



## Power Systems Conference 2009

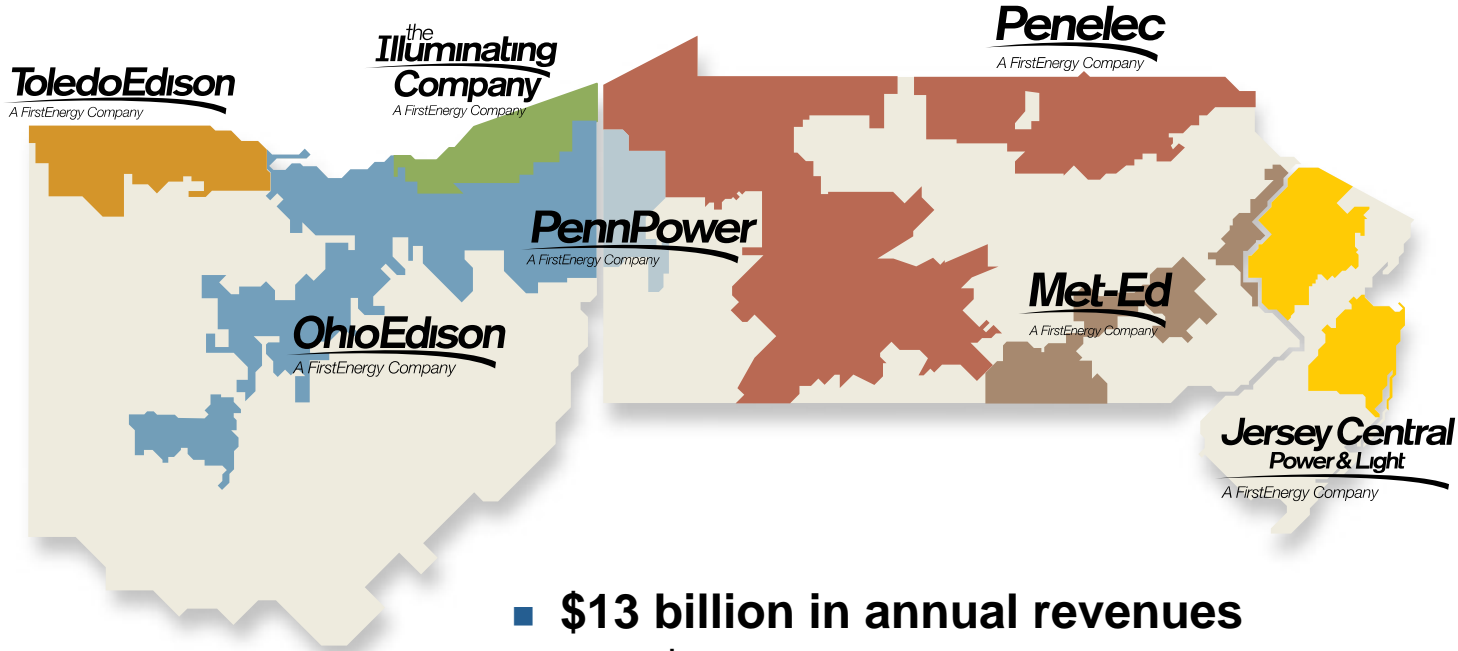
Architecture for Distributed Energy Resources  
Control including Demand Response and  
Distribution Automation at First Energy

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*Delivery Operations Technical Manager,  
FE Technologies*

March 11, 2009

# FirstEnergy Summary Profile



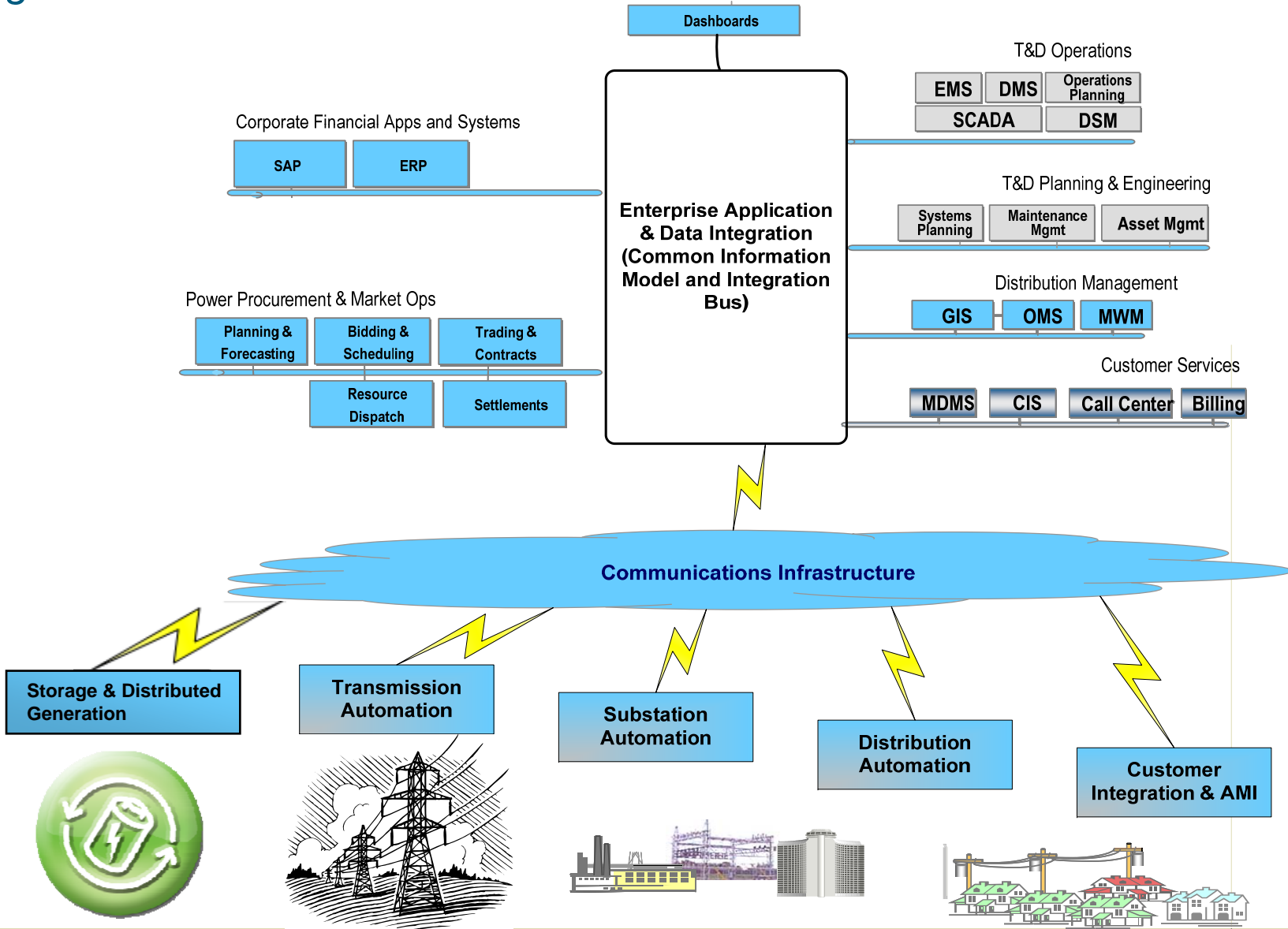
Rankings Among Electric Utilities (12 mos. ended 12/31/2007)	
Assets	11
Customers	5
Revenues	11
Market Cap (as of 2/29/08)	7

Source: EEI

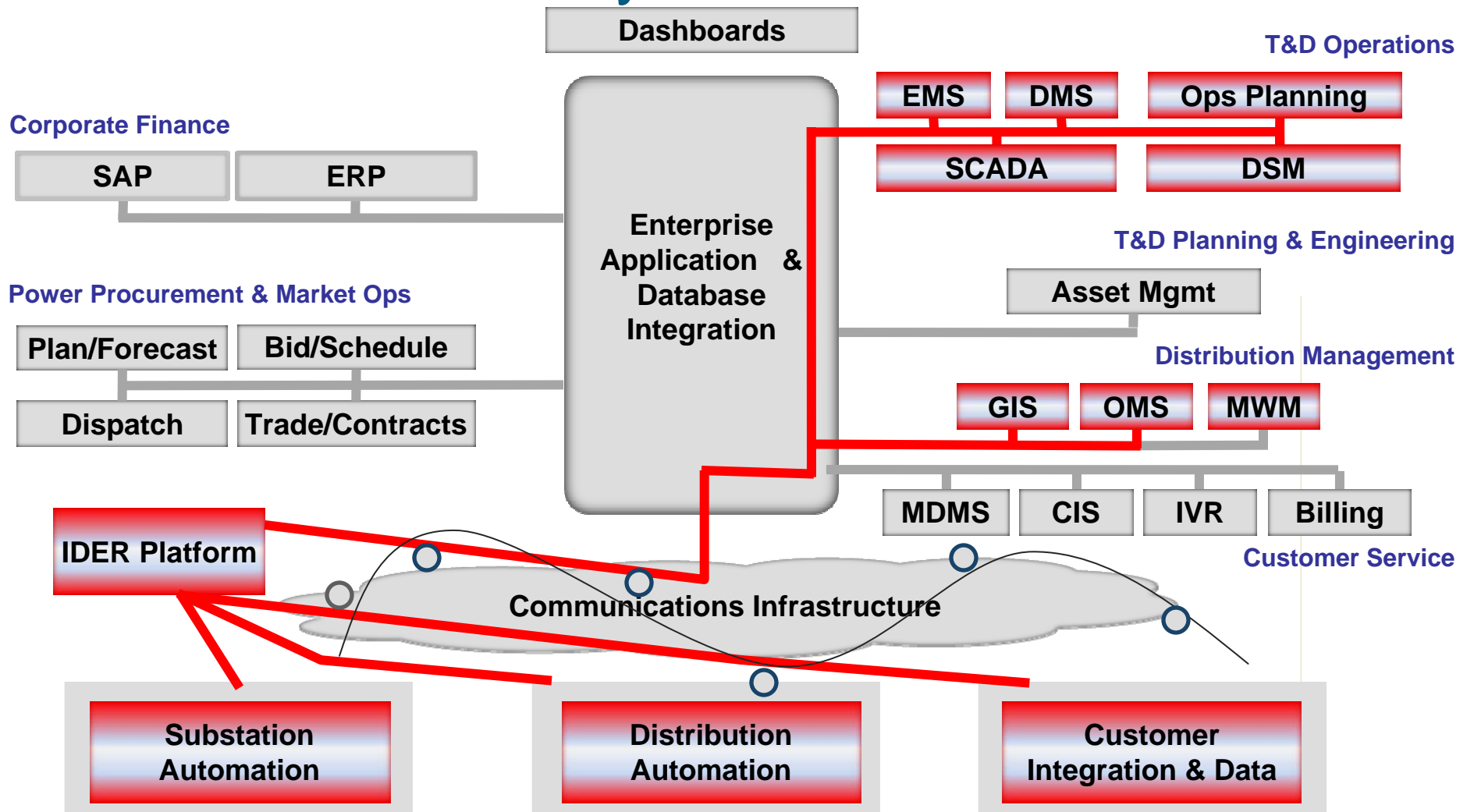
- \$13 billion in annual revenues and \$32 billion in assets
- 4.5 million customers
- 18 generating plants; more than 14,272 MW
- Approx. 133,000 transmission and distribution circuit miles
- Approx. 14,000 employees

# DER Strategy Aligns with FirstEnergy IGCA

## Integrated Grid Communications Architecture



# Integration of DER into JCP&L/FE Control and Communications Systems



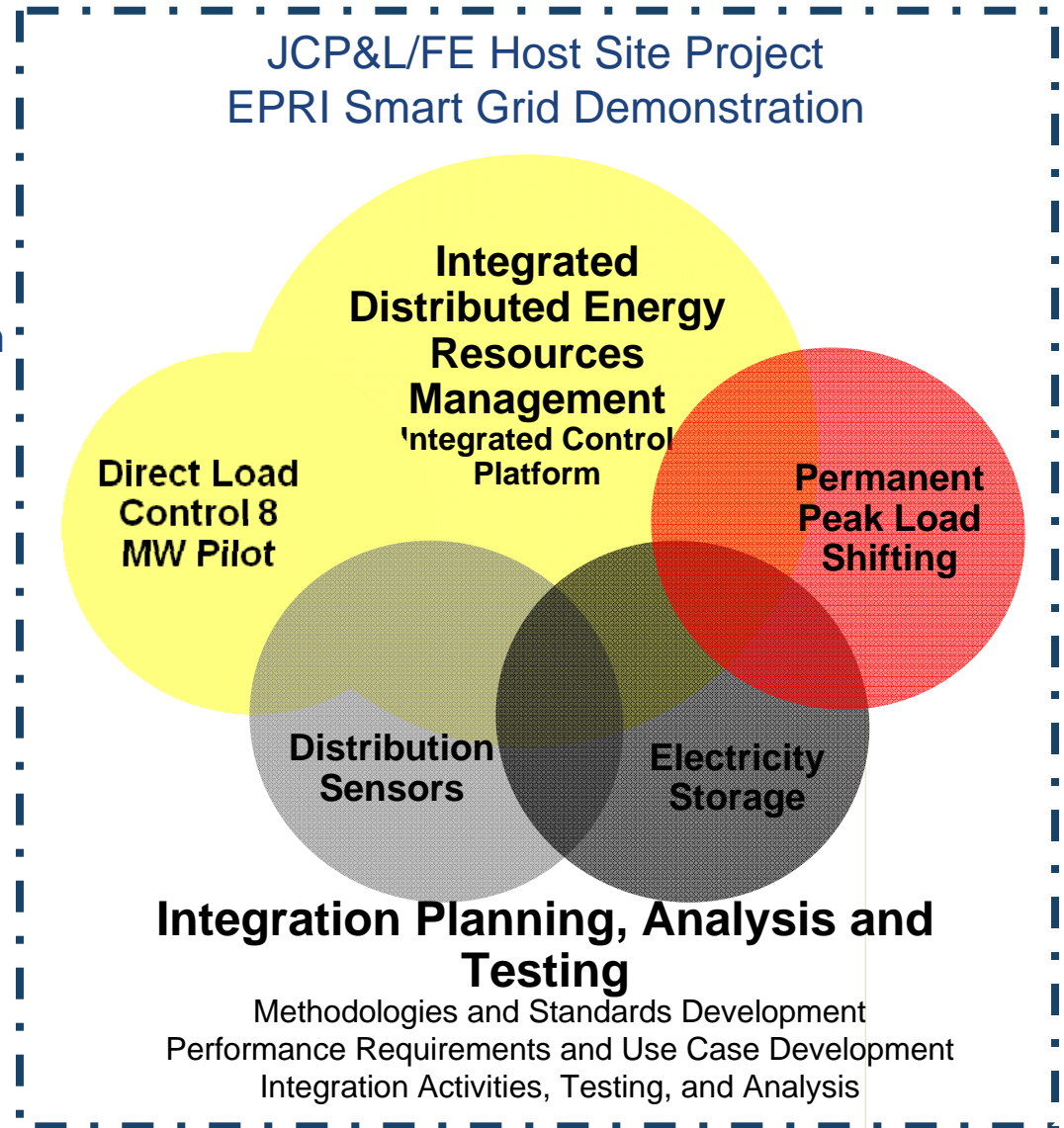
# JCP&L/FE EPRI Host Site Demonstration Project

## Comprised of:

- *Integrated Control Platform and 8MW Direct Load Control pilot*
- *DLC Expansion*
- *Permanent Peak Load Shift program*
- *Electricity Storage program*
- *Distribution Sensors*
- *Other DER technologies*

Project aligns with  
FirstEnergy IGCA Strategy

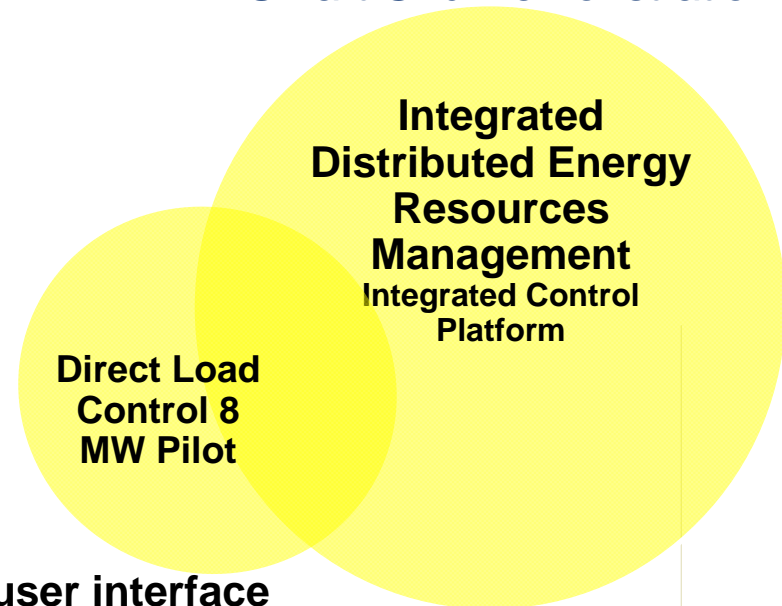
Project aligns with  
EPRI Smart Grid Strategy



# Direct Load Control, Integrated Control Platform

JCP&L/FE Host Site Project  
EPRI Smart Grid Demonstration

*Integrated Control Platform and 8MW  
Direct Load Control pilot*



- **Premise information viewed by Operator on user interface**
  - Alarm triggers based on monitored device parameters
  - Individual & aggregated load information
  - Building temperature
- **Local Grid Sensing and Control**
  - Residential Load Controllers
  - Commercial & Industrial integration with energy management systems
- **Load management verification via reports and audit logs**
- **Customized load control programs**

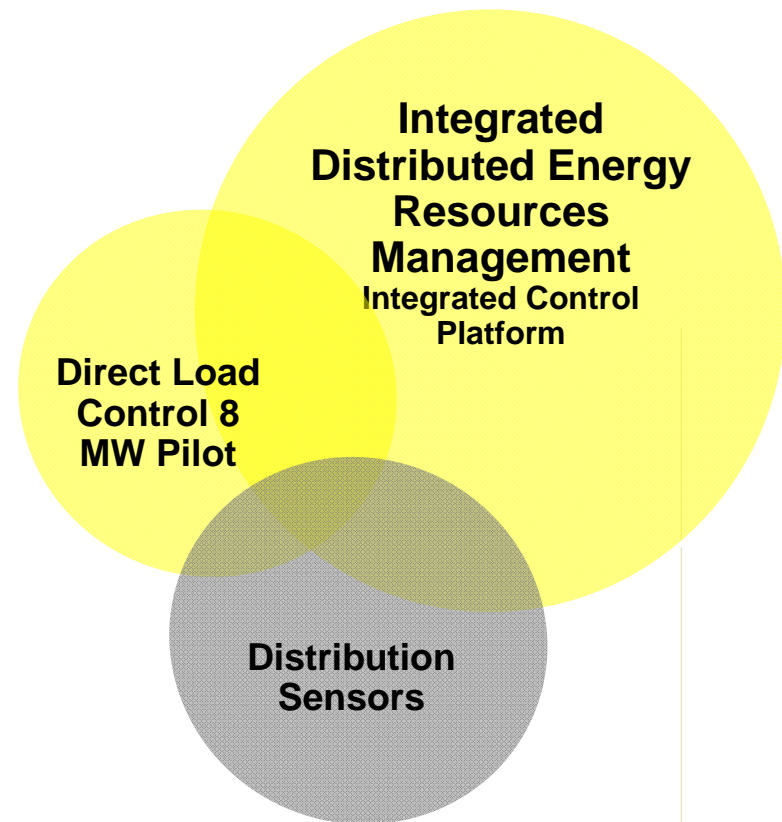
# State Monitoring, Integrated Control Platform

JCP&L/FE Host Site Project  
EPRI Smart Grid Demonstration

*Integrated Control Platform and 8MW  
Direct Load Control pilot*

*Distribution Sensors*

*DLC Expansion*



- **Monitor and visualize state transitions of individual devices**
  - Line mounted sensors
- **Action plans for state management**
  - Operator controlled
  - Real time verifiable
- **Customized verification reports**

# Expanded Integration and Associated Benefits

*Integrated Control Platform and 8MW  
Direct Load Control pilot*

*Distribution Sensors*

*DLC Expansion*

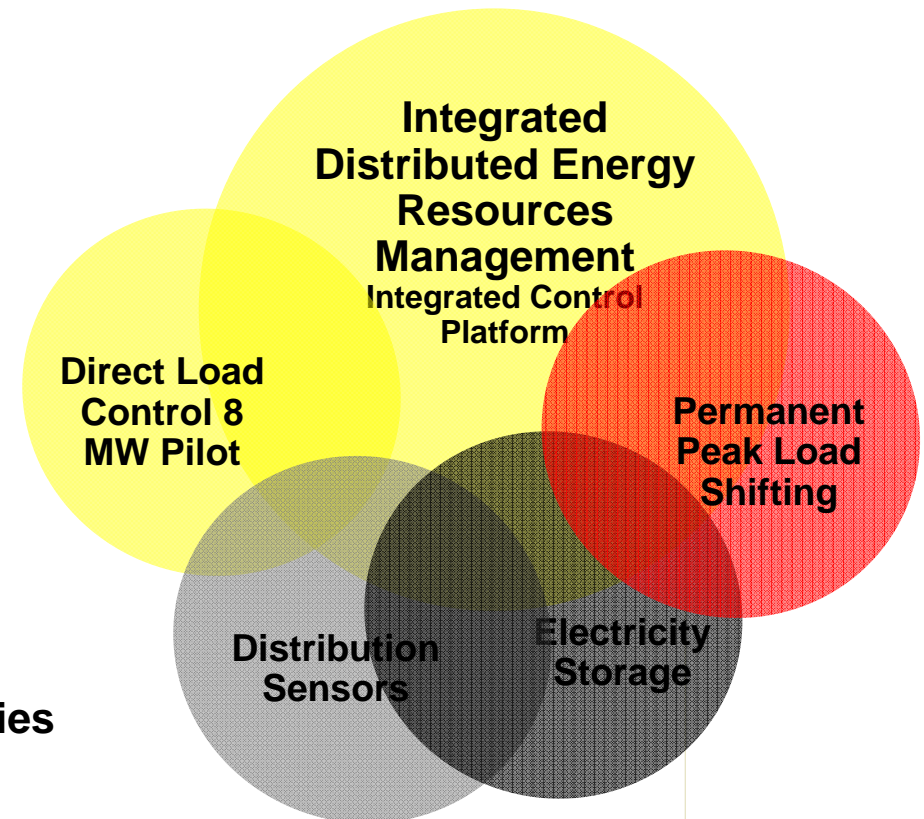
*Electricity Storage program*

*Permanent Peak Load Shift program*

*Other DER technologies*

- **Condition-based monitoring and state estimation via enhanced platform capabilities**
- **System alarm coordination**
- **Automated condition response**
- **Integrated Electricity Storage**
- **Integrated Permanent Peak Load Shifting**

JCP&L/FE Host Site Project  
EPRI Smart Grid Demonstration



## **Integration Planning, Analysis and Testing**

Methodologies and Standards Development  
Performance Requirements and Use Case Development  
Integration Activities, Testing, and Analysis



# Overview of Project Activities

**Task 1: Project Planning and Objective Setting**

**Task 2: Equipment Deployment (Installation)**

**Task 3: System Integration Activities**

**Task 4: Monitoring and Performance Assessment**

**Task 5: Performance and Integration Requirements**

**Task 6: Benchmarking Project to Existing Methodology and Standards**

**Task 7: Develop Use Case Scenarios**

**Task 8: Develop Business Case Scenarios**

**Task 9: Tasks to Support System Use**

**Task 10: Smart Grid Demo Project Analysis Activities**

# Thank You!