FSEC Advisory Board Meeting

April 15, 2022



UNIVERSITY OF CENTRAL FLORIDA

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
	Recognition of UCF President Cartwright	
9:50 a.m.	Approval of October 21, 2021 Meeting Minutes	Chris Castro

Jim Fenton, Director, FSEC

Director, Office of Energy, FDACS

Adje Mensah, A.F. Mensah, Inc.

Melissa Klembara, U.S. Department of Energy

Colleen Kettles, Director, Workforce and Business

Kelley Smith Burk,

Demonstration Office

Development Division

Chris Castro

Chris Castro

9:55 a.m.

10:20 a.m.

10:35 a.m.

10:45 a.m.

11:05 a.m.

11:35 a.m.

11:45 a.m.

11:55 a.m.

12:00 p.m.

Status of FSEC Programs

Networking Break

Florida Energy Office Report

Energy Storage Research at FSEC

Workforce Programs/Solar Apprenticeship

Date and Agenda for Next AB Meeting (TBD)

Election for New Chair and Vice-Chair

New Business/Discussion

Adjourn

Overview of the Office of Clean Energy Demonstrations

New Advisory Board Members



Dean BusheyVice President, Global
Social Environmental
Business, Hitachi



Brian DonnellyManager of Sustainability,
Publix



Director of Generation Technology, Duke Energy

Peter Hoeflich



Paul JohnstonPresident, Watsco



Jeff JugerDeputy General Manager,
Jinko Solar



Bruce Lindsay
Business Development,
Thermal Energy Storage
Trane Technologies



New Advisory Board Members



Ashraf MahmoudDirector of Operations,
Saft Batteries



Rob Rickman

Area Sales Manager,

Mitsubishi Electric Trane

HVAC LLC



Scott McWhorter
Chairman, Southeast
Hydrogen Energy Alliance



Jennifer Schaffer
Director, Clean Energy
Solutions, Florida Power &
Light Company



New Advisory Board Members



Justin Vandenbroeck
President, Florida Solar
Energy Industry
Association



Marlin Vaughn
Cogeneration Operator,
The Walt Disney Company



Tamara WaldmannDirector, Florida Distributed
Generation, Strategy, and
Policy, Duke Energy



Kristy Walson
Principal,
TLC Engineering Solutions



Agenda

Chris Castro

Chris Castro, Chair, FSEC Advisory Board;

Director of Sustainability & Resilience,

	Roll Call Recognition of UCF President Cartwright	City of Orlando Sherri Shields, FSEC
9:50 a.m.	Approval of October 21, 2021 Meeting Minutes	Chris Castro
9:55 a.m.	Status of FSEC Programs	Jim Fenton, Director, FSEC
10:20 a.m.	Florida Energy Office Report	Kelley Smith Burk, Director, Office of Energy, FDACS
10:35 a.m.	Networking Break	
10:45 a.m.	Energy Storage Research at FSEC	Adje Mensah, A.F. Mensah, Inc.
11:05 a.m.	Overview of the Office of Clean Energy Demonstrations	Melissa Klembara, U.S. Department of Energy Demonstration Office
11:35 a.m.	Workforce Programs/Solar Apprenticeship	Colleen Kettles, Director, Workforce and Business Development Division
11:45 a.m.	Election for New Chair and Vice-Chair	
11:55 a.m.	New Business/Discussion Date and Agenda for Next AB Meeting (TBD)	Chris Castro

Welcome and Introductions

Adjourn

9:30 a.m.

Status of FSEC Programs

Jim Fenton, Director

Advisory Board Meeting

April 15, 2022

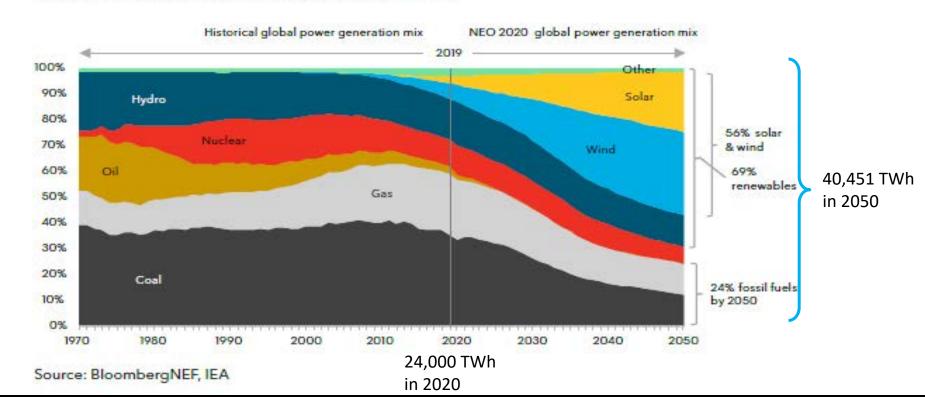


UNIVERSITY OF CENTRAL FLORIDA

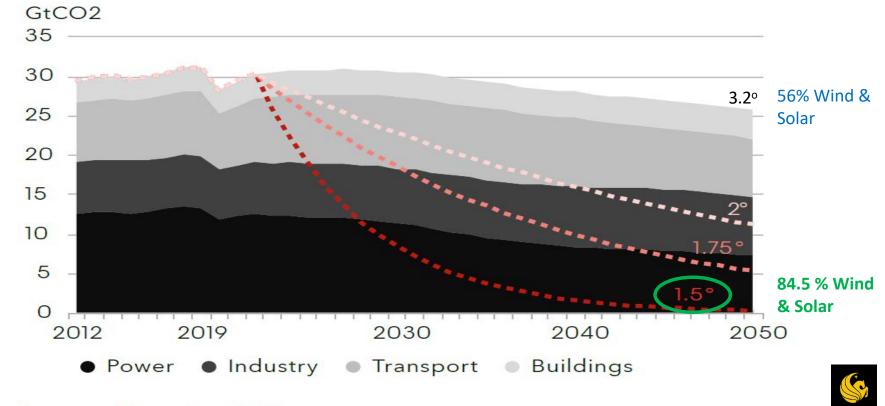
Potential for "irreversible change"

BloombergNEF New Energy Outlook 2020 Economic Transition Scenario

Figure 2: Global electricity generation mix



Emissions in the Economic Transition Scenario, by sector, and a range of carbon budgets

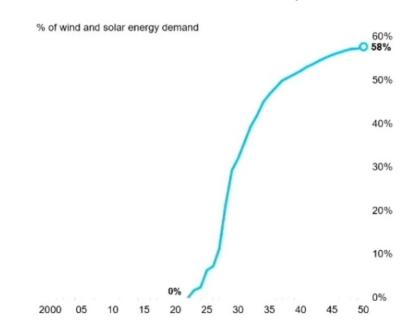


Source: BloombergNEF

Renewable energy has scaled... ... but has a long way to go



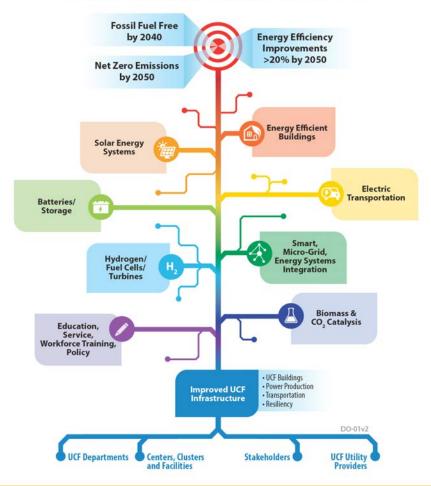
Green hydrogen has not scaled at all... ... but it could scale, massively



In 2050 102,000 TWh of Electricity, 84.5 % wind and solar, 58% of which is used to make hydrogen to achieve NZE



UCF Florida's Energy Research University Roadmap



University Partnerships

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



CURRENT CONTRACTS



Current DOE-Funded Collaborative Partnerships



Buildings Technology Office

- 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, Phase 2
 E. Martin
- Reimagining HVAC for New Manufactured Housing, Phase 2 (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 Software Development,
 L. Gu



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





 American Made Challenge Power Connector



 DOE Connected Heat Pump Water Heater Field Study



- Residential Buildings
 Subject Matter Expert
 Technical, Outreach and
 Research, and
 Development Support
- Whole Building Modeling and Simulation Software
- Deep Energy Retrofit Technical Assistance
- Test and Data Acquisition Equipment Installation in Homes With Different Attic Designs

Sandia National Laboratories

- PV Lifetime Hot and Humid Climate Flash Testing
- Long-term Outdoor PV Evaluations
- Operational Support for Meteorological Instrumentation at the Florida Regional Test Center (FL RTC)

Current Contracts



Enabling largescale adaptive integration of technology hubs to enhance community resilience through decentralized urban food-waterenergy nexus decision



- Alternative Fuel Resiliency Plan
- SunSmart
 Schools
 E-Shelter
 Maximization
 Project



Current Contracts



Estimating Internal Moisture Generation Rates in Occupied New Homes

Reliability Evaluation of

FVA and Non-FVA

Encapsulants

Associated Gas Distributors of Florida

Updating AGDF Model Costs and Equipment



Raise Awareness and Adoption of EVs Across U.S.

A.F.Mensah

Controller design and demonstration of **Integrated Battery** Storage System (Deliverable to utility)



ATLANTIC HOUSING

PARTNERS

Bifacial and Monofacial Glass/Glass Modules with Calculate Multifamily Utility Allowances and Support Existing PV **Operations and New** Installations

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



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



17

Current Contracts



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



Methane
Capture and
Conversion to
Liquid
Methanol



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



 SRCC Portal Development



Technical Support

SEI Associates

Trane Trace 3D Plus Software Development Support

Tactical Energy

Comparison of Real World Assisted Living Buildings with Baseline Models



NEW AWARDS & PENDING CONTRACTS



THE PARTY OF THE P



EnergyPlus Software

- \$1M (\$250K base, add-on each year)
- Department of Energy's EnergyPlus software wholebuilding energy simulation program development
- FSEC on core development team since 2001





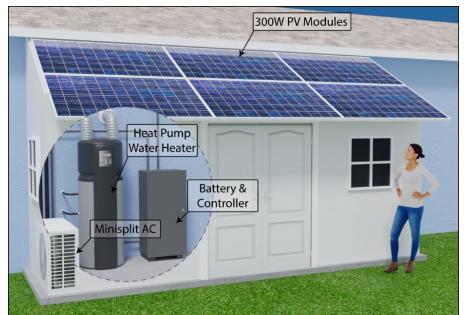
SunSmart E-Shelter Schools MAX Project

- Inspections & Repairs at 113 schools
- Additional \$1M from FDACS to make upgrades
- Replace batteries, upgrade inverters, or other needed repairs
- \$18M, 2002-present





PV GEMS (Phase 2)



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

Contact: Eric Martin, martin@fsec.ucf.edu

- PV GEMS: PV-Powered,
 Grid-Enhanced Mechanical Solution
- \$4.4M (\$3.6M + \$885k cost share)
- Development of pre-production prototypes, demonstration in occupied buildings, and commercialization activities.
- Seeking Large-scale Deployment Partners: State & local govt, financing orgs & programs, utilities, affordable housing orgs, regional efficiency orgs, marketers.

Partners:





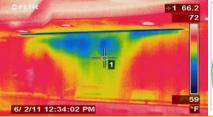


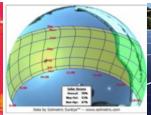


FDACS FEIC Model Program

FDACS Florida Energy Investment Collaborative Model Program Objectives:

- Identify and prioritize solar, EV charging, and energy efficiency improvements to government buildings
- 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











Energy Storage Project II

- Permanent energy storage demonstration system at FSEC (\$1.7M)
- Industry Partners
 - High Tech Corridor Council
 - Adje Mensah, Inc.
 - Smart Charging Technologies, LLC
- UCF Partners
 - Engineering College Cost Share
 - Office of Research Cost Share
 - Provost Request for Cost Share

A.F.Mensah

 Controller design and demonstration of Integrated Battery Storage System (Deliverable to utility)







Energy Storage Pilot Project



DC Combiner

Step up Transformer: 500 KVA (480 V/600V) 26

Max Power: 186.3 KW

Capacity: 372 kWh

Power Conversion

System (PCS) 500 KVA

Nominal DC Voltage: 1331.2 V

• Weight: ~7600 lbs



NEW PARTNERSHIPS



Florida Solar Apprenticeship

Solar Energy Technician

- First and only solar apprenticeship program in the country registered with the US Department of Labor
- FSEC and FlaSEIA partnership
- Pathway to solar contractor license or higher education
- FSEC developing and producing online training and instructional materials





Bipartisan Infrastructure Law - Hydrogen Highlights



- Covers \$9.5B for clean hydrogen:
 - \$8B for at least four regional clean hydrogen hubs
 - \$1B for electrolysis research, development and demonstration
 - \$500M for clean hydrogen technology manufacturing and recycling R&D



President Biden Signs the Bipartisan Infrastructure Bill on November 15, 2021.

Photo Credit: Kenny Holston/Getty Images

- Aligns with Hydrogen Shot priorities by directing work to reduce the cost of clean hydrogen to \$2 per kilogram by 2026
- Requires developing a National Hydrogen Strategy and Roadmap

About Southeast Energy Alliance



SHEA Region

2006 Organized as the South Carolina Hydrogen and Fuel Cell Alliance

2020 Reconstituted as Southeast Hydrogen Energy Alliance

2021 Commissioned SE Green H2 Supply Chain Study

2022 Southeast Clean H2 Hub Collaboration (convening stakeholders)

 January 27 Orientation Conference 240+ registered

February 2, 3, 4, 7 and 8
 Working Groups 1 – 5 Workshops
 Average 45/WG registered

- —160+ organization,260+ professionals,5 WGs, 12 WG Task Forces
- WGs Met as Required
 - 31 Multiple times total
- March 17 Consolidation Conference

 Organizing SE H2 plan and Clean H2

 RFI Response
- March 21 USDOE Clean H2 RFI Response

Board of Directors

Chairman / Consultant: Scott McWhorter

Treasurer: Ted Motyka

Advisor: David Doctor





Sarah Adair







Darrell Scott

Thomas Koeppe





Shawn Rossignol

John Ledbetter





Mark Johnson

Kevin Huang



Reasons for Hydrogen Hub in the Southeast



5 of the U.S. Largest Utilities (Dominion, Duke Energy, NextEra, Southern Co, TVA)



3.96B GDP (20+% of U.S.



Approximately 85M population (1/4 of the U.S.)



Proven Renewables – solar, hydropower, growing wind potential



Major U.S. Ports, inland ports, largest rail system in the U.S., interstate corridors



4 major NASA sites and over 85 military sites (22 major installations)



Unique natural gas and fossil pipelines (gateway to the NE)



Cars, Light & Heavy Vehicle Manufacturing centered in SE (fuelcells!)



SpacePort –
Sustainable rocket
fuel manufactured
locally using H2

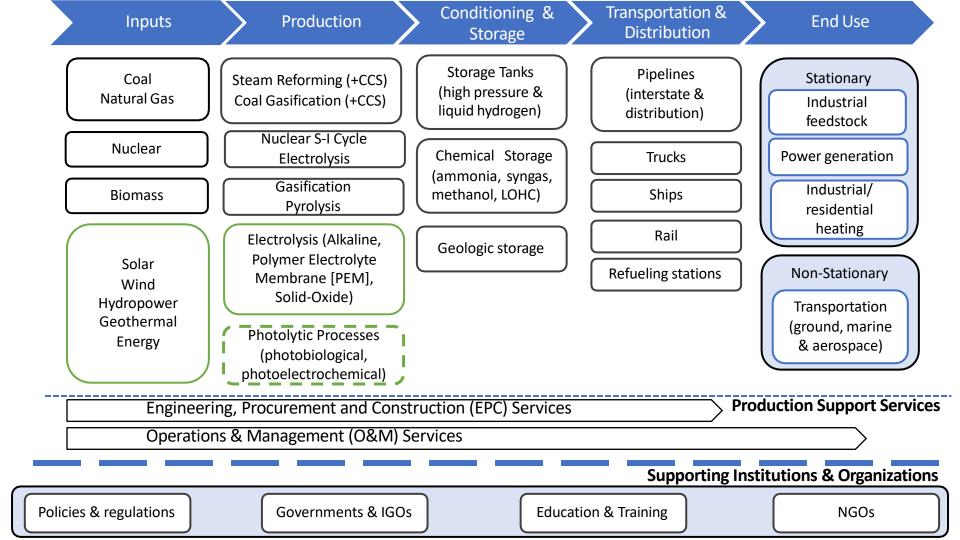


4 DOE National Laboratories (JLab, NETL, ORNL, SRNL)





Southeast Energy Alliance



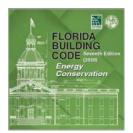
PROGRAM UPDATES





Continuing Education

- In-person Training Resumed
- Recent Webinars:



- Energy Code Updates:Residential & Commercial
- Florida Green Building
 Certification course
- Kwik Model & EnergyGauge









Continuing Education



○ A https://energyresearch.ucf.edu/education/continuing-education/





Residential Energy Modeler Track (Online)

This educational track involves four courses and a test at the end. All of these courses can be taken online. Becoming a Certified Residential Energy Modeler is a great first step in your Energy Modeling career.



Building Geometry for Energy Modeling (Online)

A free, 1-hour online course. Learn about the building geometry measurements and calculations needed for residential modeling.



Building Science for Energy Modeling and Field Inspection (Online)

This online course provides the basics of building science to better understand how to model residences for their energy use.



From Blueprints to Residential Energy Code Compliance (Online)

This is an interactive course where you will learn to measure blueprints and complete take-off sheets for Residential Energy Code compliance.



EnergyGauge Pro Hands-On (Online)

Learn all about EnergyGauge USA using a sample project house and the latest Energy Conservation Code, Earn 3 CILB CEUs.



Residential Energy Modeler Exam (Online)

After having completed the four courses in this track, take this test to earn your certification.



Entering Whole House Mechanical Ventilation in EnergyGauge USA

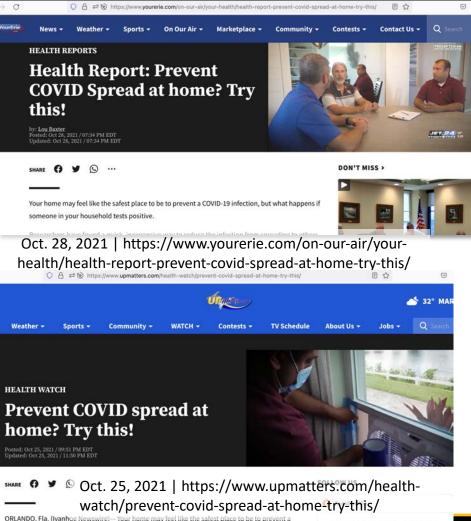
This free course describes how to enter whole house mechanical ventilation systems in EnergyGauge USA. It includes how to calculate the requirements for ASHRAE 62.2 2010, 2013 and 2019.

Increased On-demand Course Offerings



FSEC IN THE NEWS





FSEC Isolation Zone Research In The News



Oct. 25, 2021 | https://www.wearegreenbay.com/healthwatch/healthwatch-prevent-covid-spread-at-home-try-this/





RESEARCH

UCF to Study Method for Redu Energy Use by 50-75% in Older

UCF is one of seven teams selected by the Department demonstrate next-generation whole-building retrofit as

By Sherri Shields | March 30, 2022



he University of Central Florida was recently awarded a grant from the U.S. Department of Energy (DOE) to determine if a p an effective method to deploy user afficient heating, cooling and syst $March_{\rm a}30_{\rm f}$ |2022|

https://www.ucf.edu/news/ucf-tostudy-method-for-reducing-energy-useby-50-75-in-older-homes/

O A https://www.mbtmag.com/best-practic

anufacturing usiness Technology Newsletter Signup Video

est Practices **Business Intelligence** **Cloud Computing**

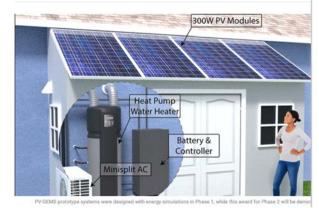
HOME | BEST PRACTICES

Pod System Could Reduce Home Energy Use by 75%

We need a better way to upgrade older homes.

Mar 30th, 2022 | By Zenaida Gonzalez Kotala, University of Central Florida





March 30, 2022

https://www.mbtmag.com/best^{th \$4.4 million} U.S. Department of Energy (DOF) to determine it a pre-packaged pod is an eleg-practices/news/22144373/pod-system-could-

reduce-home-energy-use-by-75

UCF's FSEC In The News



HOME | PRODUCT DEVELOPMENT

Pod System Could Reduce Home Energy Use by 75%

We need a better way to upgrade older homes.

Mar 30th, 2022 | By Sherri Shields









March 30, 2022 https://www.ien.com/product-

development/news/22144373/pod-system-

could-reduce-home-energy-use-by-75



UCF's FSEC In The News



TOP SOLAR CONTRACTORS

ARTICLES

POLICY ~

KETS - PRODUCT

UCTS - SU

RESOUR

Florida Solar Energy Apprenticeship Program

New Florida milestone highlights the value of apprenticeships for the solar industry

By SPW | April 7, 2022

Share

By Richard Lawrence, program director, Interstate Renewable Energ

Registered apprenticeship programs (RAPs) are a proven workforce deve employer-driven and worker-centric. They provide a pathway for new em level salary while learning the trade through a combination of on-the-job classroom instruction, with progressive wage increases as they learn and

Apprenticeships benefit employers and workers

Apprenticeships offer substantial benefits for employers and workers. Through the structured training components both on the job and in the classroom, employers can ensure that workers obtain the knowledge and skills needed to perform the job in an efficient, safe, and professional manner. The commitment to training and wage progression results in higher retention and job satisfaction, as well as higher quality work with fewer defects and accidents. The Construction Industry Institute has found that each dollar invested in craft training returns between \$1.30 to \$3.00 in benefits in the form of increased productivity and reductions in turnover, absenteeism, rework and other areas.







February 14-18, 2022

Multiple Locations and Dates

EnergyWhiz 2022

EnergyWhiz Virtual:

February 14-18, 2022

EnergyWhiz (at FSEC):

April 30, 2022

- Elementary to college students
 - Junior Solar Sprint
 - Energy Transfer Machine
 - Energy Innovations
 - Critter Comfort Cottage
 - Junior Solar Sprint
- Partners: FDACS, EFSC



Cocoa, FL - April 30, 2022

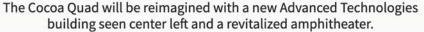
An artist's rendering shows the new main entrance from Clearlake Road to the EFSC Cocoa Campus and the STEM Building for science classrooms and labs included in an \$87 million 10-year Master Plan.

 New facilities for fields such as aerospace technology, engineering technology and advanced manufacturing, and new planetarium.

EFSC Cocoa Campus Master Plan

- 10-year master plan
- \$87M investment







Questions?



UNIVERSITY OF CENTRAL FLORIDA