

# Utilizing Advanced Microgrid Controls to Approach 100% Renewable Power

Emily LeJeune

Microgrid Applications Manager

S&C Electric Company

[emily.lejeune@sandc.com](mailto:emily.lejeune@sandc.com)

(720) 626-1117

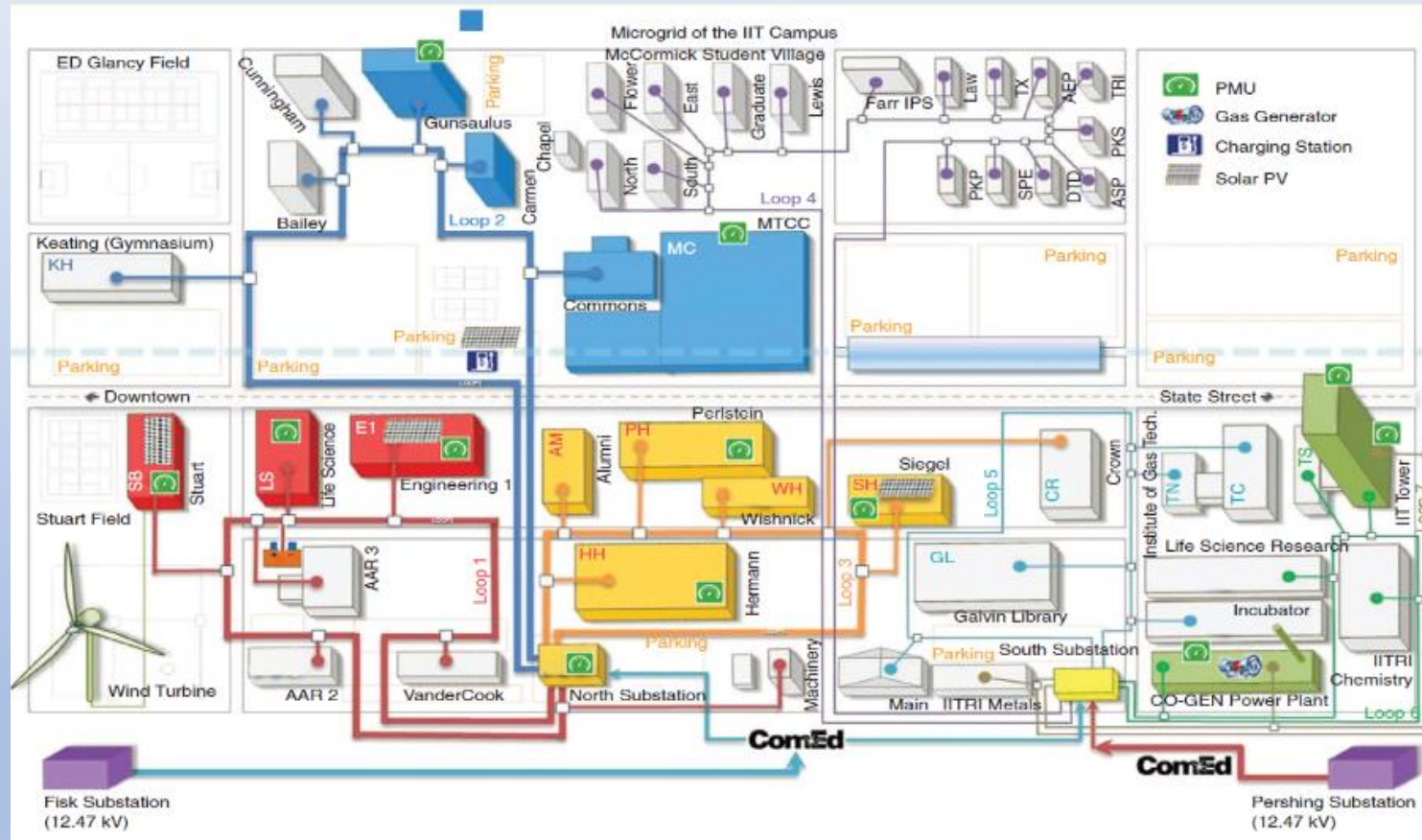


# Basic Microgrid versus Advanced Microgrid

Definition published by GTM Research in July 2018:

Microgrids vary in complexity ranging from a basic microgrid – a backup generator that is capable of running in parallel with the grid and has the ability to automatically island and resynchronize to the grid after an outage – to a multifunctional microgrid with increased capabilities providing more flexible generation and enhanced reliability to both the local community and the bulk power grid.

# Illinois Institute of Technology (IIT) - 2009



- ❑ 1 generation source
  - ❑ Campus central plant
- ❑ Existing distribution system
- ❑ Controlled by SCADA system

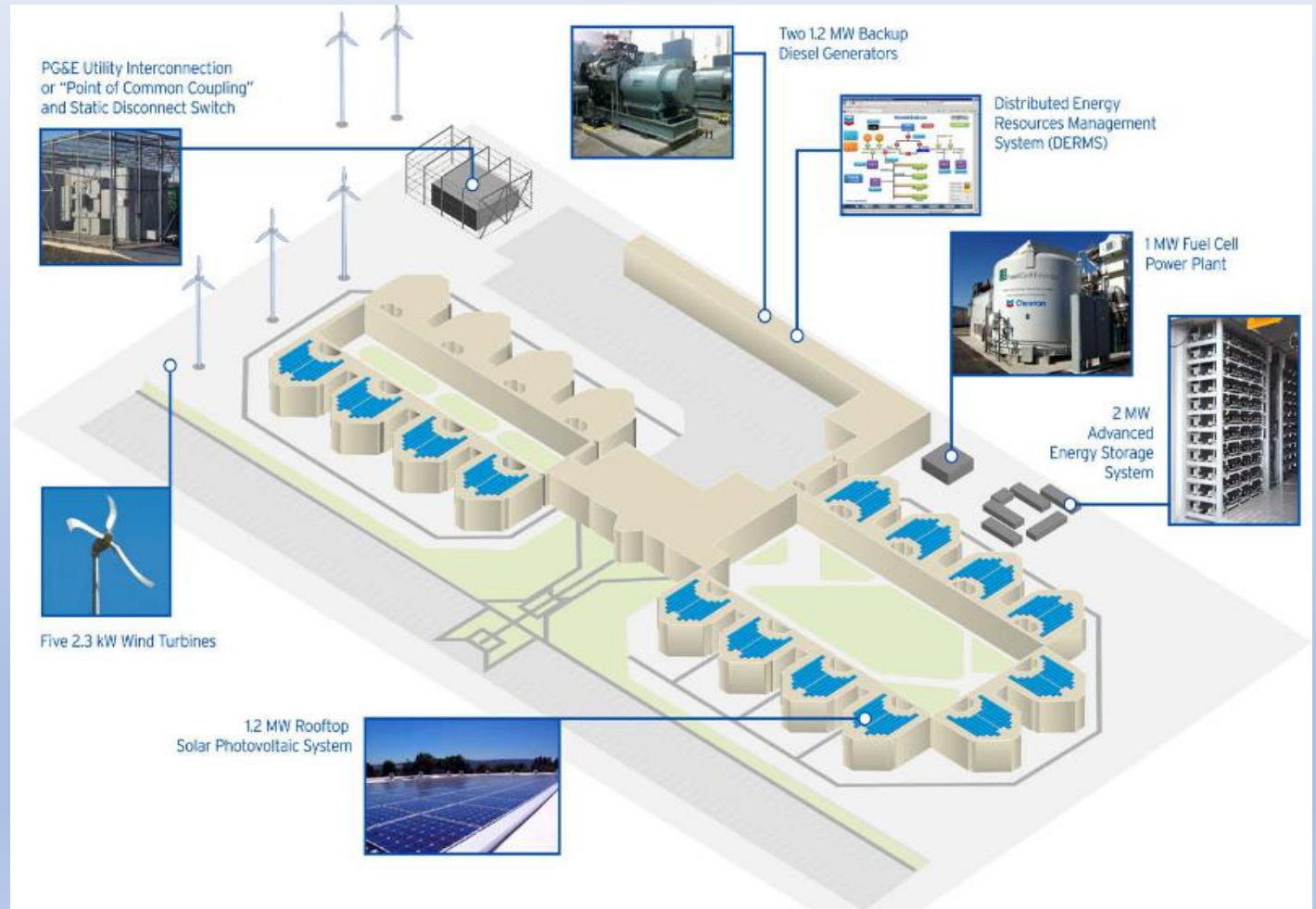
# What happens if generation source is lost?





# Santa Rita Jail, California - 2012

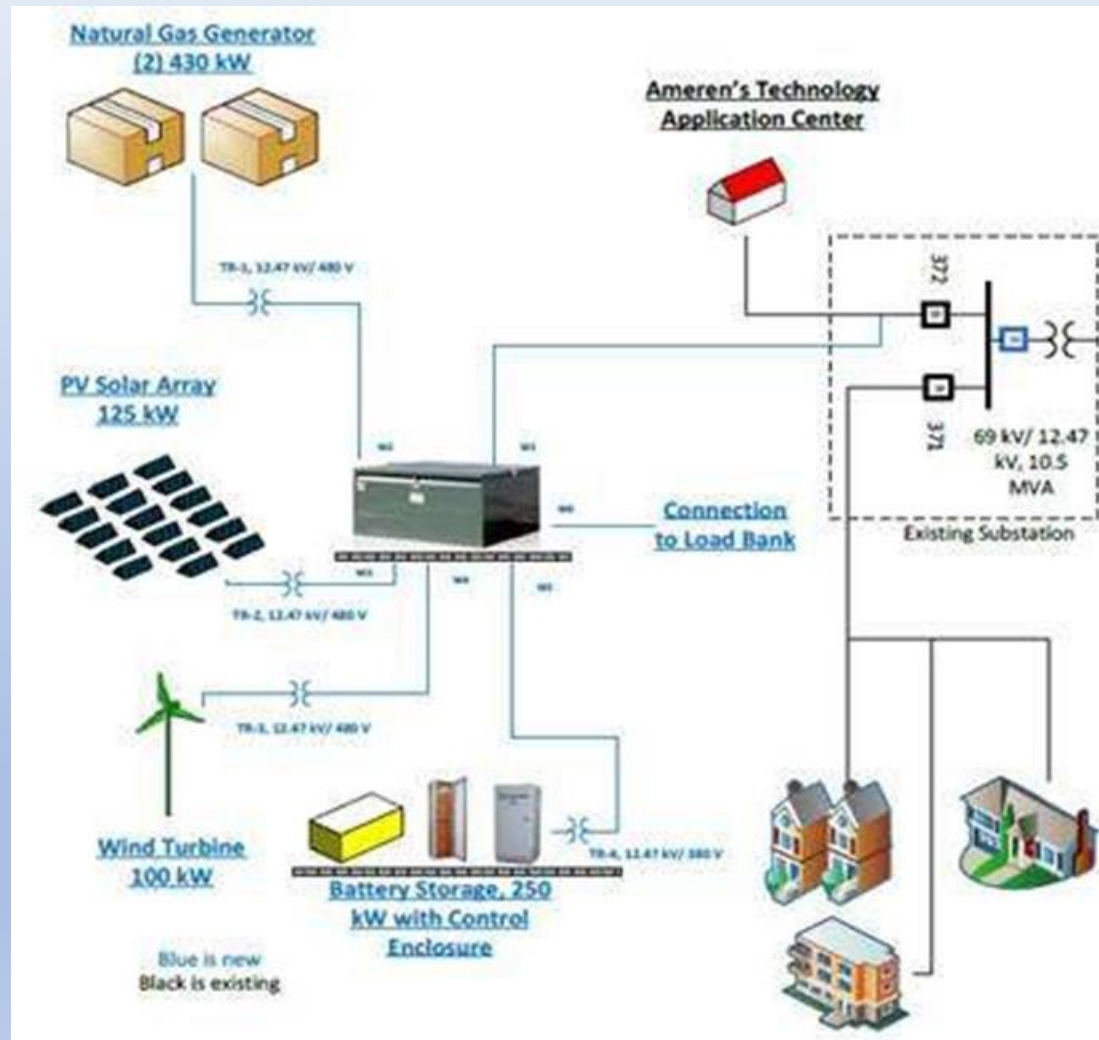
- ❑ Multiple generation sources
  - ❑ 2MW ESS
  - ❑ 1MW Fuel Cell
  - ❑ 3MW PV
- ❑ One centrally located microgrid controller



# What happens if the controller goes down?



# Ameren TAC Microgrid Installation - 2016



- ❑ Multiple generation sources
  - ❑ 125kW PV array
  - ❑ 2 430kW NG generators
  - ❑ 100kW Wind turbine
  - ❑ 250kW Battery energy storage

# Ameren Goal: Economics and Resiliency

DER Optimal Power Flow

Frequency Control

Demand Response

Grid Connected Transition

Peak Load Shaving

Islanded Transition

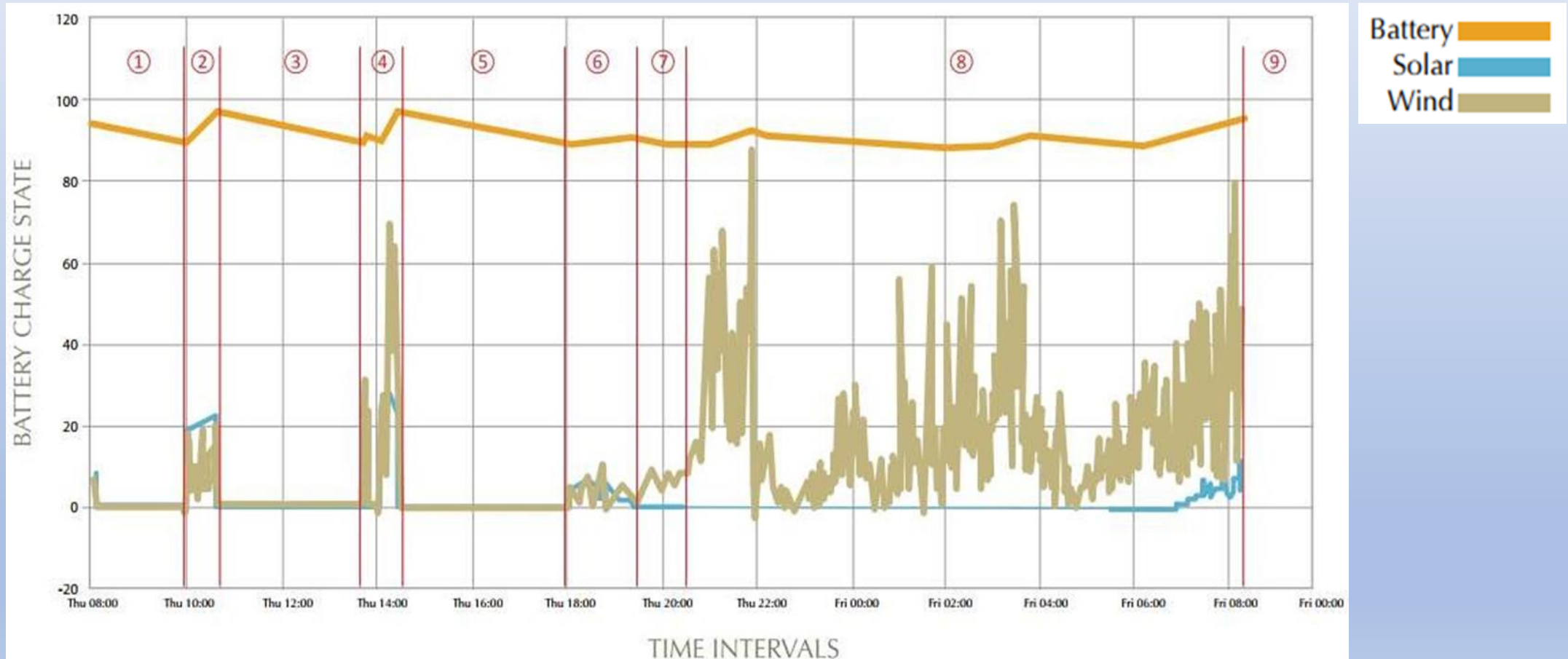
Storm Preparedness

Green Mode

Distributed ability for multiple use cases and contingencies

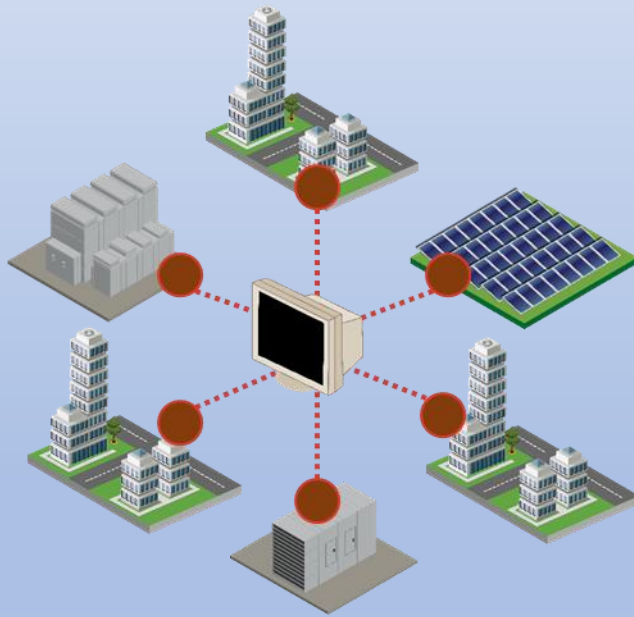


# Ameren Powered by 100% Renewables

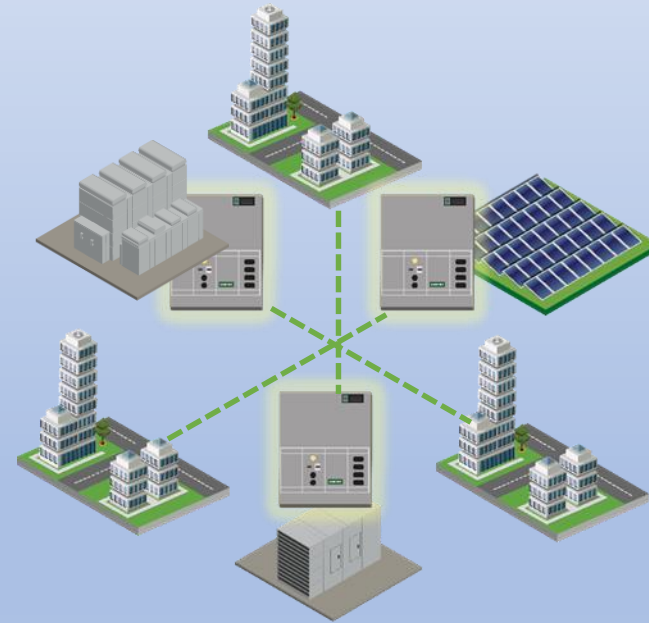


# Advanced Microgrid Controls

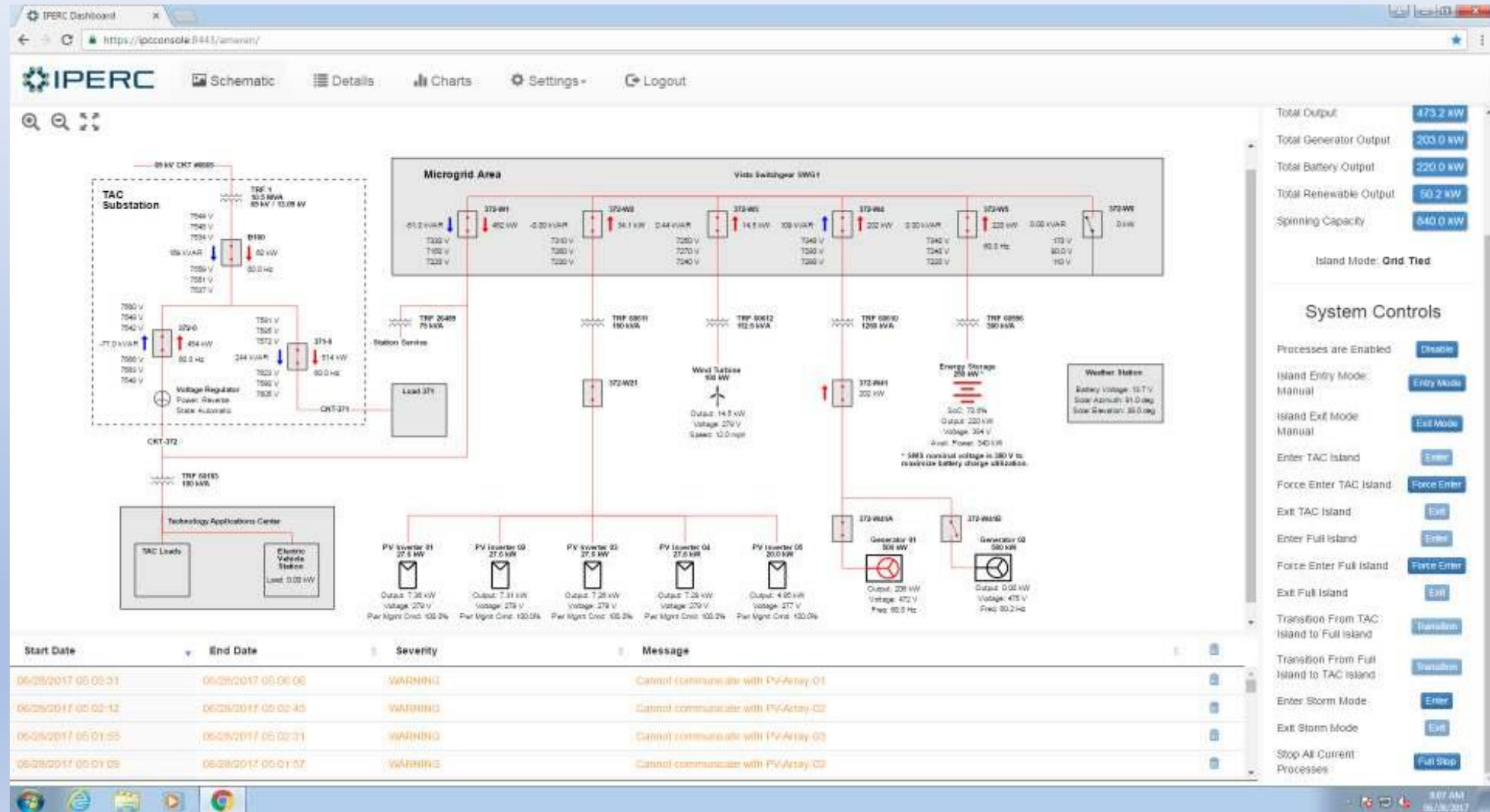
**Traditional**  
**Single Point of Failure**



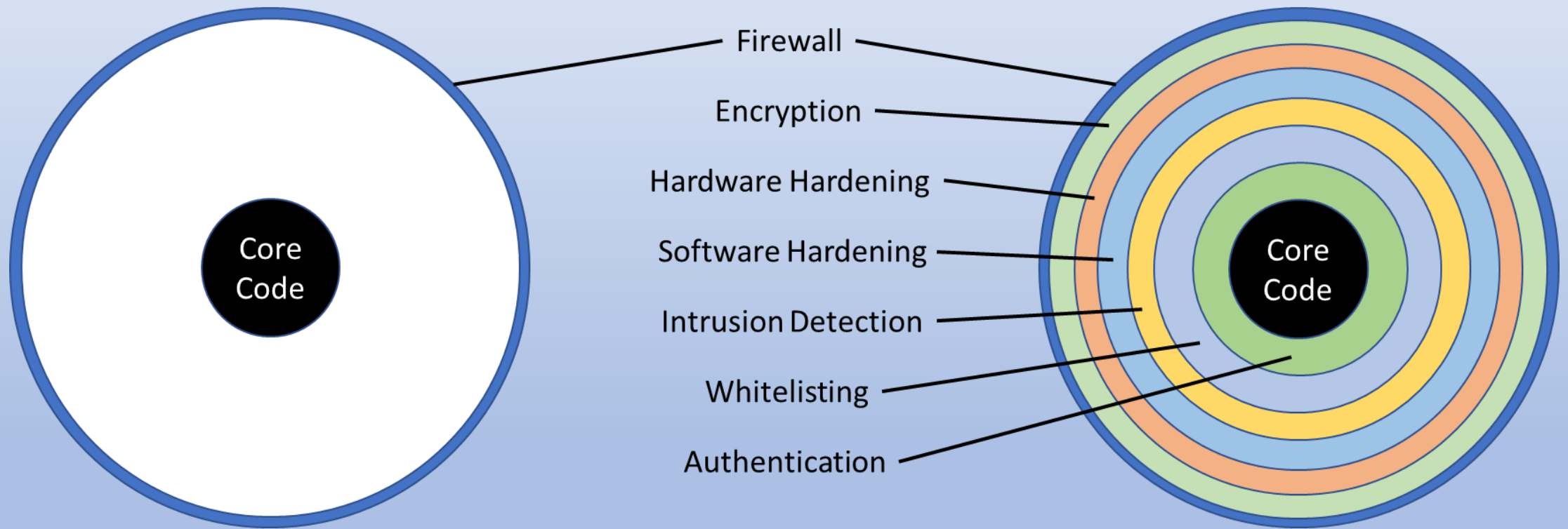
**Ameren**  
**Distributed Intelligence**



# Advanced Controls Need Simple Visibility



# Multi Layered Security Approach



# What are advanced microgrids providing?

- Ability to optimize power flow
- Multi level contingency planning
- Increased resiliency

