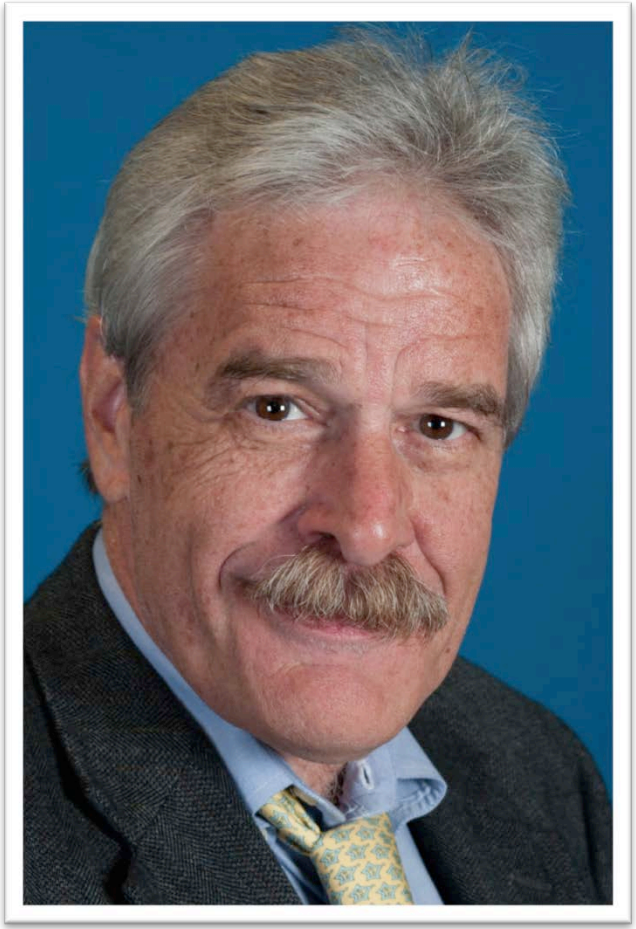
FSEC Advisory Board Meeting

October 21, 2021

FSEC Energy Research Center

UNIVERSITY OF CENTRAL FLORIDA



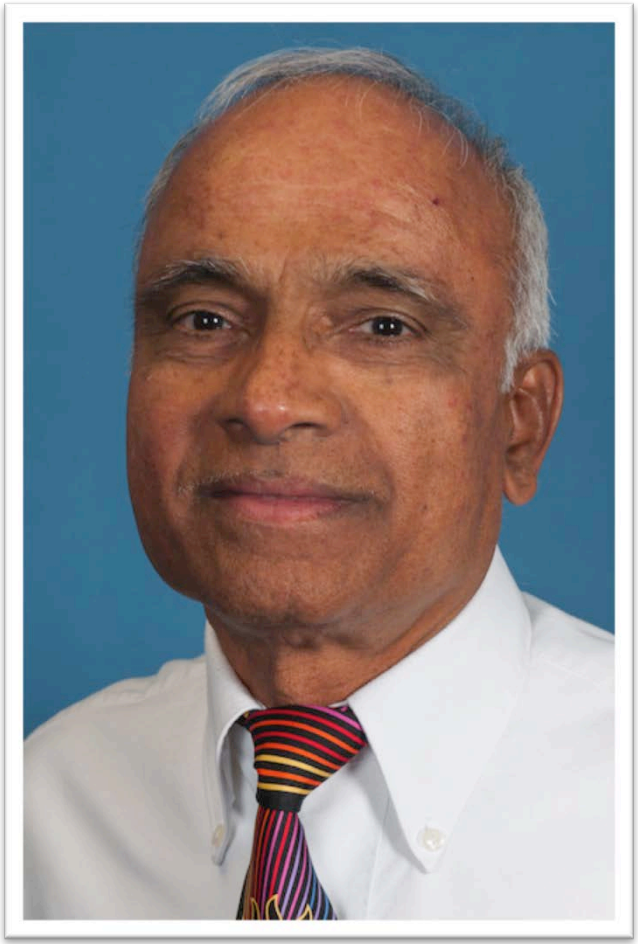
In Memory Of

Steve Gorman

1951 – 2021

Steve was a former FSEC Advisory Board member and an icon in the solar energy industry.

He devoted his career to the mission of bringing solar thermal to the masses.



In Memory Of
Neelkanth Dhere
1938 – 2021

Dr. Dhere retired from FSEC in 2017 after 27 years of service.

He was a national pioneer in the research and development of vacuum deposition, thin-film PV cells.

His students now work at hi-tech companies such as Apple, Applied Materials, Intel, Lam Research, and Motorola.

UCF

FSEC Advisory Board Meeting — AGENDA

9:30 a.m.	**Welcome and Introductions** **Roll Call**	**Chris Castro, *Chair, FSEC Advisory Board; Director of Sustainability & Resilience, City of Orlando*** **Sherri Shields, *FSEC***
9:40 a.m.	Approval of March 31, 2021 Meeting Minutes	Chris Castro
9:45 a.m.	Status of FSEC Programs	Jim Fenton, *FSEC*
10:05 a.m.	Infectious Disease Isolation Zone Research	Chuck Withers, *FSEC*
10:20 a.m.	BREAK	
10:25 a.m.	Florida Energy Office Report Florida Legislative Session Report	Kelley Smith Burk, *Director, Office of Energy, FDACS* Louis Rotundo, *Principal, Louis Rotundo and Associates*
10:40 a.m.	Strategic Plan Update: Metrics	Bill Grieco, *Vice Chair, FSEC Advisory Board;* *CEO, RAPID Manufacturing Institute™*
10:55 a.m.	The US DOE Loan Programs and Energizing Climate Justice Through Virtual Power Plants	James P. Barrett, Senior Consultant, US DOE Loan Programs Office (LPO)
11:20 a.m.	Roundtable Discussion: How the DOE Loan Program Could Help Achieve Climate Justice	James Barrett joins state, local and housing representatives. *Kelley Smith Burk moderates.*
11:55 a.m.	New Business/Discussion Date and Agenda for Next AB Meeting (TBD)	Chris Castro
12:00 p.m.	Adjourn	Chris Castro

New Advisory Board Member

Marlin Vaughn

Cogeneration Operator

The Walt Disney Company

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Status of FSEC Programs

Jim Fenton, Director

Advisory Board Meeting

October 21, 2021

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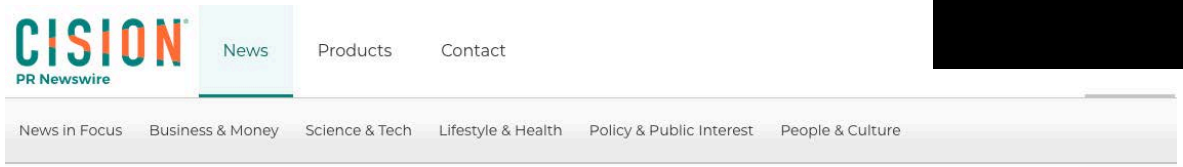
FSEC IN THE NEWS

FSEC In The News

August 2, 2021 | https://www.theinvadingsea.com/2021/08/02/dr-james-fenton-we-need-to-stop-burning-things-its-like-burning-money/

FSEC In The News



Broad Coalition Forms "Southeast Electric Transportation Regional Initiative (SETRI)" To Accelerate EV Market Expansion

Over 60 stakeholders collaborate to leverage transportation electrification opportunities in Southeast

NEWS PROVIDED BY
Southeast Electric Transportation Regional Initiative (SETRI) →
Sep 22, 2021, 10:00 ET

SHARE THIS ARTICLE

ATLANTA, Sept. 22, 2021 /PRNewswire/ -- A broad coalition of organizations from the business, education, governme and non-profit sectors has launched the **Southeast Electric Transportation Regional Initiative (SETRI).** SETRI has been designed to address one of the region's most pressing needs toward realizing the benefits of electric transportation, namely greater coordination and collaboration among key stakeholders.

SETRI aims to address regional market challenges such as electric vehicle (EV) charging and infrastructure gaps, accessibility, EV model availability and cost, policy guidance, and consumer awareness while unlocking untapped opportunities for economic development, jobs growth, enhanced energy security, and reduced environmental impacts opportunities.

Indeed, over 60 public and private organizations are founding signatories to SETRI's Memorandum of Understanding (MOU) aimed at accelerating the benefits of electric transportation for the region. This coalition includes charging companies, utilities, automakers, public officials, city planners, non-profit organizations, and universities and other research institutions. The coalition will leverage the expertise and resources needed to help state leaders navigate the transition to electric mobility. To accelerate regional transportation electrification growth throughout the Southeast, SETRI intends to:

- Promote regional EV market development,
- Conduct education and outreach to consumers and decision-makers,
- Coordinate state electrification efforts and university research, and
- Collaborate with transportation electrification efforts outside the Southeast.

https://www.prnewswire.com/news-releases/broad-coalition-forms-southeast-electric-transportation-regional-initiative-setri-to-accelerate-ev-market-expansion-301382869.html

FSEC In The News

UNIVERSITY OF CENTRAL FLORIDA

UCF SIGN IN +

UCFTODAY UCF NEWS | STORIES OF IMPACT + INNOVATION | ORLANDO, FL

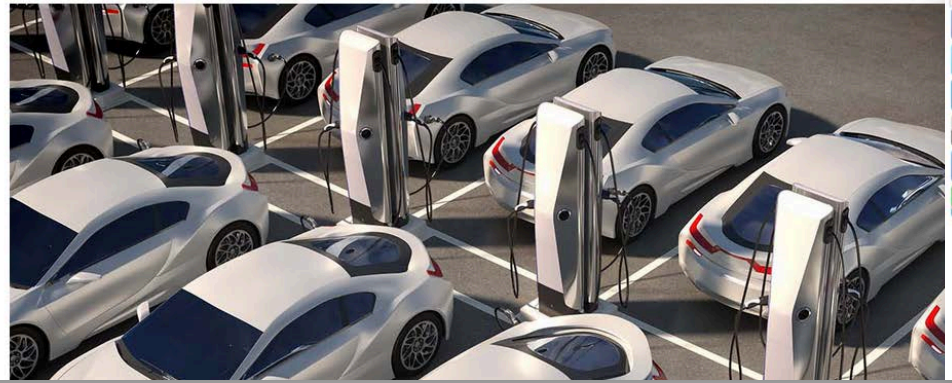
SECTIONS

SCIENCE & TECHNOLOGY

UCF Part of New Regional Movement to Accelerate Adoption of Electric Vehicle Transportation

UCF's FSEC Energy Research Center is a leader in electric transportation study and it is ready to help the new group charge on.

BY SHERRI SHIELDS | SEPTEMBER 27, 2021



https://www.ucf.edu/news/ucf-part-of-new-regional-movement-to-accelerate-adoption-of-electric-vehicle-transportation/

SPACE COAST DAILY .com

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NEWS TICKER > Legendary Brevard Junior College Coach Jim Oler Inducted into Space Coast Sports Hall of

Home » UCF Knights Part of New Regional Movement to Accelerate Adoption of Electric Vehicle Transportation

UCF Knights Part of New Regional Movement to Accelerate Adoption of Electric Vehicle Transportation

By Space Coast Daily // October 1, 2021

SHARE

ALL ELECTRIC SYSTEM COULD TRIGGER AN ECONOMIC BOON OF UP TO $47B

https://spacecoastdaily.com/2021/10/ucf-knights-part-of-new-regional-movement-to-accelerate-adoption-of-electric-vehicle-transportation/

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UCFTODAY UCF NEWS | STORIES OF IMPACT + INNOVATION | ORLANDO, FL

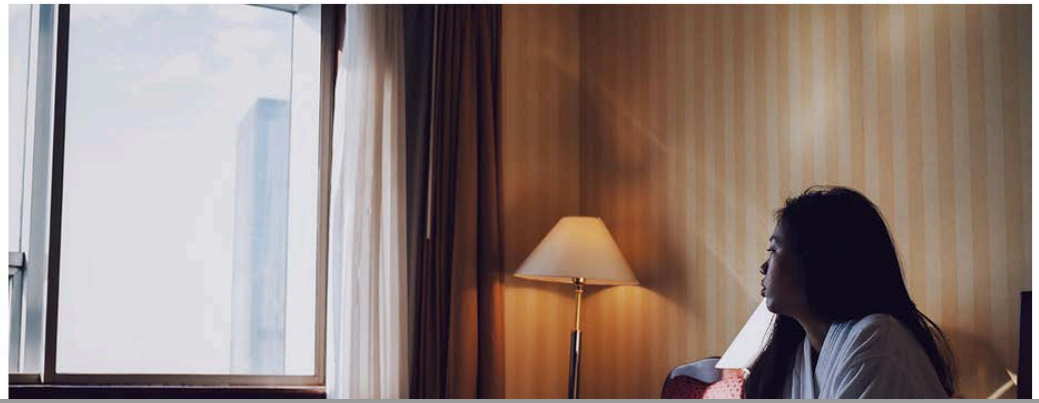
SECTIONS

SCIENCE & TECHNOLOGY

UCF Researchers Validate Simple Method to Minimize COVID Spread in Single-Family Home

The researchers found that a basic isolation zone for a contagious person could be created with little cost and effort.

BY SHERRI SHIELDS | AUGUST 4, 2021



- *Video produced by* Ivanhoe Broadcast Media

Virtual EnergyWhiz 2021

- 1,670 visitors
- 9,232 page views
- 551 comments on projects
- 86 projects
- 18 schools
- 9 recorded interviews
- 17 topical videos

https://vimeo.com/544816870

EnergyWhiz 2022

EnergyWhiz Virtual:

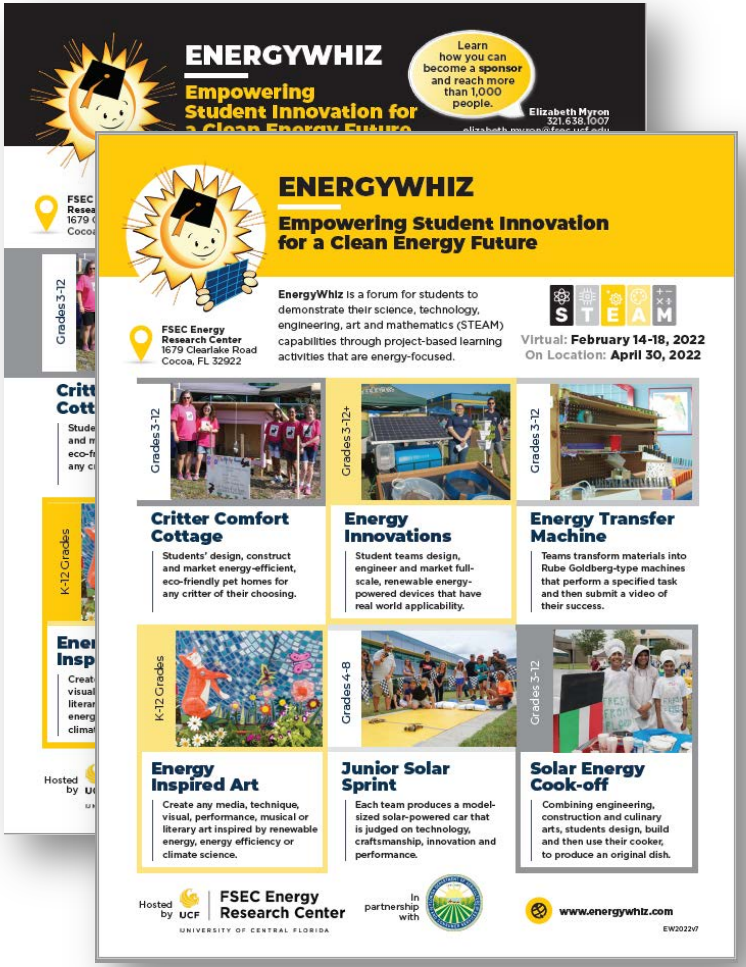
February 14-18, 2022

EnergyWhiz (at FSEC):

April 30, 2022

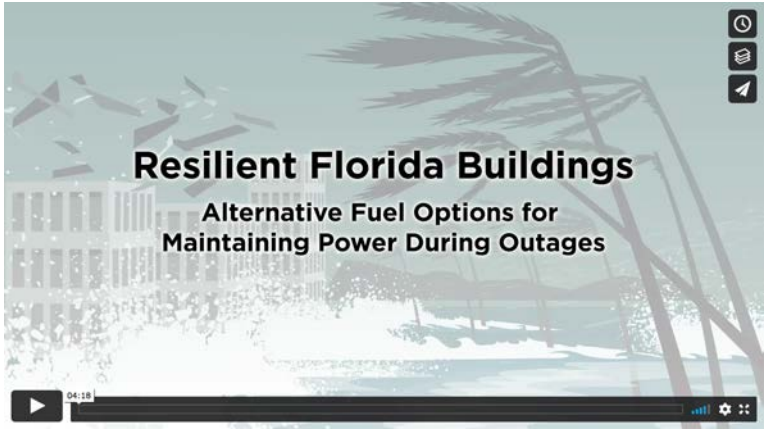
- Sponsors Needed
- Elementary to college students
  - *Junior Solar Sprint*
  - *Energy Transfer Machine*
  - *Energy Innovations*
  - Critter Comfort Cottage
  - Junior Solar Sprint

Promotional Publications



Capabilities Document

Videos



https://vimeo.com/527856308

https://vimeo.com/557714520

EnergyWhiz: 1 min video

https://vimeo.com/434436180

- Instructional videos for virtual EnergyWhiz
  - webpage design
  - judging
  - Topical presentations

CURRENT CONTRACTS

Current DOE-Funded Collaborative Partnerships

- **Gaining Fundamental Understanding of Critical Failure Modes and Degradation Mechanisms in Fielded Photovoltaic Modules via Multiscale Characterization,** *K. Davis*
- **Reliability and Power Degradation**, Sub from CWRU*, K. Davis*
- **Characterization of Contact Degradation in c-Si PV Modules**, *K. Davis*
- **Fabrication of Passivating Contact Solar Cells,** *K. Davis*
- **Low Cost Printing Techniques***, K. Davis*
- **Education Materials for Professional Organizations Working on Efficiency and Renewable Energy Developments (EMPOWERED)**, *C. Kettles*
- **Developing PID susceptibility models for Bifacial Technologies**, *H. Seigneur*
- **PV System Research Impacting LCOE**, *H. Seigneur*
- **Quantifying and Valuing Fundamental Characteristics and Benefits of Floating Photovoltaic Systems,** *J. Sherwin*
- **Secure and Resilient Operations Using Open-Source Distributed Systems Platform (OpenDSP)**, *W. Sun*

New projects

UCF

Current DOE-Funded Collaborative Partnerships

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

- **Investigation of the Prevalence and Energy Impacts of Residential Comfort System Faults – Hot Humid and Hot Dry Climates,** *E. Martin*
- **PV-GEMS: Photovoltaic Powered, Grid Enhanced Mechanical Solution**, *E. Martin*
- **Reimagining HVAC for New Manufactured Housing,** *(Subaward from Slipstream), D. Chasar*
- **Indoor Air Quality Field Study in New US Homes,** *E. Martin*
- **Energy Codes: Comparing Performance in a Changing Technological Environment,** *P. Fairey*
- **EnergyPlus Development,** *L. Gu (Renewal in process)*

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Current Contracts

- American Made Challenge Power Connector

- Residential Buildings Subject Matter Expert Technical, Outreach and Research and Development Support
- Whole Building Modeling and Simulation Software

- DOE Connected Heat Pump Water Heater Field Study

- PV Lifetime Hot and Humid Climate Flash Testing

- Enabling large-scale adaptive integration of technology hubs to enhance community resilience through decentralized urban food-water-energy nexus decision

- Alternative Fuel Resiliency Plan
- SunSmart Schools E-Shelter Maximization Project *($1M added)*

Current Contracts

ASHRAE

- Estimating Internal Moisture Generation Rates in Occupied New Homes

ASU Arizona State University

- Reliability Evaluation of Bifacial and Monofacial Glass/Glass Modules with EVA and Non-EVA Encapsulants

Associated Gas Distributors of Florida

- Commercialization of Renewable Natural Gas in Florida
- Updating AGDF Model Costs and Equipment

ATLANTIC HOUSING PARTNERS

- Calculate Multifamily Utility Allowances and Support Existing PV Operations and New Installations

DRIVE ELECTRIC USA

- Raise Awareness and Adoption of EVs Across U.S.

OUC The Reliable One®

- Demonstration of Integrated Hydrogen Production and Consumption for Improved Utility Operations

A.F.Mensah

- Controller design and demonstration of Integrated Battery Storage System

SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE

- Partnered with Hanson Professional Services and Central Florida Clean Cities Coalition to Develop an Energy Efficiency and Sustainability Plan

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Current Contracts

The Levy Partnership

- *[Sub-Award]* Maximizing the Effectiveness of Ductless Heat Pumps in Existing Homes by Demonstrating Integrated Controls

OWENS CORNING

- Lab and Field Evaluation of Condensation Potential in Buried Ducts in Vented Attics Located in the Hot and Humid Climate Zones

ICC-SRCC
SOLAR RATING & CERTIFICATION CORPORATION

- SRCC Portal Development

RESNET
RESIDENTIAL ENERGY SERVICES NETWORK

- Technical Support

SEI Associates

- Trane Trace 3D Plus Software Development Support

Tactical Energy

- Comparison of Real World Assisted Living Buildings with Baseline Models

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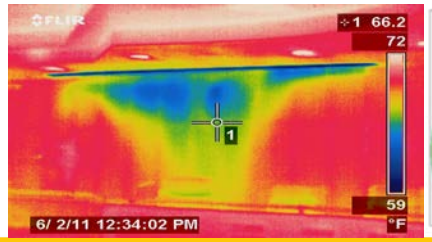
NEW AWARDS & PENDING CONTRACTS

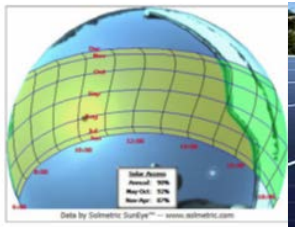
SunSmart E-Shelter Schools MAX Project

- Inspections & Repairs
- Additional $1M from FDACS to make upgrades in 55 of 113 systems
- Replace batteries, upgrade inverters, or other needed repairs
- Supply chain challenges

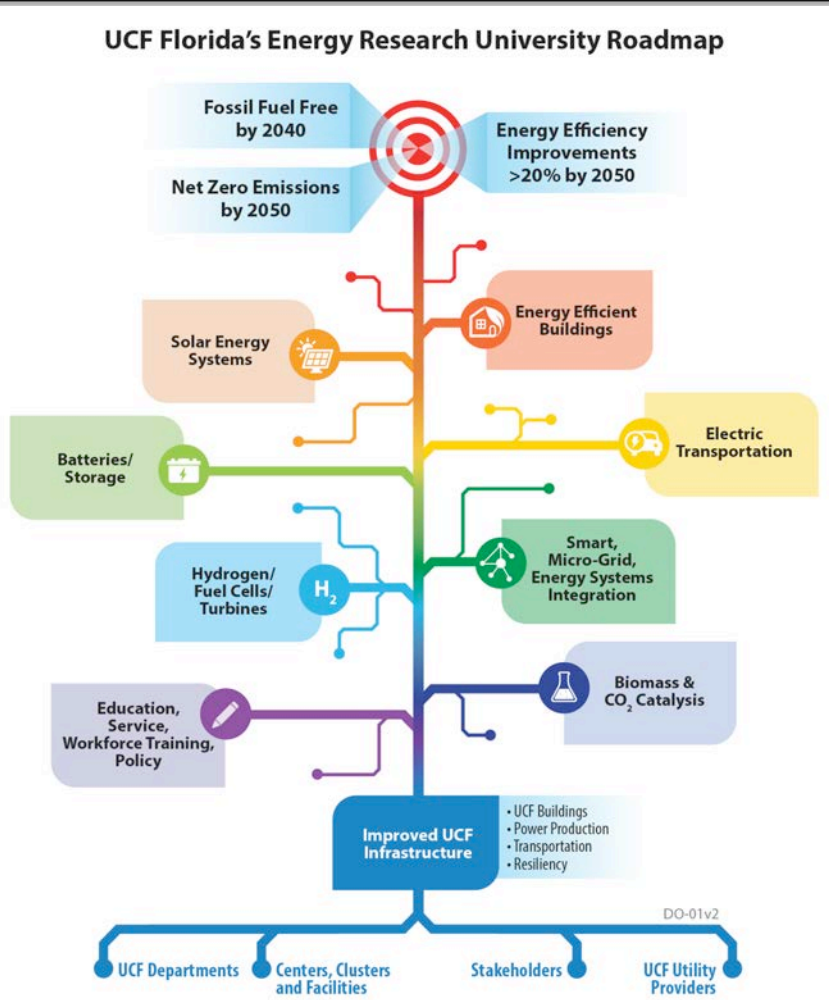
FDACS Florida Energy Investment Collaborative Pilot Program Objectives:

- Identify and prioritize highest impact, cost-effective, and timely energy sustainability projects
- Monitor/validate project deployments
- Create a streamlined project execution process
- Provide technical assistance to educate state and community decision-makers about sustainable energy practices
- Create a best practices document based on this project to be used with future communities.





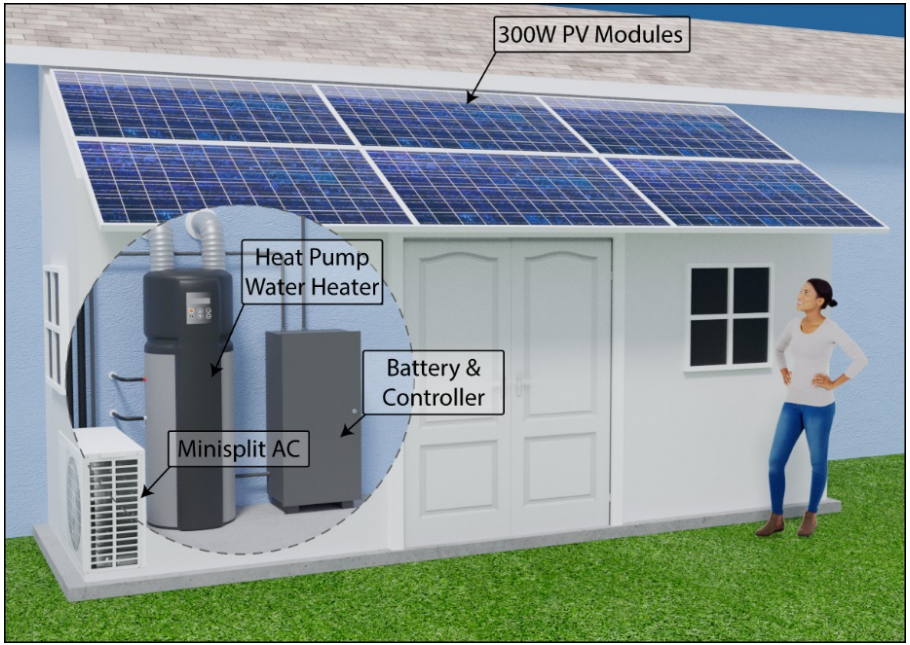
University Partnerships



- FSEC working with main campus faculty and Facilities
- Energy transition plan – Facilities & FSEC
- University sustainability plan
- UCF unique to have three utility companies (Duke Energy, OUC, FPL)

UPCOMING PROPOSALS

PV GEMS: Phase 2



PV GEMS: PV-Powered, Grid-Enhanced Mechanical Solution

SUMMARY: A pre-packaged retrofit solution targeting 75% reduction in space conditioning and water heating energy.

- Fourteen Phase 1 teams submitting proposals for five Phase 2 awards.
- Phase 2 funds intended for development of pre-production prototypes, demonstration in occupied buildings, and commercialization activities.
- **FSEC currently seeking commercialization partners**: design, manufacturing, marketing, distribution, installation, financing, etc.
- Contact: Eric Martin, martin@fsec.ucf.edu

FSEC Energy Research Center
UNIVERSITY OF CENTRAL FLORIDA

Dynamic Demand Response for Grid Services in a High PV Penetration Feeder

Control Number 2206-1590
Requested Federal Funds: $7 M, Cost Share: $4.4 M

Team

Prime:
University of Central Florida

PI:
Richard Raustad, Project Director

Partners

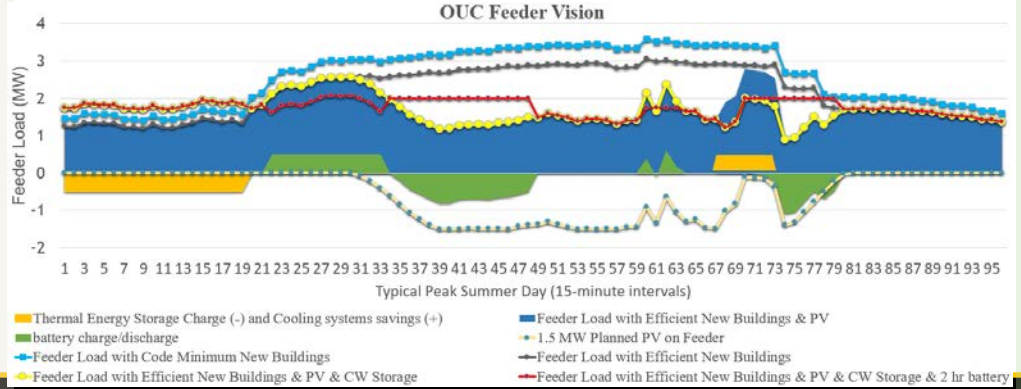
TAVISTOCK DEVELOPMENT COMPANY
OUC The Reliable One
exp.
HITACHI
ABB
SIEMENS energy

Impacts

Demonstrate methods for grid-interactive buildings to provide valuable support to the grid in a high-PV penetration scenario without compromising occupancy comfort. This will enable an increase in variable PV generation while maintaining the high level of grid reliability that utilities have demonstrated.

Summary

Shift cooling loads through chiller and air conditioner set point controls, dispatching battery energy storage, and modulating EV charging in real time via utility signals. Feeder load current 2 MW, future 4 MW, solar 1-2 MW. Evaluate TES via dynamic simulation.



Improvement Goal

Electric demand will be reduced by 15-30% and flexed by 30% through optimized infrastructure and software controls demonstrated in an urban area

The demonstration will include 3 hotels, 3 office buildings, 2 garages, a chiller plant, up to 180 EV charging stations, 1 MW of solar PV at a parking garage, and will install DC-coupled battery (500kW/2000kWh) and EV charging (8x60kW)

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A.F.Mensah

- A.F. Mensah, Inc. (AFM) is a cleantech company
- **Developer, Systems Integrator, and Operator of solar and battery storage projects**
- Clients include Electric Utilities, Municipalities, and Institutions.

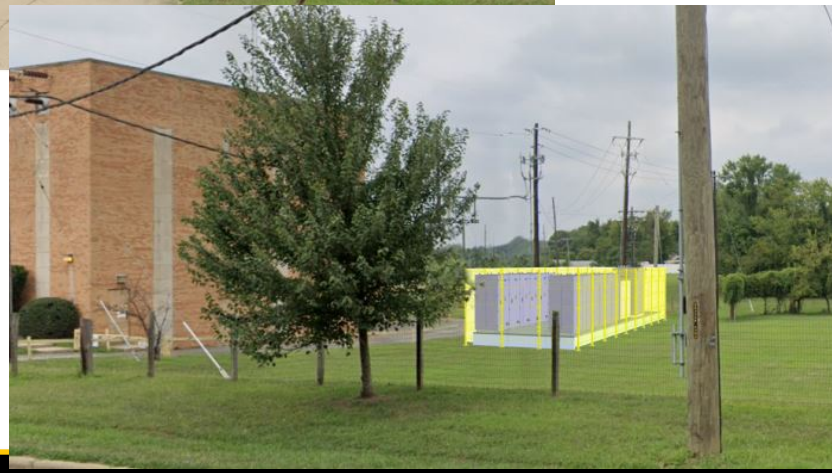
- Projects & Accomplishments
  - Solar + Storage Virtual Power Plants
  - Commercial Solar + Storage Microgrids
  - Battery Storage Projects for renewable grid integration, ancillary services and distribution grid enhancement.
  - 2nd Life Electric Vehicle Battery Integration

UCF

A.F.Mensah

Partnership with UCF Driver – Substation Deferral Project

- Exelon Utilities Substation.
- Located in Oxon Hill, Maryland.
- **Defer construction of a planned substation.**
- **Peak shaving and grid emergencies.**
- **Ancillary Services: Frequency Regulation and Spinning Reserves**
- $4.6M Cost; $11M Value.

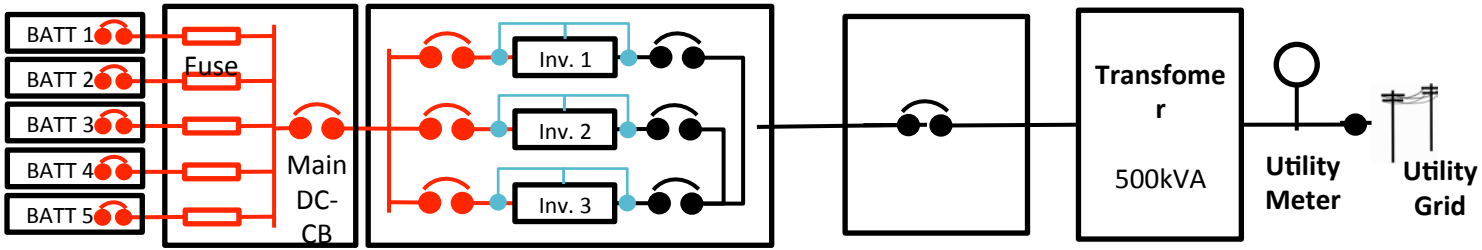


Controller design and demonstration of Integrated Battery Storage System

R&D Partnership with UCF - Key Tasks

A.F.Mensah

- Design **Unified Control Strategy: Battery Inverter, PV, Grid, EV, & Other resources.**
- Design and test Innovative **GaN Inverter** for battery storage applications. (High Power Density)
- **Test Bed** for Exelon Project for Acceptance Test as shown below: **500kW/2MWh Lithium Ion Phosphate System.**



Plans for Expansion

A.F.Mensah

- We remain committed to continue funding and driving research at UCF/FSEC in lockstep with our business expansion.
- UCF/FSEC Partnership and Florida Presence are key for our growth and expansion.

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Questions?


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