



Florida Energy Systems Consortium

# 2010 FESC Summit

University of Central Florida Student Union  
Orlando, Florida  
September 28-29, 2010



Date/Time	Monday, September 27			Tuesday, September 28	Wednesday, September 29
7:30- 8:00				Registration Poster Set-up 7:30 – 8:30AM Cape Florida Prefunction	Registration
8:00-9:00	Registration Cape Florida Prefunction			8:30 AM Cape Florida Ballroom Welcome Tony Waldrop, Provost 8:40 AM: Plenary Session I: Future Directions See page 6	8:00 – 9:30 Oral Presentations Session II Key West Rooms A, B, C, D See page 11
9:00-10:00	Photovoltaics Workshop Cape Florida AB			Break 10:00 – 10:30 Cape Florida Ballroom	Break 9:30 – 10:00 Cape Florida Ballroom
10:00-11:00				10:30 – 11:30 Cape Florida Ballroom Keynote Address John Lushetsky Program Manager, Solar Energy Technology Program U.S. Department of Energy	10:00– 11:00 Cape Florida Ballroom Panel Discussion: Florida’s Needs and Opportunities See page 12
11:00-noon				11:30 – 11:45 FESC Strategies & Programs Tim Anderson, FESC Director	11:00– 11:30 Roundtable Reports
Noon – 1:00				11:45 – 12:30 Buffet Lunch (provided) Cape Florida Ballroom	11:30– 12:30 Buffet Lunch (provided) Cape Florida Ballroom
1:00 – 2:00				Lunch on your own Registration Key West Prefunction	
2:00-3:00	Photovoltaics Cape Florida AB	Technology Transfer Key West AB	FECC Meeting Cape Florida CD	Break 2:15 – 2:45 Cape Florida Ballroom	Break 2:15 – 2:45 Cape Florida Ballroom
3:00-4:00				2:45 – 3:30 Roundtable Discussion Cape Florida Ballroom	2:45-4:00 Oral Presentations Session IV See page 14
4:00-5:30				Poster Overview Session 3:30 – 5:30 Cape Florida Ballroom See page 8	
5:30-7:00	Registration UCF LaQuinta lobby			Poster Session and Reception Cape Florida Atrium Biomass Power Plant Demo	

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## Introduction

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Welcome to the 2010 FESC Summit! The Summit is organized to bring together Florida's energy experts to share research findings, industry innovations, policy initiatives, and educational expertise to promote collaboration, commercialization, and growth to Florida's emerging energy sector. Over the next two days, you will learn of the latest ideas, innovations and programs that will advance Florida energy policy, research and innovation, as well as educational programs to develop Florida's energy workforce, outreach programs to advance practical conservation and efficiency techniques, and plans for the future.

### Keynote Speaker: John Lushetsky



Mr. John Lushetsky is the Manager of the U.S. Department of Energy's Solar Energy Technology Program (SETP) with responsibility for all solar technology development, grid integration, and market transformation activities under the Solar America Initiative announced by President Bush in 2006. His career has included significant technology development and commercialization roles with both start-up and Fortune 500 companies. Mr. Lushetsky was previously with Corning, Inc. where he held a number of senior positions with responsibility for strategic marketing, account management and business development activities. Most recently, Mr. Lushetsky was responsible for developing new strategic business opportunities in the solar technologies as well as the computer electronics, medical device and life science, and water purification industries. He also previously managed acquisitions, collaborations, and minority equity investments which expanded the company's access to new technologies. Prior to Corning, Mr. Lushetsky was with Electrosorce, Inc., an Austin, Texas-based start-up developing an advanced battery technology for electric and hybrid vehicles. While with Electrosorce, Mr. Lushetsky had responsibility for marketing, business development and company financing activities. Mr. Lushetsky holds an MBA in International Business from George Washington University and an M.S. and B.S. with High Honors in Engineering Science from the University of Florida.

### Acknowledgements

*The Florida Energy Systems Consortium is profoundly grateful to the University of Central Florida administration, faculty, staff, and students for their tireless contributions of time and effort to the success of this second annual FESC Summit. Our sincere thanks goes also to Florida Power and Light for their generous support.*



## Plenary Speakers

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### **Sena Black**

Sena H. Black is Senior Vice President of Marketing and Strategic Intelligence at Enterprise Florida, the public-private partnership responsible for leading Florida's statewide economic development and diversifying Florida's economy.

Black leads the development of Florida's statewide strategic plan, "*Roadmap to Florida's Future*", a five-year economic development plan created through competitiveness analysis and regional stakeholder forums. The goal of the Roadmap is to help diversify Florida's economy for greater competitiveness in a knowledge-based 21st century global economy. She also oversees global marketing programs to promote and brand Florida as an innovation hub for strategic clusters, business

development and job creation.

Sena has broad experience in economic development policy, research, marketing, and business development. She has won national economic development awards from IEDC and SEDC and published numerous articles on technology-based entrepreneurship and economic development strategies. As a gubernatorial appointee, she served on the Governor's Commission on the Future of Space and Aeronautics and on Destination Florida. Currently, she serves on the boards and advisory committees of the Florida Research Consortium, Central Florida Incubator Network, Florida CURED, STEMFlorida, Florida Solar Energy Center. She is a graduate of Wellesley College in Massachusetts, and has advanced degrees from the University of Michigan at Ann Arbor.



### **CD Hobbs**

Mr. CD Hobbs is currently the Managing Director of ITF Research Group, Inc., based in Richland, Washington. As such, he formed a research and advisory company to provide strategy and strategic initiative in management for CEOs and CXOs in the energy utility industry. Mr. Hobbs is an accomplished and forward-thinking executive with a distinguished career of achieving business goals of major companies by applying a unique, success-proven approach to the following disciplines: Strategic Planning, Business Development, International Operations, Product Management, Process Reengineering, Organizational Restructuring, Media/Public Relations Financial Analysis Strategic Alliances.

He is an internationally recognized expert on best practices in energy utility operations and technology, helping top global companies redefine themselves through innovative advisory strategies and high profile presentations. Mr. Hobbs also has an exceptional record of recreating established companies as industry vanguards by closely aligning marketing, financial, sales and operational strategies to fulfill real market needs with utmost efficiency. He is a seasoned, confident communicator able to inspire positive change, empower cohesive teams and maintain a vast network of valuable, executive-level partner and client relationships.



### **Mike Haridopolos**

Sen. Mike Haridopolos was first elected to the Florida House of Representatives in 2000, then to the Florida Senate in March of 2003. He was re-elected to the Senate in 2006 and will seek re-election to his final term in the Senate in 2010. In December of 2009, Haridopolos was honored with the unanimous support of his colleagues when he was designated to be the next President of the Florida Senate. He will take office as Florida's 96th Senate President following the November 2010 general election.

Sen. Haridopolos has stood up for Floridians against more government, higher taxes, and unrestrained spending in Tallahassee. He is a co-founder of the Freedom Caucus



that led the fight against tax increases and signs Americans for Tax Reform's Taxpayer Protection Pledge to "oppose and vote against any and all efforts to increase taxes" every year before the Legislature goes into session.

Haridopolos currently serves as Chairman of the Senate Committee on Energy, Environment and Land Use and the Senate Committee on Reapportionment. In addition to these Chairmanships, Haridopolos sits on committees for Social Responsibility, Ways and Means, Communications, Energy and Public Utilities, Health and Human Services Appropriations, Judiciary, Transportation, and the Select Committee on Florida's Economy, and Intergovernmental Relations.

Haridopolos has appeared on Fox News' *Huckabee* to discuss a Transparency Florida, an initiative he led to put the state budget online for all Floridians to see. He has also appeared on CNN as a guest of Lou Dobbs and has been featured in Florida Trend magazine as a legislator "...who could shape Florida politics." He was also recently named by the Hotline as one of six "rising stars" among Republican state legislators.

A graduate of Stetson University in 1992 with a B.A. in History, in 1993, he earned a Masters in History at the University of Arkansas. Later that year, at the age of twenty-three, Mike became a history instructor at Brevard Community College, and within three years he was named the Department Chair of Social Behavioral Sciences. In 1997, Mike was promoted to the Chair of the Liberal Arts Department at BCC. Mike is currently finishing his PhD at Florida State University and works as a full-time lecturer at the Bob Graham Center for Public Service at the University of Florida.

Mike represents District 26 in the Florida Senate, which includes parts of Brevard, Indian River, Osceola, and St. Lucie Counties. He is married to Stephanie Haridopolos, M.D., and they have three children: Alexis, Hayden, and Reagan.



### **Lonnie Ingram**

Lonnie Ingram is Director of the Florida Center for Renewable Chemicals and Fuels at the University of Florida with over 30 years of research experience in the conversion of lignocellulose to ethanol and value added chemicals. Educated as a Biologist (B.S.) at the University of South Carolina (1969) and a Botanist (Ph.D.) at the University of Texas at Austin (1971), his research has resulted in over 200 scientific publications and more than 30 pending and issued patents. One of these was selected by the Department of Commerce to become Landmark Patent 5,000,000 and describes the first successful genetic engineering of a microorganism to efficiently ferment the hexose and pentose sugar constituents of biomass into ethanol. All patents have been licensed to industries with the creation of three spin-off companies. These technologies are currently licensed to BP-Verenium, Myriant Technologies, and others. Licensed patents are now being commercialized for the production of ethanol as an automotive fuel, for the production of organic acids (biodegradable plastics), and for specialty chemicals. Dr. Ingram has been elected to membership in the American Academy of Microbiology, the US National Academy of Sciences, and as a fellow of the Society of Industrial Microbiology.

These technologies are currently licensed to BP-Verenium, Myriant Technologies, and others. Licensed patents are now being commercialized for the production of ethanol as an automotive fuel, for the production of organic acids (biodegradable plastics), and for specialty chemicals. Dr. Ingram has been elected to membership in the American Academy of Microbiology, the US National Academy of Sciences, and as a fellow of the Society of Industrial Microbiology.



### **James Murley**

Mr. James F. Murley, Esq., became the director of the Center for Urban and Environmental Sciences (CUES) at Florida Atlantic University in 1999. Prior to that, he served as secretary to the Florida Department of Community Affairs, and Executive Director of 1000 Friends of Florida. At CUES, he directs climate change adaptation studies funded by the National Commission on Energy Policy (NCEP). The initial NCEP/CUES study, released in 2008, was entitled "Florida's Resilient Coasts: A Statewide Policy Framework for Adapting to Climate Change." A second NCEP study is

in progress, and will address how to protect the water supply for Southeast Florida from the impacts of climate change, including sea level rise.

In addition to serving as Chair of the Florida Energy & Climate Commission, Mr. Murley also serves as Vice Chair of the Miami Dade County Climate Change Advisory Task Force and is a member of the Broward County Climate Change Task Force, where he serves as Chair of the Built Environment and Infrastructure Committee. He also currently serves as Vice Chair of the Florida Chapter of the Congress for New Urbanism. Mr. Murley is on the Advisory Boards for the Coastal States Stewardship Foundation, The Seaside Institute, The Broward Housing Partnership, Trust for Public Land in Florida, and is a Fellow of the National Academy of Public Administration.



### **Steve Precourt**

Representative Precourt was elected to the Florida House of Representatives in 2006 and subsequently reelected. He is chair of the Energy and Utilities Policy Committee.

A native Floridian, businessman and devoted husband and father, Steve Precourt wants to help make our community a better place to live, work and raise a family. As a transportation engineer for over 20 years, Steve understands the unique challenges our community faces from rapid growth - overcrowded schools, traffic and community services that are spread thin. He has the experience and determination to solve the challenges facing our community. Steve's number one priority is creating the economic climate necessary to create jobs and put Floridians back to work.

Born and raised in West Orange County near Orlando, Steve and his wife Lisa just celebrated their 25th wedding anniversary. They have five children.

Steve graduated with a Bachelors of Science in Civil Engineering from the University of Florida in 1983, and is a licensed Professional Engineer. He and his business partners built an engineering practice to 500 employees with 18 offices around Florida and the southeast. His technical areas of expertise are infrastructure and energy, growth management, and transportation. Steve is currently President of Precourt Solutions, LLC, a consulting practice specializing in Strategic Planning, Business Best Practices, and Leadership Development.



### **Jeremy Susac**

Jeremy Lawton Susac currently serves as the President of the Real Energy Strategies Group in Palm Beach, Florida. Concurrent with this position, Mr. Susac serves as the Executive Director of the Florida BioEnergy Association, and the Director of Strategic of Energy Explorations and Initiatives for the Power Center for Utility Explorations within the University of South Florida. Immediately prior, Mr. Susac served in the public sector as Florida's first Executive Director of the Florida Energy & Climate Commission, Director of the Florida Energy Office at the Florida Department of Environmental Protection. Immediately prior to running Florida's energy office Jeremy, served as a Chief Policy Advisor to Commissioner McMurrian at the Florida PSC, and also practiced law in the PSC's office of General Counsel.

Prior to working in government, Mr. Susac practiced law in Manhattan. He is licensed to practice in both NY and FL, and holds a B.A. From University of Florida, and a J.D. From New York Law School.

## 2<sup>nd</sup> Annual FESC Summit

September 28-29, 2010 • University of Central Florida

All events will take place at the UCF Student Union unless otherwise noted.

Summit Objective: To bring Florida's energy experts together to share their energy-related research findings, industry innovations, policy initiatives, and educational expertise to promote collaboration, commercialization, and growth to Florida's emerging energy sector.

### Pre-Summit Workshops – UCF Student Union

#### **MONDAY, SEPTEMBER 27**

8:00 – 9:00AM Registration (Cape Florida Prefunction)  
9:00AM – 3:00PM Photovoltaics (Cape Florida AB)  
Noon - 1:00PM Registration (Key West Prefunction)  
1:00PM – 4:00 PM Technology Transfer and Commercialization (Room: Key West 218-AB)

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### FESC SUMMIT

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#### **MONDAY, SEPTEMBER 27**

1:00 – 5:00PM: Florida Energy and Climate Commission Meeting (Room: Cape Florida CD)  
5:00 – 7:00PM Registration (LaQuinta UCF Lobby)

#### **TUESDAY, SEPTEMBER 28**

7:30 – 8:30 AM Poster set-up – UCF Student Union Cape Florida Atrium  
*Posters will remain until the Summit adjourns on the 29<sup>th</sup>*  
8:30 – 11:00 AM Registration (Cape Florida Prefunction)

### **GENERAL SESSION: UCF STUDENT UNION CAPE FLORIDA BALLROOM (ABCD)**

*MODERATOR: TIM ANDERSON*

**8:30 - 8:40 AM WELCOME**  
*Tony Waldrop, Provost, University of Central Florida*

#### **8:40 – 10:00 PLENARY SESSION: FUTURE DIRECTIONS**

*CONVERTING LIGNOCELLULOSE INTO CHEMICALS THAT REPLACE PETROLEUM*

*Lonnie Ingram, Director, Florida Center for Renewable Chemicals and Fuels, Professor, Department of Microbiology and Cell Science, University of Florida*

*WHAT'S DRIVING THE SMART GRID?*

*CD Hobbs, Senior Fellow, Public Utility Research Center, Warrington School of Business, University of Florida*

*DIVERSIFYING FLORIDA'S ECONOMY: THE CLEANTECH CLUSTER*

*Sena Black, Senior Vice President, Enterprise Florida*

*ECONOMIC OPPORTUNITIES & SOLUTIONS FOR THE 21ST CENTURY*

*Jeremy Susac, Director of Exploration, PCUE at USF; Executive Director, Florida BioEnergy Association, Inc.; President and CEO, Real Energy Strategies Group*



**10:00-10:30**            **BREAK**

**10:30 – 11:30** **KEYNOTE ADDRESS: ENERGY EFFICIENCY AND RENEWABLE ENERGY: THE 2020 VISION**

*John Lushetsky - Program Manager, Solar Energy Technology Program  
U.S. Department of Energy*

**11:30-11:45AM**        **OVERVIEW OF FESC STRATEGIES AND PROGRAMS**

*Tim Anderson, Director, FESC*

**11:45AM – 12:30PM** **BUFFET LUNCH**

## **TECHNICAL SESSION: UCF STUDENT UNION KEY WEST ROOMS A, B, C, D**

**12:30 – 2:15**    **ORAL PRESENTATIONS: SESSION I**

### **Energy Efficiency & Conservation; Education & Outreach, Policy (Key West A)**

*Chair: Ted Kury; Co-Chair: Ramona Madhosingh-Hector*

The Future Florida Grid: Ensuring Reliable and Resilient Electrical Energy Systems in a Changing Environment – *Rick Meeker, Steinar Dale, Mischal Steurer, Tom Baldwin, Peter McLaren, Karl Schoder, Omar Faruque, James Langston (#57)*

UFTR Digital Control System Upgrade for Education and Training of engineers and operators - *Alireza Haghghat and Gabriel Ghita (#52)*

How Sustainable Are Florida Cities? Results from a Survey of Energy Sustainability in Florida Cities - *Richard Fieock, Jungah Bae and Ivonne Audirac, IESES, Florida State University (#60)*

PEEP! Energy Programming for County Residents - *Ramona Madhosingh-Hector (#108)*

Implications of Carbon Cap-and-Trade for Electricity Rate Design, with Examples from Florida - *Hethie Parmesano and Ted Kury (#102)*

### **Biomass Resources; Carbon Capture (Key West B)**

*Chair: John Wolan; Co-Chair: Ali T-Raissi*

Screening and Identification of Everglades algal isolates for Biodiesel production - *Priyanka Narendar, Miroslav Gantar, and Krishnaswamy Jayachandran (#97)*

Growth of Microalgae for Biofuel Production on High Strength Wastewater - *Sarina Ergas, Xin Yuan, Ashish Sahu, and Trina Halfhide (#118)*

International Biofuel Trends: A Brazilian Perspective - *Donato Aranda (#83)*

Thermochemical Conversion of Biomass to Liquid Fuels - *John Wolan, Ali Gardezi, Joseph Babu (#66)*

### **Ocean Resources (Key West C)**

*Chair: Howard Hanson; Co-Chair: Clifford Merz*

Marine Renewable Energy: A Blue Chip in the Portfolio - *Howard Hanson (#12)*

Recent Developments in Salinity Gradient Power - *Clifford Merz (#50)*

Buoy Array for Ocean Wave Power Generation - *Steven Helkin, Carlos Velez, and Shiyuan Jin (#53)*

Drop-in Hydropower with Hydrovolts Flipwing Turbine - *Burton Hammer and C. Hampton McRae (#95)*

## **Energy Storage and Delivery, Energy Systems, Smart Grid (Key West D)**

*Chair: Debra Reinhart*

Development and Implementation of a “Smart Grid Network” - *Len Polizzotto (#107)*

Regional prediction of landfill gas to energy potential: Florida case-study - *Hamid Amini and Debra Reinhart (#8)*

Commercial Pathways to Immediate Deployment of Scalable Low Carbon Motor Fuels - *David Bruderly (#5)*

Conservation, Alternative Energy and Smart Grid Strategies for Babcock Ranch - Southwest Florida's City of Tomorrow - *Ernie Cox (#115)*

## **GENERAL SESSION: UCF STUDENT UNION CAPE FLORIDA BALLROOM (ABCD)**

**2:15 – 2:45**                      **BREAK**

**2:45 – 3:30 PM**                **ROUND TABLE DISCUSSION**

*TOWARD DEVELOPING A STRATEGIC PLAN ON ENERGY FOR THE STATE OF FLORIDA*

*Facilitator: John Shen*

### *STRATEGIC FOCUS AREAS AND DISCUSSION LEADERS:*

Solar (PV and Thermal)

*Leader: Tim Anderson*

Bio-Energy

*Leader: Pratap Pullammanappallil*

Grid Technologies & Electricity Distribution

*Leader: Dave Cartes*

Ocean Energy

*Leader: Howard Hanson*

Nuclear Education

*Leader: Ali Haghghat*

Secure Energy Systems

*Leader: Pramod Khargonekar*

Energy Efficiency and Conservation,  
Geothermal

*Leader: Rob Vieira*

Energy Storage

*Leader: Jim Fenton*

Carbon Capture

*Leader: Mark Stewart*

Wind Energy

*Leader: Shawn Smith*

Policy

*Leader: Ted Kury*

**3:30 – 5:30 PM**                **POSTER OVERVIEWS (2 MINUTES EACH)**

*Moderator: David Block; Co-Moderator: Darlene Slattery*

### **BIOMASS RESOURCES**

3:30 DFT studies on the promotional effect of platinum for the reduction of CoPt bimetallic catalyst in Fischer Tropsch Synthesis - *Nianthrini Balakrishnan (#2)*

3:32 Microalgae to Biofuels: Investigating the Role of Microbes in Wastewater-Derived Algal Cultivation Systems - *Claire Smith, Joel Kostka, and Mike Wetz (#27)*

3:34 Microalgae to Biofuels: Algal Growth Optimization in Treated Municipal Wastewater Effluent - *Kristina Welch, Michael Wetz, and Joel Kostka (#34)*

3:36 3:38 Optimization and Lipid Profiling of Algae Biofuel Feedstocks Grown in Wastewater - *William Cooper, Chris Witowski, David Podgorski, Michael Wetz, and Joel Kostka (#72)*

3:38 H<sub>2</sub> Production from Cellulosic Biomass for Bio-jet Fuels - *John Dascomb, Anjaneyulu Krothapalli, Brenton Greska, Duyen Nguyen, and Krishniah Parimi (#74)*

3:40 Woody Crops for Bioenergy Production in Florida - *Gary Peter, Alejandro Riveros-Walker, Jianzing Zhang, Patricio Munoz, Bijay Tamang, Don Rockwood, Matias Kirst and, Evandro Novaes (#82)*

- 3:42 Cost Models for a Biomass Based Transportation Fuels Plant - *Matt Wetherington and Babu Joseph (#94)*
- 3:44 A Model Cobalt/Silica FTS Nanocomposite Preparation by Surface Functionalization - *Bijith Mankidy, John Wolan, Babu Joseph, and Vinay Gupta (#28)*
- 3:46 Effect of Catalyst Preparation Conditions on the Performance of Eggshell Cobalt/SiO<sub>2</sub> Catalysts for Fischer-Tropsch Synthesis - *Sayed Ali Gardezi, Babu Joseph, John Wolan and Yogi Goswami (#3)*
- 3:50 Quantum Chemical calculations on biodiesel production reactions – *Donato Aranda (#83)*

#### **CARBON CAPTURE**

- 3:52 Terrestrial Carbon (TerraC) Information System - *Sabine Grunwald, Timothy A. Martin, Brandon Hoover, Gustavo M. Vasquez, Biao Zhong, and David DePatie, Jr. (#21)*
- 3:54 Carbon Balance in Florida: Vegetation Sequestration Offsets Residential Energy-Fuel Emissions - *Tingting Zhao and Mark Horner (#36)*
- 3:56 Accuracy of Geochemistry Software in Predicting Carbon Dioxide Dissolution in Brine at High Pressure and Salinity - *Arlin Briley, Shadab Anwar, Jeffrey Cunningham, Mark Thomas, and Maya Trotz (#43)*
- 3:58 Geochemical Modeling of CO<sub>2</sub> Sequestration in Deep Saline Aquifers in Florida - *Mark Thomas, Arlin Briley, Maya Trotz, Mark Stewart, and Jeff Cunningham (#48)*
- 4:00 Reversible Capture of CO<sub>2</sub> using Calcium Oxide and Dolomite - *Yogi Goswami, Dru Latchman, and Saeb Besarati (#73)*
- 4:02 Biocatalytic Strategies for Lignin Conversion - *Jon Stewart, Bradford Sullivan (#105)*
- 4:04 Accounting for the Carbon Costs of Alternative Water Supplies in the Tampa Bay Region - *Eleanor Foerste, M. Jennison Kipp, Dave Bracciano, and Pierce Jones (#113)*

#### **EDUCATION AND OUTREACH**

- 4:06 Sustainable Floridians: A University of Florida/IFAS Extension Community Education Program - *Kathryn Ziewitz (#91)*
- 4:08 Greenhouse Gas Emissions Inventory: A Road Map to Getting There! - *Sudeep Vyapari and Barbara Larson (#120)*
- 4:10 Building the Technician Workforce for Florida’s Energy Future - *Marilyn Barger, Richard Gilbert, and Jorge Monreal (#29)*

#### **ENERGY EFFICIENCY AND CONSERVATION**

- 4:12 The Zero Energy House Learning Center - *Stanley Russell, Mario Rodriquez, Mark Weston (#65)*

#### **ENERGY SYSTEMS**

- 4:14 Nuclear Fusion: The Real Solar Power and Renewable Energy Source - *Kyron Williams, Joseph Johnson, III, and Charles Weatherford (#40)*
- 4:16 Modeling and Design Optimization of Distributed Transformers for Renewable Energy Application - *Kejiu Zhang, Thomas Wu, Haibing Hu, Nasser Kutkut, John Shen, and Issa Batarseh (#45)*
- 4:18 Regenerative Electric Power for More Electric Aircraft - *Yuhang Deng, Indranil Bhattacharya, and Simon Foo (#47)*
- 4:20 Dual Flyback Converter Module Design - *Karthik Padmanabhan, Charles Jourdan, Jesus Barrios, Zheng Shen (#49)*
- 4:22 Design and Evaluation of a Midrange Wireless Power Transfer System - *Jamie Garnica, Joaquin Casanova, Jenshan Lin (#51)*
- 4:24 Combining Carbon dioxide Sequestration and Hydrogen Production - *Sunshant Kumar, Vadym Drozd, and Surendra Kumar Saxena (#55)*
- 4:26 Secure Energy Systems – An Initial View - *Tejaswini Akunuri, Pramod Khargonekar (#88)*
- 4:28 Off-Grid Zero Emissions Building – *Shannon Ingersoll (#123)*

## **ENERGY STORAGE**

- 4:30 Design Considerations for Distributed Micro-Storage Systems in Residential Applications - *Ala Al-Haj Hussein, Souhib Harb, Nasser Kutkut, John Shen, and Issa Batarseh (#18)*
- 4:32 Analysis of a Latent Thermal Energy Storage Module - *Sarada Kuravi, Jamie Trahan, Muhammad Rahman, Yogi Goswami, and Elias Stefanakos (#77)*
- 4:34 Integrated Carbon Nanotubes to C-MEMS for On-chip Supercapacitors - *Wei Chen, Majid Beidaghi, Chunlei Wang (#84)*
- 4:36 Carbon Nanotube-confined MnO<sub>2</sub> Nanocomposites for Electrochemical Capacitors - *Wei Chen, Chunlei Wang, Kevin Bechtold, Majid Beidaghi, and Varun Penmatsa (#85)*
- 4:38 3D Microsupercapacitor Based on C-MEMS with Improved Electrode Design - *Majid Beidaghi, Varun Penmatsa, Wei Chen, Chunlei Wang (#86)*
- 4:40 Electrochemical Impedance Spectroscopy of SEI on Porous SnO<sub>2</sub>/CNT Composite Anode for Lithium Ion Batteries - *Abirami Dhanabalan, Xifei Li, Yan Yu, Kevin Bechtold, Chunlei Wang (#87)*
- 4:42 Thermal Gravimetric and Volumetric Hydrogen Desorption in LiNH<sub>2</sub>-nanoMgH<sub>2</sub> - *Dervis Emre Demirocak, Sessa Srinivasan, Yogi Goswami, and Elias Stefanakos (#89)*
- 4:44 Virtual Battery Charging Station Utilizing Power-Hardware-in-the-Loop: Application to V2G Impact Analysis - *Brian Hacker, Chris Edrington, Oleg Vodyakho, Sardis Azongha, Alireza Khaligh, Omer Onar (#6)*

## **FUEL CELLS**

- 4:46 Insight into Membrane Degradation Mechanisms through Verification of Chemical and Mechanical Degradation Test Capabilities - *Darlene Slattery, Leonard Bonville, Marianne Rodgers (#13)*
- 4:48 Electrodeposition of Catalyst for use in Proton Exchange Membrane Fuel Cells - *Marianne Rodgers and Cunping Huang (#39)*
- 4:50 Modeling and Optimization of a Solid Oxide Fuel Cell Unit - *Wen Hang, Juan Ordonez, Jose Vargas (#122)*

## **PHOTOVOLTAICS**

- 4:52 Analysis and Control of a Multi-string Photovoltaic (PV) System Interfaced with a Utility Grid - *Chris S. Edrington, Saritha Balathandayuthapani, Jianwu Cao (#4)*
- 4:54 Adaptive Sun Tracking Algorithm for Incident Energy Maximization and Efficiency Improvement of PV Panels - *Raghuram Ranganathan, Wasfy Mikhael, Nasser Kutkut, and Issa Batarseh (#10)*
- 4:56 Development of High Throughput CIGS Manufacturing Process - *Neelkanth Dhere (#14)*
- 4:58 Development of Low Cost CIGS Thin Film Hot Carrier Solar Cells - *Yige Hu, Gijs Bosman, Timothy Anderson (#33)*
- 5:00 Novel Inverted Device Architecture used to Optimize Vertical Phase Segregation in Low-Bandgap Donor-acceptor Polymer Based Organic Photovoltaic Devices - *Frederick Steffy, Kaushik Coudhury, Jegadesan Subbiah, Chad Amb, John Reynolds, and Franky So (#64)*
- 5:02 Beyond Photovoltaics: Nanoscale Rectenna for Conversion of Solar and Thermal Energy to Electricity - *Subramanian Krishnan, Elias Stefanakas, Yogi Goswami, Shekhar Bhansali, Rudran Ratnadurai, Michael Celestin (#69)*
- 5:04 High rate chemical vapor deposition of Cu(In,Ga)Se<sub>2</sub> photovoltaic absorber - *Christopher Muzzillo, Timothy Anderson (#98)*
- 5:06 Study of the grid-connected PV system based on Z-source inverter technology - *Lei Wang and Hui Li (#100)*

## **POLICY**

- 5:08 Politics, Policy Instruments and the Clean Energy Capacity in the American States - *Hongtao Yi, Richard Feiock, and Anthony Kassekert (#62)*
- 5:10 The Renewable Energy Footprint: Addressing Cumulative Land Impacts - *Uma Outka (#70)*
- 5:12 Holdout: Existence, Information, and Contingent Contracting - *Mark Isaac, Sean Collins (#71)*

- 5:14 The State Role in Promoting Energy Sustainability through Land Use, Transportation, and Green Infrastructure Policies - *Tim Chapin (#75)*
- 5:16 Residential Energy Efficiency Loan Program Analysis - *Cali Curley, Diana Saenz, and Andrew Nieber (#81)*
- 5:18 Impacts of State Renewable Energy and Energy Efficiency Policies - *Ted Kury (#119)*

**SOLAR RESOURCES**

- 5:20 Energetic and Exergetic Analysis to Supercritical Rankine Cycles for Low-Grade Heat Conversion - *Huijuan Chen, D. Yogi Goswami, Muhammad Rahman, and Elias Stefanakos (#35)*
- 5:22 Simplified Methodology for Designing of Parabolic Trough Solar Power Plants - *Ricardo Vasquez Padilla, Gokmen Demirkaya, D. Yogi Goswami, Elias L. Stefanakos, and Muhammad M. Rahman (#59)*
- 5:24 Lipid Vesicles as Model Membranes in Solar Photocatalytic Disinfection Studies - *Kofi Dalrymple, Wainella Isaacs, Elias Stefanakos, Maya Trotz, and Yogi Goswami (#76)*
- 5:26 Solar and Waste Heat Desalination of Water by Membrane Distillation - *Ifegwu Eziyi (#78)*

**SOLAR TEST FACILITIES**

- 5:28 Solution and Support Facility for Photovoltaic Research, Innovation, Manufacturing & Development at UCF's Florida Solar Energy Center - *Nicoleta Hickman and Bob Reedy (#16)*
- 5:30 Enhanced and Expanded Solar Testing Capabilities - *Joe Walters, Stephen Barkaszi, and Jim Roland (#32)*
- 5:32 A Cost Effective Solar Simulator - *Jonathan Pandolfini (#79)*
- 5:34 High Flux Solar Simulator for the Investigation of Solar Thermochemical Cycles at Low Pressures -- *Ben Erickson and Joerg Petrasch (#96)*

**WIND ENERGY**

- 5:36 Offshore Wind Power Potential around Florida - *Cristina Collier, Shawn Smith, Mark Powell, Steve Cocke, and Mark Bourassa (#30)*

**CAPE FLORIDA PREFUNCTION / ATRIUM**

**5:30– 7:00 PM POSTER SESSION AND RECEPTION, SPONSORED BY FPL**  
*Chair: David Block; Co-Chair: Darlene Slattery*

**7:00 PM DINNER ON YOUR OWN**

**WEDNESDAY, SEPTEMBER 29**

**TECHNICAL SESSION: UCF STUDENT UNION KEY WEST ROOMS A, B, C, D**

**8:00 – 9:30 ORAL PRESENTATIONS: SESSION II**

**Energy Storage & Delivery; Smart Grid; Systems (Key West A)**

*Chair: Sukumar Kamalasadana*

Small Wind Systems – Applicability in Florida – *Matt Laffey*

Fundamental Oxidation Reaction Kinetics for the Steam-Iron Process in a Solar Thermal Reactor - *Richard Stehle, Michael Bobek, and David Hahn*

Very High Energy Density Ultracapacitors - *Ezzat Bakhom*



### **Energy Efficiency & Conservation; Education & Outreach, Policy (Key West B)**

*Chair: William Lear; Co-Chair: Svetlana Pevnitskaya*

Renewable Energy Policy in the US and Florida's Opportunity to Lead the Southeast - *Michael Dobson*  
Behavior in a Dynamic Environment with Costs of Climate Change and Heterogeneous Technologies: an

Experiment - *Svetlana Pevnitskaya and Dmitri Ryvkin*

Direct Methanol Fuel Cell System Research and Development - *James Fletcher, William Lear*

Combined Cooling, Heat, Power, and Biofuel from Biomass and Solid Waste - *William Lear, Jacob Chung, Elango Balu, Minki Kim, Sada Sekar*

Energy Cost Optimization Potential in a Petroleum Refinery - *Ven Venkatesan*

### **Biomass Resources, Carbon Capture (Key West C)**

*Chair: Jeff Cunningham*

Carbon Capture and Sequestration (CCS) in Florida - *Jeffrey Cunningham, Yogi Goswami, Mark Stewart, Maya Trotz*

Pore-Scale Modeling of Reactive-Multiphase Flow in Large-Scale Aquifers for Carbon Capture and Storage - *Shadab Anwar, Jeffrey Cunningham, Maya Trotz, Mark Thomas, and Mark Stewart*

Evaluation of Deep Saline Aquifers of South-Central and Southern Florida for Geologic Carbon Sequestration - *Tina Roberts-Ashby and Mark Stewart*

Integrated Aquaculture & Bioenergy Processing - *Jason Masters*

### **Photovoltaics (Key West D)**

*Chair: Wei Wu*

Thin-film Solar Panel Pilot Line – *Don Morel, Chris Ferekides, and Elias Stefanakos*

Nanoplasmonics in Carbon Nanoring Metamaterials for Thin-Film Energy Storage and Photovoltaic Applications. - *Mark Jack, Leon Durivage, Boyan Hristov, and Mario Encinosa*

IR Experiment of DC/AC Inverter Stages - *Wei Wu*

Photovoltaic Effect in Narrow Gap Mott Insulators - *Efstratios Manousakis*

## **GENERAL SESSION: UCF STUDENT UNION CAPE FLORIDA BALLROOM (ABCD)**

**9:30– 10:00**                      **BREAK**

**10:00 – 11:00** **PANEL DISCUSSION: FLORIDA'S ENERGY NEEDS AND OPPORTUNITIES (CAPE FLORIDA BALLROOM)**

*PERSPECTIVES ON FLORIDA'S ENERGY FUTURE*

*Mike Haridopolos, Senate President Designate*

*INSIGHTS ON FLORIDA ENERGY POLICY- A LEGISLATIVE PERSPECTIVE*

*Steve Precourt, Florida House of Representatives*

*FLORIDA'S ALTERNATIVE ENERGY CHALLENGES*

*James Murley, Chair, Florida Energy and Climate Commission*

**11:00 – 11:30 ROUNDTABLE REPORTS**

**11:30 – 12:30 BUFFET LUNCH AND TECHNICAL DISCUSSIONS**

*INFORMAL TECHNICAL DISCUSSIONS ON SPECIFIC ENERGY AREAS TO FORM PROPOSAL TEAMS*  
*Moderator: Canan Balaban*

*DISCUSSION AREAS AND LEADERS:*

Solar (PV and Thermal)

*Leader: Don Morel/Yogi Goswami*

Bio-Energy

*Leader: Pratap Pullammanappallil*

Grid Technologies & Electricity Distribution

*Leader: Rick Meeker*

Ocean and Wind Power

*Leader: Howard Hanson*

Secure Energy Systems

*Leader: Pramod Khargonekar*

Energy Efficiency and Conservation

*Leader: Hal Knowles*

Energy Storage

*Leader: Jim Fenton*

Carbon Capture

*Leader: Mark Stewart*

Policy

*Leader: Ted Kury*

**TECHNICAL SESSION: UCF STUDENT UNION KEY WEST ROOMS A, B, C, D**

**12:30– 2:15 ORAL PRESENTATIONS: SESSION III**

**Energy Efficiency & Conservation; Education & Outreach, Policy (Key West A)**

*Chair: Hal Knowles*

Energy and Climate Outreach in Florida: FESC Now and Into the Future - *Hal Knowles*

Quantifying Household Energy Performance Using Annual Community Baselines - *Nicholas Taylor,*

*Pierce Jones, Jennison Kipp*

Energy Efficiency through Occupancy Detection – *Mark Mortellaro*

SAVE: Steps in Achieving Viable Energy—A Youth Education Outreach Program - *Joy Jordan, Georgene*

*Bender, Heather Kent, Suzanne Wilson, Jessica Cochert, Kathleen Ruppert, and Tracy Tesdall*

**Biomass Resources (Key West B)**

*Chair: James Preston; Co-Chair: Daniel Yeh*

Tissue Chemistry of Potential Bioenergy Crops - *Jeffrey Fedenko, John Erickson, Lynn Sollenberger,*

*Kenneth Woodward, Robert Gilbert, and Joao Vendramini*

Bacterial Conversion of Hemicellulosic Xylans to Biofuels and Chemicals - *James Preston, Guang Nong,*

*Virginia Chow, and John Rice*

Post-Processing of Cellulosic-Ethanol Stillage for Fuel Production and Recovery of Plant Nutrients -

*Pratap Pullammanappallil, Zhouli Tian, Gayathri Ram Mohan, and Sampson Agyn-Birikorang*

Feasibility Assessment of Integrated Microalgae Biofuel Production and Wastewater Treatment for

Energy Conservation and Resource Recovery from Sewage - *Ana Preito, Robert Blair, Ivy*

*Cormier, Timothy Ware, and Daniel Yeh*

### **Photovoltaics (Key West C)**

*Chair: Nassar Kutkut; Co-Chair: Bob Reedy*

Analysis and Control of PV Inverters Operating in VAR Mode at Night - *Ali Maknouninejad, Nassar Kutkut, and Issa Batarseh*

Advanced Thermal Management Techniques for Increasing the Efficiency and Longevity of PV Cells - *Nicoleta Hickman and Bob Reedy*

A Global Maximum Power Point Tracking System for Regional Photovoltaic Systems - *Sukumar Kamalasan, Nicolas Johnson*

Large-area Graphene on Polymer Film for Transparent and Flexible Electrode – *Ved Verma, Santanu Das, Indril Lahiri, Wonbong Choi*

### **Energy Systems; Smart Grid; Storage (Key West D)**

*Chair: Surendra Saxena; Co-Chair: Charles Weatherford*

Thermodynamics of Hydrogen Production and Environment - *Surendra Saxena, Sushant Kumar, and Vadym Drozd*

Structure of Iron Oxides FeO<sub>n</sub> with High Oxygen Content - *Charles Weatherford and Gennady Gutsev*  
Low Cost Solar Driven Desalination - *Fadi Alnaimat, James Klausner*

Carbon Revenue Redistribution Strategies for Electric Power Markets - *Patricio Rocha, Tapas K. Das, Ehsan Salimi*

Multi Wall Carbon Nanotubes Firectly Grown on Copper Current Collector as Anode for Lithium Ion Batteries - *Indranil Lahiri, Sung-Woo Oh, Yan-Koos Sun, and Wonbong Choi*

### **GENERAL SESSION: UCF STUDENT UNION CAPE FLORIDA BALLROOM (ABCD)**

**2:15 – 2:45 BREAK**

### **TECHNICAL SESSION: UCF STUDENT UNION KEY WEST ROOMS A, B, C, D**

**2:45– 4:00 ORAL PRESENTATIONS: SESSION IV**

### **Energy Efficiency & Conservation; Education & Outreach, Policy (Key West A)**

Florida's Energy Future - *Josh Kellam*

Deep Energy Retrofits for Hot Humid Climates - *Rob Vieira and Janet McIlvaine*

Evidence-Driven Utility Policy with Regard to Storm Hardening Activities: A Model for the Cost-Benefit *Analysis of Storm Hardening Activities* - *Ted Kury*

When Public Goods Go Bad: An Introduction to Experimental Research on Heterogeneous Demands for Public Goods - *Mark Isaac, Douglas Norton, and Svetlana Pevnitskaya*

### **BIOMASS RESOURCES; CARBON CAPTURE (KEY WEST B)**

Production of Drop-in Transportation Fuels via Combined Biomass Gasification - Fischer-Tropsch Synthesis - *Ali T-Raissi, Nazim Muradov, Amit Gujar, Jong Baik, and Nathaniel Garceau*

Estimation of Hydrologic Environmental Impacts of Nitrate Contamination from Energy Biomass Resources Development - *Fernando Rios, Ming Ye, Paul Lee*

Post-Processing of Cellulosic-Ethanol Stillage for Fuel Production and Recovery of Plant Nutrients - *Pratap Pullammanappallil, Zhouli Tian, Gayathri Ram Mohan, and Sampson Agyn-Birikorang*

Thermophilic Bacterial Biocatalysts for the Conversion of Cellulosic Substrates to Fuels and Chemicals - *K.T. Shanmugam, Mun Su Rhee, Mark Ou*

**ENERGY STORAGE AND DELIVERY, ENERGY SYSTEMS, SMART GRID (KEY WEST D)**

Technological innovations for recovery of embodied energy from wastewater - *Daniel Yeh and Ana Prieto*

High Performance PEMFCs using Ultra-Low Platinum Loading Membrane Electrode Assembly Based on Gradient Carbon Nanotube/Nanofiber Supported Electrodes - *Jim Zheng, Wei Zhu, and Richard Liang*

An Intelligent, Grid Connected, PV Charging Station for Plug-in Electric Vehicles - *Gustavo Gamboa, Christopher Hamilton, Ross Kerley, Andres Arias, John Shen, Issa Batarseh, and John Elmes*

**4:30**

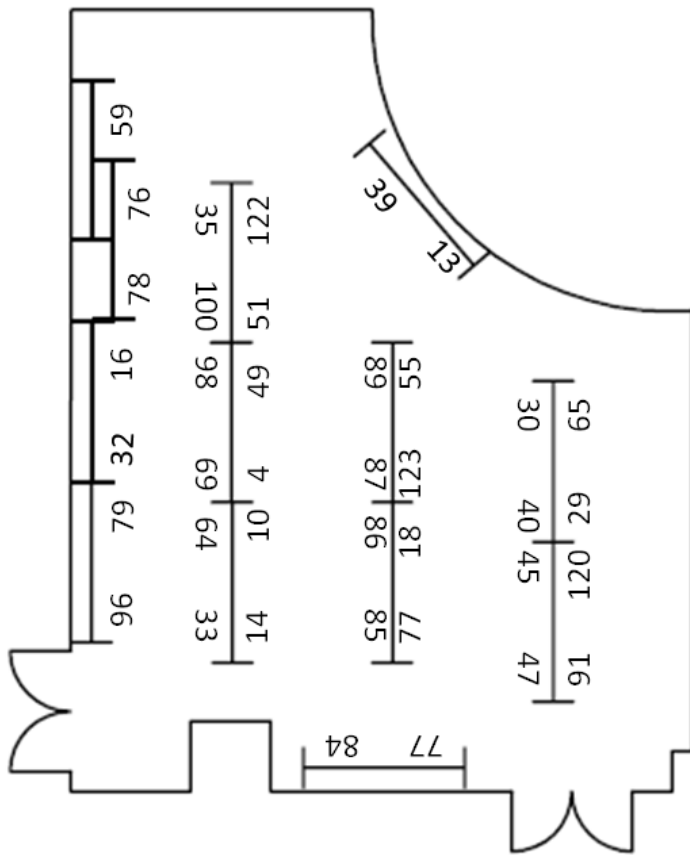
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Poster Map

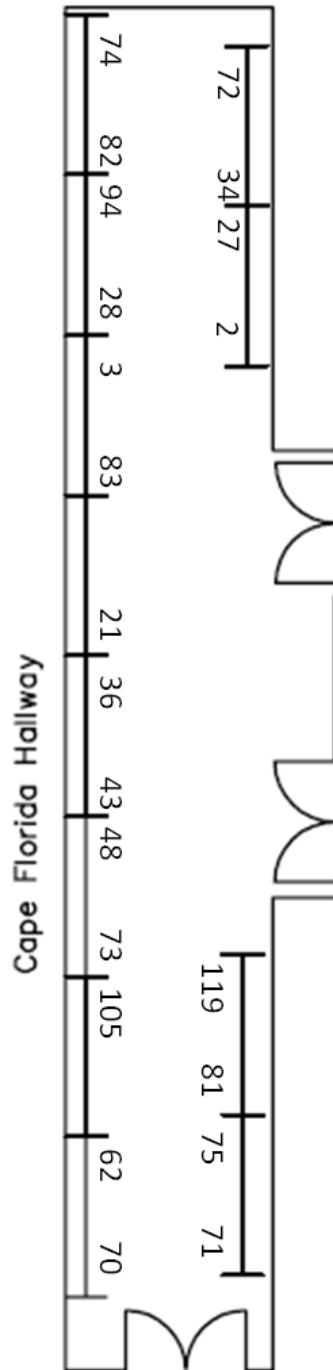
# FESC

Florida Energy Systems Consortium

2010 Summit  
September 28-29, 2010



Plan current as of 9.21.10



Cape Florida Hallway



## FESC Boards and Committees

### **Oversight Board**

*Imeh Ebong, Assistant Vice President for Research, University of North Florida*  
*Karen Holbrook, Vice President for Research and Innovation, University of South Florida*  
*Andres G. Gil, Vice President for Research, Florida International University*  
*Kirby Kemper, Vice President for Research, Florida State University*  
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*Win Phillips, Vice President for Research, University of Florida (Chair)*  
*Richard S. Podemski, Associate Vice President for Research, University of West Florida*  
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*Jeanne Ware, Director, Research Programs and Services, New College of Florida*

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### **2010 FESC Summit Program Committee**

*Gabriel M. Alsenas, Project Manager, Southeast National Marine Renewable Energy Center, Florida Atlantic University*  
*Issa Batarseh, Professor and Director, School of Electrical Engineering & Computer Science, University of Central Florida*  
*Babu Joseph, Professor and Chair, Department of Chemical Engineering, University of South Florida*  
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*Carolyn Mooney, Grants and Program Development Specialist, Institute for Energy Systems, Economics, and Sustainability, Florida State University*  
*John Shen, Professor, School of Electrical Engineering and Computer Science, University of Central Florida*  
*Melanie Simmons, Director, Healthy Community, Demography, and Population and Health, Florida State University*  
*Saxena Surendra, Director, CeSMEC, Florida International University*  
*Julianne Veal, Coordinator, FESC*

## Facilities and Demos

### The Smart Solar Plug-in EV Charging Station

This FESC-funded innovation is only 3 minutes' walk from the Student Union. It is located at the northwest end of Parking Lot D1 next to Memorial Hall. FESC Summit participants are invited to stop by to learn about it during lunch breaks or after the programs on Tuesday or Wednesday.

The system, developed by John Shen, Professor, School of Electrical and Computer Science at UCF, and his colleague, Issa Batarseh, Professor and Director of UCF's School of Electrical Engineering and Computer Science, not only allows fixed transfer of direct current (DC) from the PV units to the vehicle batteries, but also provides the ability to transfer excess power produced by the PV units out to the grid.



### 20KW Demo System by Planet Green Solutions/University of Florida

The Planet Green Solutions Bionass Power Plant will be parked at the brick paved patio on the west side of the Student Union next to the Pegasus Ballroom .



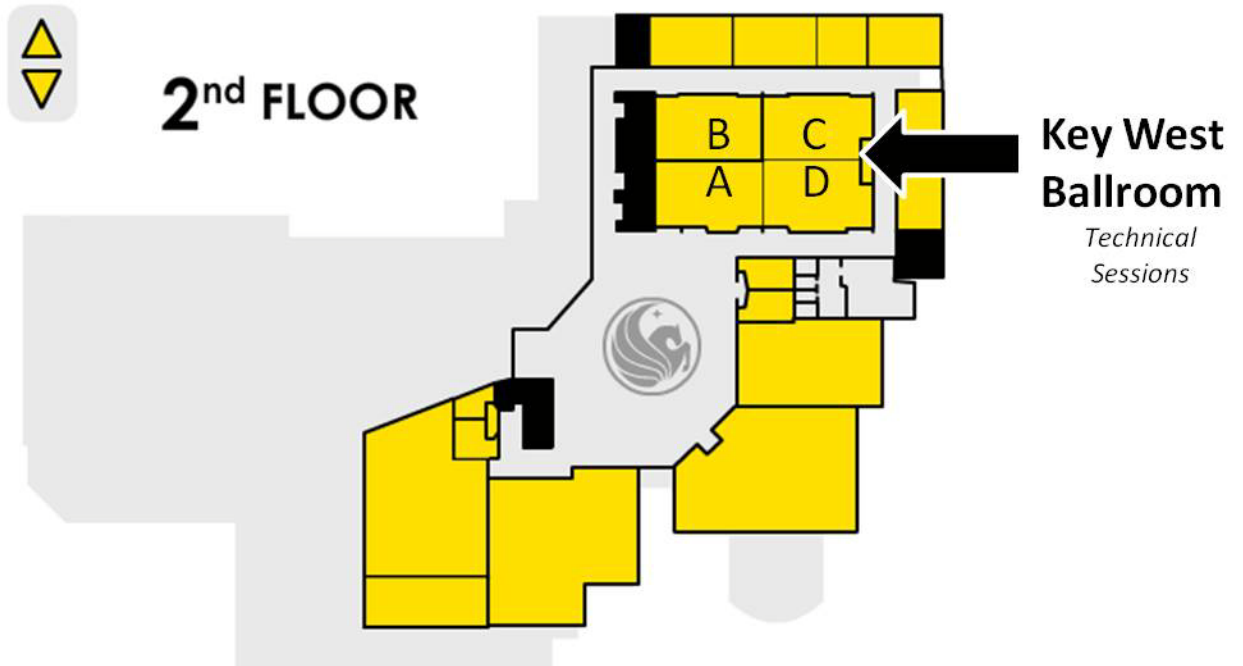
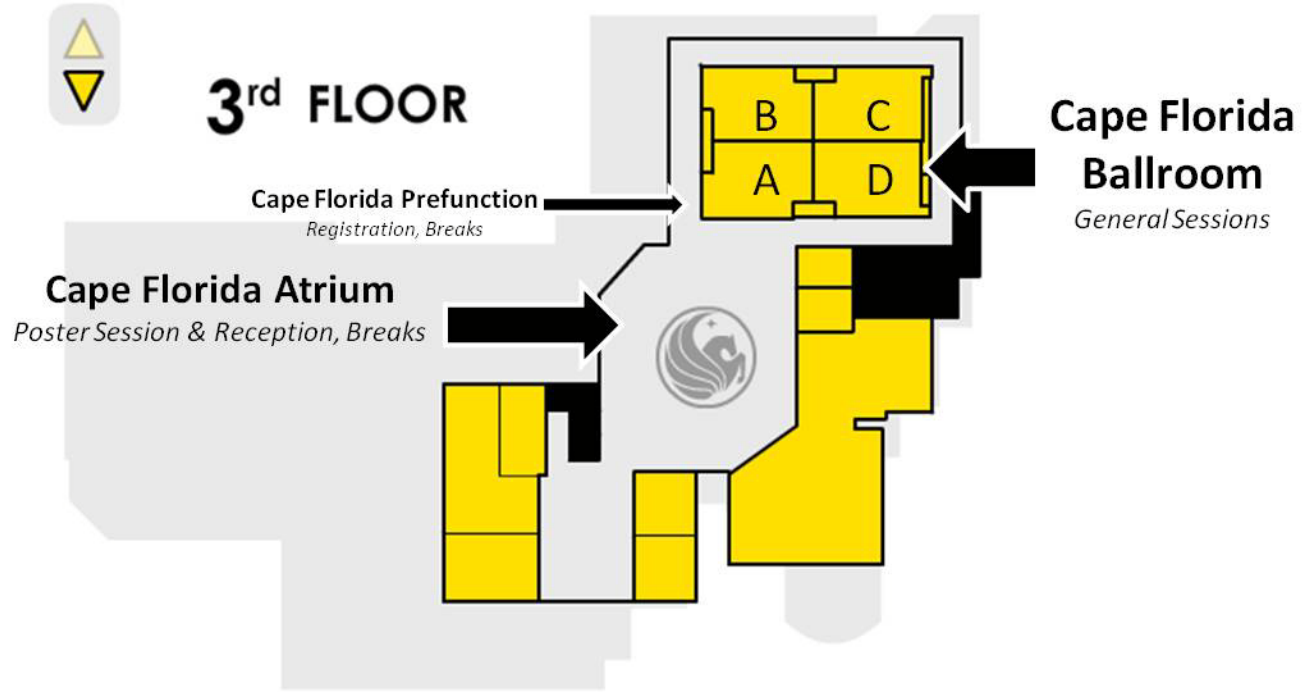
This system can run a variety of biomass materials. The gasifier reactor converts the biomass into solid carbon biochar and syngas. The syngas is then filtered for use in internal combustion engines.

Jacob Chung, Professor and Eminent Scholar in the University of Florida's Mechanical and Aerospace Engineering Department, is collaborating with Planet Green Solutions to perfect this power plant for commercial use.

*Notes*

*Notes*

# Building Map





## Bringing Energy Solutions to Florida, the Nation, and the World

The Florida Energy Systems Consortium (FESC) was created by the Florida State government to promote collaboration among the energy experts at its 11 supported universities to share energy-related expertise. The consortium assists the state in the development and implementation of an environmentally compatible, sustainable, and efficient energy strategic plan. The Consortium was charged to *'perform research and development on innovative energy systems that lead to alternative energy strategies, improved energy efficiencies, and expanded economic development for the state'*. The legislature appropriated funding for research at five of the universities as well as support for education, outreach, and technology commercialization. The Consortium reports to and supports the Florida Energy and Climate Commission in developing and implementing the State's energy and climate agenda.



Overarching to the Consortium's research strategy is an energy systems approach to identify innovation opportunities, prepare an energy workforce, and guide economic development.

Through collaborative research and development across the State University System and the industry, the goal of the consortium is to become a world leader in energy research, education, technology, and energy systems analysis. In so doing, the consortium shall:

- **Coordinate** and initiate increased collaborative interdisciplinary energy research among the universities and the energy industry.
- **Assist** in the creation and development of a Florida-based energy technology industry through efforts that would expedite commercialization of innovative energy technologies by taking advantage of the energy expertise within the State University System, high-technology incubators, industrial parks, and industry-driven research centers.
- **Provide** a state resource for objective energy systems analysis.
- **Develop** education and outreach programs to prepare a qualified energy workforce and informed public.

