FESC

Florida Energy Systems Consortium

2009 FESC SUMMIT

Marshall Student Center
University of South Florida • Tampa, Florida
September 29-30, 2009

<table>
<tr><th>Date/Time</th><th>Tuesday, September 29</th><th colspan="2">Wednesday, September 30</th></tr>
<tr><td>8:30-9:00</td><td></td><td colspan="2">Presentation of results from Round Table discussion
MSC 2100 BC</td></tr>
<tr><td>9:00-10:30</td><td rowspan="2">Registration and Poster Set up
Marshall Student Center (MSC) 2100AB</td><td colspan="2">Oral Presentations: Session 1
MSC 3705: Energy Efficiency & Conservation; Education, Outreach, & Policy
MSC 3708: Biomass Resources; Carbon Capture
MSC 3709: Ocean Energy Resources; Solar Resources
MSC 3711: Energy Storage and Delivery; Smart Grid</td></tr>
<tr><td>10:30-11:00</td><td rowspan="3">10:40-12:40
General Session
MSC 2100BC
Technical Team Roundtable Discussion
Buffet Working Lunch</td><td rowspan="3">11:30-12:30
Oversight Board Lunch
(Invitation only)</td></tr>
<tr><td>11:00-12:00</td><td>General Session MSC 2100AB
11:05 Welcome–Karen Holbrook
11:15 Keynote–Sam Baldwin</td></tr>
<tr><td>12:00-12:30</td><td rowspan="2">Buffet Lunch</td></tr>
<tr><td>12:30-1:00</td><td colspan="2" rowspan="2">12:50-2:10
Oral Presentations: Session 2
MSC 3705: Energy Efficiency & Conservation; Education, Outreach, & Policy
MSC 3708: Biomass Resources; Carbon Capture
MSC 3709: Ocean Energy Resources; Solar Resources
MSC 3711: Future Directions</td></tr>
<tr><td>1:00-2:00</td><td>Overview of Florida’s Energy Needs and Opportunities
James Murley
Mark Futrell</td></tr>
<tr><td>2:00-2:30</td><td>Overview of FESC Strategies and Programs–Tim Anderson</td><td colspan="2">2:10-2:40
Break</td></tr>
<tr><td>2:30-3:15</td><td>Round Table Discussion
Facilitator: Tim Anderson
How can FL Universities promote collaboration and assist economic development?</td><td colspan="2" rowspan="3">2:40-4:10
General Session
MSC 2100BC
Overview Presentations
Camille Coley, Mark Jamison, Jim Fenton

4:10
Closing Remarks</td></tr>
<tr><td>3:15-3:45</td><td>Break</td></tr>
<tr><td>3:45-4:10</td><td rowspan="2">Poster Overviews</td></tr>
<tr><td>4:10-5:15</td><td colspan="2" rowspan="2"></td></tr>
<tr><td>5:30-7:00</td><td>Poster Session and Reception</td></tr>
</table>

Introduction

Welcome to the 2009 FESC Summit! The Summit is organized to bring together energy experts in the State University System of Florida to share their energy-related research findings and promote future collaboration. Over the next two days, energy experts and FESC researchers will introduce you to Florida energy policy, ongoing research, and plans for the future.

2009 FESC Summit Keynote Speaker

Dr. Samuel F. Baldwin
Chief Technology Officer and Member, Board of Directors
Office of Energy Efficiency and Renewable Energy
United States Department of Energy

Sam Baldwin is a PhD. Physicist and currently serves as the Chief Technology Officer for, and a Member of the Board of Directors of the Office of Energy Efficiency and Renewable Energy at the U.S. Department of Energy. In previous positions he has served with the White House Office of Science and Technology Policy (OSTP), the National Renewable Energy Laboratory, the Congressional Office of Technology Assessment (OTA), Princeton University, the U.S. Senate, and elsewhere. He is the author or coauthor of 9 books and monographs at OSTP, OTA, DOE, and elsewhere, and more than 30 papers and technical reports on energy technology and policy, physics, and other issues. He is a Fellow of the American Association for the Advancement of Science.

Acknowledgements

The Florida Energy Systems Consortium is profoundly grateful to the University of South Florida administration, faculty, staff, and students for their generous contributions of time and effort to the success of this inaugural FESC Summit. Many thanks especially to Dr. Karen Holbrook, Vice President for Research and Innovation, for hosting us, and to Barbara Graham and Beth Beall, who were instrumental in arranging complex logistics, recruiting volunteers, and all of the behind-the-scenes detail work without which this event could not take place.

USF UNIVERSITY OF SOUTH FLORIDA

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Camille Coley, Assistant Vice President of Research, Florida Atlantic University
Dave Cartes, Associate Director, Center for Advanced Power Systems, Florida State University
Nick Gladding, Attorney, Ruden McClosky; Florida Energy and Climate Commission
Yogi Goswami, John and Naida Ramil Professor, College of Engineering, University of South Florida
George Philippidis, Associate Director, Applied Research Center; Co-Director, Energy Business Forum, Florida International University

Leadership Team

Timothy J. Anderson, Director
Canan Balaban, Associate Director of Program Development
Erik Sander, Associate Director of Industrial Collaboration & Commercialization

2009 FESC Summit

Program

All events will take place in the Marshall Student Center (MSC) unless otherwise noted

Pre-Summit Activities

MONDAY, SEPTEMBER 28:

10:30 AM – 1:30 PM Florida Smart Grid Workshop
Embassy Suites-USF

TUESDAY, SEPTEMBER 29:

8:00 – 11:00 AM Florida Energy and Climate Commission (FECC) meeting - Open to the public.
Marshall Student Center 3707 (the Oak Room), 8:00AM – 11:00AM
Agenda is posted at the FECC website:
http://myfloridaclimate.com/climate_quick_links/florida_energy_climate_commission/the_commission/meetings_and_workshops

FESC Summit

TUESDAY, SEPTEMBER 29

9:00 – 11:00 AM **Registration and Poster set-up**
MSC 2100AB

General Session: Marshall Student Center Ballroom (2100 AB)

11:05 - 11:15 AM **WELCOME**
Karen Holbrook, Vice President for Research and Innovation
University of South Florida

11:15 – NOON **KEYNOTE ADDRESS**
Sam Baldwin, Chief Technology Officer and Member, Board of Directors, Office of the Secretary, U.S. DOE Energy Efficiency and Renewable Energy

NOON – 1:00 PM **BUFFET LUNCH**

1:00 - 2:00 PM **OVERVIEW OF FLORIDA'S ENERGY NEEDS AND OPPORTUNITIES**
James F. Murley, Chairman, Florida Energy and Climate Commission
Mark Futrell, Office of Strategic Analysis and Governmental Affairs, Florida Public Service Commission

2:00 – 2:30 PM **OVERVIEW OF FESC STRATEGIES AND PROGRAMS**
Tim Anderson, Director, FESC

2:30 – 3:15 PM **ROUND TABLE DISCUSSION**
Facilitator: Tim Anderson

- How can Florida universities best promote research collaboration among themselves and with industry, and assist the state's economic development?

3:15 – 3:45 PM **BREAK**

3:45 – 5:15 PM **POSTER OVERVIEWS**
Moderator: Dave Cartes

3:50 Research Laboratories and Facilities Development
D. Block
3:52 Concentrating Solar Power Program
C. Cromer, R. Reedy
3:54 Energy Sustainable Florida Communities
R. Feiock, I. Aurirac, T. Kassedert
3:56 Promoting Energy Sustainability through Land Use, Transportation, and Green Infrastructure Policies

T. Chapin, I. Audirac

3:58 Design and Implementation of Low Cost Pyrheliometer
M. Gnos, B. Greksa, A.Krothapalli

4:00 ESC Advanced Solar Simulator
J. Pandolfini, B. Greska, A. Krothapalli

4:02 Flooding Detection in Microjet PEM Fuel Cell
A. Badaru, B. Greska, A. Krothapalli

4:04 Dual Fluidized Bed Biomass Gasification for H_2 Production
J. Dascomb

4:06 Design of a Spiral Tube Bubble Column Photobioreactor
Q. Straub, T. Tracy, J.C. Ordonez

4:08 Multi-Objective Optimization of Power Plants to Reduce Operating Costs
G.S. Dulikravich

4:10 Impact on a Microgrid of Increased Market Penetration of Plug-In Hybrid Electric Vehicles
B. Hacker, S. Azongha, C. Edrington

4:12 Energy Delivery Infrastructure
A. Domijan, A. Islam

4:14 Effect of Cluster Size on CO Absorption and Dissociation on Cobalt Catalysts: DFT Studies using Cluster Models
N. Balakrishnan, V.R. Bethanabotla, B. Joseph

4:16 Device simulation of ZnO/CdS/CIGS/Mo solar cell using Medici
Y. Hu, G. Bosman, T. Anderson

4:18 Energy Efficient Technologies and the Zero Energy Home Learning Center
S. Russell, Y. Goswami, M. Rodriguez

4:20 Metal/Support Interaction Effects in Fischer-Tropsch Synthesis: Significance of Catalyst Preparation
S.A.Z. Gardezi, B. Joseph, J.T. Wolan

4:22 Preparing the Technical Workforce to Meet Florida's 21st Century Needs
M. Barger, R.Gilbert

4:24 Cobalt Nanoparticles on Surface Modified SiO_2 Colloids for Fischer-Tropsch Synthesis
B.D. Mankidy, V.K. Gupta

4:26 Effect of Transition Metal Oxide Interlayer on the Performance of Bulk Heterojunction Solar Cell
J. Subbiah, F. So

4:28 Combined Cooling, Heat, Power, and Biofuel from Biomass and Solid Waste
W.L. Lear, J.N. Chung

4:30 Development of High Throughput CIGS Manufacturing Process
N. Dhere

4:32 PV Power Generation Using Plug-In Hybrid Vehicles as Energy Storage
J. Shen, I. Batarseh, N. Kutkut

4:34 Wave Power Generation
Z. Qu, K. Lin

4:36 Clean Drinking Water using Advanced Solar Energy Technologies
J. Klausner, F. Alnaimant

4:38 Water-use Efficiency and Feedstock Composition of Candidate Bioenergy Grasses in Florida
L. Sollenberger, J.E. Erickson, J.M.B. Vendramini, R.A. Gilbert, L.O. Ingram, J.R. Fedenko, Z.R. Helsen, K. Woodward

4:40 High Rate Chemical Vapor Deposition of $Cu(In,Ga)Se_2$
C.P. Muzzillo; T.J. Anderson

4:42 Nanostructured Chevrel Phase for Magnesium Battery Cathodes
R.Scheffler, W. Sigmund

4:44 Aluminum Secondary Battery – Battery of the Future
A. Biswas, W.M. Sigmund

4:46 Green Networks: New Results and Next Steps to Benefit Florida
K. Christensen

4:48 Database Infrastructure for Integrative Carbon Science Research
S. Grunwald, T. Martin, G.M. Basques, B. Hoover, C.A. Gonzales, R. Bracho-Garriloo, H. Beck

4:50 Fabrication of CIS Solar Cells using Nanoparticle-based Processing Technique
R. Krishnan, U.Farva, J. Young, A. Payzant, T. Anderson, C. Park

4:52 Solid State Phase Transformation of Cadmium Selenide Nanoparticles upon Thermal Annealing
R. Krishnan, U. Farva, N.T.N. Troung, T.J. Anderson, C.H. Park
4:54 Indium Gallium Nitride Solar Cell Device Simulations
D. Wood, J. Mangum, T. Anderson, G. Bosman
4:56 An Experimental Investigation of Economic Incentives in Environmental Conservation, Sustainability, and Renewable Energy
S. Pevnitskaya, D. Ryvkin
4:58 Public and Private Solutions to the Hold-Out Problem in Infrastructure Land Acquisition
S.M. Collins, R.M. Isaac
5:00 Development of Flexible Thin Film CdTe Solar Cells
S. Bhandaru, D. Hodges, V. Palekis, D. Shen, E. Stefanakos, and C. Ferekides
5:02 Communicating Energy Efficiency through Public Service Announcements
A. Opel, L. Arpan, P. Steinberg
5:04 Development of Metal-Insulator-Metal Diode-Based Un-cooled Terahertz Detector
I-T. Wu, K. Son, J. Wang

5:30 – 7:00 PM **POSTER SESSION AND RECEPTION**
A complete listing of posters and a poster map are located on pages 8 and 9.
7:00 PM **Dinner on your own**

WEDNESDAY, SEPTEMBER 30

General Session: Marshall Student Center Ballroom (MSC 2100AB)

8:30 – 9:00 AM **PRESENTATION OF RESULTS FROM ROUND TABLE DISCUSSION**
FESC Leadership Team

FESC Faculty Research Presentations

9:00 – 10:30 AM **ORAL PRESENTATIONS: SESSION I**

MSC 3705: Energy Efficiency & Conservation, Education & Outreach, Policy
Co-Chairs: Julie Harrington, Richard Gilbert
FESC Education and Outreach Efforts
P. Jones
Early Adoption of Sustainable Energy Innovations by Florida Local Governments
R. Feiock and T. Kassekert
Off-Grid Zero Emissions Building
J. Kramer, A. Krothapalli, B. Greska
Developing a Renewable Energy Research Web Portal
C. Hinnant, I. Douglas, C. McClure

MSC 3708: Biomass Resources, Carbon Capture
Chair: George Philippidis
Thermophilic Bacterial Biocatalysts for the Conversion of Cellulosic Substrates to Fuels and Chemicals
K.T. Shanmugam
Production of Liquid Fuels Biomass via Thermo-Chemical Processes
B. Joseph, Y. Goswami, J. Bhethanabotla, J. Wolan, V. Gupta
Engineering biocatalysts for Hemicellulose Hydrolysis and Fermentation
J. F. Preston
Potential for Geologic Carbon Sequestration in Deep Saline Aquifers in Florida
T. Roberts-Ashby, R. Owen, M. Thomas, M. Trotz, J. Cunningham, M. Stewart

MSC 3709: Ocean Energy Resources, Solar Resources

Co-Chairs: Camille Coley, David Block

FAU Center for Ocean Energy Technology
S. Skemp, H. Hanson, C. Coley

Beyond Photovoltaics – Nanoscale Rectennas for Conversion of Solar and Thermal Radiation to Electricity
S. Bhansali, Y. Goswami, E. Stefanakos, S. Krishman, R. Ratnadurai, M. Celestin, S. Wijewardane

Solar Thermal Power for Bulk Power and Distributed Generation
D.Y. Goswami, M. Rahman, A. Sunol, R. Vasquez, H. Chen, G. Demirkaya

Thin Film Photovoltaic Module Processing Laboratory
D. Morel, C. Ferekides, E. Stefanakos

MSC 3711: Energy Storage and Delivery, Smart Grid

Co-Chairs: Dave Cartes, Debra Reinhardt (invited)

Non-contact Energy Delivery with Integrated DC-AC Inverter for PV System
R.A. Chinga, J.J. Kasanova, J.A. Taylor, J. Lin

Chemical and Mechanical Degradation of Fuel Cells
D. Slattery, L. Bonville, X. Huang, M. Rodgers

Reliable and Resilient Future Electrical Energy System for Florida
S. Dale, M. Seurer, T. Baldwin, P. McLaren, T. Alquthami, J. Langston, R. Meeker

Innovative Processing for Novel Energy Storage Materials
Wolfgang Sigmund

General Session: Marshall Student Center Ballroom (2100 BC)

10:40 AM –12:40 PM **TECHNICAL TEAM ROUNDTABLE DISCUSSIONS AND BUFFET WORKING LUNCH**
Moderator: Canan Balaban

Technical Teams

Energy Efficiency and Conservation – *Team Leader: Pierce Jones; Scribe: Gokmen Demirkaya*
Carbon Capture and Sequestration – *Team Leader: Mark Stewart; Scribe: Tina Roberts-Ashby*
Ocean Energy – *Team Leader: Howard Hanson; Scribe: Caitlin Slezycki*
Energy Storage
Battery and Super Capacitors – Team Leader: Jim Zheng; Scribe: I-Tsang Wu
Fuel Cells – Team Leader: Jim Fenton; Scribe: Ruraskandan Ratnadural
Smart Grid – *Team Leader: Dave Cartes; Scribe: Ali E. Ercelibi*
Solar PV – *Team Leader: Tim Anderson; Scribe: Kosol Son*
Solar Thermal – *Team Leader: Yogi Goswami; Scribe: Sarada Kuravi*
Algae – *Team Leader: George Philippidis; Scribe: Nianthrini Balakrishnan*
Biomass – *Team Leader: Babu Joseph; Scribe: Ricardo Vasquez Padilla*
Policy and Systems – *Team Leader: Mark Jamison; Scribe: Bijith Mankidy*

Scribes to be assigned: Raymond Scheffle, Barbara Graham, Huijan Chen

11:30 AM –12:30 PM **OVERSIGHT BOARD LUNCH HOSTED BY WIN PHILLIPS (INVITATION ONLY)**
MSC 2702

FESC Faculty Research Presentations

12:50 – 2:10 PM ORAL PRESENTATIONS: SESSION II

MSC 3705: Energy Efficiency & Conservation, Education & Outreach, Policy

Co-Chairs: Pierce Jones, Ted Kury

Energy Policy and the Environment: Challenges and Opportunities
T. Kury, J. Harrington

Multi-Objective Optimization of Power Plants to Reduce Operating Costs and Maintenance Costs
G.S. Dulikravich
Optimizing Traffic Signal Timings to Reduce Fuel Consumption, Green House Gases, and Vehicular Emissions
A. Stevanovic
Energy Efficient Building Technologies and Zero Energy Homes
R. Vieira, P. Fairey, J. Sonne

MSC 3708: Biomass Resources, Carbon Capture
Co-Chairs: George Philippidis, James Preston
Integrated Florida Bio-Energy Production with Carbon Capture and Sequestration
A. T-Raissi, N. Muradov, D. Block
Combined Cooling, Heat, Power, and Biofuel from Biomass and Solid Waste
W.L. Lear, J.N. Chung
A Model for Redistribution of Cap-and-Trade Revenue
P. Rocha, E. Salimi, T.K. Das, R. Fehr
Accounting for Carbon Emissions in Florida: Land Use, Energy, and Fuel
T. Zhao and M. Horner

MSC 3709: Ocean Energy Resources, Solar Resources
Co-Chairs: Franky So, Darlene Slattery
Research to Improve Photovoltaic (PV) Cell Efficiency by Hybrid Combination of PV and Thermoelectric Cell Elements
N. Sorlaica-Hickman, R. Reedy
PV Energy Conversion and System Integration
N. Kutkut, J. Shen, I. Batarseh, Z. Qu, X. Wu, W. Mikhael, L. Chow
VIVACE: A New Concept in Hydrokinetic Energy Conversion
M.M. Bernitsas (presented by Nicolaos Xiros)
Clean Drinking Water using Advanced Solar Energy Technologies
E. Stefanakos, D.Y. Goswami, M. Trotz, M. Batzill

MSC 3711: Future Directions
Chair: Ali T-Raissi
PV Manufacturing Database and Florida Applications
D. Block, R. Reedy
Solar Thermal Power
Y. Goswami
SURA Workshop on Energy: A brief update and summary
B. Joseph
Smart Grid
Dave Cartes

GENERAL SESSION: MARSHALL STUDENT CENTER BALLROOM (2100 BC)

2:10 – 2:40 PM **Break**

2:40 – 4:10 PM **OVERVIEW PRESENTATIONS**
Camille Coley, Executive Assistant Vice President, FAU
Mark Jamison, Director, Public Utilitiy Research Center, UF
Jim Fenton, Director, Florida Solar Energy Center, UCF

4:10 **CLOSING REMARKS**
Tim Anderson

FESC 2009: Poster Session

1. Research Laboratories and Facilities Development – D.L. Block
2. Concentrating Solar Power Program – C. Cromer, R. Reedy
3. Energy Sustainable Florida Communities - R. Feiock, I. Aurirac, T. Kassedert
4. Promoting Energy Sustainability through Land Use, Transportation, and Green Infrastructure Policies – T. Chapin, I. Audirac
5. Siting Renewable Energy Infrastructure: Regulatory Barriers and Key Considerations – U. Outka
6. Design and Implementation of Low Cost Pyrheliometer – M. Gnos, B. Greska, A. Krothapalli
7. Systems Approach to Bioenergy Research (SABER) – J. Kostka
8. ESC Advanced Solar Simulator – J. Pandolfini, B. Greska, A. Krothapalli
9. Flooding Detection in Microjet PEM fuel – A. Badaru, B. Greska, A. Krothapalli
10. Dual Fluidized Bed Biomass Gasification for H_2 Production – J. Dascomb
11. Design of a Spiral Tube Bubble Column Photobioreactor – Q. Straub, T. Tracy, J. C. Ordonez
12. Multi-Objective Optimization of Power Plants to Reduce Operating Costs and Maintenance Costs – G. S. Dulikravich
13. Impact on a Microgrid of Increased Market Penetration of Plug-In Hybrid Electric Vehicles – B. Hacker, S. Azongha, C. Edrington
14. Energy Delivery Infrastructure – A. Domijan, A. Islam
15. Effect of cluster size on CO adsorption and dissociation on Cobalt catalysts: DFT studies using cluster models – N. Balakrishnan, V. R. Bhethanabotla, B. Joseph
16. Device simulation of ZnO/CdS/CIGS/Mo solar cell using Medici – Y. Hu, G. Bosman, T. Anderson
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18. Metal/Support interaction effects in Fischer-Tropsch synthesis: Significance of catalyst preparation – S.A.Z. Gardezi, B. Joseph, J.T. Wolan
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20. Cobalt Nanoparticles on Surface Modified SiO_2 Colloids for Fischer Tropsch Synthesis – B.D. Mankidy, V.K. Gupta
21. Effect of Transition Metal Oxide Interlayer on the Performance of Bulk Heterojunction Solar Cell – J. Subbiah, F.
22. Combined Cooling, Heat, Power, and Biofuel from Biomass and Solid Waste – W.L. Lear, J. N. Chung
23. Development of High Throughput CIGS Manufacturing Process – N. Dhere
24. PV Power Generation Using Plug-in Hybrid Vehicles as Energy Storage – J. Shen, I.Batarseh, N. Kutkut
25. Wave Power Generation – Z. Qu, K. Lin
26. Development of Metal-Insulator-Metal Diode-Based Un-cooled Terahertz Detector – I-T. Wu, K. Son, J. Wang
27. Clean Drinking Water using Advanced Solar Energy Technologies – J. Klausner, F. Alnaimat
28. Solar-Thermal Chemistry for Hydrogen Generation – R. Stehle, M. Bobek, D.W. Hahn
29. Water-Use Efficiency and Feedstock Composition of Candidate Bioenergy Grasses in Florida – L. E. Sollenberger, J. E. Erickson, J. M. B. Vendramini, R. A. Gilbert, L. O. Ingram, J.R. Fedenko, Z. R. Helsel and K. Woodard
30. High Rate Chemical Vapor Deposition of $Cu(In,Ga)Se_2$ – C.P. Muzzillo; T. J. Anderson
31. Nanostructured Chevrel Phase for Magnesium Battery Cathodes – R. Scheffler, W. Sigmund
32. Aluminum Secondary Battery – Battery of the Future – A. Biswas, W. M. Sigmund
33. Green Networks: New Results and Next Steps to Benefit Florida – K. Christensen
34. Database Infrastructure for Integrative Carbon Science Research – S. Grunwald, T. A. Martin, G. M. Vasques, B. Hoover, C. A. Gonzalez, R. Bracho-Garriloo, H. Beck
35. Fabrication of CIS solar cells using nanoparticle – based processing technique – R. Krishnan, U. Farva , J. Y. Park, A. Payzant, T. Anderson and C. Park
36. Solid State Phase Transformation of Cadmium Selenide Nanoparticles upon Thermal Annealing – R. Krishnan, U.Farva, N.T.N.Troung, T.J.Anderson, C.H.Park
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38. An Experimental Investigation of Economic Incentives in Environmental Conservation, Sustainability and Renewable Energy – S. Pevnitskaya and D. Ryvkin
39. Public and Private Solutions to the Hold-Out Problem in Infrastructure Land Acquisition – S.M. Collins and R. Mark Isaac
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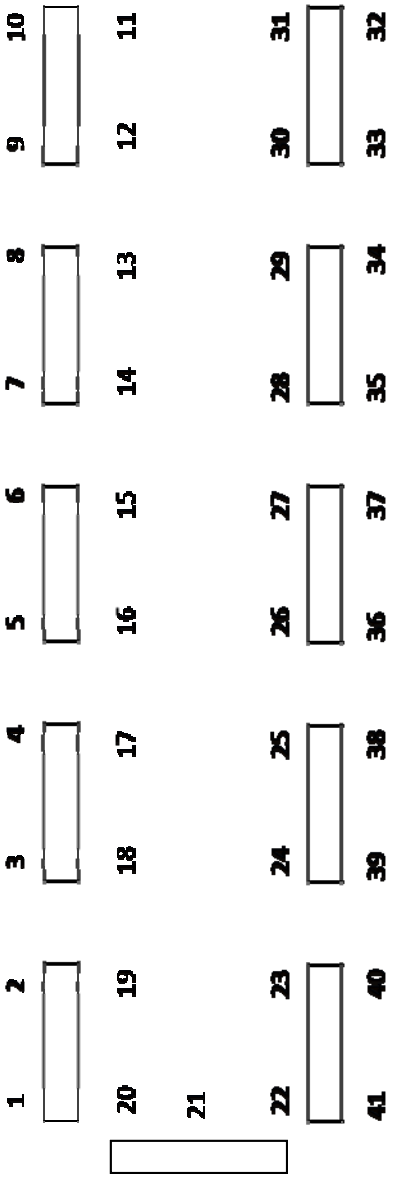
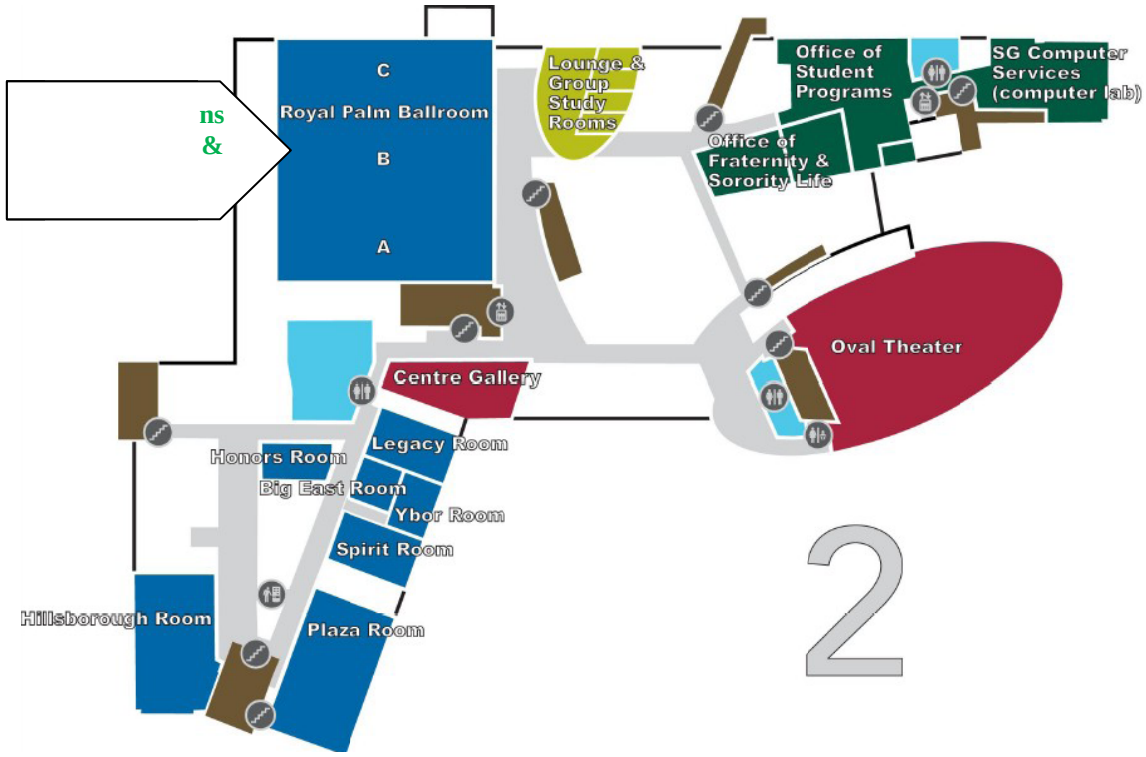
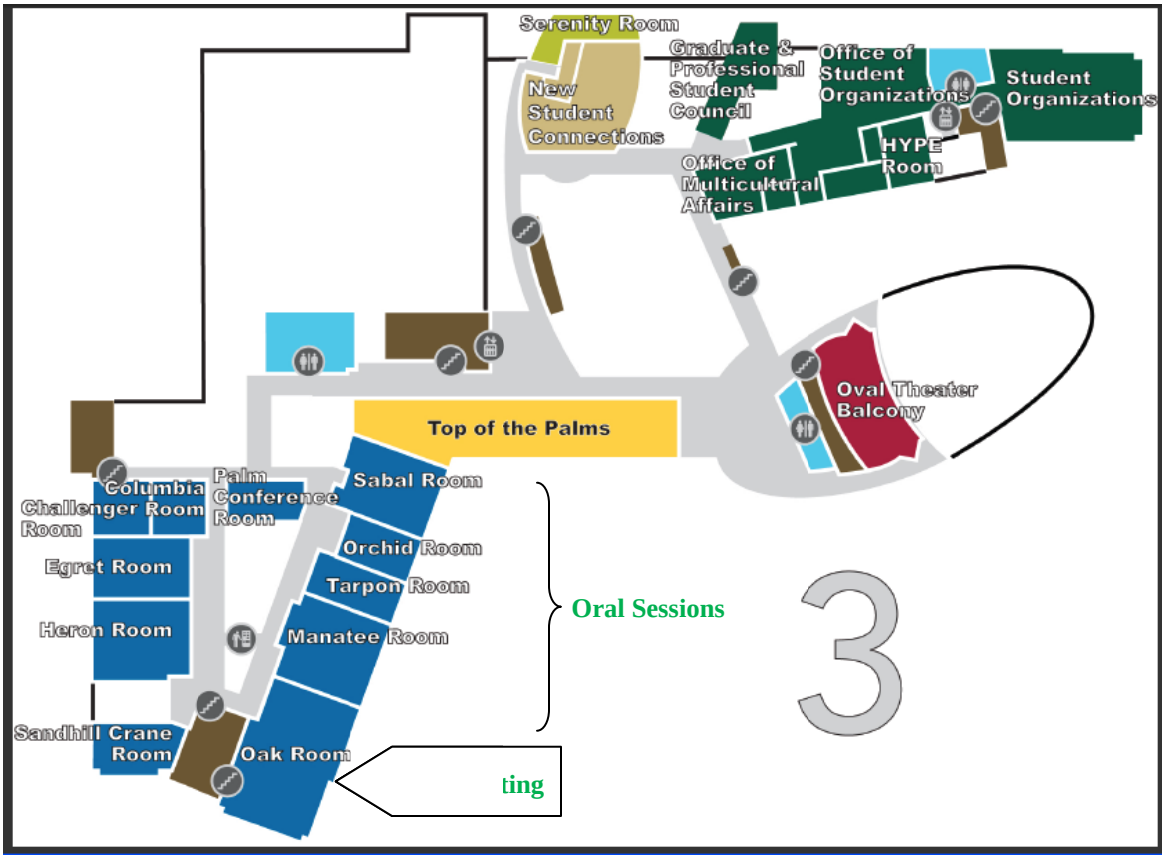
41. Communicating Energy Efficiency through Public Service Announcements – A. Opel, L. Arpan, P. Steinberg

Poster Map: MSC 2100B



Marshall Student Center Floors 2 and 3





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.

FESC

Florida Energy Systems Consortium

UF UNIVERSITY of FLORIDA · FSU · FAU FLORIDA ATLANTIC UNIVERSITY · UCF · USF UNIVERSITY OF SOUTH FLORIDA

UWF · UNF UNIVERSITY of NORTH FLORIDA · NOVUM COLLEGIUM FLORIDAE MCMLX · FLORIDA GULF COAST UNIVERSITY