

Clean Energy  
is  
Green Energy

Big Ideas.  
Big Opportunities.

University of  
South Florida



Clean Energy  
Research Center

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## "Research One" ... Innovation, Achievement

Celebrating faculty, staff and student research accomplishments through a week-long showcase across all areas of the university, USF's "Research One" was held Nov. 3-7, 2008. Awards for outstanding research achievement, excellence in innovation and graduate student research were presented Nov. 7. CERC co-director Yogi Goswami received an Outstanding Research Achievement Award.

Dr. Karen Holbrook, USF VP for Research and Innovation said that the most important aspect of "Research One" was the sharing of ideas



USF VP Karen Holbrook and CERC's Sesha Srinivasan.

across the spectrum of the university. "Faculty don't use just what comes of the the textbook to work with students, they use the knowledge that they are creating," Holbrook explained. "This gives students a wonderful opportunity to be part of creating knowledge," she continued.

In support of "Research One," the College of Engineering (CofE) hosted events aimed at strengthening its research community through information exchange and bridge building. The broad range of inter- and multi-disciplinary research pursued by CofE provided valuable exposure about engineering research areas. Poster presentations were displayed in the "Fish Bowl."

During the Nov. 4 leg, "Energy, Sustainability and Infrastructures/Transportation Power Presentations" CERC researchers showed two posters, one highlighting our work, and a second for CERC as a part of the Florida Energy Systems Consortium. Sesha Srinivasan and Michael Niemann discussed CERC's diverse project areas to interested attendees, one of whom was Dr. Karen Holbrook USF Vice President for the Office of Research and Innovation.

Graduate student research was emphasized during "CofE Research Day" on Nov. 5 held at the Interdisciplinary Research Building Galleria. CERC graduate students displayed posters focusing on their research.

- "Environmentally Sustainable Flash Desalination" (Mohammed Abutayeh)
- "Thermodynamic Cycle" (Huijuan Chen)
- "Hydrogen Storage Materials" (Pabitra Choudhury)
- "Thermo-chemical Hydrogen Production and Carbon Capture" (Drupatie Latchmen)
- "Exotic Polyaniline Nanostructures for Hydrogen Storage" (Michael Niemann)



USF's mascot, Rocky, with CERC grad students (L-R): Abutayeh, Latchman and Chen.

Renewable energy is a proven technology.

## USF-TECO Energy Forum

Showcasing energy research to highlight solutions for the State of Florida was the foundation for "An Energy Forum to Discuss Energy Solutions" in October 2008. The USF, Greater Tampa Chamber of Commerce and Tampa Electric Company (TECO) collaborated in demonstrating how scientists in the Tampa Bay area are major contributors to energy research in the State and the nation.



(L-R) CofE Dean John Wiencek, U.S. Sen. Mel Martinez and USF Provost Ralph Wilcox.

Florida's U.S. Senator Mel Martinez spoke at the Forum, where he was joined by St. Petersburg Mayor Rick Baker, Tampa Port Authority Director Joe

Wainio, Chuck Black of TECO, USF Provost Ralph Wilcox, College of Engineering (CofE) Dean John Wiencek, and CERC Directors Lee Stefanakos and Yogi Goswami.

CERC researchers fielded five technical poster presentations demonstrating the breadth and range of our ongoing energy investigations. These included:

- Overview of CERC
- Florida Energy Systems Consortium
- Solar Desalination for Potable Water
- Thermo-dynamic Cycle Simulation
- Hydrogen Production from Solar
- Photovoltaics



(L-R): CERC's Yogi Goswami, CofE Dean John Wiencek, St. Petersburg Mayor Rick Baker, USF Provost Ralph Wilcox and CERC's Lee Stefanakos.

## Kids Are STARS

Summer camps are not what they used to be for kids. Now there are specialized camps for all careers, sports, arts, and other unique subjects. STARS is an ideal setting for the child who is enthralled with chemistry, engineering, scientists and inventors.



Researcher Sesha Srinivasan demos the hydrogen toy car.

The Students, Teachers and Resources in the Sciences (STARS) Summer Camp 2008 drew quite a number of middle schoolers to the USF to participate in meaningful science activities with hands-on demonstrations of various engineering areas. STARS camps provide a kaleidoscope of activity and training opportunities for young people.



Lab Coordinator Chuck Garretson demos the solar oven.

CERC graduate students Ricardo Vasquez, Gokmen Demirkaya, Huijuan Chen,

Drupati Latchman, Michael Niemann, Sam Wijewardane and Pabitra Choudhury, gave demonstrations of our current research at the Solar Charging Station adjacent to the ENB/Glenn Burdick Hall. Demonstrations included:

- Solar charging (PV panels)
- Hydrogen production (electrolysis process) and conversion through fuel cells
- Hydrogen fuel cell and solar driven vehicle
- Solar oven
- Photocatalytic water disinfection

## Undergraduate Student Presentations and Awards

**Senior Design Project:** The College of Engineering's Senior Design Project is for undergraduate students at the end of their final semester. Student teams must conduct a research project and then present their findings at a college-wide competition held in the "Fish Bowl" of the Glenn Burdick Hall (Engineering B building). During April 2008, a team mentored by CERC faculty presented a poster on "Hydrogen Production using Solar Energy." CERC faculty mentors included Elias Stefanakos, Yogi Goswami and Sesha Srinivasan.

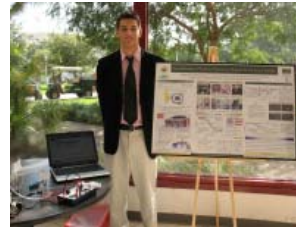


(L-R): Dr. Lee Stefanakos, Mahdusudan Narkhede, Timberland Pham, Erin Dobrzanski, Quang Bui and Ezgi Economos

Stefanakos, Yogi Goswami and Sesha Srinivasan.

### 1<sup>st</sup> Prize at the NSF Research Experiences for Undergraduates (REU) Summer Program:

Through the Research Experience for Undergraduates program, students participate in numerous research efforts while enhancing their understanding of engineering concepts and principles. Andrew Vittetoe, an undergraduate student who worked with the CERC for the REU during May-Aug. 2008, bagged first place (both oral and poster presentations) in the open competition for his research project on "Destabilizing Lithium Aluminum Hydrides for Hydrogen Storage". His award was presented by Dr. Sylvia Thomas, Asst. Dean of the USF College of Engineering. CERC mentors included Sesha Srinivasan and Michael Niemann.



Andrew Vittetoe

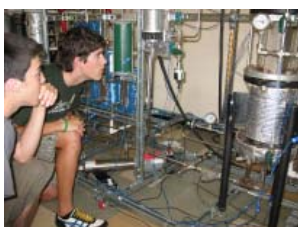
Energy conservation is the foundation of energy independence.

## Young Engineers Tour Labs

Compelling research met the eyes of young engineers touring the laboratories of the Clean Energy Research Center, in October 2008. Students from the USF Engineering Living and Learning Community used the eye opening tour to help connect their academic pursuits to research possibilities in engineering.



Filtration system impregnated with titanium dioxide for indoor air detoxification.



Innovative thermodynamic combined cooling/power cycle.



Photocatalytic reactor used to purify polluted water.



Bacteria grown to test photocatalytic disinfection.

## Making the Most of Clean Energy

CERC often hosts visiting researchers who hail from all corners of the world. CERC's expertise in renewable energy research, technical and infrastructure development and information transfer is a valuable resource to researchers far and wide. During the Summer and Winter of 2008, CERC hosted researchers from China, Greece, India and Japan.



### China: Chengqin Ren

Dr. Chengqin Ren, of the Hunan University, Changsha, China, received an award from the China Scholarship Council and the Hunan University to conduct thermodynamic heat exchange research at the CERC.



### Greece: Georgios Panaras

Mr. Georgios Panaras, of the National Center for Scientific Research "DEMOKRITOS", in Athens, Greece, studied solar thermal energy storage for implementation into solar power cycles at the CERC.



### India: Antaryami Singh

Dr. Antaryami Singh, of the Indian Defense Laboratory in Jodhpur, India, underwent training in the field of photochemical disinfection of water at the CERC.



### Japan: Noboru Yamada

Dr. Noboru Yamada, of the Nagaoka University of Technology in Nagaoka Japan, studied solar thermal energy storage and thin film photovoltaic energy production.

"I'd put  
my  
money on  
solar  
energy."

Thomas  
Edison

## Climate Change Summit

Florida Governor Charlie Crist opened the green technology expo "Climate Change Summit: Serve to Preserve," in Miami during Summer 2008. Governor Crist discussed Florida's energy and economic future. CERC's display of a photocatalytic detoxification system drew interested observers.



*(L-R): CERC researchers Michael Niemann and Nikolai Kislov with summit attendees.*

## *Clean Energy Symposia*

The Clean Energy Research Center regularly hosts symposia highlighting energy research from around the world. Three recent presentations were given by:

- Dr. Avraham Kribus, from the School of Mechanical Engineering, Tel Aviv University, Tel Aviv, Israel. Dr. Kribus talked about “Photovoltaic Cogeneration: The Promise and the Challenges.” Kribus says that even the best PV systems waste 70% of the solar energy collected. Cogeneration captures most of the wasted energy providing heat as a second energy product, or to convert to another useful energy product such as air-conditioning or desalination of water. Cogeneration offers a major leap in efficiency and cost-effectiveness of solar energy.
- Dr. Andrew Martin, from the Royal Institute of Technology, Stockholm, Sweden. Dr. Martin synopsized two of his projects: “Solar-driven Membrane Distillation Desalination;” and, “Steam Turbine optimization for Solar Thermal Power Plant.” Martin said desalination is playing a more dominant role even as vigorous water reduction and reclamation programs are employed. Linking desalination to renewable energy sources is essential to capture long-term solutions. Also, much focus has concentrated on collector development and demonstration plants, with little attention on tailoring the steam turbines, Martin said.
- Dr. Steven Novack, from the Idaho National laboratory, Idaho Falls, Idaho. Dr. Novack discussed: “Nantenna Electromagnetic Collector (NEC) for Electricity from the Sun.” The NEC devices target mid-infrared wavelengths, where conventional photovoltaic (PV) solar cells are inefficient and where there is an abundance of solar energy. The work represents an important step toward the ultimate realization of a low-cost device that will collect, as well as convert this radiation into electricity, which will lead to a wide spectrum, high conversion efficiency, and low-cost solution to complement conventional, Novack said.

Energy policy should be driven by environmental policy.

## Honors and Awards

The U.S. can be a global leader in the development of alternative energy sources.

- USF awarded the Outstanding Faculty Research Achievement Award for 2008 to Yogi Goswami, CERC Co-Director. The USF award recognizes faculty who have earned national and international recognition in their fields. Goswami was recognized for receiving the Frank Kreith Energy Award from the American Society of Mechanical Engineers; the Farrington Daniels Award from the International Solar Energy Society; and the Hoyt Clark Hottel Award from the American Solar Energy Society, for his continuing contributions to the fields of renewable energy, solar energy and energy conversion. Dr. Goswami appeared on the Faculty Spotlight website page for the USF Office of the Provost and Senior Vice President in September.



- Dr. Goswami was also awarded the "Outstanding Indian Citizen of the Year" from the Federal Indian Association/Tampa Bay in August 2008. The award honors Americans of Indian origin who excel in their professional and community activities. A previous winner was Dr. Renu Khator, then USF Provost, now Vice Chancellor of the University of Houston.

- CERC researcher Dr. Sesha Srinivasan received a Certificate of Excellence for his presentation "Nanomaterials for Energy and Environmental Applications" at the NanoFlorida 2008 during September. NanoFlorida 2008 is the first annual NanoScience Technology Symposium held at the University of Central Florida in Orlando.



- Dr. Srinivasan also gave a presentation at the Rotary Club Int'l. of Zephyrhills in September. His presentation highlighted practical solutions everyone can use to decrease our energy consumption. This is the second time the Zephyrhills Rotary Club has requested speakers from the CERC; previously Dr. Yogi Goswami presented a talk on peak fossil fuel.

- CERC affiliate faculty, Prof. Kimon Valavanis, has become the Chairman of the Electrical and Computer Engineering at the University of Denver in Colorado. Valavanis was previously a professor in the USF Department of Computer Science and Engineering, where he also served as Deputy Director at the Center for Robot-Assisted Search and Rescue (CRASAR) until the summer of 2005. In 2006 he created the Unmanned Systems Laboratory, where he served as its Director. Valavanis is also the chief editor of the *Journal of Intelligent and Robotic Systems*, and the *IEEE SMC e-Newsletter*.



## Research Topics are Wide Ranging



Abutayeh

Mohammed Abutayeh: Solar desalination of sea water using passive vacuum and flashing



Celestin

Michael Celestin: Rectenna Arrays and MIM diodes

Huijuan "June" Chen: Goswami thermodynamics cycle with CO<sub>2</sub> and absorbents



Chen

Pabitra Choudhury: Theoretical analysis of H<sub>2</sub> storage



Choudhury

Omatoyo "Kofi" Dalrymple: Disinfection of indoor air using photo-electrochemical technology



Dalrymple

Gokmen Demirkaya: Turbine design, fabrication and testing for the Goswami thermodynamics cycle



Demirkaya

Stelios Ioannou: Discrete linear constrained multivariate optimization for power sources of mobile systems



Ioannou

Subramanian "Subbu" Krishnan: Development of thin film metal insulator / metal funnel diodes for energy conversion application



Krishnan

Drupati "Dru" Latchman: Thermochemical hydrogen production using UT3 cycle

Chennan "Steven" Li: Photocatalytic detoxification and disinfection

Jonathan Mbah: Hydrogen and fuel cells

Michael Niemann: Development and investigation of novel nanostructures and complex hydrides for hydrogen storage

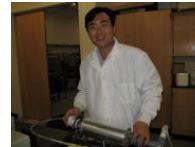
Dhionny "Tony" Strauss: Rectenna Arrays, MIM diodes and Electrical Measurements

Ricardo Vasquez: Design of solar thermal power plants

Samantha "Sam" Wijewardane: Emitters and concentrators of IR radiation for rectenna energy conversion



Latchman



Li



Mbah



Niemann



Strauss



Vasquez



Wijewardane

Renewable energy's time has come. The climate will not wait for us.



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## Become a Partner in CERC's Growth!

CERC is already ranked among the nations' elite research centers and with every year we continue to improve. Your financial contributions supplement state and grant funding, and make an enormous difference in our efforts to further renewable energy research and improve our infrastructure. All gifts are tax deductible. If you have any gift/tax questions please contact Edward Kominowski, Director of the USF's College of Engineering Development Office at (813) 974-9896. We hope that you will help the CERC and in so doing, aid the USA's transition to a renewable energy future. Thank you for your generous contribution to the USF CERC!



*Lee Stefanakos and Yogi Goswami, Directors, CERC*

Yes, I want to donate to the University of South Florida's Clean Energy Research Center.  
My donation is:

\$50   \$100   \$250   \$500   \$1000   Other

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