FLORIDA SOLAR ENERGY CENTER®

Creating Energy Independence

Dr. James Fenton, Director
October 23, 2015

A Research Institute of the University of Central Florida

FSEC 7-yr. External Review

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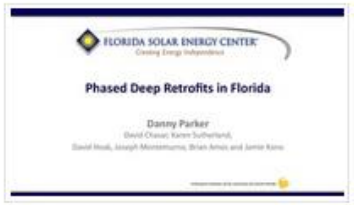
FSEC Program Highlights - April 2015 - D...
from Florida Solar Energy Center

FSEC Program Highlights - April 2015 - E...
from Florida Solar Energy Center

FSEC Program Highlights - April 2015 - C...
from Florida Solar Energy Center

FSEC Program Highlights - April 2015 - S...
from Florida Solar Energy Center

FSEC Program Highlights - April 2015 - R...
from Florida Solar Energy Center



FSEC Program Highlights - April 2015 - D...
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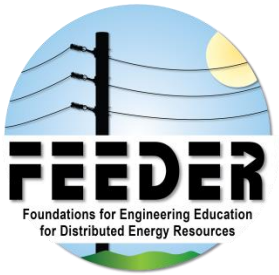
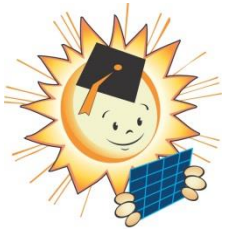
https://vimeo.com/channels/fsechighlights2015

UCF's FSEC Leads in Energy





ENERGYWHIZ
Connecting Schools, Teachers, and Students with Solar Energy

FSEC

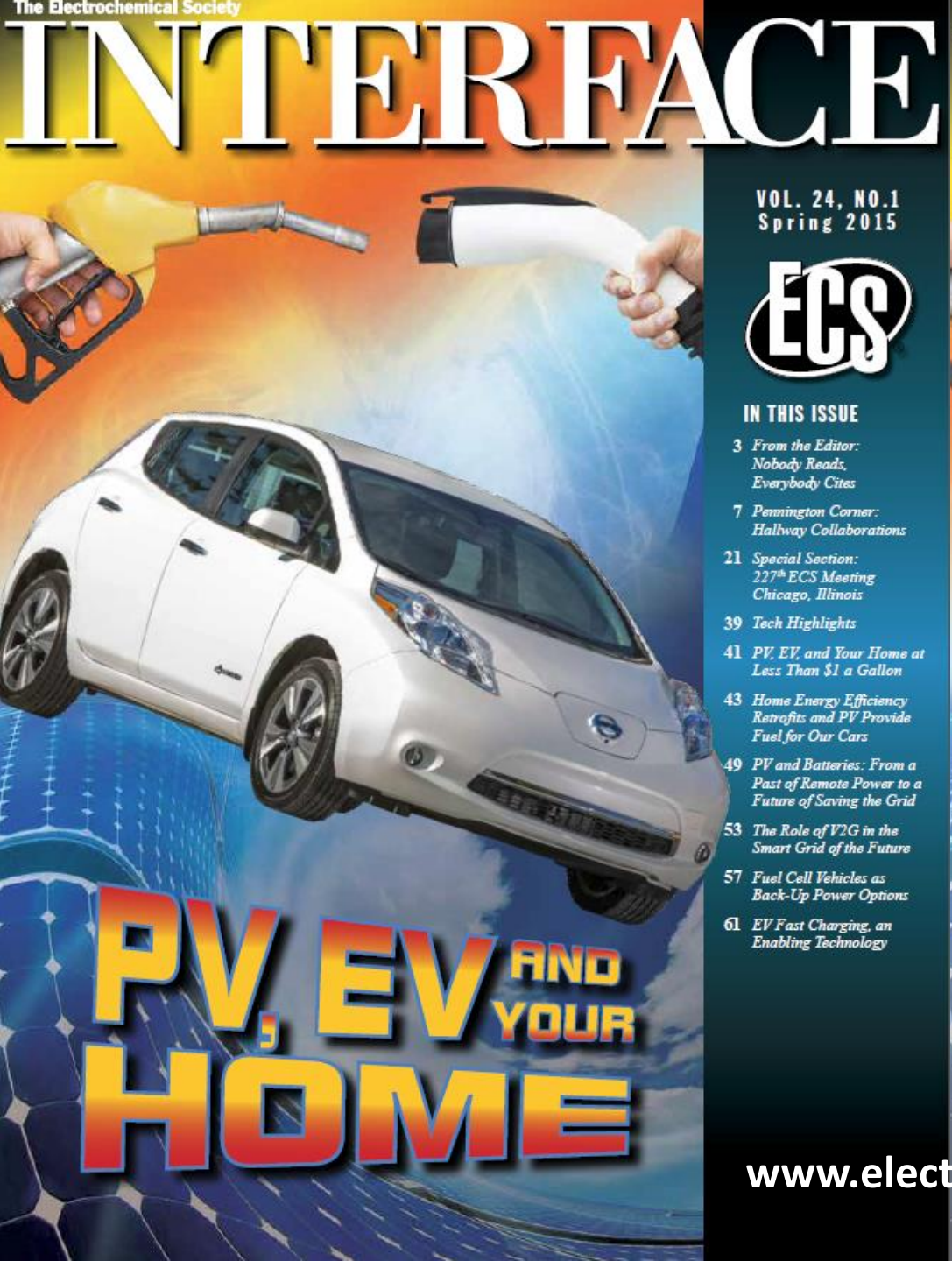
FSEC 7-yr. External Review April 2015

Strengths

- Unique, differentiated building energy science, PV testing and characterization (e.g. hot humid microclimate), and electric vehicle systems integration capabilities
- Personnel with specific expertise and credibility in energy-related fields
- Partnership development and coordination, key relationships with industry
- Familiarity with program goals and funding opportunities in DOE and other select federally-funded programs

Challenges and Opportunities

- Lack of well articulated, integrated strategic plan and communications (both internal and external stakeholders)
- Decreasing and changing funding opportunities from traditional sources
  - Shift in energy space to understanding impact of wide-scale deployment of distributed energy generation and building efficiency, systems integration may provide an opportunity for FSEC to expand beyond traditional funding sources.
- Lack of fundamental research, and institutional / enterprise-level coordination across UCF
  - Cluster hire represents unique opportunity to better integrate FSEC and UCF academic programs through hiring complimentary capabilities to drive fundamental research versus FSEC's applications research



VOL. 24, NO.1
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ECS

IN THIS ISSUE

The Electrochemical Society
INTERFACE

www.electrochem.org/dl/interface

Building AMERICA
U.S. Department of Energy

Partnership for Improved Residential Construction

BA-PIRC

Creating and retrofitting homes that are twice as energy efficient as standard homes through research and industry partnerships

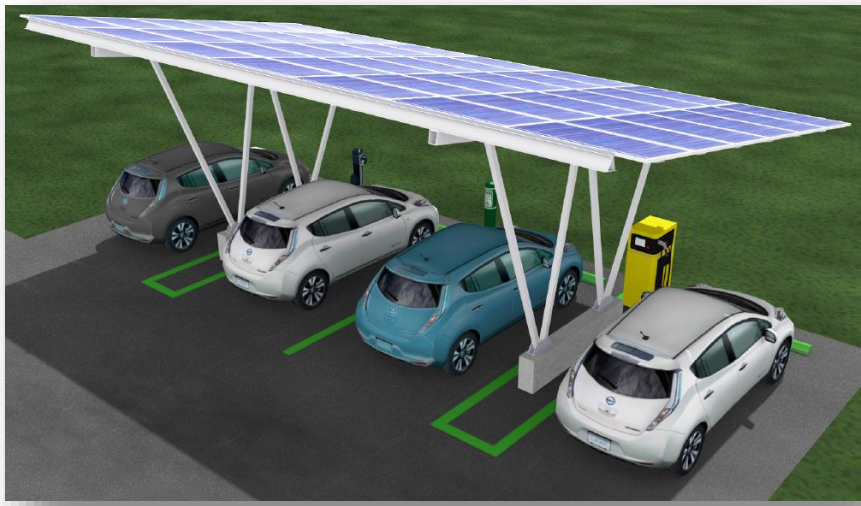
- Recipient of 8 Building America "Top Innovations" awards
- Awarded $14 M DOE funds and $1.3 M in cost share since 2006.

Eric Martin, PI, presents overview
Danny Parker, presents Phased Deep Retrofit project

FSEC

EVTC

Electric Vehicle Transportation Center



EVs for sustainable transportation and a framework for more solar to be integrated into the "Smart Grid"

- Only U.S. DOT University Transportation Center on Electric Vehicles
- Awarded $5.6 M DOT funds and $2.8 M in cost share from 2013 to 2017

Dave Block, PI

Rich Raustad, Technical Lead, presents overview

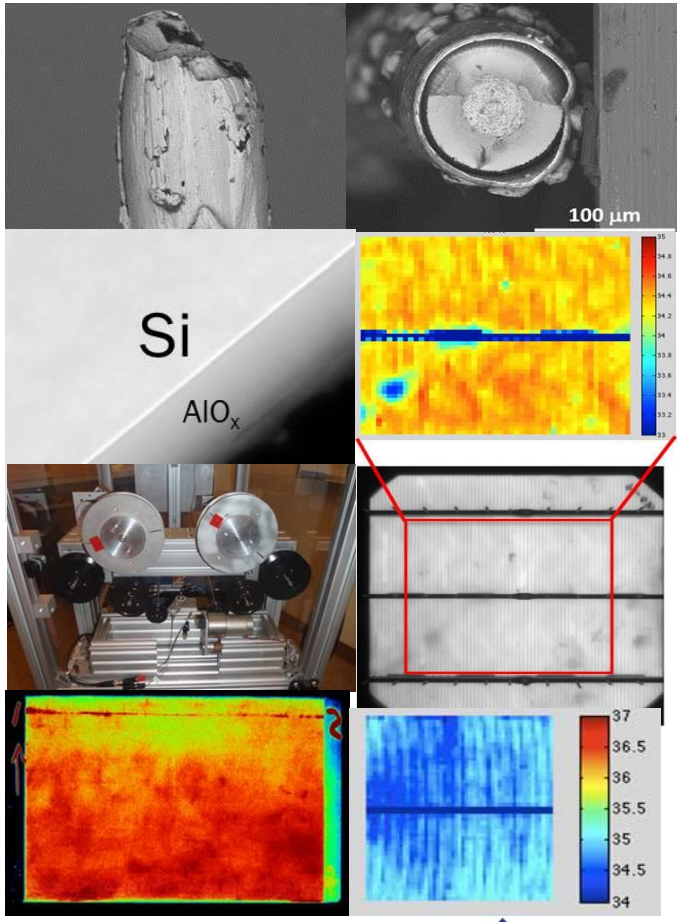
FSEC

U.S. Photovoltaic Manufacturing Consortium

An Industry-led consortium driving collaborative projects in c-Si PV

- U.S. DOE SunShot Program funded at $10M
- Currently 14 active collaborative projects in metrology and feedstock/wafering
  - Diamond Wire Failure Mode Analysis
  - Multi-functional Oxide Passivating Films
  - Predictive Metrology
  - Prototype Diamond Wire Metrology System
  - Casting/Wafering Impact on Cell Performance

Winston Schoenfeld, PI, presents overview



Regional Test Centers

Differentiating PV Quality

Addressing challenges in the commercialization of PV

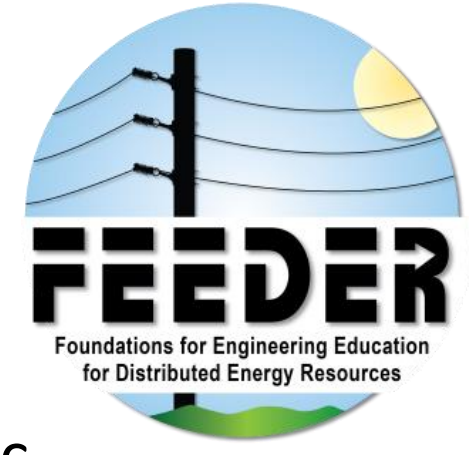
- Provides independent validation of performance and durability of modules, inverters, and components
- The hot and humid climate at FSEC provides critical data for existing and new PV technologies
- Awarded $1.07 M DOE funds since 2011 through the concept, development and implementation of the RTC program since 2011

Stephen Barkaszi, PI, presents overview

FSEC

Foundations for Engineering Education for Distributed Energy Resources (FEEDER)

- DOE-sponsored program to provide Grid Engineering for Accelerated Renewable Energy Deployment (GEARED)
- Aimed at educating the current and future utility industry workforce (capable of making electric energy systems sustainable, economic, reliable, and robust)
- UCF/FSEC is one of three nationwide centers
- DOE funding of $3.2M (total award $4.8M with industry match and other cost share) for the period 2013-2018



FSEC K-12 Education and Professional Development for Teachers

- **EnergyWhiz Event at FSEC**
  - Expecting 1000 participants
  - 2015 EnergyWhiz Expos in Tallahassee, Gainesville and Orlando
- **Student Groups**
  - 4th grade to college level
  - Over 1000 students
- **Teacher Workshops**
  - Solar Schools, Hydrogen, Solar Cookers, Photovoltaics

- **Presentations, Special Events and Other Outreach**
  - STEM focused
  - Over 30,000 students

Drive ELECTRIC Florida

Advancing the energy, economic, and environmental security of the state by promoting the growth of electric vehicle ownership and accompanying infrastructure

- Support and accelerate the adoption of plug-in electric vehicles by engaging and educating the public, businesses, and policy-makers; facilitating collaboration; and supporting EV-friendly policy and programs.
- Statewide organization representing electric vehicle stakeholders, including automobile manufacturers, infrastructure providers, government, academic and environmental interests.
- Provides collaboration with EVTC

Colleen Kettles, Coordinator, presents overview

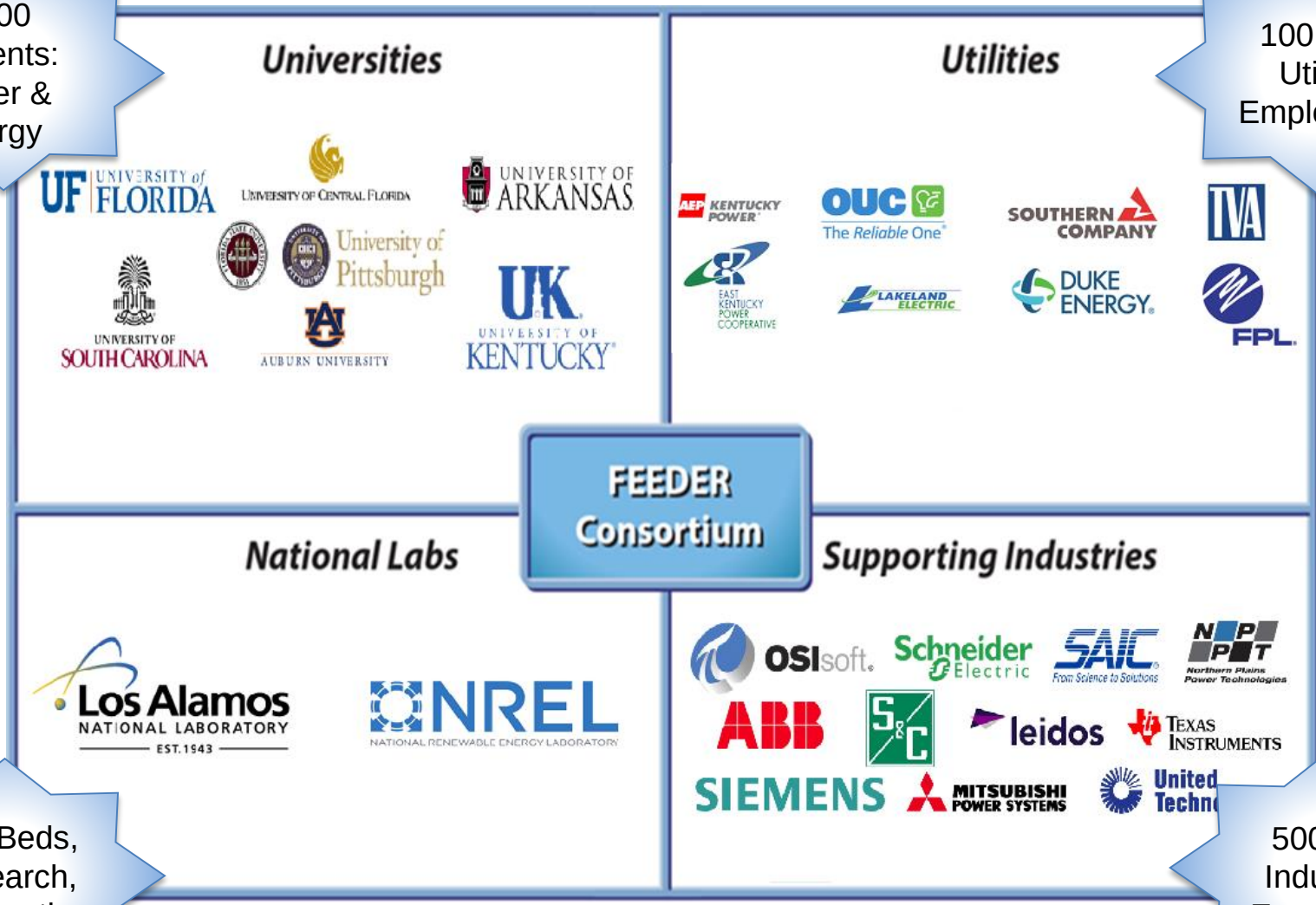
FSEC

- https://www.facebook.com/driveelectricflorida/videos/vb.464504620359407/6349255366500647/?type=2&theater

The FEEDER Team

6,000 Students: Power & Energy

100,000 Utility Employees



Test Beds, Research, Collaborations

500,000 Industrial Employees

EnergyWhiz Event & Expos

Hydrogen Challenge

Energy Innovations

Junior Solar Sprint

Bright House Solar Energy Cookoff

Critter Comfort Cottage

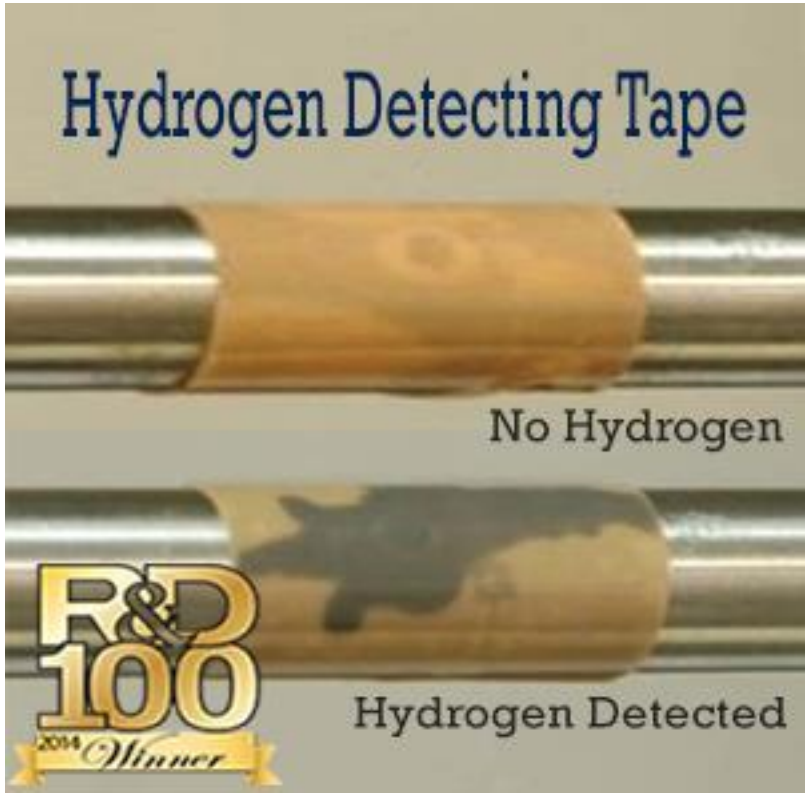
Electrathon

FSEC Research → Curriculum Development, Professional Development, Student Outreach

2014 R&D 100 Awards

The 100 Most Innovative Technologies Introduced in 2013

- NASA KSC
- UCF (FSEC Advanced Energy Division)
- HySense Technology



http://www.bizjournals.com/orlando/morning_call/2014/09/ucf-recognized-with-an-oscar-of-invention.html

R&D 100
52 Years of Invention

2014 R&D 100 Awards

The 100 Most Innovative Technologies Introduced in 2013

FSEC Continuing Education

- PV Systems Design and Installation
- PV Technologies and Business Opportunities
- Solar Water and Pool Heating Systems
- Residential Energy Raters
- Building Energy Codes
- ENERGY STAR New Homes
- Green Buildings
- Weatherization

SITN Regional Training Providers

SSTN Activities

- 28 workshops conducted
- PV, solar water heating, design and commissioning, code official, first responder, marketing
- 73 educational institution partners
  - 132 instructors trained
- Code Official Solar PV Workshops
  - 480 code officials trained
- First Responders and PV Workshop
  - 23 first responders trained

FESC Florida Energy Systems Consortium

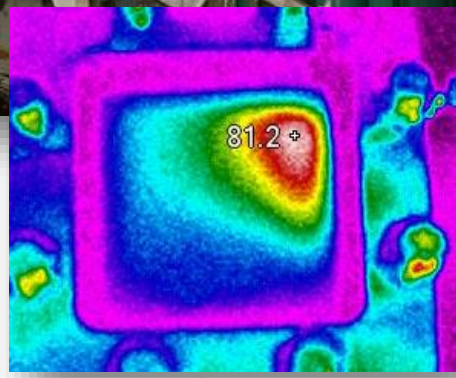
Universities Addressing Florida's Energy Needs

A Florida multi-university program to enhance and expand the use of solar energy and other renewable energy and energy efficiency technologies in the state of Florida

- UCF portion of project was a multi-task R&D effort that supported both FSEC and UCF Electrical Engineering
- Tasks in biomass, PV, solar thermal and building efficiency
- State funding for FSEC of $4.1M July 2008 – December 2012

Membrane Electrode Assembly Fabrication
US DOE High Temperature Membrane Working Group

- 11 teams developed advanced membranes for 120°C
- Ex situ and in situ characterization
- Recommend most-promising materials
- Work with membrane suppliers to maximize performance
- Managed the U.S. DOE's High Temperature Membrane Working Group
- DOE funding of $2.6 M with $0.6 M cost share, 2006 – 2012



ENERGYWHIZ
Connecting Schools, Teachers and Students with Solar Energy.

Solar Schools Programs

Innovation Education

The EnergyWhiz Olympics is all about clean energy and creative kids. Each year, on the first Saturday in May, hundreds of students converge at the Florida Solar Energy Center in Cocoa, Florida to participate in renewable energy themed events.

Take a look at our EnergyWhiz video and see for yourself.


EnergyWhiz Olympics


Energy Curricula


Science Fair


Games and Activities


Sample Data

Featured Story

Energy Matters

The video at the link below provides a brief yet effective look at energy's role in making our world function. It can be used as an overview, introduction or summary lesson and is less than five minutes in length.

http://www.energy.gov/eere/education/videos/ted-ed-video-guide-energy-earth

About Us

The SunSmart Schools Program has worked to increase the deployment of solar energy systems to Florida schools and colleges, which has been funded through several grant awards.

The SunSmart E-Shelter Program provides 10kW photovoltaic systems with battery back-up to schools that are designated as emergency shelters.

Solar System Performance Data of Florida SunSmart E-Shelter Schools

Select A School

Select A County

Select A Utility

Southeast Solar Training Network (SSTN)

U.S. DEPARTMENT OF ENERGY | Solar Instructor Training Network
Southeast Region

Powered by SunShot
U.S. Department of Energy

Train the Trainer—Provide solar training to southeast states' public educational institution instructors

- Provide trainers with methods, tools, curriculum and resources to develop local training programs
- Ensure that training programs create high quality solar installations
- FSEC has been awarded $1.1 M in DOE funds since October 2011, with a program end date of June 2015.

FSEC®