ENERGY WHIZ

EnergyWhiz is FSEC's statewide forum for students to demonstrate their science, technology, engineering, art and mathematics skills (STEAM) capabilities through project-based, energy-focused learning. Held each Spring, hundreds of students across Florida converge at FSEC to participate in renewable energy themed events. Professional development workshops for teachers are held throughout the year to enable them to serve as coaches and mentors for EnergyWhiz participants.

Each spring, nearly 1,000 students, teachers and parents—from Florida's Panhandle to the Keys—converge at FSEC to watch students show off their solar cars, cookers and inventions at EnergyWhiz. Virtual EnergyWhiz was inaugurated in 2020 and will continue to be held each year, in addition to the face-to-face event.

FSEC™

EXPLORE

FSEC®

Florida's Premier Energy Research Center at the University of Central Florida

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UCF

UNIVERSITY OF CENTRAL FLORIDA

Energy Research, Development and Education

As Florida's statewide energy research center, FSEC has nearly 50 years of basic and applied research excellence, which has grown in scope to include solar energy, high performance buildings, sustainable transportation, energy storage, energy systems integration, education and training. As a result of FSEC's extensive research capabilities, its programs are nationally and internationally recognized.

The University of Central Florida's FSEC in Cocoa has nearly 50 years of excellence in energy research.

Hydrogen Detection Safety Tape

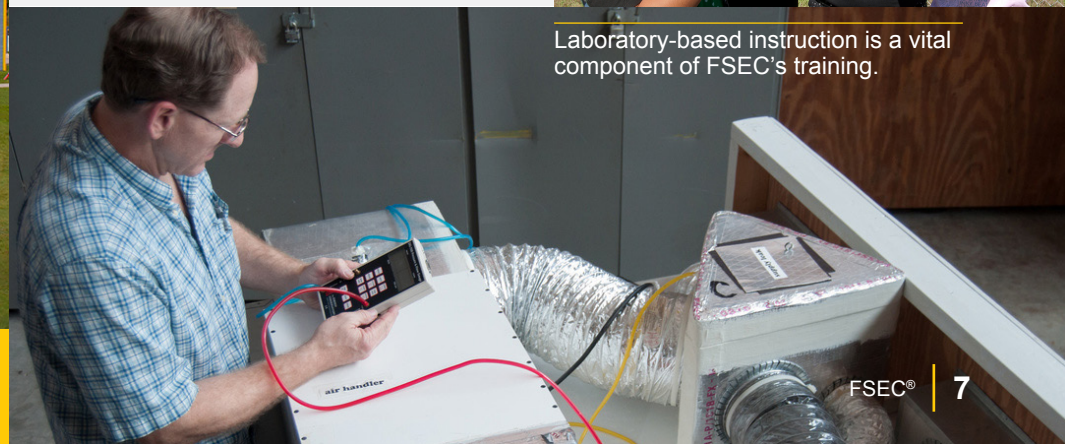
A hydrogen detection safety tape developed at FSEC, in partnership with NASA, provides a visual indication when hydrogen (odorless and colorless) is leaking.

A hydrogen detection safety tape, developed in partnership with NASA KSC and licensed by UCF start-up HySense Technology, was internationally recognized by the R&D 100 Awards program as one of the most technologically significant products to enter the marketplace in 2013. It is UCF's first R&D 100 Award winner.

SUNSMART SCHOOLS

FSEC developed and maintains the SunSmart E-Shelter program that installed over 100 Solar+Storage systems throughout the state on schools that serve as emergency shelters. FSEC's Solar Matters curriculum allows teachers to include renewable energy in K-12 students' learning experiences. Supported by Florida's electric utilities and state office of energy, hands-on activities are facilitated with the distribution of specially designed energy education kits for each grade level.

The SunSmart E-Shelter Schools Program installed more than 100 solar systems at emergency shelter schools throughout Florida and included a renewable energy curriculum with hands-on STEM learning experiences.



Laboratory-based instruction is a vital component of FSEC's training.

TECHNOLOGY TRANSFER

FSEC has 117 patents, 38 of which are licensed.

FSEC's technology transfer efforts extend to curriculum development and training for the energy workforce, including solar installers and developers; energy rating and weatherization technicians; home builders, designers, and allied trades; code officials; and, related practitioners. The classroom and laboratory-based short courses have trained thousands of workers in the energy industry over the years and provide the basis for certification and licensing by public and private organizations.

FSEC maintains national RESNET accreditations as a Home Energy Rating System (HERS) Training Provider, HERS Quality Assurance Provider and HERS Software Tool Provider. FSEC has trained and certified more than 1300 Home Energy Raters who have conducted more than 90,000 Home Energy Ratings. FSEC's EnergyGauge® building energy simulation and analysis software suite for both energy code compliance and HERS energy ratings is widely used across Florida and in many other areas of the country.

The Gossamer Wind Ceiling Fan

Largest royalty generator

UCF's most productive patent—the Gossamer Wind ceiling fan—was developed out of FSEC's building energy research and is sold at The Home Depot stores.

The Results

This fan is the basis of the ENERGY STAR® ceiling fan program.

More than **2M** fans sold

Each fan saves **$20** per year

More than **$40Million** in energy savings each year.

SOLAR RESEARCH

FSEC conducts small and large-scale performance testing of photovoltaic systems.

FSEC's solar energy research, testing and demonstration programs validate the performance of small- to large-scale photovoltaic (PV) systems; identify cell-level manufacturing improvements; and, issue code-compliant PV system certifications for solar installers. These programs provide a measure of quality control and reliable field performance.

PV systems floating on water bodies (floatovoltaics) are the latest innovation in PV system deployment. FSEC is leading a U.S. Department of Energy funded project that is monitoring floating solar systems around the country and comparing their performance to their land-based counterparts. Of particular interest is their impact on the water ecosystem and validation of the theory that the cooling effects of the water body improve PV system performance.

FSEC is leading a nationwide research project on floating solar systems like this one located in Orlando. Photo: Orlando Utilities Commission

BUILDINGS RESEARCH

FSEC's extensive buildings research program regularly receives funding from federal and state agencies as well as the private sector. Researchers determine the effectiveness of building codes and methods for improving the codes. They test innovative HVAC systems that focus on high efficiency, greater moisture removal, or reducing duct system heat gains and losses. FSEC's buildings research is conducted in the lab and the field to identify ways to improve indoor air quality when whole house ventilation systems are deployed.

FSEC's Hot Water Systems Lab is used to evaluate a variety of hot water systems simultaneously and side-by-side to compare energy performance and time of day electric loads.

FSEC researches a variety of energy system improvements to homes in a hot-humid climate using, two onsite, heavily-instrumented and identical side-by-side homes with simulated occupancy.

Working with innovative builders, FSEC researchers have determined reliable, cost-effective measures to incorporate in today's energy efficient homes. The FSEC-led Building America Partnership for Improved Residential Construction is the nation's leading university/industrial-based Building America partnership. FSEC works with developers, builders, Habitat for Humanity affiliates, suppliers, and utility research partners throughout the United States. These efforts foster adoption of systems engineering principles that lead to enhanced energy efficiency in new and existing housing, and ultimately, to improvements to local and national building energy codes and standards.

FSEC originated the concept of the Zero Energy Home, developing the nation's first in Lakeland Florida in 1998. Today, major builders are offering Zero Energy Home's throughout the U.S. in models from starter homes to luxury homes.

FSEC is working with utilities, municipalities and developers to examine the resiliency of buildings under different climate or utility interruption scenarios. Work includes solar-generated hydrogen storage, batteries, vehicle to grid-technology and natural gas combined heat and power.

FSEC has been developing and testing innovative water heating technologies for more than 40 years—from electric and natural gas systems to solar thermal, and now PV-powered systems. Our patented PV-assisted heat pump technology has been shown to be 90% more efficient than standard water heaters under stringent laboratory test conditions that simulate residential hot water draw patterns.

FSEC has extensive expertise in user-specific development and enhancement of energy modeling tools such as the U.S. Department of Energy's flagship EnergyPlus. This energy simulation tool is used for analyzing building energy performance across the globe.

FSEC specializes in all aspects of building science, including indoor air quality. Mechanical ventilation testing is shown here.

TRANSPORTATION

The Electric Vehicle Transportation Center at FSEC is studying infrastructure needed to accommodate the influx of electric vehicles and their power demands. FSEC supports the Central Florida Clean Cities Coalition and Drive Electric Florida, collaborative working groups of industry professionals, utility representatives, manufacturers, government agencies and national labs and agencies for the purpose of accelerating alternative fuel vehicle acceptance and adoption.