

FSEC Advisory Board Meeting

April 25, 2024



Agenda

Time	Description	Speaker
9:30 a.m.	Welcome	Bill Grieco, Chair, FSEC Advisory Board; Chief Innovation Officer, Innventure
	Introductions (Roll Call)	Sherri Shields, Communications Director, FSEC
9:40 a.m.	Approval of November 9, 2023 Minutes	Bill Grieco, Chair
9:45 a.m.	Status of FSEC Programs & KPIs	Jim Fenton, Director, FSEC
10:30 a.m.	Florida Energy Office Report	Brooks Rumenik, Director, Office of Energy, FDACS
10:40 a.m.	Florida Legislative Session Report	Louis Rotundo, Principal, Louis Rotundo and Associates
10:50 a.m.	Fundraising	Garrett Preisser, Development Director, UCF Foundation
11:00 a.m.	Break	10 Minutes
11:10 a.m.	Emerging Technologies Activities at OUC	Paul Brooker, Supervisor, Research & Engineering, Orlando Utilities Commission
11:40 a.m.	Interdisciplinary and Multi-Faceted Research Aimed at Accelerating the Adoption of Solar Energy Technologies	Kristopher Davis, Professor, Director of Solar Energy Research, FSEC
12:15 a.m.	New Business Co-Chair Election Date and Agenda for Next AB Meeting - Thursday, October 24, 2024	Bill Grieco, Chair
12:30 p.m.	Adjourn to Lunch	All

New Advisory Board Members



Jason Gaschel

Project Director,
Electric Vehicles
Florida Power and
Light Company



Kumar Ranganathan

Pegasus Professor,
Mechanical and Aerospace
Engineering,
Associate Dean for Research,
University of Central Florida



Kelley Smith Burk

Project Director,
HNTB





October 1954 –
April 2024

In Memory of
Wanda Dutton

Time at FSEC:
April 19, 1985 – April 5, 2024

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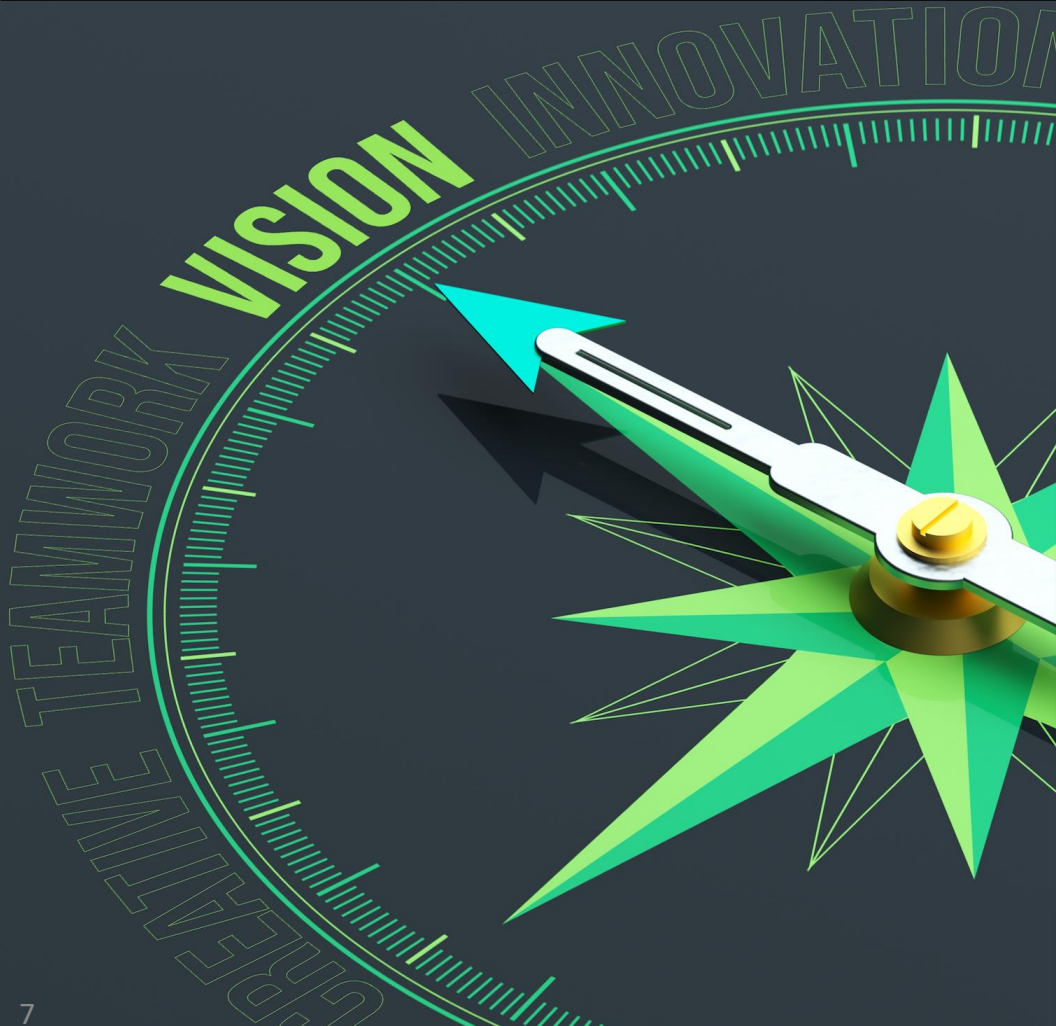
Status of FSEC Programs

Jim Fenton, Director

Advisory Board Meeting

April 25, 2024





VISION

Promote the rapid transition to a sustainable energy economy through renewable energy, energy efficiency, and sustainable transportation research, demonstration, and education.



MISSION

Develop, research, and evaluate energy technologies that enhance the environment and economy, and transfer the results to the public, students and practitioners.

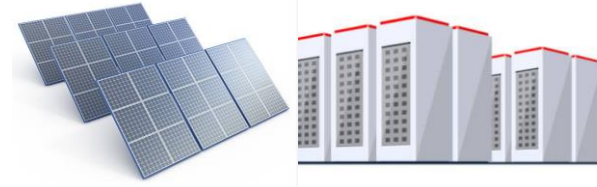
FSEC Principal Energy Programs



Energy Efficient Buildings



Grid Modernization/Energy Systems Integration



Solar Energy/Storage Systems



Electric Transportation



Hydrogen/Catalysis



Education, Service, Workforce Training, Policy



Advisory Board Partners

Energy Consumers



Builders/ Energy Providers



Electric Utilities



Manufacturers



Associations/ Government



FSEC Project Current Partners



A.F.Mensah



ATLANTIC HOUSING PARTNERS



SEI Associates

Tactical Energy



SOLAR RATING & CERTIFICATION CORPORATION



Associated Gas Distributors of Florida



UCF's Strategic Plan identifies **five key focus areas**.

UCF Office of Research Leading a Energy Research Council:
Khondaker, Davis, Fenton, Kapat, Qu, Rahman, Stevens, Sumathi,

Swami

AREAS OF FOCUS

Innovation. Partnership. Impact. Our integrated approach to teaching, learning and research unleashes the potential of our faculty and students — empowering them to make a difference in their communities and around the world.

**SPACE TECHNOLOGIES
& SYSTEMS**

**ENTERTAINMENT &
IMMERSIVE
EXPERIENCES**

**HEALTH & HUMAN
PERFORMANCE**

**ENERGY &
SUSTAINABILITY**

**TRANSFORMATIVE
TECHNOLOGIES &
NATIONAL SECURITY**

NEW CONTRACT AWARDS



- **Pathways to Career Opportunities Grant (PCOG) Program** | Florida Department of Education | 7/1/23 - 6/30/24 | \$245,660 | PI-Colleen Kettles, Co-PI Susan Schleith
- **Next Generation Process Development for Stranded Gas Conversion to Low-Carbon Fuels and Chemicals** | M2X Energy Inc. | 4/5/2024 – 3/31/2025 | \$267,916 | PI - Nazim Muradov
- **Next Generation Process Development for Stranded Gas Conversion to Low-Carbon Fuels and Chemicals** | Florida High Tech Corridor Council | 4/5/2024 – 3/31/2025 | \$150,000 | PI - Nazim Muradov
- **Buildings Upgrade Prize Technical Assistance** | Alliance for Sustainable Energy, LLC (NREL) | 2/7/24 - 9/30/24 | \$9,908 | PI - Eric Martin
- **EnergyPlus Software Development and Technical Assistance: Task Order 03** | Alliance for Sustainable Energy, LLC (NREL) | 1/12/24 - 12/15/24 | \$210,000 | PI - Lixing Gu, Co-PI's Richard Raustad and Bereket Nigusse
- **Comparison of the 8th Edition Florida Building, Energy Conservation Code with IECC 2024 & ASHRAE 90.1-2022** | Florida Department of Business and Professional Regulation | 7/1/23-6/30/24 | PI - Bereket Nigusse, Co-PI - Jeffrey Sonne

CURRENT PROGRAMS



Current DOE-Funded Collaborative Partnerships

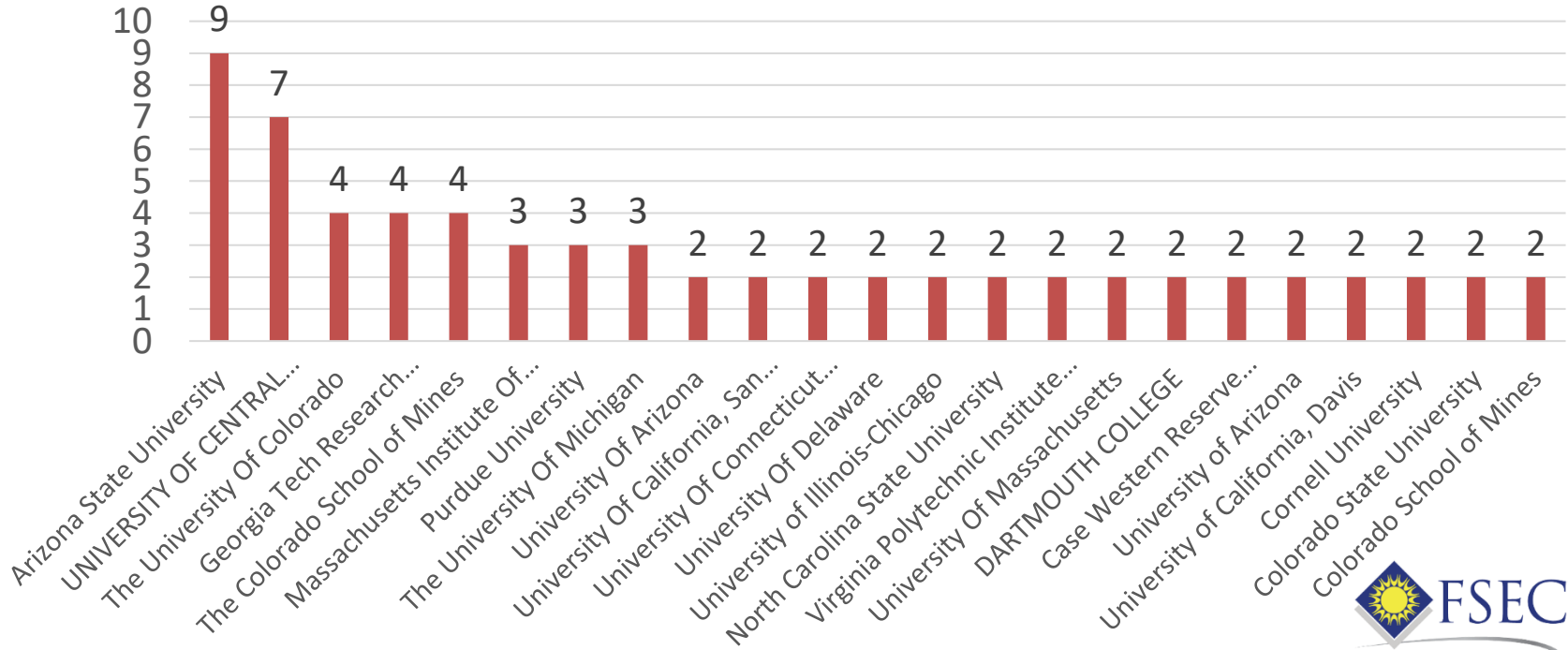


**SOLAR ENERGY
TECHNOLOGIES OFFICE**
U.S. Department Of Energy

- **Gaining Fundamental Understanding of Critical Failure Modes and Degradation Mechanisms in Fielded Photovoltaic Modules via Multiscale Characterization**, *K. Davis*
- **Clean, Affordable, and Resilient Energy Systems (CARES) for Socially Vulnerable and At-Risk Communities**, *K. Davis*
- **Photonic Curing of Printed Copper Contacts for High Efficiency and Low-Cost Silicon Heterojunctions**, *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*
- **Quantifying and Valuing Fundamental Characteristics and Benefits of Floating Photovoltaic Systems**, *C. Kettles, M. Matam*
- **Secure and Resilient Operations Using Open-Source Distributed Systems Platform (OpenDSP)**, *W. Sun*



US DOE SETO Awardees Presentations at 2024 Peer Review Conference





U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

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
- **Energy Codes: Comparing Performance in a Changing Technological Environment**
P. Fairey
- **EnergyPlus Software Development and Technical Assistance**
L. Gu
- **Building Intelligence with Layered Defense Using Security-Constrained Optimization and Security Risk Detection (BUILD-SOS): A Probabilistic Approach**
Q. Sun



Buildings

- **Updating AGDF Model Costs and Equipment for the Associated Gas Distributors of Florida** | Associated Gas Distributors of Florida | EOC: 12/31/2024 | R. Raustad
- **Lab and Field Evaluation of Condensation Potential in Buried Ducts in Vented Attics Located in the Hot and Humid Climate Zones** | Owens Corning | EOC: 4/30/2024 | J. Sonne
- **Reimagining HVAC for New Manufactured Housing** | Slipstream | EOC: 6/30/2024 | D. Chasar
- **Trane Trace 3D Plus Software Development Support** | S.E.I. Associates | EOC: 7/18/24 | R. Raustad
- **Comparison of the 8th Edition Florida Building Energy Conservation Code with IECC 2024 & ASHRAE 90.1-2022 and IECC 2021 & ASHRAE 90.1-2019** | Florida Department of Business and Professional Regulation | EOC: 6/30/24 | B. Nigusse
- **8th Edition (2023) Florida Building Code, Energy Conservation** | Florida Department of Business and Professional Regulation | EOC: 6/30/24 | J. Sonne
- **Valencia College Energy Transition Plan** | Hanson Professional Services Inc. | EOC: 9/30/24 | C. Kettles

Solar

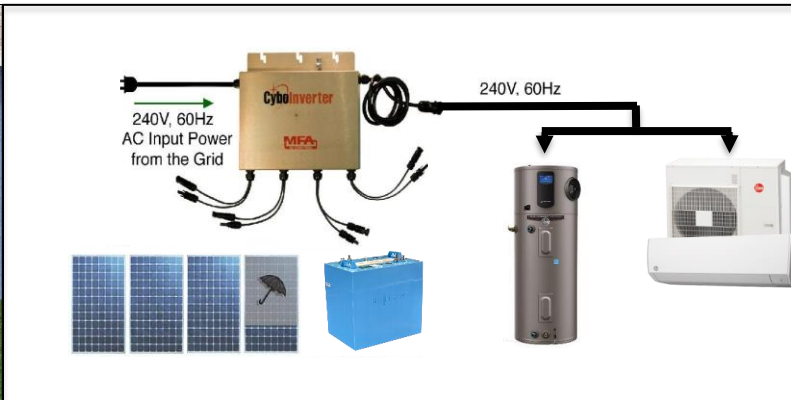
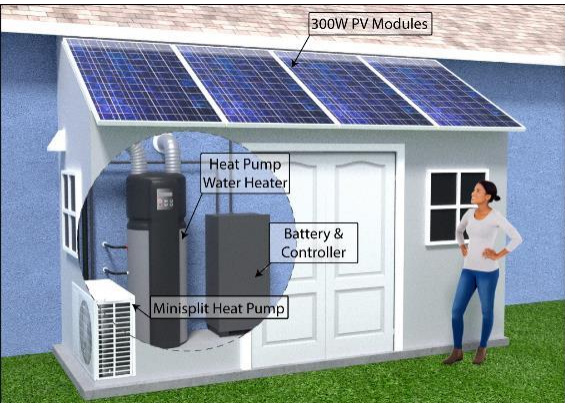
- **SunSmart Schools E-Shelter Maximization Project – Phase 1** | Florida Department of Agriculture and Consumer Services (FDACS) | EOC: 6/30/2024 | C. Kettles
- **Long-term Outdoor PV Evaluations** | Sandia National Laboratories | EOC: 9/30/2024 | H. Seigneur
- **2023 Solar Roof Installation Research Project FSEC Flexible Residential Test Facility** | GAF Energy LLC | EOC: 10/31/25 | J. Sonne
- **Materials Data Science for Stockpile Stewardship (MDS³) Center of Excellence** | U.S. DOE National Nuclear Security Administration (NNSA) | EOC: 09/27 | K. Davis (PI), M. Li (Co-PI)

Hydrogen/Catalysis

- **Demonstration of Integrated Hydrogen Production and Consumption for Improved Utility Operations** | Orlando Utilities Commission | EOC: 2/28/2027 | J. Fenton
- **Benchscale Methanol Synthesis Process Development & Testing** | M2X Energy | EOC: 12/29/2024 | N. Muradov

Workforce

- **Flexible Load Adaptation Training (FLAT) for Energy Services Professionals** | The Association of Energy Services Professionals (AESP) | EOC: 5/31/2025 | C. Kettles
- **Equitable Mobility Powering Opportunities for Workplace Electrification Readiness (EMPOWER)** | U.S. Department of Energy | EOC: 6/30/2025 | C. Kettles



- PV GEMS: PV-Powered, Grid-Enhanced Mechanical Solution
- \$4.4M (\$3.6M + \$885k cost share)
- Focus is on manufactured housing application.
- Planning demonstrations in MA, CO, TX, OR, NC and GA.
- Current activity:
 - Constructing demonstration system prototype.
 - Creating engineering drawings for permitting.
 - Documenting controller IP.
 - Recruiting participants in MA and CO.

Partners:



PI's: Eric Martin and Carlos Colon

Challenges for Florida Government Buildings: Energy Efficiency and On-site Solar Energy

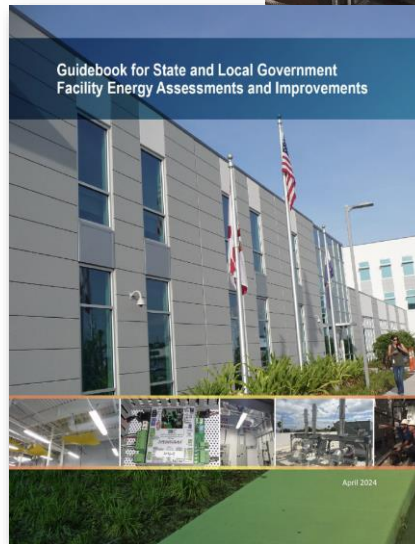
- Local Governments
 - 67 County, 411 Municipal, 95 School, >1,800 special districts
- Long-run federal financial assistance is substantially increasing
- More governments are motivated to find ways to increase sustainability
- Quality building energy auditing and analysis expertise is missing piece



Pilot: Government Building Sustainability

- **Objective:** Enable local governments to identify and prioritize cost-effective opportunities for Energy Efficiency Measures (EEMs) and on-site solar energy
- Pilot project with FDACS to test objective
 - Identify EEM and solar feasibility
 - Created replicable process
 - Provided technical assistance on sustainable energy improvement
 - Perform Measurement and Verification (M&V)
 - Created best-practices manuals
 - Principal Investigator: Chuck Withers

https://publications.energyresearch.ucf.edu/wp-content/uploads/2024/04/FSEC-CR-2126-24_Energy-Audit-Guidebook.pdf





SunSmart Schools Emergency Shelter Program

2010-2014

- Funded by American Reinvestment and Recovery Act (ARRA), through FEO – \$10M

2019-Present

- 118 schools inspected
- 109 schools received new batteries
- Over \$2M from FDACS to make upgrades
- Ends June 30, 2024



Florida

SOLAR ENERGY

Apprenticeship  Program



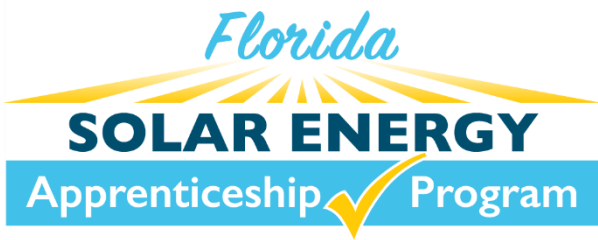
Solar Energy Technician

- First solar apprenticeship program in the country registered with the US Department of Labor
- FSEC and FlaSEIA partnership
- FSEC producing online training and building hands-on lab facilities
- 15 apprentices currently enrolled



<https://florasolarapprentice.com/>





- Florida Solar Energy Apprenticeship Program
- Moss & Associates Solar Apprenticeship
- Solar For All Workforce Development

Solar Workforce Initiatives



MOSS

Apprenticeship Program

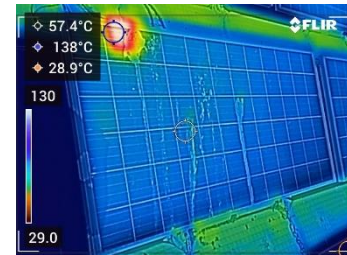
#MossSolar

Floating Solar

- FSEC Prime on US DOE sponsored project (~\$1M).
- Analyzed four floating sites.
- Floating Panels attract more birds, translates to more bird droppings.
- High temperature delta in floating PV modules (5-30 °C), but less in land PV modules (<5 °C).
- This sounds alarming, but need to look at more sites and data.



Bird droppings, after three years in operation, on a 1.7 MW Floating solar PV at a water treatment facility, Windsor, CA



From a floating solar PV in FL: Bird dropping completely blocked a PV cell, and, the cell is operating at 138°C.

SOLVE THE FLARING PROBLEM AND MONETIZE TRADITIONALLY UNECONOMIC GAS STREAMS

MISSION

“Stopping flaring and venting is the single most impactful measure that can be taken to reduce methane emissions from the energy industry’s operations.”

– IEA 2023

- Methane capture and conversion to liquid methanol
- 16K flare sites globally



- Next Generation Process Development for Stranded Gas Conversion to Low-Carbon Fuels and Chemicals
- (FSEC-M2X Phase IV)
 - PIs: Nazim Muradov, Hsiang-Sheng Chen
 - Period of Performance: 4/1/2024- 3/31/2025
 - Amount granted: \$267,916 (M2X), \$150,000 (FHTC)



M2X Energy

Valorization of stranded methane: From flare gas to bio (landfill) gas

Upstream stranded methane source

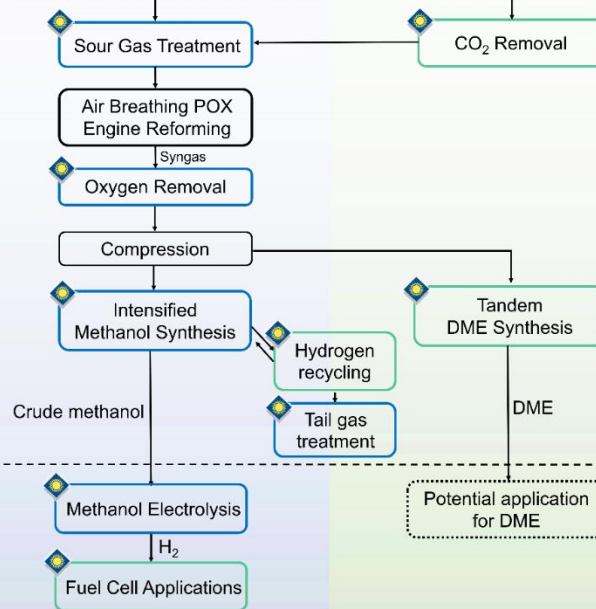


Flare gas from oil wellheads (>90% methane)



Biogas & landfill gas (≥50% methane, ≤50%CO₂)

M2X's modular reactor



Downstream applications

Other supporting activities from FSEC

Field trial support

Life cycle assessment



M2X team touring Brevard County landfill



- Crude methanol mobile plants to be constructed at FSEC



FOAK field test in ND

EVENTS & NEWS



2024

- 152 teams registered
- 441 students
- 150 teachers/coaches
- 70 volunteers & FSEC staff

Compared to Last Year

- 50 more teams registered
- 3 more schools
- 100 more students

Supported by





U.S. DEPARTMENT OF
ENERGY

Office of
Science

Middle School Science Bowl

- Middle School Science Bowl @ FSEC: **February 24, 2024**
- Regional competition open to all Florida middle schools
- 10 teams competed
- Abraham Lincoln Middle School (Gainesville, FL) gets an all-expenses-paid trip to compete in the national event near Washington, D.C.



Partnership with FSEC

Supported by



Video provided by Jinko:

<https://jinkosolar.box.com/s/j0w1sc09nr4gcu7k0y307fyjhuxazx4>



Winners of the Florida Regional Middle School Science Bowl, Abraham Lincoln Middle School's Team 1

Congratulations!



Home About ▾ Resources ▾ Events ▾ Selecting a Contractor ▾ Members ▾ Member Login



FLORIDA SOLAR AND STORAGE SUMMIT

April 29-May 1, 2024 | Rosen Shingle Creek Hotel Orlando

[Schedule](#)

[Exhibit Hall](#)

[Host Hotel](#)

[Registration](#)



Penny Hall

2024 FlaSEIA Hall of Fame Inductees

Vincent P Biel, SolarTrek

Roger Messenger

Freeman Ford, FAFCO

David Sizelove, Aquatherm

Dan Fieldman, Ivan Labs (posthumously)

Penny Hall, FSEC

Wayne Wallace, Solar Source



- 5 yrs – William Mollenkopf
- 15 yrs – Cheryl Suter Thorn
- 20 yrs – Jim Fenton
- 25 yrs – Susan Schroen
- 25 yrs – Lavonia Scott
- **45 yrs!! – Philip Fairey**



<https://vimeo.com/932898240>

- **Mechanical Ventilation in Homes Works—If You Use It**
<https://www.probuilder.com/mechanical-ventilation-field-studies>
- **UCF Research Team Moves to Build Mobile Resilience Hubs for Local Neighborhoods**
<https://floridaphoenix.com/2023/11/02/florida-fails-to-ask-for-federal-funds-to-help-poor-people-buy-solar-panels/>
- **Florida’s solar power surge: Why the Sunshine State is investing so much in the sun**
<https://www.floridatoday.com/story/money/business/2024/02/08/florida-solar-power-growth-expansion-renewable-energy-fpl-duke-babcock-ranch/71311749007/>
- **Bright idea: Orange County offers partly used solar panels free. Here’s how to get yours**
<https://www.orlandosentinel.com/2024/02/24/bright-idea-orange-county-offers-partly-used-solar-panels-free-heres-how-to-get-yours/>
- **How Your Solar Panels Work When the Sun Isn’t Out**
<https://www.cnet.com/home/energy-and-utilities/do-solar-panels-work-when-its-cloudy/>

PROBUILDER Design Construction Business Management Products Events Utopia
ADVERTISEMENT
INDOOR AIR QUALITY
Mechanical Ventilation in Homes Works—If You Use It
Building America field studies show a disconnect between intended and actual use of mechanical ventilation systems in newer homes

Home - Home Energy & Utilities
How Your Solar Panels Work When the Sun Isn't Out
Yes, your solar panels will still generate electricity during cloudy weather. But they're most efficient when it's sunny.

UCF TODAY UCF NEWS | STORIES OF IMPACT • INNOVATION | ORLANDO, FL
SCIENCE & TECHNOLOGY
UCF Research Team Moves to Build Mobile Resilience Hubs for Local Neighborhoods
The team, led by Kelly Stevens, will take its designs and data from Phase 1 of the project and implement them into fully built and tested trailers that will serve residents in need during future emergencies.
By Josh Halder '19 | January 11, 2024



Your solar panels still work even without the sun. Photo credit: iStock/Getty Images



Members of the UCF REACH Hub project team include (front row, from left) principal investigator Kelly Stevens, co-principal investigator L. Brandon S. March, senior personnel Christopher Davis, senior personnel Ian LaRuff, Brock New, from left co-principal investigator Yee-Ga and Zhuhua Qu, senior personnel Michael Hess with the City of Orlando, and co-principal investigator Liqiang Wang. Photo Credit: Blake Osting, CCR Communications

FSEC

- **Ahmad Esmaeilzadeh**, Research Associate, Buildings Research [starts 8/8/2024]
- **Dr. Alireza Shantia**, Assistant In Research in Building Simulation Development [starts 8/8/2024]
- **Dr. Erfan Asadipour**, Post Doctoral Scholar [starts 01/2025]
- **Bryan Smith**, Maintenance Technician I, Facilities [started 02/16/2024]

FSEC Staff for M2X Energy Project

- **Dr. Daniel Ramirez**, Post Doctoral Scholar, M2X [starts 5/10/2024]
- **Dr. M. Veronica Rigo**, Research & Program Coordinator, M2X [starts 5/10/2024]
- **Lili Hellerman**, Student Assistant Clean Energy, M2X [starts 5/24/2024]
- **Justin Gonzalez**, Student Assistant Clean Energy, M2X [starts 5/24/2024]

In Progress

- Assistant Research Professor in Solar and Hydrogen Smart Power and Energy Systems [starts 08/08/2024 or sooner]
- Assistant Research Professor in Photovoltaic Module Characterization [starts 08/08/2024 or sooner]

Recruitment Stage

- Research Assistant Professor in Integration of Applied Catalyst with Industrial Technologies
- Assistant Research Professor in Grid-Integration of Customer-Owned PV, Energy Storage and EVs

SUSTAINABILITY GOAL PARTNERSHIPS



SHCEA

Southeast Hydrogen Energy Alliance



Vision for Florida

Spend Little to No Funds on Imported Primary Fuels
Keep the Jobs and Wealth in Florida!



100% Renewables Using Florida Energy

- Building Energy Efficiency Improvements
- Utility & Rooftop Solar
- Energy Storage
- Transportation Electrification
- Smart-charging Electric Vehicles (V2G)
- Demand Response

100% Renewables & Net Zero Emissions

- Sustainable aviation fuels
- High-speed electric trains
- Hydrogen as a fuel and feedstock

Clean Energy Workforce Development

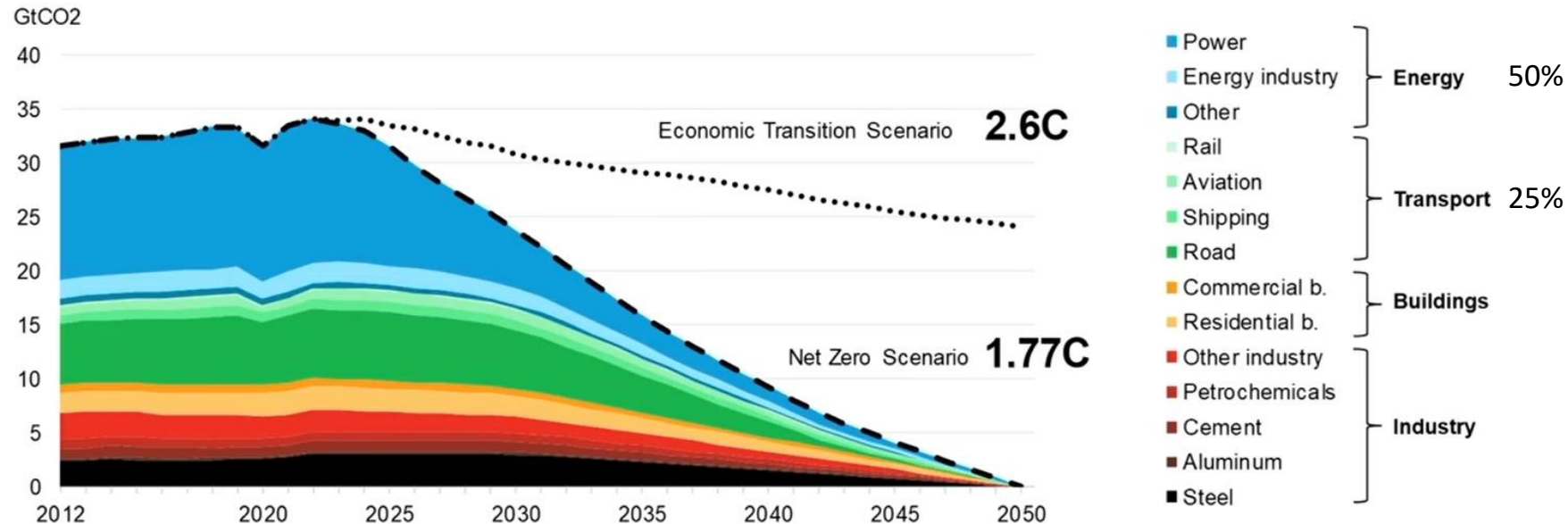
- Apprenticeship Programs



Zero Emission Goals by Sector

To reach net zero globally, every sector of the economy must reach net zero

Global energy-related carbon emissions and sector carbon budgets (BNEF New Energy Outlook)



Source: BloombergNEF.

Clean Transport: The Road Ahead

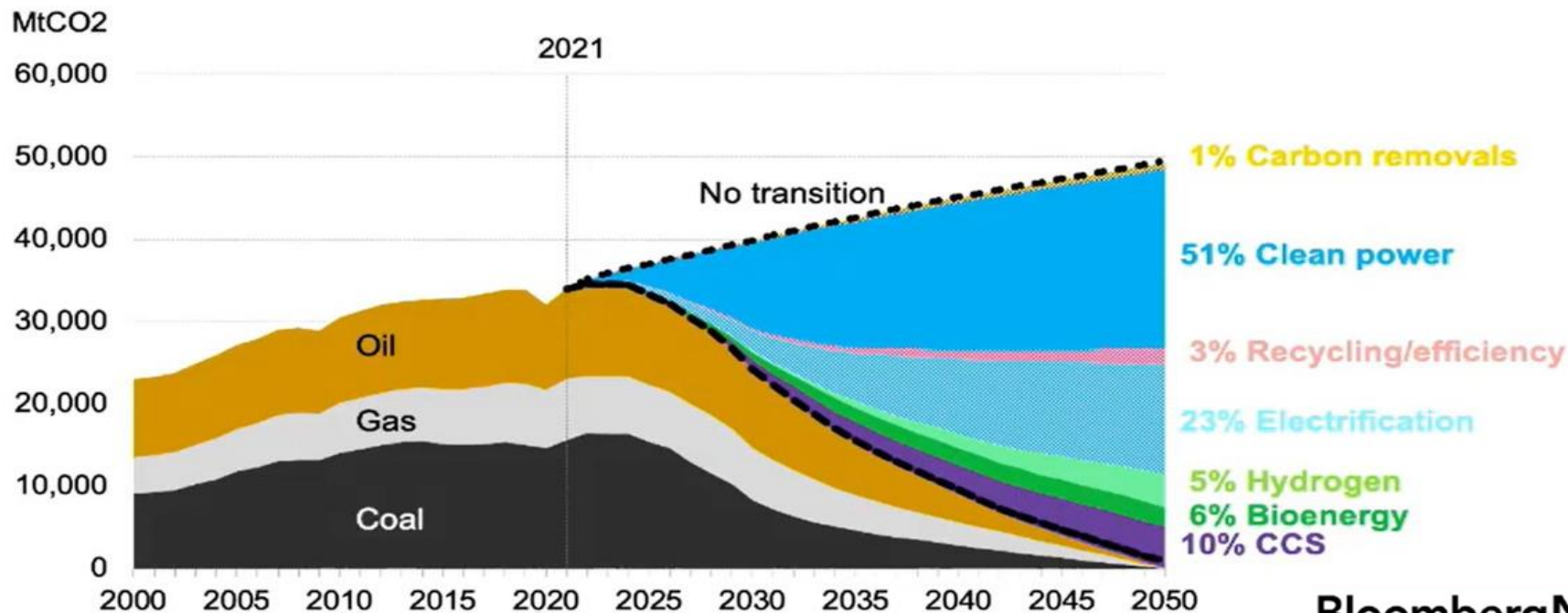
BloombergNEF



Possible Paths to Net Zero Emissions by 2050

Clean power and electrification are the main drivers of emissions abatement

CO2 abatement by technology/type, Net Zero Scenario



Source: BloombergNEF. Note: Abatement also includes fuel switching and other abatement technologies.

BloombergNEF

BNEF Summit San Francisco 2023

U.S. CLEAN ENERGY EMPLOYMENT by state, total jobs and density 2022

Total CE Job Rank	State	Clean Energy Jobs	CE Jobs per Capita	CE Share of all U.S. Energy Jobs	Renewable Energy Jobs	Storage & Grid Jobs	Energy Efficiency Jobs	Biofuels Jobs	Clean Vehicle Jobs
4	Florida	165,857	17.3	48.4%	25,913	5,851	118,904	2,815	12,374

STATE SOLAR *spotlight*

Florida

Ranks **3rd**
for total installed solar capacity

Total solar installed (MW)
13,911.95
3,217.71 MW in 2023

Growth projection over the next 5 years (MW)
15,591.98
Ranks 3rd



Solar jobs in the state¹
12,267
Ranked 2nd in 2023

Enough solar installed to power
1,663,089
homes

Percentage of state's electricity from solar²
6.75%

471
solar companies are currently operating in Florida

64 manufacturers

231 installers/developers

176 other companies

Value of the state solar market
\$20 billion
\$4.7 billion invested in 2023

Price decline over the last ten years
47%

Florida Solar Bigger Print than Mahomes

FLORIDA TODAY

PART OF THE USA TODAY NETWORK



Distractions won't shake Mahomes' focus in Super Bowl

SPORTS, 1B

FLORIDATODAY.COM

SUNDAY, FEBRUARY 11, 2024

SPECIAL REPORT

Florida warms to solar power

As sites grow, FPL aims for jump to 35% of its energy mix by 2032

David Berman and Laura Layden
USA TODAY NETWORK - FLORIDA

PALM BAY - A drive deep into the woods along an unpaved road in southern Palm Bay suddenly and surprisingly leads to rows upon rows of solar panels.

There are more than 284,000 panels in all, sitting on 486 acres owned by Florida Power & Light Co., the nation's largest electric utility.

A little farther down the road from the Palm Bay Solar Energy Center, FPL has a second one called the Iris Solar Energy Center, which went into service at the end of January. And nearby, land has been reserved for a third one, the Fox Trail Solar Energy Center, which will launch in early 2025.

These three solar centers - being built on land that once supported citrus groves, and cattle and sod farms - are symbolic of the future of energy generation in Florida, where utilities seek a shift to renewable energy, and away from energy sources that have more volatile price swings.

"Because of our growing solar investments, FPL has had to purchase less fuel, which means less cost that is passed on to customers," FPL spokesman Marshall Hastings said.

See SOLAR, Page 4A



Florida's solar energy sites

- Duke Energy Florida
- Florida Power & Light
- Tampa Electric
- Other

NOTE: Other includes Barton, Gainesville Regional Utilities, JEA, Lakeland Electric, Orlando Utilities Commission, Miami-Coral Gables Improvement District, Tallahassee, Confederate Rural Electric Membership and Sunshine Electric.

There are municipal electric utilities that have a purchase power agreement with nearby solar farms to use solar energy.

SOURCE: Florida Public Service Commission, Facts and Figures of the Florida Utility Industry, 2023

Table 1: State of Florida - Renewable Energy Generation

Utility	2022 Actual			2032 Projected		
	NEL	Renewables		NEL	Renewables	
	GWh	GWh	% NEL	GWh	GWh	% NEL
FPL	147,131	8,660	5.9%	152,225	54,303	35.7%
DEF	46,141	2,225	4.8%	44,705	10,973	7.2%
TECO	21,572	1,492	6.9%	22,822	4,535	19.9%
FMFA	7,097	148	2.1%	6,802	764	11.2%
GRU	1,895	622	32.8%	1,952	881	45.1%
JEA	12,930	150	1.2%	13,765	3,298	24.0%
LAK	3,406	17	0.5%	3,740	180	4.8%
OUC	7,764	346	4.5%	8,077	3,198	39.6%
TAL	2,611	114	4.4%	3,018	115	3.8%
SEC	16,330	463	2.8%	18,233	740	4.1%
State of Florida	274,025	15,786	5.8%	283,094	79,134	28.0%

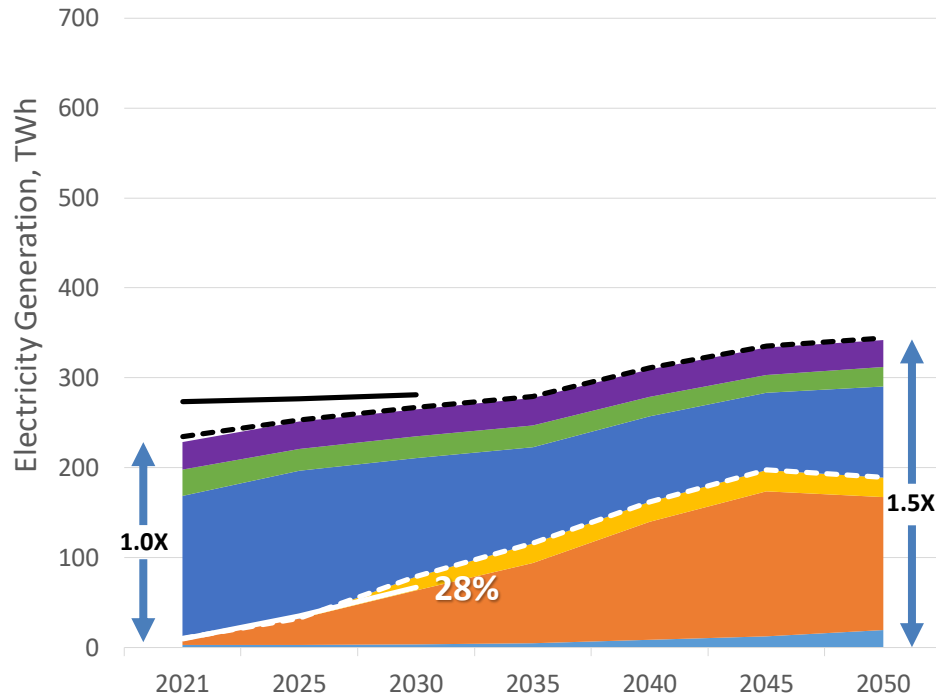
FRCC 2023 Regional Load and Resource Plan & T YSP Utilities' Data Responses

<https://www.floridapsc.com/pscfiles/website-files/PDF/Utilities/Electricgas/TenYearSitePlans//2023/Review.pdf>

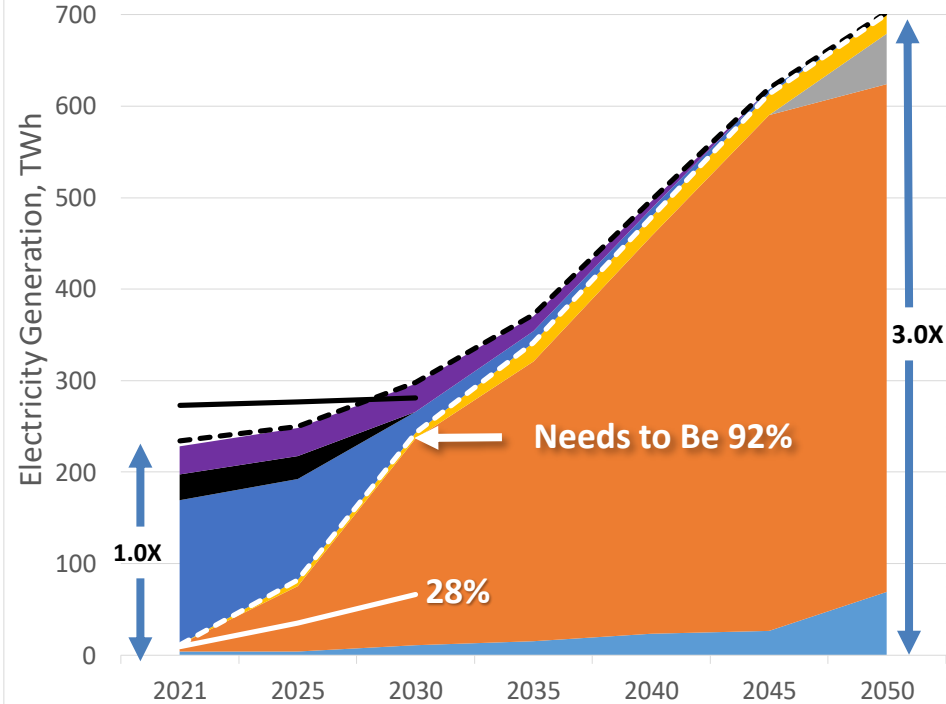


Florida Electricity Generation

Florida Baseline Electricity Generation



Florida 100% Renewable Electricity Generation



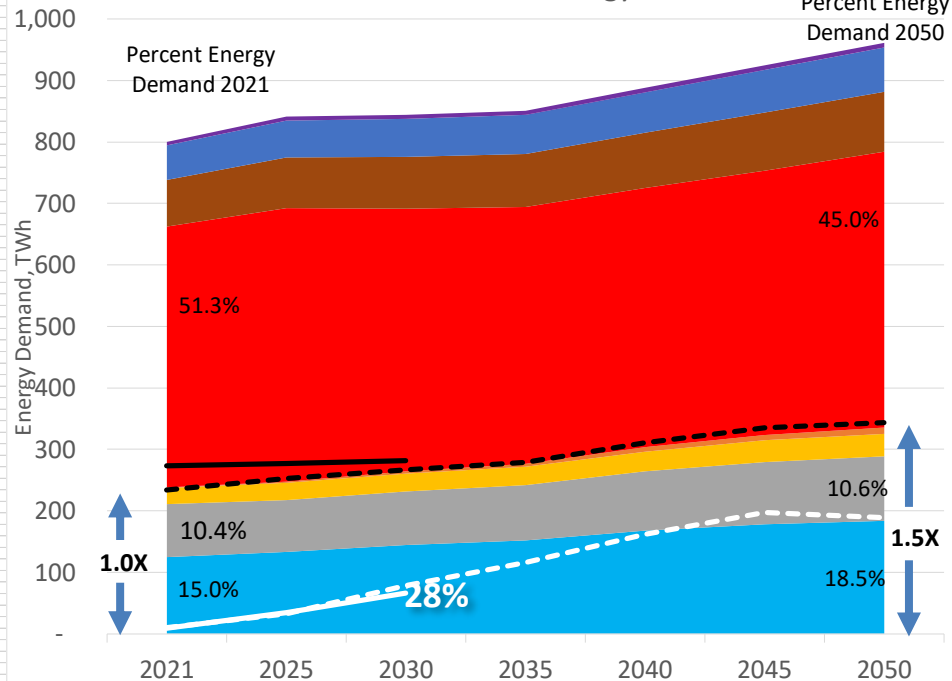
■ Customer-sited Solar ■ Transmission-sited Solar
■ Gas ■ Coal
■ Nuclear - - - Total Electricity Demand
■ Offshore Wind ■ Onshore Wind

■ Offshore Wind ■ Onshore Wind
■ Nuclear - - - FL Net Electric Load PSC
■ Transmission-sited Solar ■ Gas
■ Customer-sited Solar - - - Total Electricity Demand

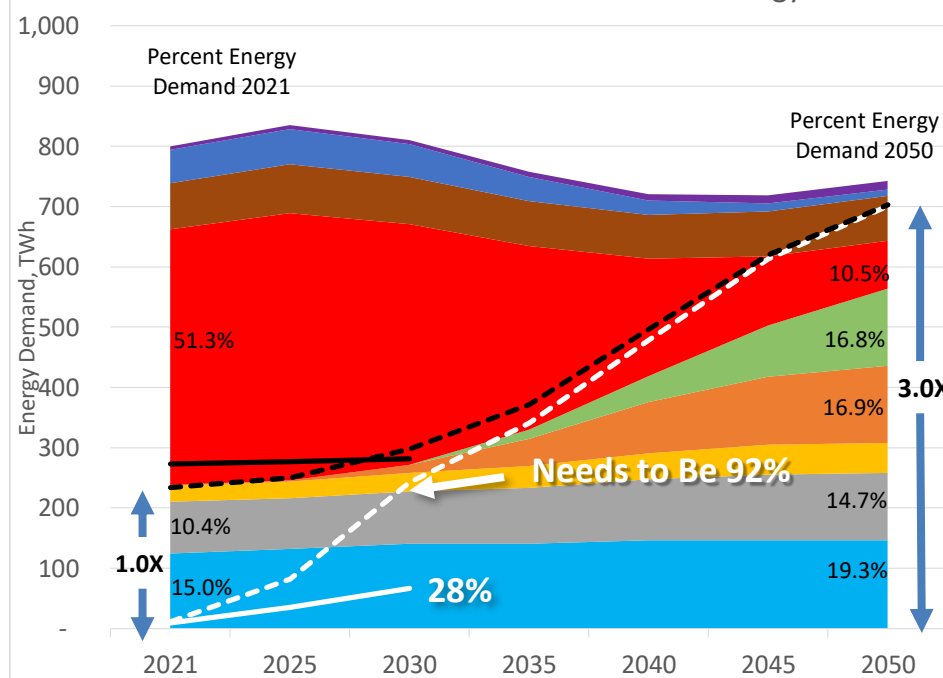
Total Solar and Wind Electricity

All Energy Loads

Florida Baseline Final Energy Demand



Florida 100% Renewables Final Energy Demand



- Residential Electricity
- Transportation Electricity
- Industrial Fossil Fuels

- Commercial Electricity
- Hydrogen Demand from Electrolysis
- Pipeline Gas

- Industrial Electricity
- Transportation Fossil Fuel
- Industrial Hydrogen

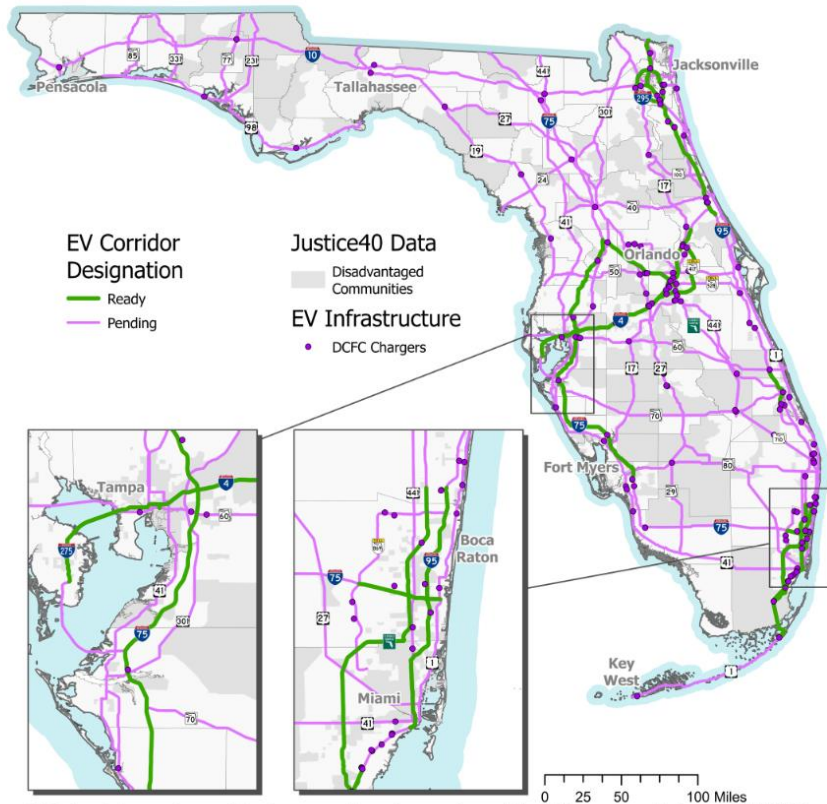
- Total Solar and Wind Electricity Generation

- FL Net Electric Load PSC

- FL Renewable Electr PSC

- Total Electricity Demand

Florida EVs and Charging



- Florida consumes 8.7 Billion gal/yr gasoline
- 210 Billion Miles which requires 65.5 TWh for EVs
- 2022: 15.8 M Gasoline Vehicles 0.17 M EVs
- 2032: 2.7 M EVs; 0.49 M Public Chargers; Consume 10.9 TWh

(1) Designated segments support hurricane evacuation routes, economic development, tourism, rural needs, and/or freight

Source: <https://afdc.energy.gov/stations> as of 7/19/2022
Justice40 Data from USDOT as of 5/10/22

[2023 Electric Vehicle Infrastructure Deployment Plan](#) (10/02/2023)
<https://afdc.energy.gov/states/FL>

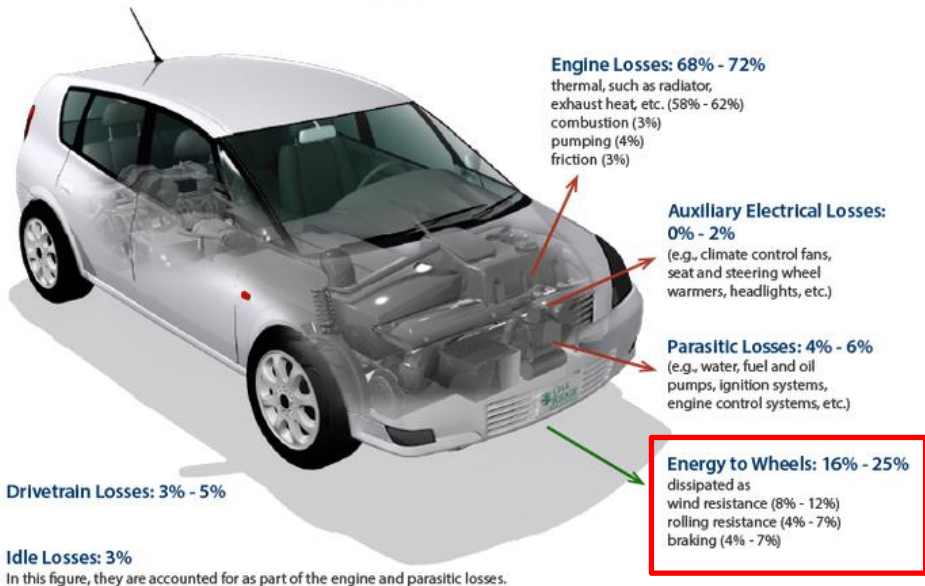
Figure 2: Florida's DCFC Locations within one-mile of an AFC

Energy to Wheels

In 2022, Florida consumed **8.7 Billion Gallons** of Gasoline for Transportation at **\$30.7 B**

Energy Requirements for Combined City/Highway Driving - Gasoline Vehicles

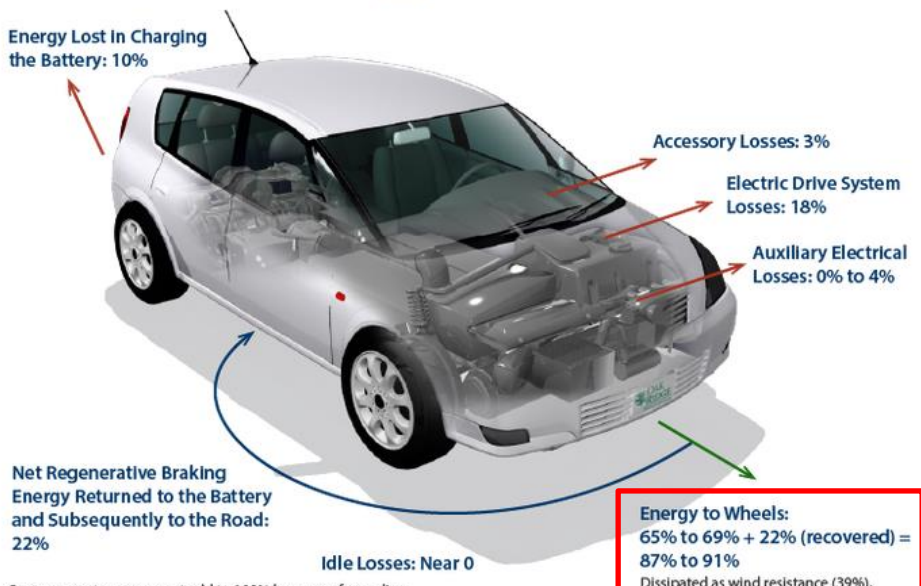
Click on blue text for more information.



Some percentages may not add to 100% because of rounding.

Energy Requirements for Combined City/Highway Driving - Electric Vehicles

Click on blue text for more information.



Some percentages may not add to 100% because of rounding.
Percentage total may exceed 100% because regenerative braking recaptures energy and reuses it.

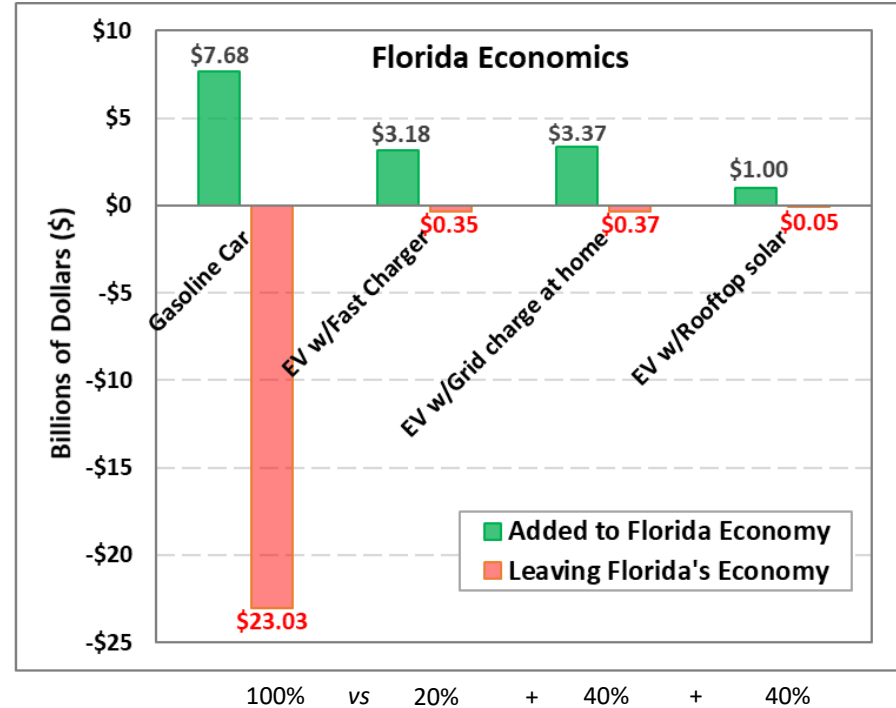
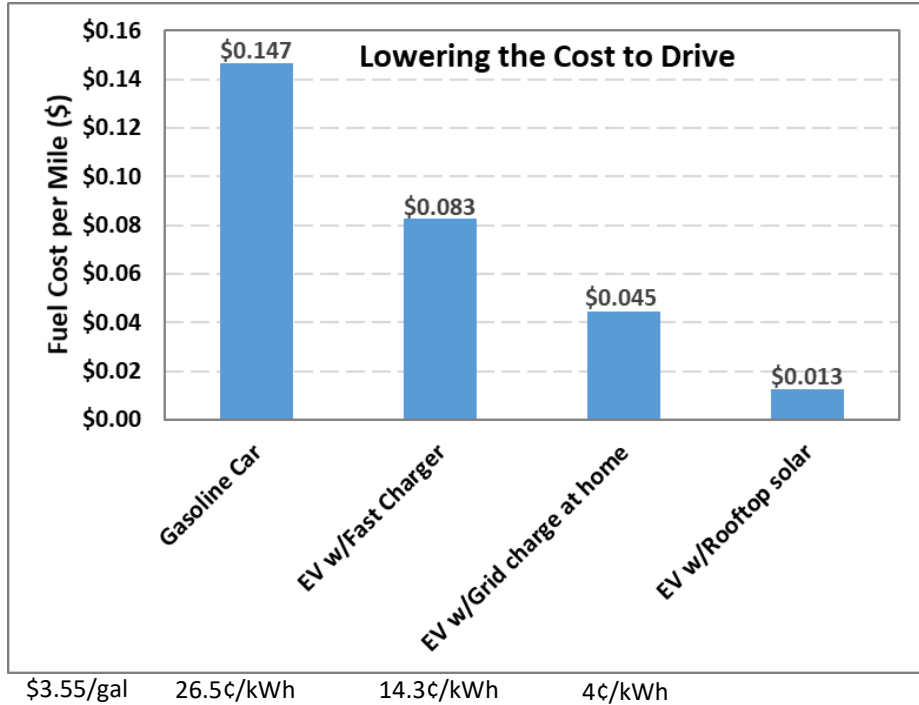
79% of Gasoline is lost (**\$24.3 B**)

<https://www.fueleconomy.gov/feg/atv.shtml>

11% of Electricity is lost (**\$0.92B**)

<https://www.fueleconomy.gov/feg/atv-ev.shtml>

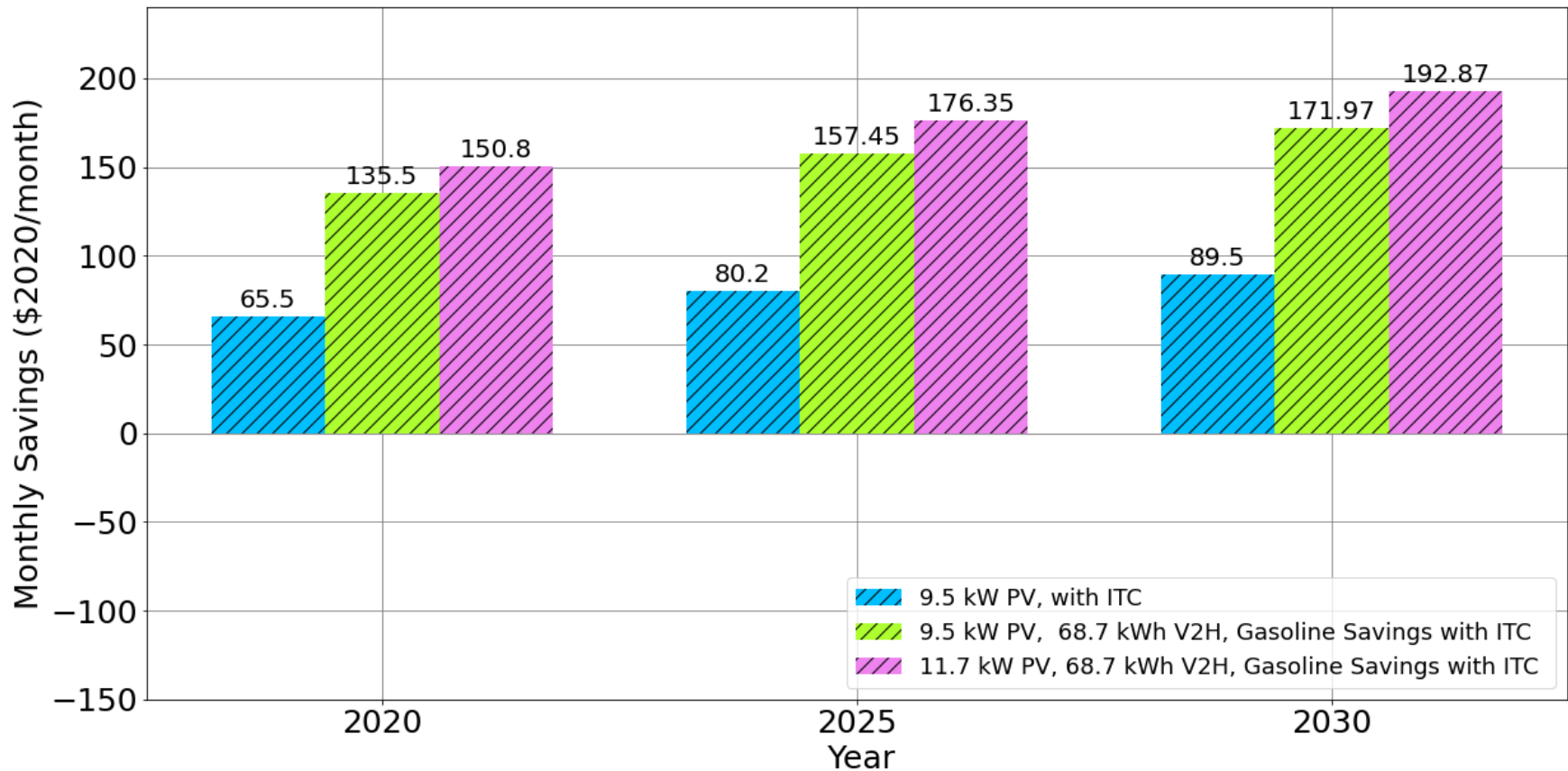
Today's Cost To Drive



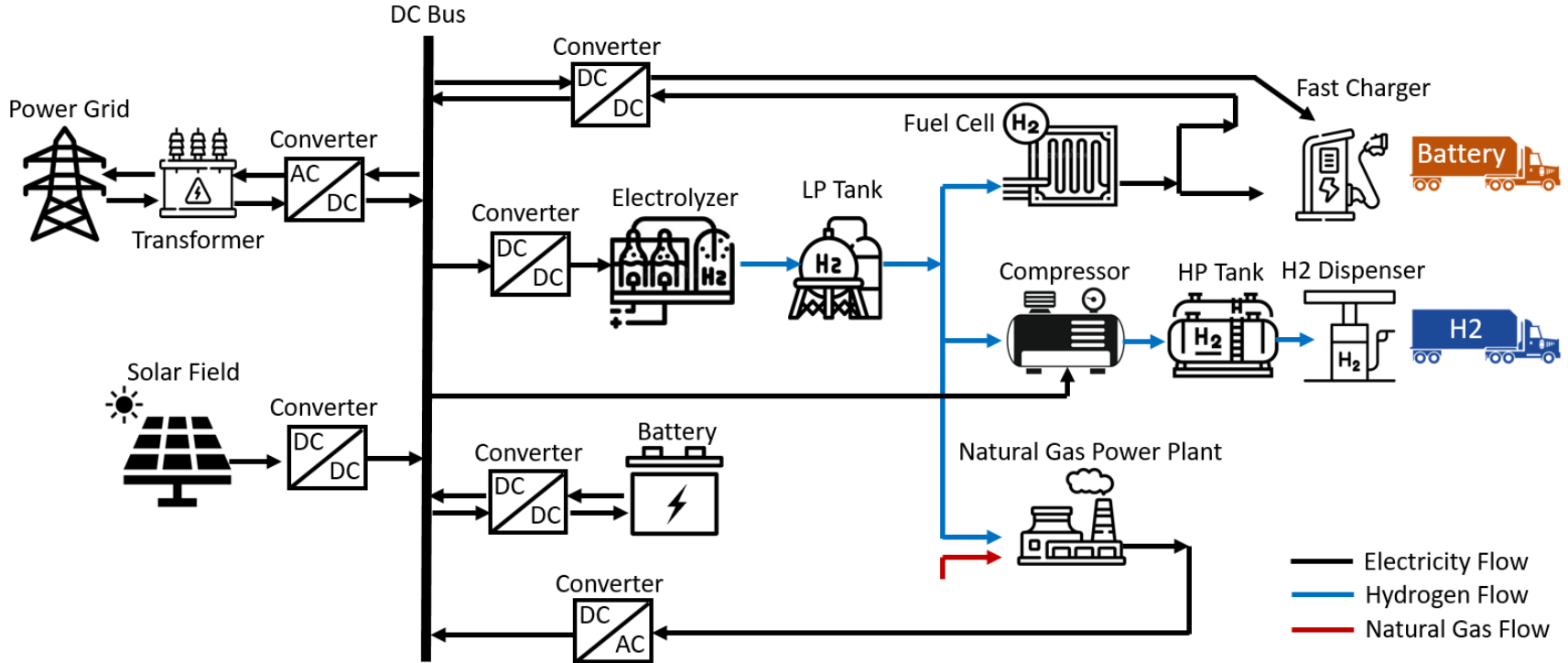
Efficiency of avg. Gasoline Vehicle is **24.2 mpg**

Efficiency of avg. EV = **3.2 miles/kWh** (220 miles/68.7 kWh battery)

Rooftop PV+EV+V2H = Monthly Savings and Resiliency



Proposed Renewable Powered Grid-Connected Truckstop Schematic



- **Goals:** Transportation electrification, improved utility operation, improving system level resilience

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10:50 a.m.	Fundraising	Garrett Preisser, Development Director, UCF Foundation
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11:40 a.m.	Interdisciplinary and Multi-Faceted Research Aimed at Accelerating the Adoption of Solar Energy Technologies	Kristopher Davis, Professor, Director of Solar Energy Research, FSEC
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12:30 p.m.	Adjourn to Lunch	All

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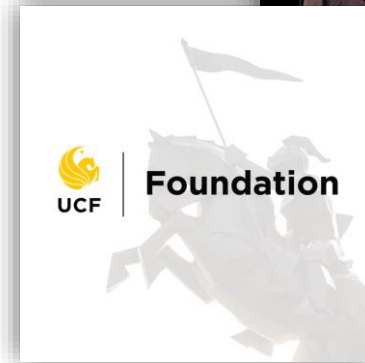
Development Director, UCF Foundation

GARRETT PREISSER



In 2025, FSEC turns 50!

- We are planning ways to celebrate
- You will hear more about our celebration plans at the next meeting
- We are also partnering with the UCF Foundation to provide an opportunity to invest in FSEC.



Impact of Potential Fundraising

- Increased reliable support for K-12 education programs
- Ability to provide more training of workforce development
- More internships or positions for students
- Fund infrastructure improvements

FSEC UCF Day of Giving Message

FSEC's research, workforce development and education activities are preparing the next generation of research scientists and sustainable environment leaders to tackle the largest challenge we all face as a society — climate change. This year, you can make a difference in key areas:

- FSEC's annual EnergyWhiz competition for K-12 students
- Professional development for teachers, and
- Continuing education for energy practitioners.

By helping us expand these activities, together we can move closer to a sustainable energy future.



DAY OF

GIVING

APRIL 11, 2024

**FSEC
Inaugural
Year Results**

**7 Donations,
\$850 Total**



High Visibility Fundraising

Goal: People can donate for infrastructure with high visibility

Consistent with FSEC mission

- Front parking lot solar canopy
- Expanded charging area with solar canopy

Solar Canopy in Front Parking Lot

- Canopy approximately 45' x 140'
- 115 to 130 kW
- At \$3/W cost might be \$350,000 to \$400,000



picture from <https://bungalower.com/2015/02/22/i-wish-this-was-a-solar-parking-lot-2/>

Solar Canopy and Expanded Charging Area

- Current: Two working public charging level 2 parking spots
- Vision: additional
 - two level 2,
 - two fast level 3 (150kW+) chargers,
 - two hyper-fast (350kW) chargers
- Able to recharge busses when students visit
- Also provides some research opportunities for customer peak reduction with batteries
- New charging: \$600,000
Solar canopy: \$120,000



How can YOU help?

- “Why?” is giving important
- “Who?” should we be talking to
- “What?” are the areas of focus

10-minute

BREAK



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Supervisor, Research & Engineering, Orlando Utilities Commission

PAUL BROOKER



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Professor, Director of Solar Energy Research, FSEC

KRISTOPHER DAVIS



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Next Advisory Board Meeting

October 24, 2024



SHCEA

Southeast Hydrogen Energy Alliance





Central Statement

At SHEA, we believe in the boundless potential of hydrogen energy to shape a brighter, greener future for all. Our mission is to build understanding and knowledge, facilitate innovation and collaboration, and initiate the adoption of the hydrogen movement in the Southeast. We are leading the charge towards a world powered by clean energy, creating a sustainable legacy for generations to come. Today, we build the infrastructure for a hydrogen-powered tomorrow.

Mission

Our mission is to empower the Southeast to embrace a hydrogen future through SHEA's commitment to drive innovation, amplify education, enable change and adoption, and accelerate the critical process of decarbonization.

Vision

Our vision is to position the Southeast as an epicenter for hydrogen advancements. We see the Southeast with the lowest carbon footprint in the United States. We aspire to build an inclusive community that thrives on boundless potential of hydrogen energy.

Our Pursuits



Drive Innovation & Collaboration

Focus Areas:

- Connect members to opportunities by providing key connections and resources
- Create an environment conducive to startups of mature and nascent technologies
- Maximize hydrogen innovation through local, state, and federal investment dollars
- Highlight hydrogen businesses/ uses in a focused campaign for other businesses to join the region
- Make collaboration the way of business, not the exception, resulting in expansive commerce
- Creating an organization that is a tool for companies rather than an obligation to join

Increase Education & Awareness

Focus Areas:

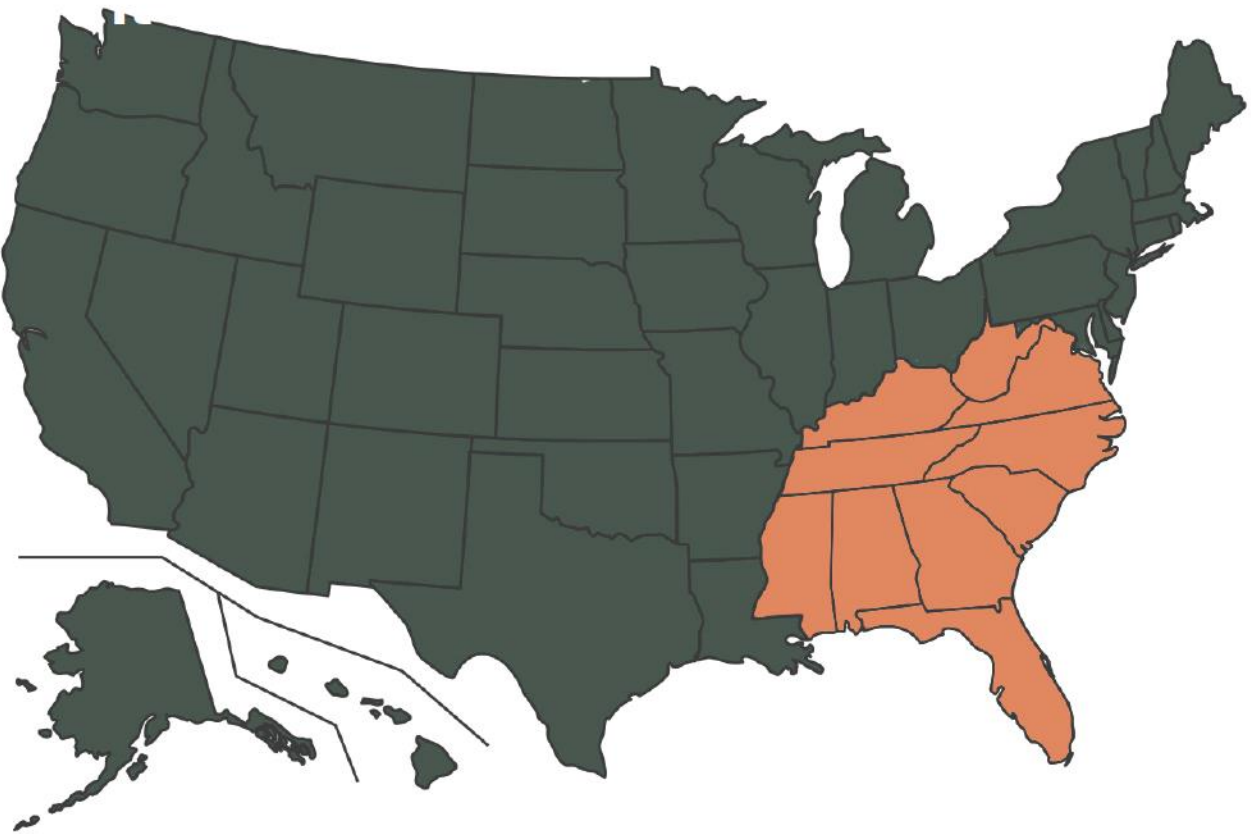
- Provide credible, trustworthy and transparent education on the hydrogen industry
- Train workforces of all sizes and backgrounds
- Partner with academia at each level of the education spectrum to create curriculum and opportunities to grow Hydrogen education
- Create partnerships with national labs
- Develop recognizable branding and marketing efforts
- Host, contribute, and attend educational webinars
- Launch educational and promotional campaigns to target specific areas and raise awareness

Enable Change & Adoption

Focus Areas:

- Partner with local and state governments to mobilize opportunities
- Establish connections with the Federal government where appropriate, including linkage to incentives and permitting opportunities
- Streamline hydrogen agenda across all 10 states and local municipalities
- Engagement directly with staff & membership
- Foster coordination across each state's key organizations, such as the Clean City Coalitions and the State Energy Offices
- Inform and uplift the Southeast communities about their key role in hydrogen development

Geographical Footprint



Governing Board

Dr. Scott McWhorter, Chairman
President/CEO
Joule Consulting

John Ledbetter, Treasurer
President/Owner
Summit Worx, LLC

Sarah Adair, Director
Managing Director, Public Policy
Duke Energy

Dr. Mark Johnson, Director
Thomas F. Hash Endowed Chair for
Sustainable Development, Director of
Center for Advanced Manufacturing
Clemson University

Geovanni Castano Cerpa, Director
Energy Technology Advisor
Dominion Energy

Dr. Neda Askari Tari, Director
Power Systems Development Account Manager
Siemens Energy

Dr. James Fenton, Director
Director of FSEC Energy Research Center
University of Central Florida

William Kimbro, Director
President / Owner
Kimbro Companies

Dr. Theodore Motyka, Director
Senior Consultant
CC Energy Consulting, LLC

Michael Walton, Director
Managing Partner
Energy Transition Finance, LLC

Don Daniels, Director
Chief Strategy Officer
Mitsubishi Power

Chad Martin, Director
Vice President of Strategy
Kimbro Companies

Dr. Kevin Huang, Director
Professor
University of South Carolina



SH2EA

Southeast Hydrogen Energy Alliance

Find out more:
www.seh2.energy
learnmore@seh2.energy

