Energy Efficiency and Sustainable Energy at the University of Louisiana at Lafayette

LOUISIANA SOLAR ENERGY LAB AND GREEN HYDROGEN CENTER OF EXCELLENCE

Clean Energy Research, Education, Workforce Development, Economic Development, Outreach

Multidisciplinary Renewable Energy Research

- Systems Engineering
  - Renewable energy performance modeling
  - Operational field testing of renewable energy systems and components
  - Long-term reliability and degradation studies
  - Microgrids, smart grids, DER's
  - Agrivoltaics
- Big Data and Visualization
  - Solar resource forecasting
  - Power forecasting
  - Virtual reality models for education
- Cybersecurity
  - Cybersecurity of PV, microgrids, and other distributed energy resources (DERs), Electric Vehicles (EV's)
- Water and Sanitation
  - Floating solar power plants for reservoirs
  - Concentrating solar thermal for wastewater treatment, disinfection, desalination
- Emergency Management
  - Use of DERs and microgrids for emergency power
- Building Energy Management
  - Use of solar and other DERs in commercial buildings
- Materials
  - Battery storage
  - Reflective materials for Concentrating Solar Power (CSP)

74 journal articles in last 5 years

37 in last 2 years

Photovoltaic

The 1.1 MW Louisiana Solar Energy Lab is one of the largest outdoor test facilities in the southeast United States

Degradation, soiling, performance modeling, solar resource and power forecasting

Extensive Outdoor Test Facilities

New Building w/ indoor test facilities

Used for research, education workforce development, economic development, and outreach

Research and Training Test Beds

Single-Axis Tracker (FS6)

Dual-Axis Tracker

Bi-Facial Test Stand

Commercial Roof

Residential Roof

Conical Dish Receiver

Cleco Alternative Energy Center

Solar Thermal Applied Research and Testing (START) Lab

- One of the largest university-owned CSP test facilities in the nation and one of only a few in the southeast

Biomass

- Gasification
- Torrefaction
- Digestion

Microgrid Test Facility

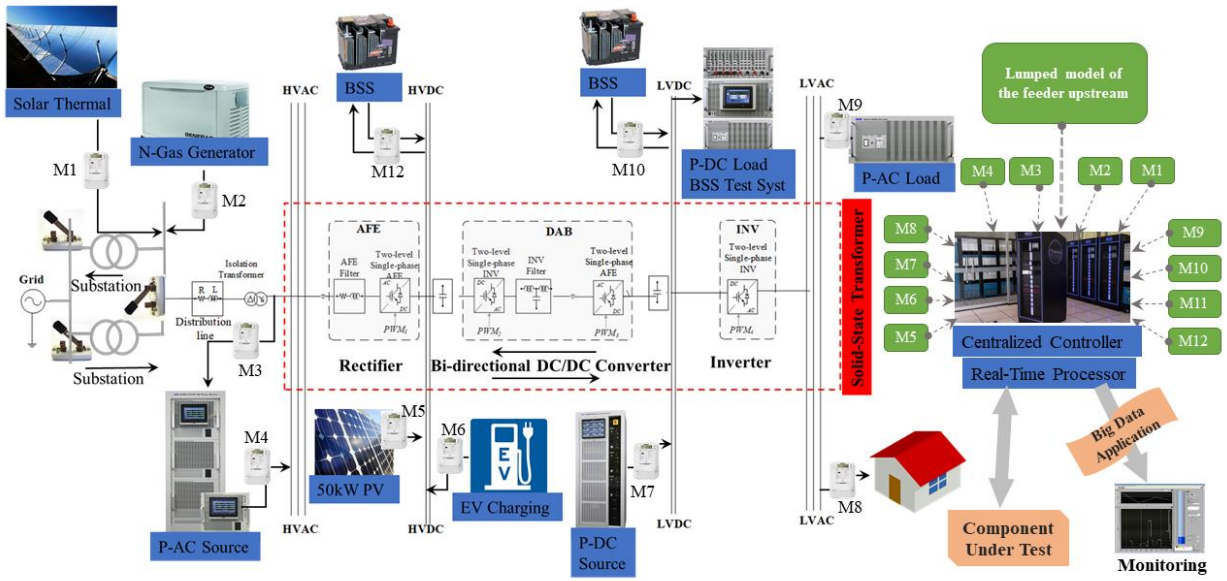
$816K Project

Ties all our renewable energy generation facilities at the Crowley facility into a micro-grid

Test various micro-grid components (solar, storage, EV's, Loads) under realistic conditions

Simulate any type of load profile (commercial, residential, etc.)

Simulate any type of generation profile (wind, solar, traditional)



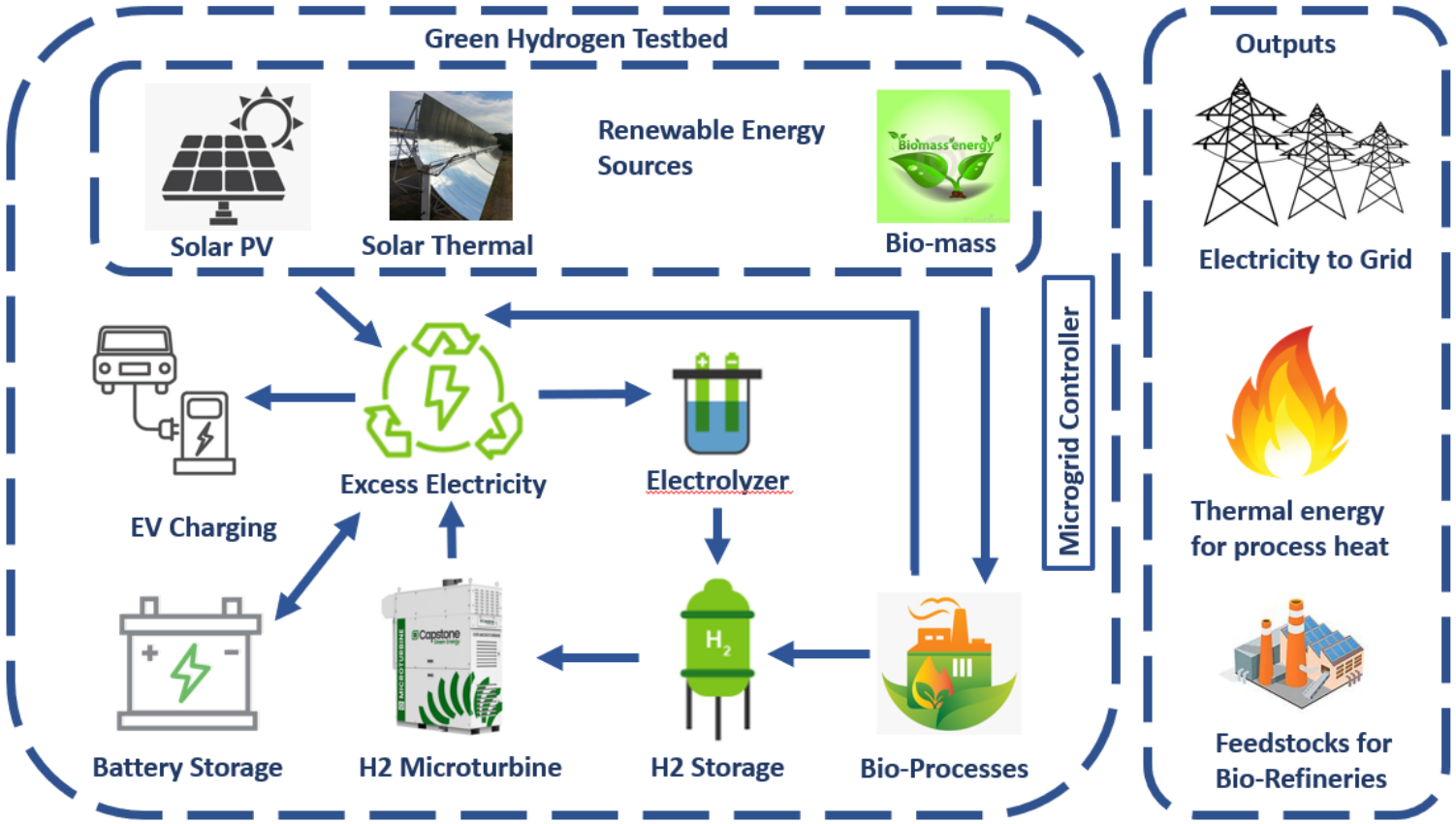
Cleco Alternative Energy Center

CLECO

UNIVERSITY LOUISIANA Lafayette

H2theFUTURE

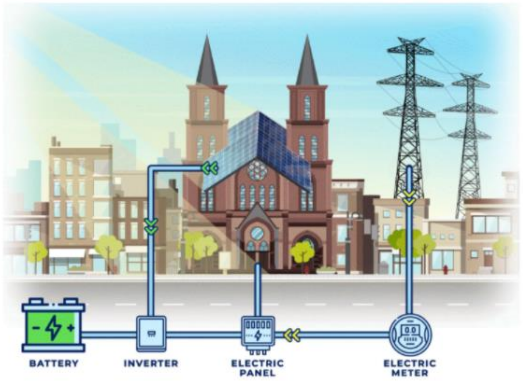
ENERGY TRANSFORMATION IN SOUTH LOUISIANA



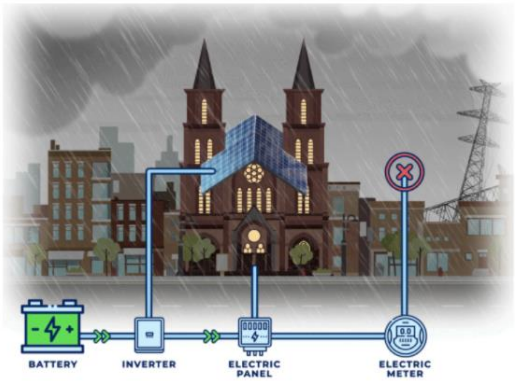
Green Hydrogen Testbed Schematic

Hubs for Energy Resilient Operations (HERO)

- $500M State-wide Proposal to Implement Solar Resiliency Projects
  - Solar + battery microgrids with 12 hours of storage for emergency operations and community support following extreme weather events



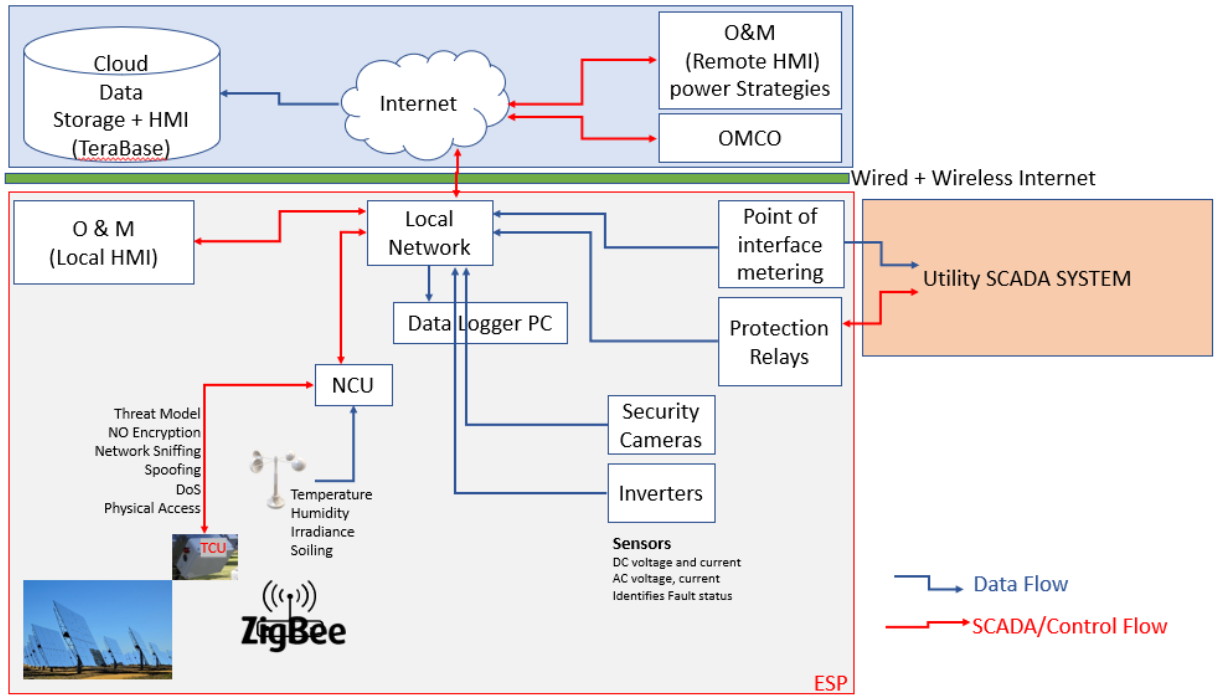
In normal times, the **solar array** helps defray electricity costs.



If the grid goes down, **battery storage** restores power so community institutions can respond.

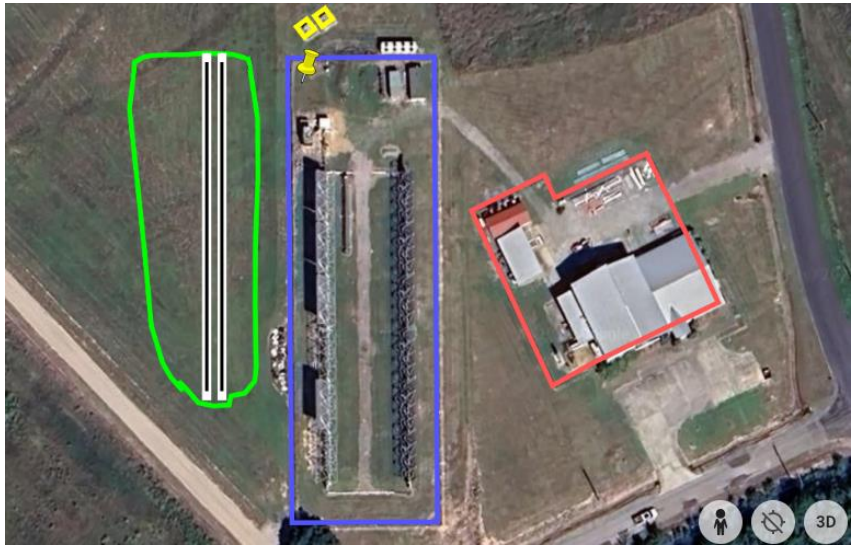
Cybersecurity of Utility-Connected Systems

- EV Charging Stations, SCADA Systems, PV System Components
- Working with National Labs and Industry
- $100K in Recent Funding Applicable to Cleco Alternative Energy Center



Agrivoltaics

- Studying combined use of solar and agriculture in Louisiana
- We will study crawfish farming
- $100K of new funding for Cleco Alternative Energy Center



SOLAR ENERGY EDUCATION

Train the renewable energy engineers and technologists of the future

Solar Engineering Education

- Renewable Energy Minor
- New solar-related courses (4 courses created in last 2 years)
  - ENGR 400G – Energy Systems and Sustainability
  - ENGR 430 – Introduction to Solar Energy System Design
  - ENGR 431 – Utility-Scale Solar Energy System Design
  - ENGR 432 – Modeling and Simulation of Solar Energy Systems (planned)
  - ENGR 400G - Solar Thermal System Design
  - ENGR 695 – Sustainable Energy System Design
- Internships
  - Establishing industry partners so that students can get design experience to obtain the NABCEP PV Design Specialist Certificate
- MCHE Department has added a solar energy representative to their Industrial Advisory Board as a mechanism for receiving industry input on curriculum
  - David Spieldenner – First Solar/Terrabase

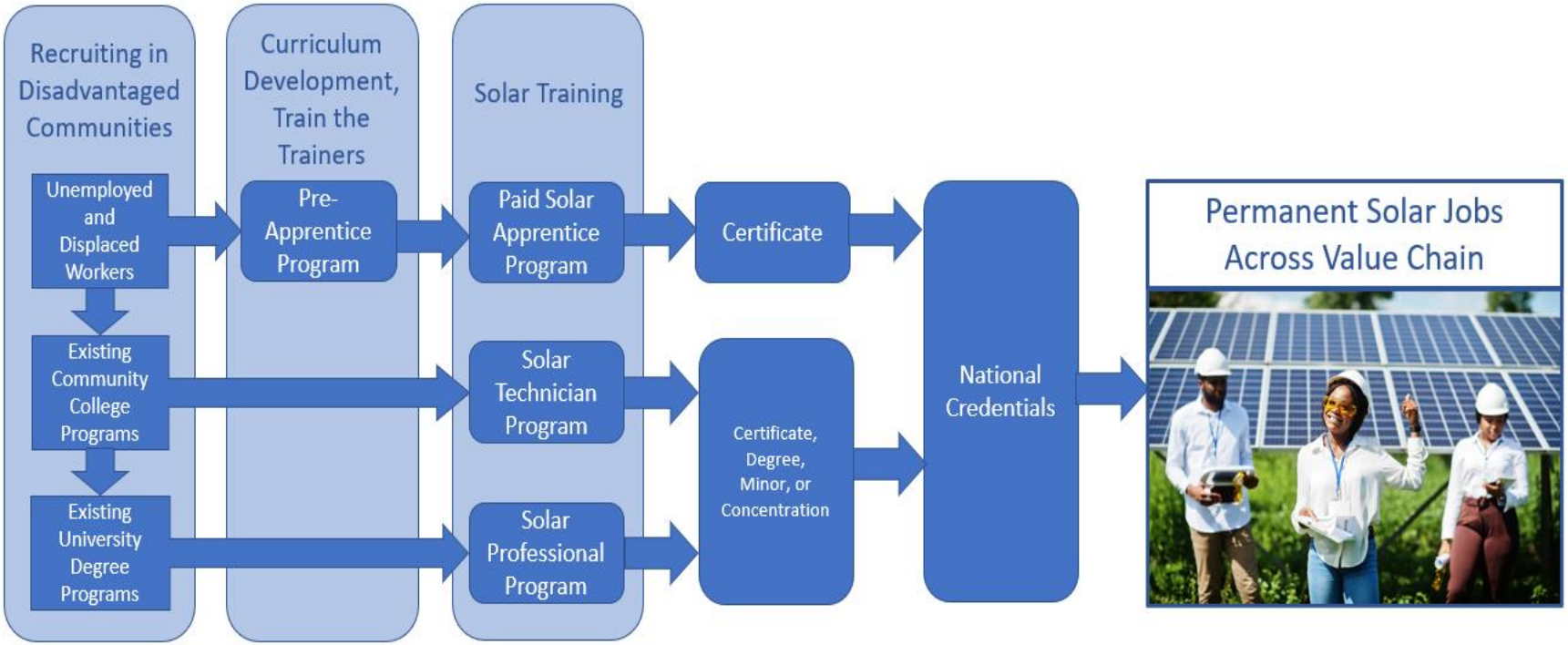
SOLAR WORKFORCE DEVELOPMENT

Training the solar energy technicians of the future

Louisiana Solar Corps

- $1M DOE Solar Workforce Development Grant
  - UNO
  - Together Louisiana
  - Get Lit Stay Lit
  - Louisiana Green Corps
- Create a State-Wide Solar Training Program
  - Three universities, three community colleges, other training orgs
- Training along three pathways
  - Pre-apprentice to apprentice
  - Two-year
  - Four-year
- Training across entire solar value chain
  - Including manufacturing

Louisiana Solar Corps



Solar Energy Technician Program

NABCEP ASSOCIATE™ Photovoltaic

- PV101: Intro to Grid-Direct Photovoltaic Solar Energy System Design and Installation (60 PDH)
- PV202: Intermediate Grid-Direct Photovoltaic Solar Energy System Design and Installation (40 PDH)
- PV203: Intro to Battery-Based Solar Electric Design (40 PDH)
- PV206: Solar Business and Technical Sales (60 PDH)
- PV350: Tools and Techniques for Operations and Maintenance (40 PDH)

Helping other universities and community colleges set up their own solar training programs

ECONOMIC DEVELOPMENT

Helping industry navigate the energy transition, in Louisiana and around the globe.

Industry Research Partners

LUS
LAFAYETTE UTILITIES SYSTEM

CLECO
Connecting Louisiana's future.

NORWICH SOLAR

entergy

RAPTOR MAPS

OMCO SOLAR

KIPP & ZONEN
an OTT HydroMet brand

ScorpiusTrackers
Tracking the Sun. From dawn to dusk.

First Solar®

3M

KONICA MINOLTA

POWER STRATEGIES

IN-BETWEEN INTERNATIONAL

terabase

D&D Manufacturing

GreenField Solar

GOSSAMER INNOVATIONS
"THE MOST CREDIBLE NAME IN SOLAR"

PLANT PREDICT

First Solar Manufacturing Plant

- "First Solar's selection of Iberia Parish for its newest solar panel production facility leaves no doubt that ***Louisiana is leading the global energy transition, and creating good-paying jobs as a result***," Gov. John Bel Edwards
- $1.1B investment
  - Largest ever in Iberia Parish
- 700 permanent jobs
- Annual payroll of $40M
- A new 10,000 sq ft manufacturing facility being set up at UL Lafayette

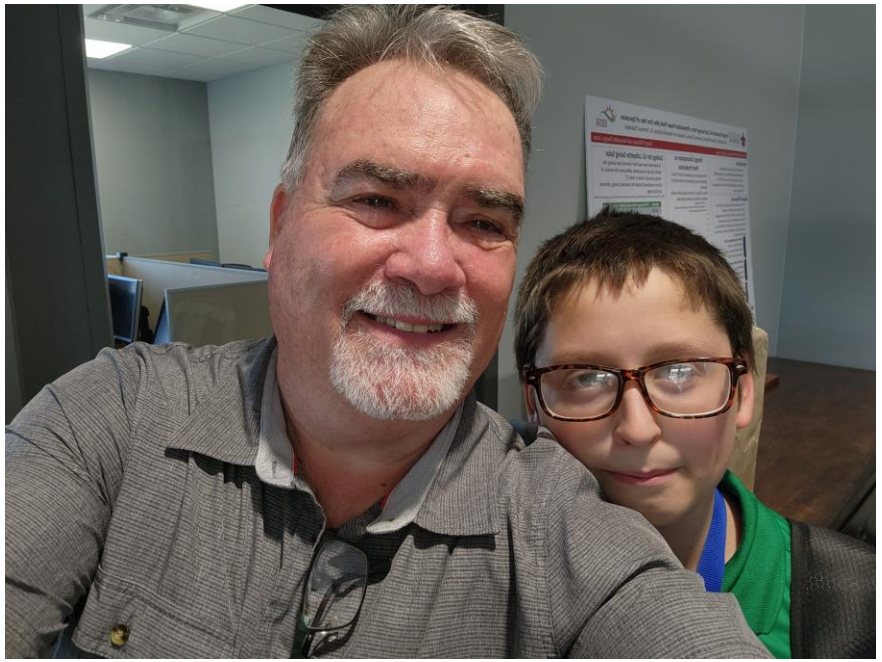
LED LOUISIANA ECONOMIC DEVELOPMENT

OUTREACH

Inspiring the next generation of renewable energy workers

2 - 3 tours per week for public officials, industry, the general public, and K-12 students

Why do we do all this?



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Thank you for attending today's presentation.