



Florida Energy  
Systems Consortium

**February 2014  
Issue**

FESC Highlights

Florida Energy News

Funding Opportunities

U.S. Energy News

#### Upcoming Events

201 Energy & Sustainability Conference Feb 11-12 Richmond, VA

41st Annual PURC Conference: Feb 19-20 Gainesville, FL

iiSBE Net Zero Built Environment 2014 Symposium Mar 6-7 Gainesville, FL.

2014 International Biomass Conference Expo Mar 24-26 Orlando, FL.

FESC Workshop May 12-13 Gainesville, FL

World Congress on Industrial Biotechnology May 12-15 Philadelphia, PA.

Second Annual Go SOLAR Renewable Energy Fest June 6-7 Fort Lauderdale, FL

## Florida Energy System Consortium Workshop | May 12-13 | Gainesville, FL

The **2014 FESC Workshop** is scheduled for **May 12-13, 2014**, at the **Hilton University of Florida Conference Center** in **Gainesville, Florida**. *FESC will financially support the hotel expenses for up to 84 oral presenters from academia. In addition, on a first-come, first-serve basis, FESC will financially support the hotel expenses for up to 66 poster presenters and attendees from academia including students.*

## WORLD ENERGY NEWS

### Green Fatigue Threatens Clean-Energy Leader Germany

BERLIN, Germany — Power plants don't make front-page news as a rule. But it turns out Germans don't always follow the rules after all. A long-standing leader in environmental protection, this country has achieved dramatic success in reducing pollution during the past three decades, changing consumer behavior and slashing emissions of the greenhouse gases scientists say are responsible for climate change.



The share of renewables in power generation has jumped from 6 percent to 25 percent over the past decade. (Sean Gallup/Getty Images)

Institute for Energy and the Environment (IFEU) says there are no easy answers. "We have to be very clear: an energy transformation from a fossil to a renewable energy age does cost money," he says. "However, the cost of inaction would be higher." Germany has been ahead of the curve in protecting the environment since the 1970s, a decade before the Green Party won its first seats in parliament. Germans pioneered recycling and conservation long before such practices were known elsewhere.

Today, the average German makes some 140 trips by public transport a year, compared with a measly 25 by Americans, according to a recent US study. Germans install "green roofs" — covered with grass, vines or gardens that absorb rainwater, recycle carbon dioxide and reduce energy bills — at a rate of some 100 million square feet per year, compared with a historical total of around 6 million square feet across the US. Since the Renewable Energy Act

But a media blitzkrieg this month against Chancellor Angela Merkel's bold new plan to cut 1990 emission levels by as much as 80 percent by 2050 — without relying on nuclear power — suggests the plan may be a step too far for many Germans. There are signs that "green fatigue" may make the target hard to reach. With Florida, Vermont and other US states just starting to adopt the German model, a perceived failure here could set back American efforts. Martin Pehnt of Heidelberg's

established an innovative incentive program to stimulate investment in clean power a decade ago, the share of so-called renewables in Germany's electricity generation has jumped from 6 percent to 25 percent, compared with an increase from 9 percent to 14 percent in the US.

After Japan's Fukushima disaster in 2011 — when Merkel accelerated plans to phase out nuclear power — renewables have also eclipsed reactors on the grid, providing 136 billion kilowatt hours of electricity compared with nuclear's 99 billion last year. As a result, the kinds of benefits US President Barack Obama has promised for Americans' future have already materialized here. Although Germany still imports some 70 percent of its energy, it has shaved nearly \$10 billion off its annual bill by generating green power at home. Green energy has created some 350,000 jobs that can't be outsourced in rural communities struggling to keep residents from moving away.

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## Latin America's Oil Rush Means More Climate Change

LIMA, Peru — Latin America's new oil rush may delight the region's treasury ministers, but the extra greenhouse gases it will unleash will only deepen the world's climate crisis. With the region's existing oil and gas wells gradually running dry, and global demand growing, Latin American governments are now seeking to exploit unconventional deposits that were previously too



difficult, expensive or just plain polluting to extract. Among the biggest is Brazil's Libra deep-sea oil field, in the southern Atlantic, which was awarded to a consortium including Shell and two Chinese firms in October.

More oil, more emissions. (Narinder Nanu/AFP/Getty Images)

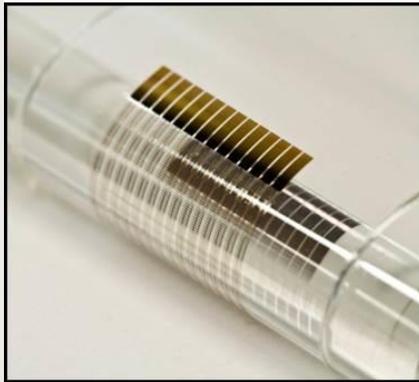
President Dilma Rousseff's administration estimates Libra holds between 8 billion and 12 billion barrels of oil. The highly technical and energy-intensive process of extracting it is expected to cost some \$185 billion over the next three decades. As a result, the Brazilian government expects to pick up \$400 billion in royalties over the lifetime of the reserve. But according to Greenpeace Brazil, burning the oil from Libra will result in a staggering 5 billion tons of carbon dioxide being dumped into the atmosphere — roughly equivalent to the United States' entire annual output.

Libra is just the first "pre-salt" deep-water reserve that Brazil is planning to drill, so-called because it is buried under a mile-thick layer of salt below the ocean. Such deep-sea deposits would allow Brazil to account for one-third of the growth in global oil supply to 2035, the International Energy Agency said in its 2013 World Energy Outlook, released Tuesday. The country's total potential pre-salt reserves are estimated at between 50 billion and 80 billion barrels. If the higher figure is confirmed, then exploiting it all, Greenpeace Brazil says, would trigger 35 billion tons of carbon pollution — equivalent to one year of current global emissions.

## FESC HIGHLIGHTS

### UCF Research Team Finds Way to Make Solar Cells Thin, Efficient and Flexible

Converting sunshine into electricity is not difficult, but doing so efficiently and on a large scale is one of the reasons why people still rely on the electric grid and not a national solar cell network. But a team of researchers from the University of Illinois at Urbana-Champaign and the University of Central Florida in Orlando may be one step closer to tapping into the full potential of solar cells. The team found a way to create large sheets of nanotextured, silicon micro-cell arrays that hold the promise of making solar cells lightweight, more efficient, bendable and easy to mass produce.



The team used a light-trapping scheme based on a nanoimprinting technique where a polymeric stamp mechanically embosses the nano-scale pattern on to the solar cell without involving further complex lithographic steps. This approach has led to the flexibility researchers have been searching for, making the design ideal for mass manufacturing, said UCF assistant professor Debashis Chanda, lead researcher of the study. The study's findings are the subject of the November cover story of the journal *Advanced Energy Materials*. Previously, scientists had suggested designs that showed greater absorption rates of sunlight, but how efficiently that sunlight was converted into electrical energy was unclear, Debashis said. This study demonstrates that the light-trapping scheme offers higher electrical efficiency in a lightweight, flexible module. The team believes this technology could someday lead to solar-powered homes fueled by cells that are reliable and provide stored energy for hours without interruption.

Other researchers on the project include Ki Jun Yu, Li Gao, Jae Suk Park, Yi Ri Lee, Christopher J. Cocoran, Ralph G. Nuzzo and John A. Rogers from the University of Illinois at Urbana-Champaign. Debashis Chanda joined UCF in Fall 2012 from University of Illinois at Urbana-Champaign with joint appointment in the Nanoscience Technology Center and the College of Optics and Photonics (CREOL). He has published multiple articles on light-matter interactions and metamaterials and is a reviewer for multiple journals in his field. For some of his pioneering works Debashis was awarded a Department of Energy solar innovation award and a Natural Sciences and Engineering Research Council award among others. He also earned a National Science Foundation Summer Institute Fellowship this year.

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### USF: The Heat is On...or Off

Office buildings have an enormous carbon footprint, but often energy is being wasted maintaining empty rooms and spaces at a comfortable temperature. Research to be published in the *International Journal of Communication Networks and Distributed Systems* shows how the ubiquity of smart phones connected to the office network could be used to monitor occupancy and reduce heating or air conditioning for unused spaces.

Bruce Nordman of the Lawrence Berkeley National Laboratory, plus Ken Christensen of the Department of Computer Science and Engineering at the University of South Florida, and other colleagues from those institutions and the University of Puerto Rico at Arecibo, explain how implicit occupancy sensing can be undertaken using existing IT infrastructure. The infrastructure includes networked smart phones, devices on the local IP network like computers, and others – and avoids installing dedicated sensors in every space in a building. Their approach is to continually monitor the network addresses associated with every device, or data flowing to or from the devices.

The implicit sensing approach uses the network identity and other data and how devices are accessing specific wireless access points and other network equipment in the building and then correlates them with the assumed location of the users of those devices when mapped against the building's floor plans, or location of the access points. Unoccupied and frequently unused spaces can then have their temperature control and air-conditioning adjusted to lower power consumption, at least until the space is once again occupied. Controls could be put in place to allow temperature of a given space to be adjusted in advance for schedule occupancy.

The team describes three main advantages of their approach over dedicated monitoring equipment. First, there is no additional hardware cost in terms of devices, installation, operation, or maintenance. Secondly, sensor readings can be obtained readily over an existing network. Finally, the system can drill down to occupancy number, identity and activity, information that would not be available for dedicated sensors. Such information can be coupled to management systems or can simply be used to ensure that cleaning staff are not blasted with heat while working nor office workers chilled too drastically in a meeting room

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## Advancing Safety Through Color Changing Technology

An intelligent tape that changes color in the presence of hydrogen has been licensed by UCF to a faculty-led spinoff company. HySense Technology, LLC of Rockledge, FL, licensed the technology that was co-developed by its founder, Nahid Mohajeri, a researcher at UCF's Florida Solar Energy Center. She co-developed the technology to detect hydrogen leaks wherever hydrogen is produced, stored or transported.

Early detection of the highly flammable, invisible gas can prevent dangerous explosions and casualties. The technology was developed as part of a larger \$20M grant awarded to UCF from NASA's Kennedy Space Center for hydrogen research. The specialty tape uses proprietary color changing pigments, Intelligiment™, to alert users to the exact location of a hydrogen leak. It can be wrapped around pipe fittings, flanges, valves, and storage and transportation vessels. Color change occurs in a matter of seconds when hydrogen is detected and in concentrations as low as 1% hydrogen.



**Nahid Mohajeri of UCF's Florida Solar Energy Center and Luke Roberson, Science Payload System Engineer with NASA's Kennedy Space Center, show some of the products HySense has produced with its proprietary hydrogen sensing tape. The work that led to the tape began with a NASA KSC grant for hydrogen research.**

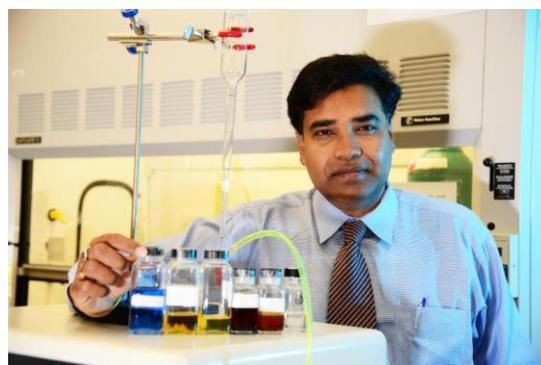
HySense's Intelligigment™ tape has been tested and evaluated by chemical manufacturers and hydro-electric and nuclear power plants. The company hopes to begin US sales soon. Svetlana Shtrom, Director of UCF's Office of Technology Transfer commented, "We have received many inquiries for this hydrogen sensing tape for a variety of potential applications. Now, with the NASA – UCF – HySense partnership, the product will be brought to the marketplace. We anticipate a variety of opportunities ahead for improving the safety in handling this widely used gas." For more information or to request a quote, visit [hysensetechnology.com](http://hysensetechnology.com).

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## UCF NanoScience Center Develops New Program

The University of Central Florida's NanoScience Technology Center is developing a new program to make a graphene-based spray coating that would help multiple industries easily and inexpensively fight corrosion.

The center is building on the recent success of UCF spin-off Garmor, Inc. in making a powder form of super-strong graphene available to industry. "We can use graphene and composite materials to produce new ways for automotive, aerospace, oil and gas, the military and even the medical industries to take advantage of this extremely powerful material," said Sudipta Seal, director of the NanoScience Technology Center and



**Sudipta Seal, director of the UCF NanoScience Technology Center and Advanced Materials Processing Analysis Center**

Advanced Materials Processing Analysis Center and a professor of Materials Science and Engineering. Seal has published articles on the strength and flexibility of aluminum composites reinforced with carbon nanotubes that is central to the process. The goal of the program is to provide a cost-effective, large-area polymer/graphene based coating technology to both strengthen mechanical components such as materials used for the construction of aircraft and cars, and protect materials such as gas and oil pipelines from corrosion.

The research program will concurrently focus on developing graphene oxide, a plastic host and a plasma spray. Garmor, Inc., a UCF spinout company that has licensed technology developed by NanoScience Center researchers Richard Blair and David Restrepo, will assist with formulating the graphene oxide. The scientists will modify graphene, which originates from graphite like that in pencil lead, so it can be adhered to a plastic host and sprayed onto a surface while retaining its innate strength and elasticity. NanoScience Professor Lei Zhai will focus on developing the material to host the graphene and ensure the graphene keeps its electrical and mechanical performance when embedded.

The composite development element is being led by Seal, who will configure the graphene agent for performance testing on steel, aluminum, and high strength plastic. The coated substrates will be evaluated for their mechanical (abrasion and strength) as well as corrosion performance. Companies and potential students interested in learning more about the project should contact Seal at [Sudipta.Seal@ucf.edu](mailto:Sudipta.Seal@ucf.edu).

## UF to Spend \$4.7 Million More On Pre-Eminence Goals

The University of Florida has announced a second round of spending to hire researchers and faculty to bolster programs identified as critical to the university's push toward pre-eminence.

UF will spend \$4.7 million hiring as many as 30 researchers and professors in 10 disciplinary areas administrators have said will help burnish its stature as a top 10 university. Those areas include the Online Learning Institute, social network analysis, renewable energy and storage, creative writing, and African studies.

The latest round of spending follows an announcement by UF President Bernie Machen and approval by the Florida Board of Governors to spend \$13.3 million in 16 strategic areas to build on UF's current strengths and expertise. Those include the McKnight Brain Institute, "Big Data," cybersecurity, life sciences and food security. "The idea is to bring in teams of researchers in fields where we're already on the cusp of top national stature," Machen said. Investment in those areas will lead to "breakthrough discoveries, greater educational opportunities, a spike in federal research dollars for Florida, more spinoff companies and creation of jobs," Machen said. The university already has posted 14 "preeminence faculty" positions on its jobs website. The 2013 Legislature passed legislation creating a pre-eminence program to give millions in bonus money to state universities that met at least 11 of 12 academic and research benchmarks. UF met all 12 benchmarks.

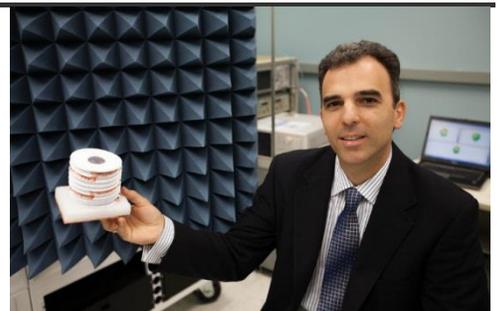
The state gave UF \$15 million a year over the next five years to spend on areas to bolster its pre-eminence status. Machen has pledged to match that \$75 million with an equal amount of private donations and use that money to recruit nationally renowned research faculty. The UF Foundation has pledged to raise an additional \$800 million to support the pre-eminence effort by creating endowed chairs and professorships, build or renovate labs, classrooms and other facilities, and invest in scholarship programs. The administrative team, led by Provost Joe Glover, invited department heads and college deans to submit proposals for how to best spend that extra money, and initially chose 16 projects that had the most potential to boost UF's standing.

Many of those projects take an interdisciplinary approach to solving societal problems, Glover said. For example, the Informatics Institute, which received \$3.8 million, will involve faculty from the colleges of Medicine, Public Health and Health Professions, Liberal Arts and Sciences, Engineering, Nursing, Agricultural and Life Sciences, and the Museum of Natural History.

## Origami Techniques Lead to Newly Engineered Compact Antennas and Electronics

FIU researchers are using technology and principles derived from the traditional Japanese art of origami to create remarkably compact and incredibly efficient antennas and electronics.

"By using origami geometries we can reconfigure antennas to whatever shape fits our purpose," said Stavros Georgakopoulos, assistant professor



Stavros V. Georgakopoulos, assistant professor at FIU's Department of Electrical and Computer Engineering, holding an origami antenna.

in FIU's Department of Electrical and Computer Engineering. "These geometries offer unique advantages of collapsibility. That's important for a number of applications, such as technology that needs to be launched in space or used on the battlefield."

Georgakopoulos is working with colleagues at Georgia Tech with the support of a \$2 million grant from the National Science Foundation. The team will work on the development of unique shapes that can allow the antennas to be only a couple of centimeters when folded flat and expand into much larger spaces with powerful, ultra-broadband capabilities.

"A soldier will be able to carry a powerful antenna into combat folded in his back pocket," said Georgakopoulos.

Possible applications for the antennas include a range of military and commercial uses, including communications equipment, wireless sensors, health monitoring sensors, portable medical equipment, and many other applications. A traditional paper-folding art, origami includes both modular and moving types of structures. Mathematicians recently have focused on theoretical and practical questions raised by origami, resulting in technical advances in many areas.

Origami structures can be fabricated from a wide variety of materials. While Georgakopoulos mainly uses paper, he is also exploring plastics and flexible dielectrics. The researchers use sophisticated inkjet printing techniques to deposit conductive materials such as copper or silver onto paper in order to create antenna elements with novel signal reception and other capabilities.

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## **FSU: Researchers Target Sea Level Rise to Save Archaeological Evidence**

Prehistoric shell mounds found on some of Florida's most pristine beaches are at risk of washing away as the sea level rises, wiping away thousands of years of archaeological evidence. "The largest risk for these ancient treasure troves of information is sea level rise," said Shawn Smith, a senior research associate with the Center for Ocean-Atmospheric Prediction Studies at Florida State University. But a joint project between Smith and the National Park Service is drawing attention to the problem to hopefully minimize the impact on the state's cultural sites. Smith and Margo Schwadron, an archaeologist with the National Park Service, have embarked on a project to examine past and future changes in climate and how we can adapt to those changes to save areas of shoreline and thus preserve cultural and archeological evidence.



**Shawn Smith, senior research associate with the Center for Ocean-Atmospheric Prediction Studies at Florida State University.**

"We're kind of the pioneers in looking at the cultural focus of this issue," Smith said, noting that most weather and ocean experts are concerned about city infrastructure for coastal areas. To complete the project, the National Park Service awarded Smith a \$30,000 grant. With that money, Smith and former Florida State University undergraduate Marcus Johnson spent hours compiling modern, colonial and paleo weather data.

The focus of their initial research is the Canaveral National Seashore and Everglades National Park, which both have prehistoric shell mounds, about 50 feet to 70 feet high. Researchers believe these shell mounds served as foundations for structures and settlements and later

served as navigational landmarks during European exploration of the region. Modern temperature and storm system information was easily available to researchers. But, to go hundreds and then thousands of years back took a slightly different approach. Log books from old Spanish forts as well as ships that crossed the Atlantic had to be examined to find the missing information. The result was a comprehensive data set for the region, so detailed that modern era weather conditions are now available by the hour.

Smith and Schwadron are trying to secure more funding to continue their work, but for now, they are making their data set available to the general public and other researchers in hopes of raising awareness about the unexpected effects of sea level rise. The National Park Service has also published a brochure on climate change and the impact that sea level rise could have on the shell mounds found at Cape Canaveral.

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## **USF researchers find wider swings in tidal levels in last century in the Gulf of Mexico**

TAMPA - Research out of the University of South Florida has produced some worrisome findings for anyone living near the water. In Florida- that's most of us. High tides, especially during hurricane season are getting higher. The research was done by a team that included USF Marine Scientist Professor Mark Luther that examined high and low tide measurements all along the Gulf that had been recorded over or the past hundred years. The results are clear. "They've gotten higher in the summers and lower in the winters by a significant amount" says Luther.

The research shows that while the average sea level over the last century as risen steadily but modestly, the amplitude or the swings between high and low tide have increased by much more. So much so that researchers estimate the risk of hurricane caused flooding has almost doubled. "It all depends on when the storm hits. If the storm hits at high tide you got a much bigger problem than if it hits at low tide. Even just a few millimeters increase in water levels means a lot more properties get flooded" says Luther.

This research is bound to get the attention of policy makers in Tallahassee trying to tame out of control flood insurance rates. They won't be happy to learn one other finding from this research. This increased volatility is far more pronounced in the Eastern Gulf than the Western Gulf.

"This seasonal swing was almost nonexistent in the Texas Coast and was large, on the order of many centimeters off the Florida Coast" said Luther.

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## **UM Scientist Takes Part in Study to Examine Pacific "Global Chimney"**

MIAMI (January 9, 2014) – A team of scientists, including University of Miami (UM) Rosenstiel School of Marine and Atmospheric Science Professor Elliot Atlas, is headed to Guam next week to study how the remote waters of the western tropical Pacific Ocean shape climate and air chemistry worldwide.

The major field project, called CONTRAST (Convective Transport of Active Species in the Tropics) seeks to better understand the region's influence on the global climate — including how it may change in coming decades if storms over the Pacific become more powerful with

rising global temperatures.

“There are so few measurements of atmospheric composition in this important region of the atmosphere that we expect to be able to significantly advance our understanding with the data we will be able to collect during CONTRAST,” said Elliot Atlas, UM Rosenstiel School marine and atmospheric chemistry professor and a CONTRAST principal investigator.

With the warmest ocean waters on Earth, the western tropical Pacific fuels a sort of chimney whose output has global reach. The region feeds heat and moisture into huge clusters of thunderstorms that loft gases and particles into the stratosphere, where they spread out over the entire planet and influence the climate.

“To figure out the future of the air above our heads, we need to go to the western Pacific,” said Laura Pan, a scientist at the National Center for Atmospheric Research (NCAR) and one of the principal investigators on the field project. “This region has been called the holy grail for understanding global air transport, because so much surface air gets lifted by the storms and then spreads globally.”

CONTRAST, which will be based in Guam, is being coordinated with two other field projects – NASA’s Airborne Tropical Tropopause Experiment (ATTREX) and Britain’s Natural Environment Research Council Facility-funded CAST (Coordinated Airborne Studies in the Tropics) Experiment – in order to give researchers an especially detailed view of the air masses over the Pacific with a vertical range spanning tens of thousands of feet. CONTRAST is funded by the National Science Foundation (NSF) and includes more than 40 scientists from University of Miami, NCAR, NASA, and other universities across the country.

Together, the sensor-laden research flights will provide a comprehensive view of the atmosphere from the ocean surface, where gases produced by marine organisms enter the air, to the stratosphere, more than 60,000 feet above.

As trade winds flow across the tropical Pacific, they push warm water to the west, where it piles up in and near the CONTRAST study region. The waters around Guam have the world’s highest sea surface temperatures of open oceans. They provide heat and moisture to feed clusters of thunderstorms that lift air through the troposphere (the lowest level of the atmosphere) and the tropopause (a cold, shallow region atop the troposphere) and then up into the stratosphere.

The CONTRAST team will deploy the NSF/NCAR HIAPER aircraft, a Gulfstream V jet modified for advanced research that will fly at altitudes between about 25,000 and 50,000 feet. Using spectrometers and other instruments on board, the researchers will measure various chemicals and take air samples across a wide region, both in storm clouds and far away from them. The measurements will be analyzed in conjunction with data from the ATTREX Global Hawk (covering altitudes up to 65,000 feet) and CAST BAe146 (with observations from the ocean surface to about 20,000 feet).

The researchers are planning as many as 16 flights, targeting both towering storms that loft fresh air into the stratosphere as well as collapsed storms to examine the composition of the air that remains lower down, in the troposphere.

While the scientists will have considerable follow-up research to do in their labs, some of the airborne instruments will provide real-time measurements to the team. State-of-the-art models of atmospheric chemistry will help guide the research flights in the field, as well as aid in subsequent analysis of the observations.

## FSU: Electrical and Computer Engineering Professor Leads One of Six University Team Partners of New US Private-Public Manufacturing Initiative

"We are proud to be selected as one of six university partners in the newly established Institute," said Dr. Hui "Helen" Li, a professor in electrical and computer engineering at the FAMU-FSU College of Engineering. Dr. Li is the FSU team leader, focused on WBG device based PV converters.



From left-to-right: Thierry Kayiranga (Graduate Student), Dr. Hui "Helen" Li (Lead PI), Yuxiang Shi (Ph.D. student), Ran Mo (Graduate student)

In recent years, Li's **Florida State University** (FSU) team has had many research accomplishments in power electronics technology and wide bandgap (WBG) devices application. These research efforts, aside from meeting the extremely challenging system design requirements, offers a significant opportunity to develop innovations in advanced power electronics technology, modeling, control, and WBG devices integration in power converters.

This new public-private manufacturing innovation Institute will have four research and development (R&D) thrust areas: **SiC** (*Silicon Carbide*), **GaN** (*Gallium Nitride*), **Packaging** and **Power Electronics**.

Li's team will be working with **North Carolina State University** (NCSU) and **Virginia Polytechnic Institute and State University** (VaTech) in the power electronics research area. More specifically, the FSU team will focus on developing Wide bandgap (WBG) devices based PV converter with reduced cost and improved reliability. Their research goal is to develop innovative technologies of PV converters with WBG devices integration to achieve high performance operation, cost reduction and reliability improvement competitive with current PV converters.

Having gained rich experience in WBG devices application in grid-connected PV converters the past several years, Li's research team had received grants from National Science Foundation (NSF) and industry companies to successfully develop GaN based PV microinverters and SiC based high power PV converters for grid-interactive application to achieve high power density and high power efficiency. The high frequency operation performance of GaN devices and SiC devices in PV converters has been investigated and evaluated. The team also addressed the effects of these WBG devices on the cost and reliability of PV converters.

"In addition," remarked Li, "We have worked closely with the Solar Industry to provide some novel ideas about power electronics technology integrated with WBG devices, promoting the WBG devices application in energy conversion market."The interaction of Dr. Li's team and the industry is substantial which has fostered a greater synergy in research and product development efforts for this new WBG Institute.

"To be one of the six university partners in the new WBG Institute provides an extraordinary opportunity for FSU to capitalize on the consortium's broad strengths to build a world-class research, development and demonstration (RD&D) infrastructure for the new technology," continued Li. "We believe the overall efforts of this partnership will accelerate US manufacturing capability in wide bandgap power semiconductor technology, while leading to sustained job growth."

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## **FAMU Forges Research, Development Partnership with TLB Enterprises, United Arab Emirates**

In partnership with TLB Enterprises Group Holding, a delegation of Florida A&M University (FAMU) officials and researchers will participate in the World Future Energy Summit held in Abu Dhabi, the capital and second largest city in the United Arab Emirates (UAE). The conference will be held Jan. 20-22. The trip marks the official launch of a Memorandum of Understanding (MOU) between FAMU and TLB, which will facilitate an ongoing relationship with UAE government officials and leaders in academia. This relationship will allow FAMU to offer training, expertise, research and development in an array of disciplines, including: environmental, natural and pharmaceutical sciences and engineering.

FAMU delegates include: Rodner Wright, interim provost and vice president for academic affairs; Dr. Ken Redda, professor and interim vice president for research; Dr. Yaw Yeboah, dean of the FAMU-FSU College of Engineering and Dr. Robert Taylor, dean and director of land grant programs at the College of Agriculture and Food Sciences. Terence Bolden, the president of TLB, a black-owned consulting company operating in the UAE, will host the delegation.

"The FAMU visit provides the opportunity for both the university and TLB Enterprises Group Holding to fulfill its partnership goal of adding substantive value to the United Arab Emirates as professional service providers," Bolden said.

He continued, "It is our vision to do this by combining the strengths of our organizations to address substantial human need issues like environmental agriculture, waste to energy, clean water and educational services. We are excited about this historic visit and look forward to the value and benefit it will produce for all parties involved." Redda echoed Bolden's sentiments. "This trip is important for FAMU, TLB and the host country (UAE) to lay out the groundwork for concrete engagement in promoting education, research and development," Redda said. "Our expectations for this partnership are to also further explore the current and prospective needs and priorities of the UAE region, to share FAMU's expertise in these processes relevant to the UAE area and to interact with the main stakeholders in the UAE."

According to Redda, the delegation hopes to utilize the trip to further its understanding and

appreciation of the culture, language and best practices of the UAE environment. "FAMU wants to pursue the possibilities of future funding for the proposed MOU-driven projects," Redda said. While in Abu Dhabi, the delegation will participate in business matchmaking and strategy sessions, meet with the UAE National Research Foundation and the Ministry of Higher Education and Scientific Research, as well as visit local universities.

## 2014 Florida Colleges Energy Education Forum

The 3rd Annual Florida Colleges Energy Education Forum was hosted by Palm Beach State College's Institute for Energy and Environmental Sustainability (IEES) on January 31st. Forty participants from the energy education and industry realms were treated to exciting presentations covering a range of energy-related topics. This is the third workshop offered by FLATE-FESC to bring educators and industry people from all over Florida together to learn and share ideas and knowledge about energy education and energy industry workforce needs.



Power Analytics Activity

The morning session included presentations about electric vehicles, algal biofuel and marine renewable energy, as well as a Florida Department of Education update from Kathryn Frederick Wheeler, Supervisor of Energy and Architecture and Construction Career Clusters. Florida Power and Light Company brought a selection of electric cars/truck for participants to explore up-close, during the lunch hour. The afternoon session included a panel discussion on turbines and advanced fuels followed by a power analytics professional development activity held in IEES' state-of-the art power analytics lab.



Attendees examine electric vehicle

Thanks to Palm Beach State College's Media Technology and Instructional Services, the meeting was also broadcast live via the Internet, so that folks that wanted to attend, but couldn't travel could participate "remotely". Feedback received was overwhelmingly positive - "innovative and current ideas to encourage students", "general interaction was great", were some of the comments received from workshop attendees.

Please visit [www.fl-ate.org](http://www.fl-ate.org) to download forum presentations.

## FLORIDA ENERGY NEWS

### Florida-based NTE Energy to build \$500 million natural gas power plant in Middletown

The St. Augustine, Fla.-based NTE Energy announced Tuesday that it plans to build and operate a \$500 million plant in Middletown that will generate enough power for about 400,000 homes.

The St. Augustine, Fla.-based NTE Energy announced Tuesday that it plans to build and operate a \$500 million plant in Middletown that will generate enough power for about

400,000 homes. Company officials said the Middletown Energy Center will use a Mitsubishi Power Systems Americas M501JAC combustion turbine. The design captures head exhaust from the turbine and uses it in a steam cycle, generating about 500 megawatts of power.

The company described the turbine as next-generation technology and said that it should create 60 percent less emissions than older, traditional power plants.



## U.S. ENERGY NEWS

### Ford Debuts Solar Energy Concept Car



The Ford Motor Company unveiled on January 2 the C-MAX Solar Energi Concept, a sun-powered vehicle with the potential to deliver what a plug-in hybrid offers without depending on the electric grid for fuel. The concept vehicle, shown recently at 2014 International CES, a major consumer electronics conference in Las Vegas, Nevada, is a collaborative project of Ford, the SunPower Corp., and Atlanta-based Georgia Institute of Technology.

Instead of powering its 7.6 kilowatt-hour lithium-ion battery from an electrical outlet, the Ford C-MAX Solar Energi Concept can harness the power of the sun by using a special concentrator that acts like a magnifying glass, directing and focusing rays onto solar panels on the vehicle roof while the car is parked. The panels use high-efficiency silicon solar cells from SunPower.

According to Ford, the concept vehicle takes a day's worth of sunlight to deliver the same performance as the C-MAX Energi plug-in hybrid, which draws its power from the electric grid and gets an estimated 92 miles per gallon equivalent on the highway. By using renewable power, the C-MAX Solar Energi Concept is estimated to reduce the annual greenhouse gas emissions a typical owner would produce by four metric tons.

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### Top 10 Biofuels Biobased Predictions for 2014

#### 1. RFS2

The coalition surrounding RFS2 has done an incredible job of protection in 2013. The opposing forces will make another titanic effort in 2014 to derail the Renewable Fuel Standard, but attempts to repeal are dead. We also predict a substantial northward revision of the biodiesel target for 2014 after significant negative blowback from stakeholders on EPA's proposal to hold the biodiesel mandate to 2012 levels in 2014 and 2015.

On Capitol Hill, we see efforts to amend RFS2 by legislative action dying a quiet death as legislators opt to issue a report on RFS2's shortcomings, and adopt a wait-and-see attitude on

whether EPA manages to avoid big RIN prices while continuing to push the mandate numbers forward in a slower yet positive direction.

## **2. E85**

After a bullish year for E85 in which falling corn prices and rising RIN values made it possible for high-ethanol blends to routinely beat gasoline on price, we see E85 prices settling in at closer to a 50-cent discount to gasoline, down from the 60-70 cent range that was driving E85 sales to near-record levels in states like Iowa. Corn prices will continue to be low through the first half of 2014 (at least), but EPA action on RFS2 will bring down RIN prices and create less need for blenders to discount E85 as a means around the ethanol blend wall.

## **3. Algae**

We see almost all of the action for closed bioreactor systems in the first half of 2014 to be in the nutritional supplements side of the equation, with a focus on omega-3 fatty acids like DHA and EPA. To date, DSM's Martek unit has been just about the only game in town on DHA; production levels from competitors will be low, but the number of players who announce that they are targeting these markets will continue to increase. In the second half, attention will shift back to fuels and chemicals as larger-volume producers such as Algenol reveal their plans for commercial-scale production.

## **4. Sorghum on the rise.**

Though camelina, jatropha and other novel feedstocks have grabbed most of the headlines, look for sweet sorghum and grain sorghum (both) to slowly establish itself as the most interesting set of terrestrial alternatives to traditional grain and oilseed crops. Look for a big announce in the first third of the year to give sorghum the momentum for "feedstock of the year".

## **5. Asia, Brazil, US continue to be the hot deployment markets.**

Despite a continuing array of technologies being developed in the EU, and some pretty substantial assists from national and regional authorities in terms of supporting commercial-scale in Canada, the EU and Australia, the hot markets will continue to be in Asia, the US and Brazil.

Look to companies like Green Biologics, POET-DSM, Beta Renewables and DuPont to make their US commercial progressions increasingly clear. Look for one major commercial scale project announce by late April. In Brazil, Raizen and GranBio will dominate the fuel headlines, with BP Biofuels as a dark-horse; Solazyme-Bunge's venture in Moema will be grabbing eyeballs in the first half when it opens. For Asia, look for at least one major new project announce in Indonesia this year as the Asian focus shifts slightly southward.

## **6. Licensing**

Models for selling and getting installations of processing technology are everywhere. Build-and-operate, JV, bolt-on, retrofit — there are companies happily pursuing each of those. Straight licensing has been less popular because the capital-intensive nature of building out early-stage companies has made it difficult for companies to see a way to generate investor ROI in giving up so much of the value-chain to customers and partners. But with synthetic biology toolkits becoming well established and technology development costs dropping, look for licensing to make a big comeback. Companies like Genomatica are already leading the way.

## **7. Mergers & acquisitions**

Speaking of Genomatica, we don't expect that it will be all that much longer that renewable chemicals #1 company will be able to resist overtures on the acquisition front. When and as the company begins to make its third molecular target clearer, companies like BASF may decide that the time has come to buy out the other partners. Other candidates for stake or company acquisition include the likes of Gevo and Ceres that are not well understood by public investors and may be available at nice discounts to the underlying company value.

### **8. Renewable Chemicals — propylene on the rise?**

In 2014, look for another big year on the 4-carbon platform, with BDO and isobutanol still as hot as ever but n-butanol and butadiene increasingly in focus. We expect to see more action on the 3-carbon platform as ethane crackers continue to put pressure on steam naphtha cracking, and leave the world short on propylene.

One expectation is that at least one company capable of making methanol will add-on (or switch to) MTO-like technologies to convert methanol to propylene, as an alternative to making ethanol for an increasingly saturated alcohol fuels market or making gasoline using the MTG process.

### **9. The Great Green Fleet**

Despite occasional dyspepsia on Capitol Hill, the Navy will go forward in spring 2014 with its initial RFP for \$4 per gallon, drop-in marine diesel and aviation biofuels. Initial fuel contracts will be awarded in 2015 and first deliveries scheduled for mid-year 2015. The fuels will contain biofuels blends of between 10 and 50 percent. We expect DLA Energy to have a second solicitation in summertime.

First deliveries under the Farm to Fleet program are 330 million gallons (with a minimum biofuels component of 33 million gallons) scheduled for the Inland/East/Gulf Coast fuel procurement region — which includes the Eastern US as well as Guantanamo Bay. The second deliveries under the program are 370 million gallons (with a minimum biofuels component of 37 million gallons) scheduled for the Rocky Mountain / West Coast region.

### **10. Goodbye, stand-alone ethanol/DDGS plant**

If RFS2 pressures on the ethanol industry were not enough, think of all the technologies now available to turn ethanol plants into integrated biorefineries producing either a more significant array of co-products or a higher-value primary molecule. Whether it is corn oil extraction, algae add-ons, isobutanol or n-butanol conversion, switch to milo/biogas, or adding on a source of fermentable cellulosic sugars from crop residues or bagasse— we don't expect that there will be a sub-50 million gallon ethanol plant surviving that won't have announced a deal or being in furious negotiation to do so, to expand its product set.

## **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.

### **DEPARTMENT OF ENERGY**

#### **[DE-FOA-0000991](#) - FY 2014 VEHICLE TECHNOLOGIES PROGRAM WIDE FUNDING**

#### **OPPORTUNITY ANNOUNCEMENT**

Concept Paper Submission Deadline: 2/19/2014 8:00 PM ET

Full Application Submission Deadline: 4/1/2014 8:00 PM ET

The Vehicle Technologies Office supports a broad research, development, and deployment technology portfolio focused on reducing the cost and improving the performance of a mix of near- and long-term vehicle technologies including advanced batteries, power electronics and electric motors, lightweight and propulsion materials, advanced combustion engines, advanced fuels and lubricants, and other enabling technologies.

Specifically, activities are aimed at meeting the goals and objectives of the President's Electric

Vehicle Everywhere Grand Challenge as well as improvements in other vehicle technologies such as powertrains, fuel, tires, and auxiliary systems and Vehicle Technologies Office. Investment in advanced vehicle technologies, like vehicle electrification, lightweighting, and combustion engines will yield benefits to conventional vehicles, as well as yielding the technologies necessary for alternative fuel vehicles.

**[DE-FOA-0000997](#) - Microgrid Research, Development, and System Design**

Application Due Date: April 28, 2014 at 3:00:00 PM (Eastern Time)

The purpose of this FOA, issued by NETL, on behalf of the Office of Electricity Delivery and Energy Reliability, is to solicit R&D and testing of advanced microgrid controllers that will allow communities in the United States to develop/design commercial-scale microgrid systems.

It is hoped that, ultimately, these (and other efforts) will facilitate communities' deployment of microgrid systems that enhance reliability, sustainability, and economic value by allowing achievement of their specific objectives for energy resilience; and help meet the DOE targets.

Projects proposed in response to this FOA are to be conducted within the States, District, Territories, and tribal lands of the United States. Moreover, proposed designs should significantly advance microgrid deployments in keeping with the DOE targets, rather than merely presenting marginal improvement of existing commercial or previously demonstrated technology.

**[DE-FOA-0001042](#) - NATIONAL INCUBATOR INITIATIVE FOR CLEAN ENERGY**

Submission Deadline for Concept Papers: February 21, 2014

Submission Deadline for Full Applications: March 21, 2014

EERE is seeking applicants to establish the National Incubator Initiative for Clean Energy (NIICE). NIICE seeks to advance three goals:

1. Improve the performance of existing and new clean energy business incubators across the country by setting a high performance standard, fostering best practices, and improving coordination of the incubator community;
2. Strengthen support for early-stage companies developing high-risk technologies and scaling from prototype to domestically-based production; and
3. Catalyze investment in early-stage clean energy businesses by improving information regarding capital access for incubators, including disseminating analysis and materials on philanthropic funds, corporate venture, and other innovative financing mechanisms

**[Notice of Intent No. DE-FOA-0001039](#) - Notice of Intent to Issue Funding Opportunity Announcement No. DE-FOA- 0001027 "Building Energy Efficiency Frontiers & Incubator Technologies (BENEFIT) - 2014"**

The Office of Energy Efficiency and Renewable Energy (EERE) intends to issue, on behalf of the Building Technologies Office (BTO), a Funding Opportunity Announcement (FOA) entitled "Building Energy Efficiency Frontiers & Incubator Technologies (BENEFIT) - 2014".

**[DE-FOA-0001043](#) - Scientific Data Management, Analysis and Visualization at Extreme Scale**

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Issue Date: 12/19/2013

Application Due Date: 03/19/2014 at 5 PM Eastern Time

The Office of Advanced Scientific Computing Research (ASCR) in the Office of Science (SC), U.S. Department of Energy (DOE), hereby invites applications for basic research that significantly advances management, analysis and visualization of data in scientific disciplines supported by DOE in the context of emerging architectures for extreme scale computing platforms.

**[Notice of Intent No.DE-FOA-0001069](#) - Notice of Intent to Issue Funding Opportunity Announcement No. DE-FOA-0001016 "Low Temperature Mineral Recovery Program"**

It is EERE's intent that this opportunity will lead to commercialized technologies for the efficient recovery of strategic materials from geothermal brines, effectively lowering the cost to produce geothermal energy while at the same time diversifying and stabilizing the supply of critical materials for domestic industries.

**[DE-FOA-0000988](#) - Vehicles Technologies Incubator**

Issue Date: 1/16/2014

Submission Deadline for Concept Papers: 02/25/2014

Submission Deadline for Full Applications is 04/16/2014

The DOE Office of Energy Efficiency and Renewable Energy (EERE) is an organization focused on achieving aggressive and well defined mid to long term clean energy goals for the United States of America. In that context, EERE has established multi-year plans and roadmaps. EERE is issuing "Incubator" Funding Opportunity Announcements (FOAs) within its existing Offices and programs to support innovative technologies and solutions that could help meet existing goals but are not represented in a significant way in the Offices' existing Multi Year Program Plans (MYPPs) or current portfolios. The Incubator programs will allow EERE to assess new technologies for their potential to be "on ramped" to future MYPPs.

**[DE-FOA-0001037](#) - Research for Safe and Permanent Geologic Storage of CO2**

Issue Date: 01/23/2014

Application Due Date: 03/24/2014 at 8:00:00 PM Eastern Time

Projects selected under this FOA will develop characterization tools, technologies, and or methodologies that improve the ability to predict geologic storage capacity within 30 percent, improve the utilization of the reservoir by understanding how faults and fractures in a reservoir affect the flow of CO2, and ensure storage permanence.

**[DE-FOA-0001068](#) - Notice of Intent to Issue Funding Opportunity Announcement No. DE-FOA-0001018**

The Office of Energy Efficiency and Renewable Energy (EERE) intends to issue, on behalf of the Solar Energy Technologies Office, a Funding Opportunity Announcement (FOA) entitled Solar Manufacturing Technology 2 (SolarMat 2). This FOA supports the development and

implementation of innovative technologies that will create competitive advantage for domestic solar energy technology manufacturers and manufacturers in the solar supply chain. The total federal funding will be approximately \$25M with a minimum 50% awardee cost share required. Projects are expected to be funded with a maximum award level of \$5M.

## **NATIONAL SCIENCE FOUNDATION**

### **NSF 14-534 - Sustainability Research Networks Competition (SRN)**

Full Proposal Deadline(s)(due by 5 p.m. proposer's local time): April 29, 2014

The goal of the Sustainability Research Networks (SRN) competition is to bring together multidisciplinary teams of researchers, educators, managers, policymakers and other stakeholders to conduct collaborative research that addresses fundamental challenges in sustainability. The 2014 SRN competition will fund research networks with a focus on urban sustainability.

## **OTHER**

### **Neutron Scattering Science** - Oak Ridge National Laboratory

Proposals for beam time at Oak Ridge National Laboratory's High Flux Isotope Reactor (HFIR) and Spallation Neutron Source (SNS) will be accepted via the web-based proposal system until 11:59 a.m. EST, (NOON) Wednesday, February 26, 2014. This call is for experiments anticipated to run from July through December 2014.

Previously submitted proposals may be used as the basis for new proposals. All proposals will be reviewed for feasibility, safety, and the potential for high impact science. Before beginning approved experiments, users must complete access and training requirements and ensure that the appropriate user agreements are in place.

## **UPCOMING EVENTS**

### **41st Annual PURC Conference: Politics & Policy: What is Next for Utilities? | Feb 19-20 | Gainesville, FL**

Please join us for PURC's 41st Annual Conference where we will examine options and decision making for energy supply, energy efficiency, the environment, prices, new technologies, and water regulation. Speakers and participants will engage in discussions regarding:

1. How will initiatives and inaction at the federal level shape Florida?
2. How will innovations and technological changes affect the business models of energy utilities?
3. What are the risks and opportunities with natural gas?
4. What can be expected regarding broadband development and universal service?
5. What are the options for improving water service in Florida?

## **2014 Energy & Sustainability Conference | Feb 11-12 | Richmond, VA**

Virginia Commonwealth University, a leader in sustainability, and the Virginia Chamber of Commerce are excited to host the largest energy and sustainability conference in Virginia! Set for February 11-12 at the Greater Richmond Convention Center in Richmond, Virginia, the 2014 Energy and Sustainability Conference features national leaders from across business and institutional market sectors. They'll discuss how sustainability is changing their organizations and how they're adapting and leveraging sustainability to enhance their business results. Sponsors & Exhibitors: Reserve Your Space Now! Contact the conference coordinators today at [ncrowe@convention-connections.com](mailto:ncrowe@convention-connections.com) for details.

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## **iiSBE Net Zero Built Environment Symposium | Mar 6-7 | Gainesville, FL**

The first meeting of an international collaboration of researchers, industry representatives, and professionals involved in the the design and construction of net zero energy buildings will be held at the University of Florida, March 6-7, 2014. For more information contact Charles Kibert at [ckibert@ufl.edu](mailto:ckibert@ufl.edu)

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## **2014 International Biomass Conference Expo | Mar 24-26 | Orlando, FL**

The International Biomass Conference & Expo is the largest gathering of bioenergy professionals in North America, featuring 80+ presenters, a poster session, a trade show of 150 booths, two industry tours, and multiple networking sessions. It is our mission to bring individuals from academia, industry, finance, public policy, and regulation together to openly discuss how biomass-to-energy systems advance down economically sustainable and environmentally prudent paths. Given the recent growth of the bioenergy industry in the Southeastern United States and particularly Florida, we will be holding the 2014 International Biomass Conference & Expo in Orlando, FL. For more information contact Kolby Hoagland at [khoagland@bbiinternational.com](mailto:khoagland@bbiinternational.com)

We are accepting poster abstracts on all topics affecting the biomass-to-energy sector within four tracks:

- Track 1: Pellets & Densified Biomass
- Track 2: Biomass Power & Thermal
- Track 3: Biogas & Landfill Gas
- Track 4: Advanced Biofuels & Biobased Chemicals

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## **2nd Interdisciplinary Workshop on Smart Grid Design & Implementation | Mar 28-29 | Gainesville, FL**

March 28 - 29, 2014

Department of Electrical & Computer Engineering and the Warrington College of Business Administration  
University of Florida

This is a sequel to a conference of the same name, held in 2012 LINK. The goal is to examine how best to maximize the contribution of renewable energy and a "smart grid" to realize a sustainable energy future.

We will draw upon the combined wisdom and collaboration of engineers, economists, and policymakers to explore the technological challenges, the challenges associated with informing and motivating consumers, and the challenge of ensuring the financial integrity of industry producers.

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## **Florida Energy System Consortium Workshop | May 12-13 | Gainesville, FL**

The 2014 Florida Energy Systems Consortium (FESC) Workshop is scheduled for May 12-13, 2014, at the Hilton University of Florida Conference Center in Gainesville, Florida.

FESC will financially support the hotel expenses for up to 84 oral presenters from academia. In addition, on a first-come, first-serve basis, FESC will financially support the hotel expenses for up to 66 poster presenters and attendees from academia including students. Students will share hotel rooms with other student attendees.

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## **World Congress on Industrial Biotechnology | May 12-15 | Philadelphia, PA**

The 11th Annual BIO World Congress on Industrial Biotechnology will take place May 12-15, 2014 in Philadelphia at the Pennsylvania Convention Center. BIO is proud to partner with PHLLife to bring this event to the Philadelphia area!

December 12, 2013- Deadline to submit an abstract

December 2013- Registration, housing & exhibit sales open

Early February 2014- Program Announced

March 31, 2014- Early Bird Registration Deadline

April 2014- BIO One-on-One business partnering open for attendees to schedule on-site meetings

May 12-15, 2014- BIO World Congress in Philadelphia!

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## **Second Annual Go SOLAR Renewable Energy Fest | June 6-7 | Fort Lauderdale, FL**

The Fest will be held on June 6 and 7, 2014 at the Greater Fort Lauderdale/Broward County Convention Center in Fort Lauderdale. This is the premier event in South Florida to promote and expand rooftop solar in Florida. For our second Fest, in addition to photovoltaics, we added topics such as thermal, biomass, energy efficiency, and wind energy and job creation to our agenda.

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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)