing. Gradually that role can be taken over by green gas fired CHP plants, using biogas and gas produced from surplus wind and solar power, when production exceeds demand.

We will also need new energy storage systems and 'smart grid' demand side management measures, and the development of a continental-scale supergrid will allow countries to balance their electricity supply and demand, smoothing out local peaks of production and demand.

### **First, we must decide what to aim for**

While fossil fuels are still used, CCS might help reduce some of the resultant emissions, although some see the development of biomass energy carbon capture and storage (BECCS) as a better bet, since that would be carbon negative. Assuming you are happy with using biomass!

There are of course many other strategic issues to face like this: should we aim mainly for electrification or for green heat and gas as well? What's the right scale for projects? Can more of them be locally owned and controlled?

But the basic point is that we can head for a near 100% renewable future should we wish. The key questions are how quickly can, should or must we do that?

## **FESC HIGHLIGHTS**

### **Concentrating Solar Thermal Power Plant at USF**

With funding from the Florida Energy Systems Consortium (FESC), the University of South Florida, Clean Energy Research Center (CERC) has built a concentrating solar power (CSP) plant on the USF/Tampa campus, under the leadership of Dr. Yogi Goswami.

This concentrating solar thermal pilot power plant can produce 50 kW of electricity. The collected solar energy is translated into thermal heat which is stored



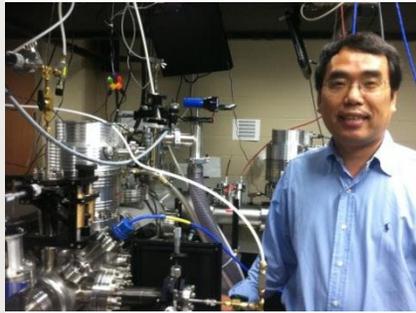
**2 USF's Solar Thermal Plant in Tampa, FL**

in phase change materials, which are also under development at the CERC.

To reduce the cost of energy storage, major efforts are being directed towards the use of encapsulated phase change materials to be incorporated in CSP plants to increase the capacity factor and address utility load requirements. Being able to save the energy collected from the sun, is a game changer, and phase change materials are seen as the next frontier in solar and other renewable energy. The CSP plant will be used for continued research and student hands-on education.

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## UCF Researcher Aims to Shatter Own World Laser Record



**3 Zenghu Chang, University of Central Florida physicist.**

A world-record-holding University of Central Florida physicist has earned more than \$9 million in federal grants to research developing faster computers and more efficient solar energy.

Zenghu Chang from the College of Sciences and the College of Optics & Photonics is the only researcher in Florida to receive a Department of Defense

Multidisciplinary University Research Initiative Award this year.

Chang is the lead researcher on one project and is a co-investigator on another project. UCF, Yale University and the University of California, Berkeley, are among universities that received multiple awards.

Chang's lab holds the world record for the shortest laser pulse ever created at 67 billionths of a billionth of a second. His lead research project will work to make pulses up to six times faster than his current world record.

Called attosecond lasers, research in this field can be used to study electrons and other molecules that researchers were previously unable to measure. The research will help scientists better understand the movements of electrons, eventually leading to faster computers and electronic devices.

This project is funded for \$7.5 million over five years.

"With this grant, we will be able to take attosecond science to the next level and see things that have never been seen before," Chang said.

Chang's second project, led by the University of California, Berkeley, will help scientists understand the first step of many chemical processes. Through understanding chemical reactions — such as those that convert absorbed sunlight into electrical power — the research could lead to more efficient solar energy.

Chang's UCF team will receive \$1.6 million over five years for that project.

The Army Research Office, the Air Force Office of Scientific Research and the Office of Naval Research provided \$167 million to researchers across the country. Spread over five years, the 24 awards came from an initial pool of 661 submissions and will research areas important to

the Department of Defense and the military.

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## UF Tech Connect Fuels Innovation Economy in First 12 Years

***EDA University Center Helped Launch 157 Tech Startups that Created 2,000 Jobs, Raised \$1B Since 2002***

GAINESVILLE --- In its first dozen years of operation, the [University of Florida's Tech Connect](#) program has helped launch 157 technology-based startup companies that in turn generated more than \$1 billion in private funding, \$530 million in public funding and 2,000 new jobs, according to a report released today.

During the fiscal year that ended June 30, the report shows, the program's affiliated companies hired more than 345 new employees and raised more than \$106 million in private funding and \$105 million in public funding. The report was prepared by [UF's Office of Technology Licensing](#).

Headquartered in the UF Office of Technology Licensing at the Florida [Innovation Hub](#), UF Tech Connect assists in commercializing university research discoveries by helping to create startup companies. A five-year, \$645,000 grant from the [U.S. Department of Commerce's Economic Development Administration](#), matched by the university, funds the program, one of several dozen EDA University Centers across the country.

"These startup companies are fueling the innovation economy," said Jane Muir, director of UF Tech Connect, associate director of UF OTL and director of the Innovation Hub. "The jobs they've created are less vulnerable to natural disasters and seasonal fluctuations. That makes Florida's economy more stable."

Among the more notable companies UF Tech Connect helped launch are educational software developer [Shadow Health](#); genomics technology developer [Rapid Genomics](#); and [Banyan Biomarkers](#), which develops and commercializes technology for the diagnosis and treatment of traumatic brain injuries.

As a partner with UF OTL, UF Tech Connect accelerates regional and statewide economic growth by assisting technology-based companies in commercializing inventions in medicine, biotechnology, engineering, health, information systems and other fields. UF receives an average of more than 300 invention disclosures a year on more than \$600 million in research.

"Investing in our tech startups provides great ROI, not only financially but also socially," said UF Assistant Vice President David Day, director of UF OTL. "They're transferring university technologies from the laboratory to the market, helping to make the world a better place."

UF has partnered with EDA on several grant opportunities during the past decade, including the 2009 grant for \$8.2 million that funded the construction of the Florida Innovation Hub at UF. This unique business incubator opened in October 2011 and is home to UF Tech Connect, the Office of Technology Licensing and several dozen technology-based startup companies, including many that license UF research discoveries.

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## UCF-Based Research Fuels \$100k Win for Entrepreneur

A UCF spinoff company received the \$100,000 first-place award at the [CAT5 Awards](#) at Innovation Concourse of the Southeast: Manufacturing and Safety event in Orlando. The company took the top prize from a pool of more than 80 technology-based companies.

HySense Technology, founded by [UCF Florida Solar Energy Center](#) researcher Nahid Mohajeri, develops and produces an intelligent tape that changes color in the presence of hydrogen and other gases.

“This is real validation, just the fact that people, the judges, believe in us,” Mohajeri said.

Mohajeri developed technology to detect hydrogen leaks wherever it is stored or transported as part of a \$10 million grant from NASA’s Kennedy Space Center. Her company later licensed the technology from UCF.

HySense is marketing a specialty beige tape that turns black when hydrogen is detected. It can be wrapped around or attached to surfaces where gas might leak. Mohajeri has five customers so far, and is aiming for \$90,000 total revenue this year.

“To have an awards program like this in Central Florida is huge,” she added. “As scientists, we are very much aware that low wages are in issue in the region. But these awards can bring more high-paying jobs here. When people see that we have this level of support, that makes a difference.”

The CAT5 Awards is hosted by [Space Florida](#) and UCF. It showcases tech companies in the Southeast that attracts venture funding for Florida’s entrepreneurs. This year’s event was held in Orlando on June 3-4 at the Hyatt Regency Orlando Airport.

“The CAT5 Awards support the idea that technology businesses are a key component to the enhancement of Florida’s future innovation-based economic growth,” said Tom O’Neal, associate vice president of [Research and Commercialization at UCF](#). “HySense is a clear example of innovation-based economic growth.”



**4 Hysense Technology CEO Nahid Mohajeri and Production Manager Monica Kowalczyk accept a \$100,000 check at the Innovation Concourse of the Southeast 2014 in Orlando.**

## **Technology Transfer Brings “More Than Money” to University Communities**

Translating university researchers' discoveries to the market can transform both the institution and society

TAMPA, Fla. – Just how valuable is "technology transfer" for universities? This question is addressed in "More than Money: The Exponential Impact of Academic Technology Transfer," an article from the National Academy of Inventors (NAI) that examines the impact of landmark 1980 legislation that facilitated technology transfer from the academic inventors'

"bench" to commercialization and the far-reaching and beneficial changes for universities and communities that have resulted.

The article appears in the current issue of [Technology and Innovation](#) and is available Open Access.

According to the authors, the benefits of technology transfer for universities go far beyond any potential revenues from licenses and royalties. Such benefits can be significant, including:

- A vibrant culture of entrepreneurship that promotes recruitment and retention of faculty who reap the rewards of innovation and the practical application of their research
- Increased student success through participation in real world research, exposure to the patenting process, and increased job prospects
- Public benefits from applied research that seeks to address global challenges around health, the environment, technology and our changing societies
- Economic development, with licensing revenue that boosts the economy, better retention of local talent, and new high-skill, high-wage jobs from university start-ups
- Increased opportunities for funding through inter-institutional and interdisciplinary grants, new start-ups and international research relationships
- Increased prestige and fundraising from a stronger university brand, and donor ties deepened through relationships with start-ups

"In the academic setting, technology transfer is a critical component for facilitating and sparking innovation within universities and helping to connect universities with commercial partners in the community," says co-author Paul R. Sanberg, president of the NAI.

"Technology transfer can be truly transformational to a university and to the community,"

For example, data gathered from 82 institutions responding to a survey conducted by the Association of University Technology Managers (AUTM) reports that in 2012 \$36.8 billion in net sales were generated by startup companies from 70 institutions that provided fulltime employment for 15,741 people. Additionally, 705 new companies were created based on university patented inventions and 591 new commercial products were launched for consumer use in 2012.

"Technology transfer describes the process of transferring scientific findings from one organization to another for the purpose of further development and commercialization," explains lead author Valerie Landrio McDevitt, former associate vice president for technology transfer and business incubation at the University of South Florida (USF) and current executive director of AUTM.

"Strong and supported technology transfer programs, the availability of funding from seed through venture capital, serial entrepreneurs, administrative support, and community engagement all become critical components affecting the success of technology transfer, and the best opportunity for reaping the benefits of technology transfer arises when all of the necessary components come together and are supported," said McDevitt.

Technology transfer in the past 35 years has transformed not only universities, but also transformed American society and the world beyond; the benefits are all around us, say the authors, and the increases in university-based patents and licensing, often to small startup

companies, continues.

"Having an active academic technology transfer program benefits individuals within the university community," said Sanberg, who is also senior vice president for research and innovation at the University of South Florida. "The NAI felt this paper was important because we are dedicated to supporting the patenting and research efforts of faculty, and wanted to make sure that the impact of those efforts was understood, beyond the bottom line."

In addition to McDevitt and Sanberg, the co-authors of the paper are Joelle Mendez-Hinds of the University of South Florida, David Winwood of the University of Alabama at Birmingham, Vinit Nijhawan of Boston University, Todd Sherer of Emory University, and John F. Ritter of Princeton University.

The [Fourth Annual Conference of the National Academy of Inventors](#) will take place Mar. 19-20, 2015, at the California Institute of Technology in Pasadena, Cal.

News Release by Florida Science Communications, [www.sciencescribe.net](http://www.sciencescribe.net)

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## FSU Researchers Win Financial Support to Help Move Inventions Closer to Market

By: Kathleen Haughney

Three Florida State University researchers are getting some extra cash to help steer their cutting edge work to the marketplace.

Researchers Alexey Kovalev, Branko Stefanovic and Mei Zhang received a combined \$62,000 to help further their work on a more effective bullet-proof glass alternative, a new anti-fibrotic drug and an innovative nanocarbon foam material through a university program called the Grant Assistance Program, or GAP.

GAP provides university researchers with funding to help prepare their work for commercialization and potentially find outside investors. Over the last nine years, it has doled out nearly \$2.2 million to help researchers develop products such as new cancer treatments, food contamination test kits and next generation wound dressings.



FSU Vice President for Research  
Gary K. Ostrander

"We've hired some really outstanding faculty," said Vice President for Research Gary K. Ostrander. "And this program can really help move their research to the next level and let them explore business opportunities related to that work. It's an important part of what we're all about at a large research-

focused public university like FSU."

The winning projects are:

**A new, cheaper alternative to bullet-proof glass:** Kovalev, a researcher at the National High

Magnetic Field Laboratory, has developed a new transparent, bullet-proof barrier out of aluminum and acrylic materials that is far cheaper and easier to repair than traditional bullet-proof glass.

The new product can even be assembled and taken apart in the field because it has sections that fit together to form a solid barrier.

“It can stop hand guns. It can stop rifles and maybe even a grenade,” Kovalev said.

Traditional bullet-proof glass is made of thin layers of glass stacked on top of each other. It’s very heavy and expensive and repairs are extremely time consuming.

Kovalev will receive \$6,000 from GAP to help begin to explore additional opportunities to bring the technology to market.

**A novel anti-fibrotic drug:** Stefanovic, a professor in the College of Medicine, has developed a new drug to treat fibrosis, scarring of the liver. There is no current drug on the market to effectively treat fibrosis, which opens up a unique market for Stefanovic because liver fibrosis is often a precursor to cirrhosis, the final state of liver disease where the liver is barely functioning.

Scarring of the liver cannot be reversed, but Stefanovic’s drug would stop it from progressing, he said.

“Doctors have no tools to stop progression right now,” he said.

Stefanovic has already completed a preclinical evaluation and plans to use his GAP award — \$28,500 — to run some additional evaluations on the drug.

**A nanocarbon foam:** Zhang, associate professor of industrial and manufacturing engineering, has developed a lightweight, elastic and conductive foam out of nanocarbons.

But even though it is lightweight, it can hold 38 times its own weight.

The foam has a lot of potential applications, Zhang said. It could be used as an electrode for a battery or as a sensor. It could also be used as a conductive elastomer, a material used to conduct electricity to design a special shielding effect.

Zhang will receive \$27,500 to perform more tests on larger scale pieces of the foam and look for potential commercialization options.

For more information about GAP, visit the [GAP website](#).

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## **FAU to Install World’s First Ocean Current Energy Test Site**

BOCA RATON, Fla. – Researchers at Florida Atlantic University’s Southeast National Marine Renewable Energy Center (SNMREC) will soon install the world’s first offshore test berth for small-scale ocean current turbines thanks to a recently signed five-year lease agreement between FAU and the U.S. Department of the Interior’s Bureau of Ocean Energy Management

(BOEM).

“This project is a potentially paradigm-shifting development in the global quest for clean energy sources and puts South Florida at the forefront of research in this critical effort,” FAU President John Kelly said. “It also demonstrates the multidisciplinary nature of marine renewable’s research, a successful public, private partnership and FAU’s international leadership in the field.”

The lease allows installation of multiple anchored floating test berths on the U.S. outer continental shelf 13 miles (22 km) offshore from Broward County, Fla. These test berths, each consisting of a buoy anchored to the sea floor, allow ocean current turbine prototypes (up to 100kW generation capacity) to be deployed from vessels moored in the Gulf Stream for a few weeks at a time.

“This is the first time a lease has been issued to test ocean current energy equipment in Federal waters,” said Walter Cruickshank, BOEM acting director. “The Gulf Stream contains a tremendous amount of energy, and this technology offers exciting potential to expand the nation’s renewable energy portfolio.”

Industry partners will have the opportunity to evaluate the efficacy of their turbine designs while mooring buoys collect measurements of ocean conditions nearby.

“Our team’s hard work and dedication to our vision is symbolized by the signed lease,” said Susan Skemp, director of SNMREC in FAU’s College of Engineering and Computer Science. “We are now looking forward to working closely with our industry partners as we begin to collectively evaluate equipment to generate power from ocean currents and continue to inform future regulatory processes.”

FAU’s SNMREC has been working since 2007 to establish the world’s first offshore ocean current turbine test site. Researchers recently performed a successful final sea trial of the first test berth buoy as well as preliminary tow tests of a small-scale research turbine in late 2013 — key steps before the installation of the test site. Before receiving a lease offer from BOEM, an environmental assessment of the project concluded that “no significant impact” was expected. Before installation of the first test berth planned this year, a project plan will be reviewed by BOEM. This work is supported by close to \$20 million in funding from the U.S. Department of Energy, the state of Florida and private companies.

FAU SNMREC’s lease application, a revised environmental assessment, as well as Findings of No Significant Impact (FONSI), can be accessed on BOEM’s Florida Activities web page [here](#) . Images of the small-scale research turbine and video from its tow tests can be [downloaded here](#).

For more information, contact Susan Skemp at 561-297-2339 or [sskemp@fau.edu](mailto:sskemp@fau.edu).

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## **FSU Engineer Uses Light to Change Makeup of Plastics**

By: Kathleen Haughney

A FAMU-FSU College of Engineering professor is using rays of light to control the shape of a special type of plastic, a project that could have long-term implications for manufacturing, solar energy harvesting, aerospace flow control and robotic actuators.

Mechanical engineering Associate Professor [William Oates](#) is in the midst of a four-year project supported by the Air Force Office of Scientific Research to test the possibilities of how light can change the shape of plastics and how those changes could help robots perform different tasks, like grip materials through adhesion. It is a collaborative project with a colleague in chemical engineering, Associate Professor Anant Paravastu.



**6 Mechanical engineering Associate Professor William Oates.**

“We are using light to control the structure of the material,” Oates said. “You can basically make the plastic bend and twist through a special type of photochemical reaction.”

The work is being funded by a \$580,000 grant from the Air Force Office of Scientific Research.

But, the process of exploration is done on a very small scale.

Oates and his graduate students use a light emitting diode (LED) and focus it on a tiny piece of plastic. The piece is currently only about as thick as an insect wing.

“The light is a little brighter than the sun,” Oates said.

The work on this project originally started in 2009 when Oates won a Young Faculty Award from the [Defense Advanced Research Projects Agency](#) that provided him with some initial funding and has been extended through an [NSF CAREER grant](#).

His work caught the attention of both the Air Force and other researchers at Florida State who were working on robots to see how they could collaborate.

“It’s great because I have so many colleagues working on different projects and sometimes our work can overlap,” Oates said.

Oates’ work may also result in the creation of cilia, the tiny hair-like structures on cells that are used for movement, biological adhesion, and to gather food. Oates and Ken Hanson, an assistant professor in chemistry, are working with a start-up company to see if it is possible to use a 3D printer to make these adaptive materials and structures respond to light in a much more efficient and novel manner.

“Hopefully, we’ll begin to see our technology transition to novel applications in the years ahead,” Oates said. “There have been many other ‘smart materials’ utilized in commercial applications such as ultrasound devices using piezoelectric materials and bio-medical stents using shape memory alloys. The use of light to control the shape of a structure provides an entirely new opportunity to manipulate engineering structures without using wires or heat to control the material.”

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## **UM: Study Provides New Approach to Forecast Hurricane Intensity**

MIAMI – New research from University of Miami (UM) Rosenstiel School of Marine and

Atmospheric Science suggests that physical conditions at the air-sea interface, where the ocean and atmosphere meet, is a key component to improve forecast models. The study offers a new method to aid in storm intensity prediction of hurricanes.

“The general assumption has been that the large density difference between the ocean and atmosphere makes that interface too stable to effect storm intensity,” said Brian Haus, UM Rosenstiel School professor of ocean sciences and co-author of the study. “In this study we show that a type of instability may help explain rapid intensification of some tropical storms.”

Experiments conducted at the UM Rosenstiel School Air-Sea Interaction Salt Water Tank (ASIST) simulated the wind speed and ocean surface conditions of a tropical storm. The researchers used a technique called “shadow imaging,” where a guided laser is sent through the two fluids – air and water – to measure the physical properties of the ocean’s surface during extreme winds, equivalent to a category-3 hurricane.

Using the data obtained from the laboratory experiments conducted with the support of the Gulf of Mexico Research Initiative (GOMRI) through the CARTHE Consortium, the researchers then developed numerical simulations to show that changes in the physical stress at the ocean surface at hurricane force wind speeds may explain the rapid intensification of some tropical storms. The research team’s experimental simulations show that the type of instability, known as Kelvin-Helmoltz instability, could explain this intensification.

Haus and colleagues will conduct further studies on hurricane intensity prediction in the new, one-of-a-kind Alfred C. Glassell, Jr., SUSTAIN research facility located at the UM Rosenstiel School. The SURge-STructure-Atmosphere INteraction laboratory is the only facility capable of creating category- 5 level hurricanes in a controlled, seawater laboratory. The nearly 65-foot long tank allows scientists to simulate major hurricanes using a 3-D wave field to expand research on the physics of hurricanes and the associated impacts of severe wind-driven and wave-induced storm surges on coastal structures.

The SUSTAIN research facility is the centerpiece of the new \$45 million Marine Technology and Life Sciences Seawater Complex at the UM Rosenstiel School where scientists from around the world have access to state-of-the-art seawater laboratories to conduct an array of marine-related research.

The study, titled “The air-sea interface and surface stress under tropical cyclones” was published in the June 16 issue of the journal Nature Scientific Reports. The paper’s lead author was Alex Soloviev of the UM Rosenstiel School and Nova Southeastern University Oceanographic Center and its coauthors include: Mark A. Donelan from the UM Rosenstiel School; Roger Lukas of the University of Hawaii; and Isaac Ginis from the University of Rhode Island.

## UCF: New NanoTech May Provide Power Storage in Cables, Clothes

Imagine being able to carry all the juice you needed to power your MP3 player, smartphone and electric car in the fabric of your jacket?

Sounds like science fiction, but it may become a reality thanks to breakthrough technology developed at a University of Central Florida research lab.



**7 Nanotechnology scientist and Professor Jayan Thomas.**

So far electrical cables are used only to transmit electricity. However, nanotechnology scientist and professor Jayan Thomas and his Ph.D. student Zenan Yu have developed a way to both transmit and store electricity in a single lightweight copper wire.

Their work is the focus of the cover story of the June 30 issue of the material science journal *Advanced Materials* and science magazine [Nature](#) has published a detailed discussion about this technology in the current issue.

“It’s an interesting idea,” Thomas said. “When we did it and started talking about it, everyone we talked to said, ‘Hmm, never thought of that. It’s unique.’”

Copper wire is the starting point but eventually, Thomas said, as the technology improves, special fibers could also be developed with nanostructures to conduct and store energy.

More immediate applications could be seen in the design and development of electrical vehicles, space-launch vehicles and portable electronic devices. By being able to store and conduct energy on the same wire, heavy, space-consuming batteries could become a thing of the past. It is possible to further miniaturize the electronic devices or the space that has been previously used for batteries could be used for other purposes. In the case of launch vehicles, that could potentially lighten the load, making launches less costly, Thomas said.

Thomas and his team began with a single copper wire. Then he placed a sheath over the wire made up of nanowhiskers the team grew on the outer surface of the copper wire. These whiskers were then treated with a special alloy, which created an electrode. Two electrodes are needed for the powerful energy storage. So they had to figure out a way to create a second electrode.

They did it by adding a thin plastic sheet around the whiskers and wrapping it around using a metal sheath after generating nanowhiskers on (the second electrode and outer covering). The layers were then glued together with a special gel. Because of the insulation, the inner copper wire retains its ability to channel energy, but the layers around the wire independently store powerful energy.

In other words, Thomas and his team created a supercapacitor on the outside of the copper wire. Supercapcitors store powerful energy, like that needed to start a vehicle or heavy-

construction equipment.

Although more work needs to be done, Thomas said the technique should be transferable to other types of materials. That could lead to specially treated clothing fibers being able to hold enough power for big tasks. For example, if flexible solar cells and these fibers were used in tandem to make a jacket, it could be used independently to power electronic gadgets and other devices.

“It’s very exciting,” Thomas said. “We take it step by step. I love getting to the lab everyday, and seeing what we can come up with next. Sometimes things don’t work out, but even those failures teach us a lot of things.”

Yu is the co-author of the study. He works in Thomas’ Nano Energy-Photonics Group. It conducts research focused primarily on nanostructured supercapacitors and Lithium-ion batteries, nanoarchitected light-trapping solar cells, photorefractive polymers for 3D display applications, and nonlinear optical materials.

Thomas is a faculty member at the UCF Nanoscience Technology Center with joint appointments in the College of Optics and Photonics (CREOL) and the College of Engineering and Computer Science. He has multiple degrees including a master’s degree in chemistry and a Ph.D. in material science. He is a recipient of National Science Foundation’s prestigious CAREER award. He’s received media attention over the past few years for his work on lasers and advanced nanomaterials.

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## **New Smart Sensors Research Partnership Aims to Boost Florida in Growing Industry**

The University of Central Florida will partner with Osceola County and the Florida High Tech Corridor Council to establish a state-of-the-art research and incubation facility focused on the next generation of universal smart sensors.

The goal of the Florida Advanced Manufacturing Research Center is to recruit or create the world’s first industry-led smart sensor consortium. Formed to make Florida a global leader in a rapidly growing industry, the center will be the home of research aimed at advancing technologies that will shape the future of automobiles, surgical devices, home appliances and a host of other devices.

As these innovations become ready for the marketplace, the center’s partners envision a growth in high-wage jobs for Central Floridians as existing companies expand and new companies move to the region to collaborate with the center’s researchers.

“This center holds great potential for becoming another economic game changer for our entire region – and the timing for such an endeavor could hardly be better,” said UCF President John C. Hitt.

Sensors allow us to see, hear, touch, taste, and smell beyond our capabilities. Sensors can detect things that we cannot, such as deadly carbon monoxide. They can show how diseases such as cancer and Alzheimer’s disease affect the human body, helping doctors provide more effective drug treatments.

The world smart sensors market is projected to reach \$7.8 billion by next year, according to Global Industry Analysts Inc., and global demand is expected to increase dramatically in the years to come.

“We’ve asked ourselves for years what comes next after Medical City and it’s this infrastructure project,” said Rick Weddle, president and CEO of the Orlando Economic Development Commission – a partner in the new center – and current president of the International Association of Science Parks and Areas of Innovation. “This is how the communities of the future are being built and this is what technology-led economic development is all about.”

The center will be built on 20 acres owned by Osceola County near the intersection of U.S. 192 and Florida’s Turnpike, across U.S. 192 from Osceola Heritage Park.

The Osceola County Commission on Monday evening approved a memorandum of understanding with UCF and the Florida High Tech Corridor Council. Osceola County committed to investing \$61 million for design, construction and equipment costs associated with the 100,000-square-foot center. UCF will lease the building for \$1 a year for 30 years and will operate the center.

“This is a historic day for Osceola County. Partnering with the University of Central Florida as the home of a research facility of this significance ties into all the planning and work we’ve done to diversify our economy,” said Osceola Commission Chairman Fred Hawkins, Jr. “Creating these types of 21st Century jobs will make us a world leader in this coveted and competitive hi-tech field.”

The new partnership comes at a time when Florida continues to lose manufacturing jobs. A Brookings Institute report issued this month noted that Florida has lost 75,000 manufacturing jobs since 2007, and the state’s domestic and international trade deficit is growing. The same report said that for every four boxcarloads of goods brought into the state, only one carload is leaving with goods manufactured in Florida.

“We must change those numbers, and our dynamic partnership between UCF and Osceola County will help to make it happen,” Hitt said.

UCF researchers have developed sensors capable of a range of applications – from detecting hydrogen and specific chemicals in the air to reading oxygen in the blood – and are also creating the materials that will enable sensors to be integrated into ever-smaller computer chips.

UCF is set to provide \$10 million – from non-state and non-tuition sources – to help design and build the center and for start-up costs, as well as an additional \$7 million for focused faculty hires.

The Florida High Tech Corridor Council will contribute \$1 million initially. The council also will expand the scope of its signature Matching Grants Research Program at UCF, the University of South Florida and the University of Florida to include Sensor-Driven Advanced Manufacturing. Up to \$5 million of matching funds will be available for research activities and the operation of a consortium.

“Thanks to the forward-thinking leadership in Osceola County, this project will help create

more opportunities for our entire region,” said Randy Berridge, president and CEO of the Florida High Tech Corridor Council.

UCF’s connections with Osceola County include a shared campus with Valencia College on Denn John Lane, as well as business incubators in St. Cloud and Kissimmee. Osceola County also was one of the first partners to contribute to the development of the Medical City at Lake Nona.

## FLORIDA ENERGY NEWS

### MagLev Energy Partners with UCF to Develop a Fuel-Saving APU

A Florida-based company, in partnership with UCF researchers, has developed an innovative technology that will reduce fossil fuel usage in commercial trucks, potentially saving owners of large fleets money while reducing carbon emissions into the atmosphere.

Professor Thomas Wu and his research team from the College of Engineering & Computer Science and researchers from MagLev Energy Inc. (MEI) invented the motor/generator technology and accompanying electronics that power an all-electric Auxiliary Power Unit (APU).

The unique design enables the device, appropriately called Silent Night™, to operate without generating harmful emissions like fossil-fuel powered APUs.

Jon Harms, Maglev president and CEO, noted the participation of truck manufacturer Peterbilt Motors and Walmart in testing the prototype. Peterbilt conducted the testing at its Advanced Concepts Technical Center on a truck loaned by Walmart. Peterbilt found the device performed far better than existing APUs and described it in a letter of support as being “on path to potentially produce the most efficient battery-based (APU) systems in the industry.”

No-idle regulations in many jurisdictions throughout the country require commercial drivers to shut off their engines for meals, deliveries and mandatory rest stops. MEI’s electric APU powers air conditioning, lights, television, computers, and other “hotel” amenities overnight and other times when the truck engine is off.

Current models are estimated to save a trucker between \$45 and \$48 per day, and up to \$15,000 annually, Harms said. The savings become even more significant for owners of large fleets and when combined with a high-efficiency alternator that the company is also developing.

“This unique technology runs cool, is quiet and yields extraordinary horsepower per pound,” said UCF’s Wu.



**8 From left, Maglev Chief Financial Officer Martin Epstein and UCF College of Engineering & Computer Science Professors Louis Chow and Thomas Wu with research equipment in Wu's lab.**

The device is still in the prototype stage and MEI officials expect to sell the product in limited quantities by the end of the year and to begin full production by mid-2015. Pricing is expected to be competitive with conventional APUs.

The work was funded by MEI and the Florida High Tech Corridor Council Matching Grants Research Program. Silent Night™ uses highly efficient lithium ion batteries together with a proprietary high-efficiency motor design to cycle through an industry-leading 10 hours of air conditioning (at 10,000 BTU's) or heat, said Jon Harms. In addition, the APU can also power up to 2,500 watts of power simultaneously – enough for lights and a small television or computer and other amenities. “We wanted to give the user a full night of power,” said Harms.

The system recharges when the truck is operating.

The industry has previously relied on diesel or other fossil fuel powered units. In the face of increasing costs and ever-stricter fossil fuel emission regulations, those units pose problems including high fuel and maintenance costs.

Harms said the Silent Night™ APU is able to operate at about 60 percent of the cost of fossil fueled APUs. The Silent Night™ prototypes are bolt-on replacements to existing diesel APUs.

MagLev and UCF are further developing the technology for other clean-energy applications. For more information on MagLev: <http://maglev-energy.com/>

## U.S. ENERGY NEWS

### BOEM Issues First Renewable Energy Lease for Marine Hydrokinetic Technology Testing

As part of the Obama Administration’s Climate Action Plan to create American jobs, develop domestic clean energy sources and cut carbon pollution, the Bureau of Ocean Energy Management (BOEM) today announced it has issued a lease to Florida Atlantic University (FAU) for marine hydrokinetic technology testing offshore Florida to evaluate the use of turbines powered by ocean currents.



9 Two photos showing BOEM's Director, Tommy Beaudreau engaging the media

energy portfolio.”

FAU’s Southeast National Marine Renewable Energy Center (SNMREC) applied for a lease to deploy experimental demonstration devices in an area located approximately 10 to 12 nautical miles offshore Fort Lauderdale.

“This project is a potentially paradigm-shifting development in the global quest for clean energy sources and puts South Florida at the forefront of research in this critical effort,” FAU

“This is the first time a lease has been issued to test ocean current energy equipment in Federal waters,” said BOEM Acting Director Walter Cruickshank. “The Gulf Stream contains a tremendous amount of energy, and this technology offers exciting potential to expand the nation’s renewable

President John Kelly said. "It also demonstrates the multidisciplinary nature of marine renewables research, a successful public, private partnership and FAU's international leadership in the field."

The proposed project involves the installation of multiple anchored floating "test berths" to evaluate ocean current turbine designs. Each test berth will consist of a buoy anchored to the sea floor to measure ocean conditions and allow ocean current turbine prototypes to be deployed from vessels moored in the Gulf Stream. Now that the lease has been executed, FAU may submit a project plan for BOEM's review.

In April 2012, BOEM published in the Federal Register an environmental assessment (EA) for the proposed project for a 30-day public review period. The EA considered potential environmental impacts and socioeconomic effects of issuing a lease and associated project activities (e.g., conducting surveys, installing mooring and telemetry buoys, and testing of equipment) designed to use the Florida current to generate electricity.

BOEM published a revised EA in August 2013. Based on the analysis contained in the revised EA, BOEM issued a Finding of No Significant Impact, which concluded that the environmental impacts associated with the proposed activities would not significantly impact the environment.

Today's announcement builds on BOEM's activities to grow offshore renewable energy through issuing leases for renewable energy activities. BOEM has awarded five commercial wind energy leases off the Atlantic coast: two non-competitive leases and three competitive leases. BOEM expects to hold additional competitive auctions for wind energy areas offshore Maryland, Massachusetts and New Jersey this year.

Off the Pacific Coast, BOEM has given the approval for Principle Power, Inc. to submit a formal plan to build a 30- megawatt pilot project using floating wind turbine technology offshore Coos Bay, Oregon and is reviewing an application from the National Northwest Marine Energy Center-Oregon State University for a research lease to evaluate wave energy converter performance.

For more information about the FAU lease and EA, go to BOEM's website by clicking [here](#).

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## **Solar Fuels: How Close, How Real?**

Jim Lane, Biofuels Digest

There's a class of fuels that don't use an intervening biomass to make a fuel — so, though they use biology or waste carbon, they've bristled at being called "biofuels." Instead, the technologies that depend on unique pathways to converting CO<sub>2</sub> and water to fuels and chemicals prefer "solar fuels."

By any name, they're fascinating. What's the latest?

The most well-known of the solar fuels is, without a doubt, those from Joule Unlimited, which pioneered the term "solar fuels" in the first place and is the closest to reaching scale. Using modified cyanobacteria, they form jet fuel, diesel and ethanol under the brand name "Sunflow" — and have been operating a demonstration facility in Hobbs, New Mexico for

going on two years now.

But other technologies have come along — not following the same biotechnology path, but utilizing some of the same underlying concepts of waste CO<sub>2</sub> utilization, bypassing biomass, and making target fuels and chemicals directly from the same inputs that plants use to make biomass in the first place.

### **About Liquid Light**

One of the most interesting of these is Liquid Light, which emerged from stealth mode in the past year, and focuses on electrocatalytic conversion of CO<sub>2</sub> to useful fuels and chemicals. The company's first process is for the production of ethylene glycol (MEG), with a \$27 billion annual market.

In measuring progress, the company notes that “Results consistent with cost-advantaged production have been validated at lab scale for key parts of our process. Ultimately, the company has opportunities in propylene, isopropanol, methyl-methacrylate and acetic acid.”

So, here's a company that doesn't use biology, doesn't use sunlight, and doesn't use an intervening biomass. Well might you ask, what has this anything to do with a solar fuel?

### **Back to Solar Fuels**

So, let's focus for a moment back on solar fuels. Is there anything in this class of technologies that might prove out the potential of a new way of storing solar energy, as liquid fuel?

You see, that's been perhaps the biggest challenge of solar technology to date. Production gets better and cheaper all the time, but how do you store it — and, in real-time, how do you deal with the intermittent nature of key renewable energy technologies?

After all, electro-chemical batteries, that store solar energy in electron form — well, they're getting better but not nearly fast enough to match the interest in solar, or match the rate of improvement in solar PV technology. Grid-scale systems still generally try to use solar energy in real-time, for peak power periods — which electric cars suffer from short ranges.

A very interesting advance along that front appears this week in the *Journal of CO<sub>2</sub> Utilization*. A research team from Princeton, using Liquid Light catalysts and specially-designed reactor cells, demonstrated that it was possible to produce formates.

What makes it especially interesting is that they used a standard solar panel to power the set of electrocatalytic reaction cells. The project confirmed that renewable power, in this case solar, worked as a power source, and that the intermittent, sometimes-unpredictable nature of renewable sources did not negatively impact process efficiency.

There have been attempts to make formates directly from sunlight before. None have reached the basic processing efficiency benchmark, which was to match or exceed the conversion efficiency of natural photosynthesis.

In this case, the results were as much as 9X better than the best previously reported results by industry or research labs, for converting solar energy to formates, and roughly 2X better than

photosynthesis.

The researchers report (*BEWARE: sciencespeak alert!*)

*The storage of solar energy as formic acid generated electrochemically from carbon dioxide has been identified as a viable solar fuel pathway. We report that this transformation can be accomplished by separating light absorption and CO<sub>2</sub> reduction through the use of a commercial solar panel illuminated with natural AM1.5 sunlight to power a custom closed-loop electrochemical flow cell stack. Faradaic yields for formate of up to 67 percent have been demonstrated in this system, yielding a solar energy to fuel thermionic conversion efficiency above 1.8 percent.*

### **What Are Formates, Again?**

Formate itself is salt or an ester of formic acid — which is best known as the key chemical in ant venom and accounts for the odor from a crushed ant.

For one, there are formic acid fuel cells, where the formic acid can be fed directly to proton exchange membrane fuel cells and provide electricity to power mobile phones and laptops. Though formic acid fuel cells are not yet a practical technology, they've been touted as an alternative to hydrogen fuel cells because they don't require exotic temperatures and pressures like hydrogen does.

For those of you who hate the charge times of Li-ion batteries — well, you are talking about seconds by simply re-fueling. Some of the latest work on catalysts for formic acid fuel cells is here, from work [performed at Umea University in Sweden, here](#) . Work from 2012 [is also reported here](#).

### **Another Technology Path Using Some of the Same Ideas**

James Liao's lab at UCLA has been working on some of the same ideas. Back in 2012, they reported that "We've been able to separate the light reaction from the dark reaction and instead of using biological photosynthesis, we are using solar panels to convert the sunlight to electrical energy, then to a chemical intermediate, and using that to power carbon dioxide fixation to produce the fuel. This method could be more efficient than the biological system."

"Instead of using hydrogen, we use formic acid as the intermediary," Liao told Gizmag, based on work he published in Science. "We use electricity to generate formic acid and then use the formic acid to power the CO<sub>2</sub> fixation in bacteria in the dark to produce isobutanol and higher alcohols."

Brookhaven and AIST have been pursuing some related ideas. In their case, they think that hydrogen and CO<sub>2</sub> can be converted to formic acid, stored more safely and efficiently than cryogenically cooled hydrogen, then convert back to hydrogen when its time to release into the fuel cell. [More on that here](#).

### **Back to Liquid Light and Chemical Production**

For now, the Princeton research confirmed that Liquid Light's underlying technology could produce compelling results across more than one target chemical. And, the portion of the

experiment that measured cell efficiency also supported the high expected efficiency for electrocatalytic conversion of CO<sub>2</sub> to other chemicals (such as ethylene glycol) using Liquid Light's technology.

### **The Bottom Line**

There's increasing evidence that a scaleable process to store solar energy as a liquid chemical at standard temperature and pressure is on the way. And, that useful targets like MEG (ethylene glycol) are in the mix, there.

That's a key substantiation that there's a near-term market available to Liquid Light that will support its path to commercial success. Which will be mighty pleasing to its investors, which include VantagePoint Capital Partners, BP Ventures, Chrysalix Energy Venture Capital, and Osage University Partners.

Longer term, couple of forks in the road ahead. Could be that target fuel molecules will appear in Liquid Light's future — or, via partners.

More interestingly, there are opportunities here to — in the long term — connect two of the most hyper-efficient technologies around (solar PV and fuel cells). Is formic acid going to be the crucial intermediate that links high-efficiency energy capture to high-efficiency electric engines?

It's the kind of challenge that ought to deserve an X Prize. We'll see if one emerges.

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## **Biofuel Advancement Threatened: How Can We Save the Renewable Fuel Standard?**

Jan Koninckx, Global Business Director of Biorefineries, DuPont Industrial Biosciences

Advanced biofuels are no longer a futuristic hope — they are here. This year, three companies including DuPont will turn on commercial-scale cellulosic ethanol biorefineries, the result of billions of dollars in investment and close to 10 years of collaborative research with universities, government agencies and other private entities. This is a tremendous step forward in our country's effort to lower our dependence on finite fuel sources and to give consumers a renewable choice at the pump.

But that progress is under threat. The policy that has enabled the industry, the Renewable Fuel Standard (RFS), is at risk of being altered, and the volumes of renewable fuels being blended into our fuel supply stymied. The United States Environmental Protection Agency (EPA), which administers the policy, will issue its final ruling later this year on those volumes. That agency's decision has the potential to secure U.S. leadership in this innovative new industry or cut our legs out from under us, right as we are learning to walk.

How did this happen? And how did we get here?

In 2007, a bipartisan Congress passed the RFS, which requires a growing amount of renewable fuel to be blended into the nation's gasoline supply each year. The policy has been a success: over these past seven years,



the RFS has decreased greenhouse gas emissions by 33.4 million metric tons, lowered gas prices by \$1.09 per gallon and has helped the value of U.S. farmland grow by \$500 billion. Arguably no other policy has done more to lower greenhouse gas emissions than the RFS.

However last fall, [opponents of renewable fuels were successful](#) in convincing the EPA that they had hit a “blend wall” and could not further increase the amount of clean, renewable fuels that they are blending into the fuel supply. These opponents, largely from the oil industry, insist that the infrastructure just isn’t there to deal with increasing amounts of renewable fuel — when ironically, they control the development of the necessary infrastructure upgrades, such as blender pumps. With this misinformation, the EPA proposed to limit the 2014 volume of renewable fuel to 10 percent in U.S. gas tanks, a reduction from 2013.

Luckily, [this was just a proposal](#). Since that time, the agency has heard from over 300,000 people, companies and organizations who filed comments on the rulemaking. They heard how time and time again, we’ve seen this ‘blend wall’ consist of nothing but thin air. NASCAR, for instance, uses E-15 (15 percent ethanol blend) in all of their stock cars. One of the country’s largest retail convenience store chains, Mapco, has been offering E-15 at many of their stations, providing consumers with the option of a more sustainable, home grown fuel. In essence, the only reason that this blend option is not the norm is the unwillingness of some fuel suppliers to adapt to the new technologies, thereby maintaining control of the market. Also E-85 availability continues to grow and benefit flexfuel car owners.

In fact, there is widespread support for reducing our dependence on foreign oil and its volatile supply chains, keeping jobs here at home and innovating additional ways to provide cleaner energy for a growing planet. Later this year, DuPont will open the largest cellulosic ethanol biorefinery in the world in Nevada, Iowa. The plant will produce 30 million gallons of fuel from corn stover — the stalks, cobs and leaves left in the field after the harvest — which the company will purchase from 500 local farmers, providing them with a new source of income in return for what would otherwise be agricultural waste. This greenhouse-gas-neutral biorefinery, like the two others under construction in the United States, is pumping money back into our rural economy that would have otherwise gone overseas.

This is no small accomplishment. DuPont and other leaders in advanced biofuels have achieved in a few short years what Mother Nature takes millions of years to accomplish. The technology to unlock the sugars in cellulose and the supply chains to deliver those sugars at scale are enabling the commercial deployment of advanced renewable fuels today. Tomorrow, these same sugars and supply chains will be enabling a whole new world of bio-based chemicals and materials, delivering on the promise of a more bio-based economy.

DuPont will continue to work with the EPA and others to underscore what’s at stake and how we can best chart a course forward toward a cleaner energy future for America and the world.

## 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-0001078 - NOTICE OF INTENT (NOI): To Issue a Restricted Eligibility Funding Opportunity Announcement for Collaborative Grid Testing, Research and Valuation and Testing of Advanced Energy Storage Systems**

Submission Deadline: TBD

ARPA-E intends to promptly issue a restricted-eligibility Funding Opportunity Announcement (FOA) for collaborative electrical power grid testing, research and valuation of advanced energy storage systems. The purpose of the FOA is to fund one or more research collaborations that facilitate rapid commercialization of energy storage systems resulting from ARPA-E funded research efforts. While new grid storage technologies are maturing quickly, their adoption is hindered by a lack of performance and reliability data, and by customers' perceptions of the technologies as unproven. The research collaboration(s) selected through the FOA will address this gap in adoption of new energy storage technologies.

### **DE-FOA-0001002 - ARPA-E Open Innovative Development in Energy-Related Applied Science**

Concept Paper Deadline: 9/26/2014, 5:00pm, EST

Submission Deadline: TBD

This Funding Opportunity Announcement (FOA) is intended to provide rapid support to revolutionary applied energy research (Studies) that may lead to new ARPA-E programs to develop transformational and disruptive energy technologies. Studies are defined as single phase efforts of durations less than 12 months and cost less than \$500,000. Awards will be issued through Grants. ARPA-E is issuing this FOA as a one-year pilot initiative. If successful, this or a similar FOA will be issued annually. Applicants will submit brief Concept Papers (4 page maximum) as described below, and selected Concept Paper Applicants will then be invited to submit Full Applications. This FOA addresses only the Concept Paper process. Applicants must propose energy research that is not (1) covered by current ARPA-E projects, programs, FOAs, and RFIs (Requests for Information) and (2) an incremental improvement to existing technology. Applicants are encouraged to review current ARPA-E projects, programs, FOAs, and RFIs prior to application.

### **DE-FOA-0000890 - Frontier Observatory for Research in Geothermal Energy (FORGE)**

Application Issue Date: 07/17/2014

Application Due Date: 10/01/2014

The Department of Energy's (DOE) National Energy Technology Laboratory (NETL) on behalf of the DOE, Energy Efficiency and Renewable Energy (EERE) Geothermal Technologies Office (GTO) is seeking applications under this Funding Opportunity Announcement (FOA) for establishing and managing a dedicated Enhanced Geothermal Systems (EGS) field laboratory called the Frontier Observatory for Research in Geothermal Energy (FORGE). FORGE will focus on science and technology Research & Development (R&D) in an ideal EGS environment (see Section I.D.) in a domestic location. It is envisioned that FORGE will result in a rigorous and reproducible methodology that will enable development of on the order of 100+ GWe of cost-

competitive EGS power, supporting the President's climate goals.

Projects under this FOA will be comprised of three Phases. Under Phase 1 Applicants will complete certain mission-critical technical and logistical tasks that demonstrate the proposed site's viability and the Applicant's full commitment and capability to implement Phase 2 and 3 activities of FORGE as envisioned by DOE. Phase 2 is comprised of three subphases that collectively involve preparation and demonstration of full readiness of the FORGE site, including detailed site characterization and full environmental compliance, as well as initial planning for technology testing R&D and evaluation in Phase 3. Phase 3 involves full implementation of FORGE and tasks specific to the identification, testing and evaluation of new and innovative EGS techniques and technologies.

#### **DE-FOA-0000951 - Alternative Fuel Vehicle Deployment Initiatives**

Application Issue Date: 07/16/2014

Submission Deadline for Concept Papers: 08/01/2014

Submission Deadline for Full Applications: 10/01/2014

For the past 20 years Clean Cities has supported the use of alternative fuel in transportation, including renewable biofuels and the deployment of energy efficient transportation technologies. The Clean Cities activities were authorized by the Energy Policy Act (EPAct) of 1992, Section 505. This requirement aligns with EERE's Strategic Plan that aims to reduce U.S. dependence on foreign oil, increase the viability and deployment of renewable energy technologies, and increase energy efficiency.

The objective of this FOA is to create and implement high impact and highly innovative approaches to increase the acceptance and deployment of Alternative Fuel Vehicles (AFVs). This will be accomplished in part by funding three different Areas of Interest (AOI) which focus on: AFV-use demonstrations via hands-on experiences, safety-related training, and emergency preparedness.

#### **DE-FOA-0000995 - FY 2014 Continuation of Solicitation for the Office of Science Financial Assistance Program**

Issue Date: 10/01/2013

Application Due Date: Open until September 30, 2014 or until replaced by a successor FOA

The Office of Science of the Department of Energy hereby announces its continuing interest in receiving grant applications for support of work in the following program areas: Advanced Scientific Computing Research, Basic Energy Sciences, Biological and Environmental Research, Fusion Energy Sciences, High Energy Physics, and Nuclear Physics. On September 3, 1992, DOE published in the Federal Register the Office of Energy Research Financial Assistance Program (now called the Office of Science Financial Assistance Program), 10 CFR 605, as a Final Rule, which contained a solicitation for this program. Information about submission of applications, eligibility, limitations, evaluation and selection processes and other policies and procedures are specified in 10 CFR 605. This Funding Opportunity Announcement (FOA), DE-FOA-0000995, is our annual, broad, open solicitation that covers all of the research areas in the Office of Science and is open

throughout the Fiscal Year.

## **NATIONAL SCIENCE FOUNDATION**

### **NSF 14-511 - NSF/DOE Partnership On Advanced Frontiers In Renewable Hydrogen Fuel Production via Solar Water Splitting Technologies 2014-2016**

Letter of Intent Due: 10/06/2014

Full Application Due: 12/11/2014

The Directorate for Engineering at the National Science Foundation (NSF) has established a partnership with the Fuel Cell Technologies (FCT) Office of the U.S. Department of Energy (DOE) in order to address critical fundamental and applied research challenges associated with advanced technologies for the production of hydrogen fuel via solar water splitting processes. The goal of the partnership is to leverage the complementary missions of applied research, development and demonstration (DOE) and use-inspired fundamental research and education (NSF) to address issues of national importance that impact the sustainable production of fuels using renewable resources. The Directorate for Engineering seeks proposals with transformative ideas that meet the detailed requirements delineated in this solicitation.

## **OTHER**

### **2014-NIST-AMTECH-01 - NIST Advanced Manufacturing Technology Consortia (AMTech) Program, Planning Awards**

Applications Due: October 31, 2014

The National Institute of Standards and Technology (NIST) today announced a new competition for planning awards to support industry-driven consortia in developing research plans and charting collaborative actions to solve high-priority technology challenges and accelerate the growth of advanced manufacturing in the United States.

NIST's Advanced Manufacturing Technology Consortia ([AMTech](#)) Program anticipates awarding a total of \$5.6 million in two-year grants during the young program's second competition. Awards will range between about \$250,000 and \$500,000, subject to the availability of funds.

### **2014-NIST-CR-COE-01 - Community Resilience Center of Excellence Program**

Closing Date: 09/12/2014

NIST is soliciting applications to establish a Community Resilience Center of Excellence in which NIST researchers collaborate with interdisciplinary researchers from academia and industry on development of tools and standardized methods that will enhance the disaster resilience of communities and their built environment through innovations in

measurement science and in new modeling, simulation, data, and informatics tools coupled with field studies of multiple hazard events.

### **OBAMA-SINGH 21ST CENTURY KNOWLEDGE INITIATIVE (OSI)**

Proposals Due: November 3, 2014

The United States-India Educational Foundation (USIEF) announces an open competition for the support of projects through the Obama-Singh 21st Century Knowledge Initiative (OSI). Announced by the U.S. and Indian governments, OSI aims to strengthen collaboration and build partnerships between American and Indian institutions of higher education. Accredited U.S. post-secondary educational institutions meeting the provisions described in Internal Revenue Code section 26 U.S.C. 501c(3) may submit proposals to support the program's goals of encouraging mutual understanding, facilitating educational reform, fostering economic development, and engaging civil society through academic cooperation with Indian post-secondary educational institutions, in the thematic areas of Energy, Climate Change & Environmental Studies; Education & Educational Reform; Public Health; Sustainable Development & Community Development; and International Relations & Strategic Studies.

[Read more >>](#)

## **UPCOMING EVENTS**

### **Midwest Energy Policy Conference**

September 30th - October 1st  
St. Louis, MO

The Midwest Energy Policy Conference in 2014 will address:

- The 2014 environmental and energy rulings of the United States Supreme Court
- The path forward following the EPA greenhouse gas 111(d) ruling
- What makes successful state energy plan programs relevant and successful in several key focus areas (economic development, education, research, regulations, portfolio mix, biofuels, and more)

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### **USEA 7th Annual Energy Supply Forum**

October 2nd, 2014  
The National Press Club, Washington, DC

Corporate executives will gather to discuss topics ranging from unconventional energy supply resources to onshore exploration and production to technological advances in the supply sector.

Topics:

- U.S. Exports-Crude Oil, Natural Gas, Coal
- Shale Revolution
- The Future of Coal & Nuclear Power
- Promoting Technological Innovation

- Domestic Production Advances
- Future Global Outlook

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## 2014 International Workshop on Environment and Alternative Energy

October 21st - October 24th, 2014

The Debus Conference Center, Kennedy Space Center Visitor Center

An exciting program is being planned that will include presentations on current issues, progress on those issues, and technological solutions, from research and development to commercially available technologies, with a view toward collaboration.

This year's workshop will have a unique combination of technical presentations and discussions including:

- Increasing Space Mission Critical Ground Infrastructure Resiliency through Sustainability
  - Energy/Water Security Measures
  - Infrastructure Resiliency Measures and Analytical Tools
- Environmentally-Driven Changes to Aerospace Materials and Process Management:
  - Corrosion Protection
  - Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation
- Other collaborative opportunities welcomed
- Student presentations on related international and domestic research

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## World Bio Markets USA

October 27th - October 29th, 2014

San Diego, CA

The must attend forum for North America's leaders in advanced biofuels and bio-based chemicals.

Join us in 2014 for the 5th annual edition of North America's #1 bio-based markets congress looking at bio-based fuels and chemicals. With a new look format for this year featuring 2 tracks: WBM Fuels and WBM Chemicals, 2013 provided you with more in-depth content alongside broader networking opportunities - and 2014 is proving to be better.

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## Canadian Bioeconomy Conference

December 1st - December 3rd, 2014

Westin Harbour Castle Hotel, Toronto, ON, Canada



This December, the Canadian Renewable Fuels Association (CRFA) will host its 11th annual conference - which is expanding to become the first national Canadian Bioeconomy

Conference.

The Canadian Bioeconomy Conference will continue to include the content you've come to expect over our 10 year history as well as a wide range of topics and information on the emerging bioeconomy. This natural transition reflects the ever-evolving changes and advancements in Canadian renewable fuels and sustainable products as outlined in CRFA's new vision and action plan Evolution and Growth.

This premier policy event brings together over 300 professionals from North America including leading petroleum, ethanol and biodiesel companies, trade suppliers, government officials and members of the finance and investment industries.

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## **Power Generation Week**

December 7th - December 11th, 2014

Orange County Convention Center; Orlando, FL

## **Renewable Energy World Conference and Expo**

December 9<sup>th</sup> – December 11<sup>th</sup>, 2014

Orange County Convention Center; Orlando, FL

Our large-scale renewables track will cover baseload and multi-megawatt-scale renewable energy projects, policies and applications.

Our distributed generation track will look at smaller commercial and behind-the-meter renewable energy applications, technologies and policies and our utility integration track will cover permitting and interconnection and other grid impacts of renewable energy.

Our renewables and the global market track will examine how renewables are making an impact on emerging markets, for example how they are solving energy issues for the billions of people worldwide without access to power.

Finally, our innovative energy partnerships track will look at how renewable energy and other traditional fuels can work together such as pairing geothermal energy with oil and gas exploration; algae projects with power plants; pumped hydro or natural gas with wind farms and solar with coal plants.

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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)