

Florida Energy Systems Consortium

Stakeholders Meeting
August 20, 2014

Hosted by FPL



OVERVIEW

- Sunshine State Solar Grid Initiative – *SUNGRIN*
- Electrical Energy Storage
- Virtual Storage – *Buildings as Batteries*
- Smart Grid Education: **FEEDER Consortium**



Sunshine State Solar Grid Initiative

SUNGRIN – Looking at the implications of a high penetration of solar energy on the Florida Grid

Goals of the \$3.6M DOE project:

- Better understand solar variation in Florida
- Address the impacts on the distribution and transmission grid of high penetration levels of PV
- Improve availability of validated models for the stakeholder community
- Develop converter and control system solutions to enable successful integration of high levels of PV
- To improve awareness and understanding of solar PV potential, challenges and opportunities



Electrical Energy Storage

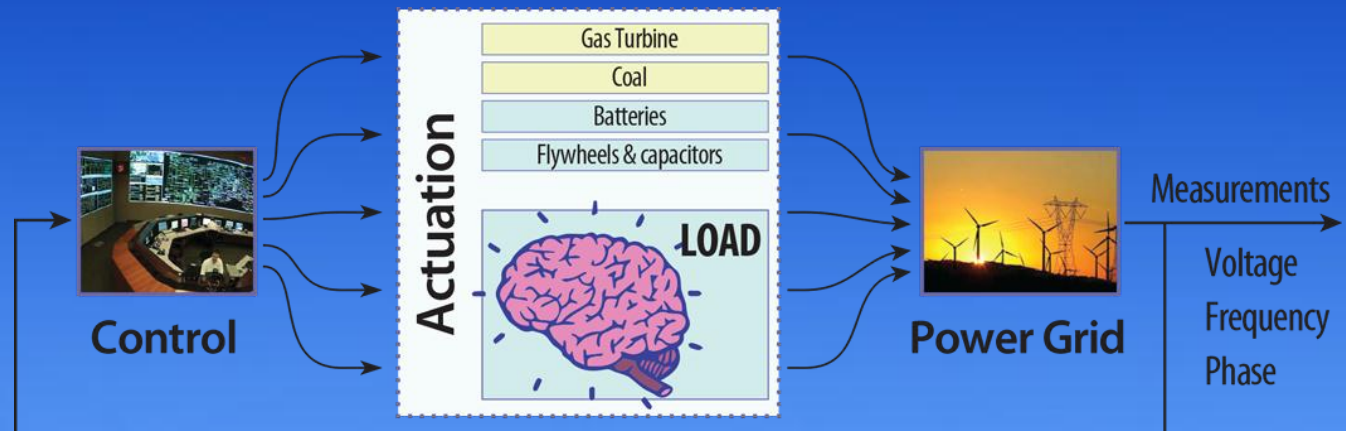
- Battery electrodes/materials characterization by Dr. K. Jones, UF
- Solar thermochemistry and storage by Dr. Hahn et. al., UF
- GLIDES: Ground level pumped storage Bill Lear, Oak Ridge & UF
- Li-Ion Batteries, by Dr. Wolfgang Sigmund, UF
- Nanomaterials for batteries, by Dr. Kirk Ziegler, UF
- Li-Ion super capacitors by Dr. Jim Zheng, FSU, *Formed General Capacitors LLC with his technology*
- Micro Battery Development, by Dr. Chunlei Wang, FIU: *Developing functional 3D microbatteries based on carbon micro electro mechanical systems (C-MEMS) technique. Could offer order of magnitude increases in electrode surface area and charging capability than thin film batteries at the same size scale.*
- Fabrication and Investigation of Porous Tin Oxide Anodes for Li-Ion Micro Batteries by Dr. Chunlei Wang, FIU

Virtual Storage From Flexible Loads

Today: Traditional generators ramp up and down in response to fluctuations in supply & demand

Tomorrow: Experiments at UF demonstrate that HVAC in commercial buildings can provide 40 GWs of balancing reserves/frequency regulation in the US, replacing traditional generators, without any impact on indoor climate.

Other loads are considered in current research: Pool pumps in Florida can supply 1GW of balancing reserves.



Foundations for Engineering Education for Distributed Energy Resources (FEEDER) Consortium

Partners: Consists of seven Universities in the SE United States, eight utility companies, seven supporting industry partners and two national labs and a research center.

Goal: To develop the engineering capability to accelerate the deployment of distributed renewable energy technologies onto the electric utility grid.

- This is being accomplished by upgrading the existing power systems engineering workforce, upgrading power systems engineering programs at our universities, and developing a pipeline of new power systems engineers and engineering faculty.
- Through the efforts of this Consortium, we will feed a new group of engineers into the workforce capable re-engineering the existing electrical grid infrastructure to include a highly sophisticated communications infrastructure.

➤ **Critical Needs:** Standardization and grid security

Foundations for Engineering Education for Distributed Energy Resources

FEEDER: The GEARED-Up Team

6,000
Students:
Power &
Energy

100,000
Utility
Employees

7 Universities



8 Utilities



FEEDER Consortium

2 National Labs



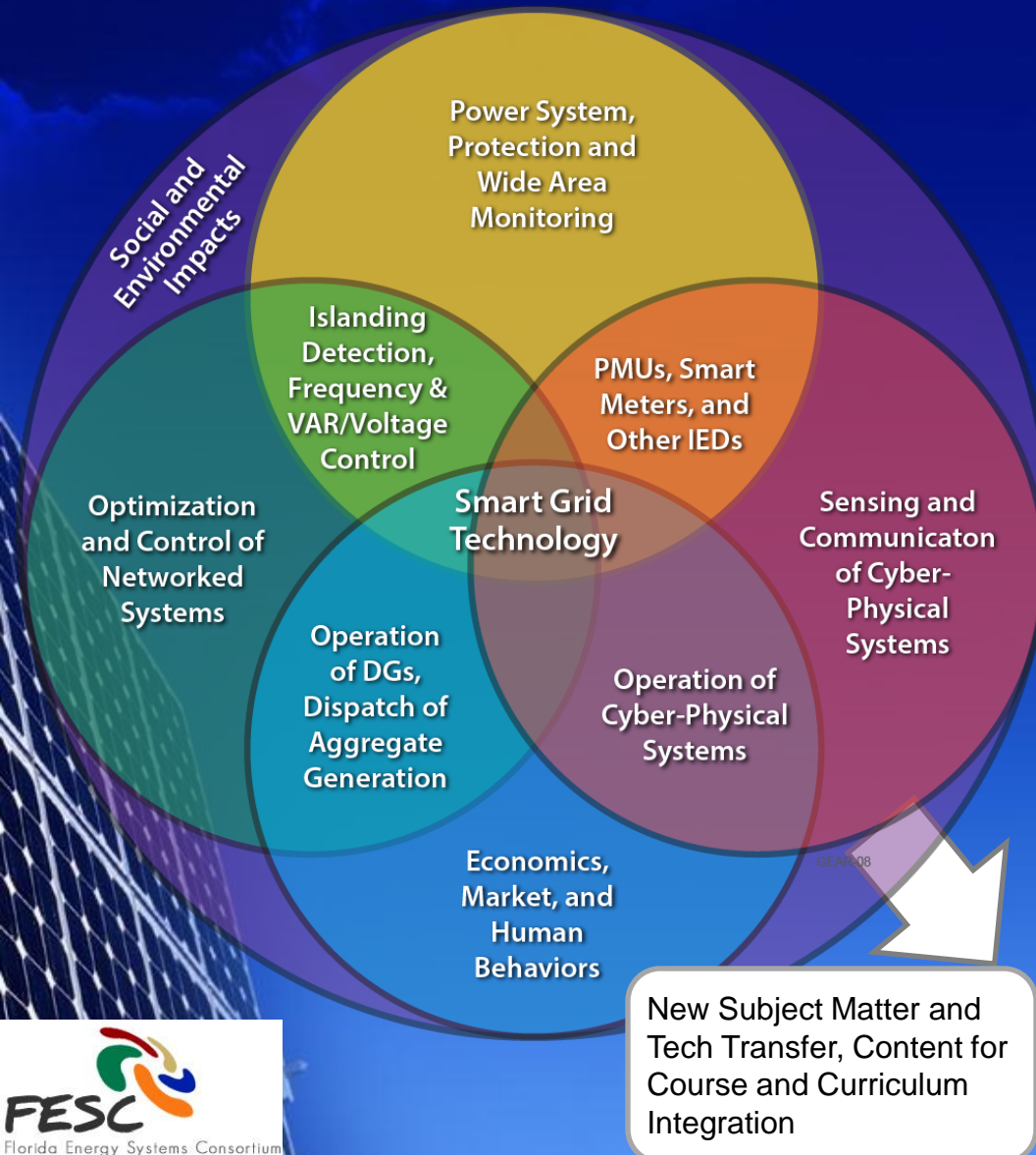
Supporting Industries



Test Beds,
Research,
Collaborations

500,000
Industrial
Employees

FEEDER: Research Thrusts



Research Focus:

- Power systems engineering
- Distributed power management
- System planning and operation
- Interconnection and communication hardware and software development
- Demand response, and use of storage technologies for integrating PV
- Network science, communications theory, controls, automation
- Implications of cyber-physical systems as applied to the electric grid.