



## The Integrated Grid – International Coordination

Mark McGranaghan
Vice President, Power Delivery and Utilization
19 February 2014



#### **Electric Power Research Institute**

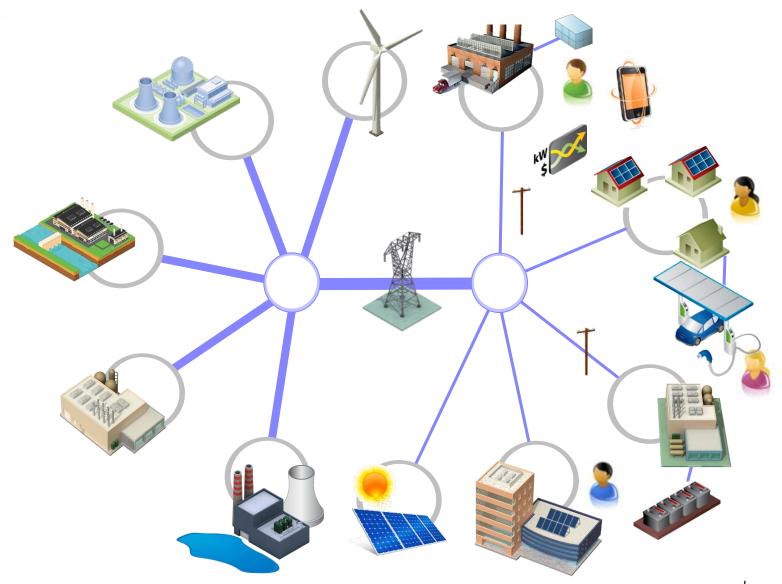


Together...Shaping the Future of Electricity



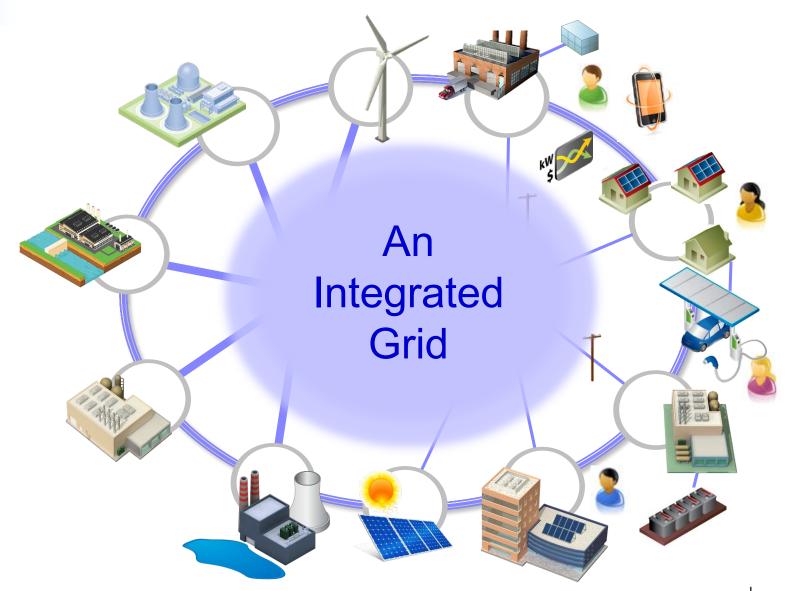


## Working towards an integrated grid





## **Meeting the challenge**





## Foundation of An Integrated Grid

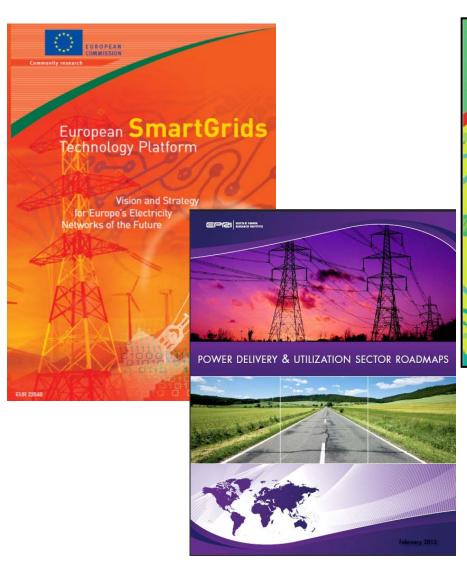
- 1. Grid Modernization
- Communication
   Standards and
   Interconnection Rules
- 3. Integrated Planning and Operations

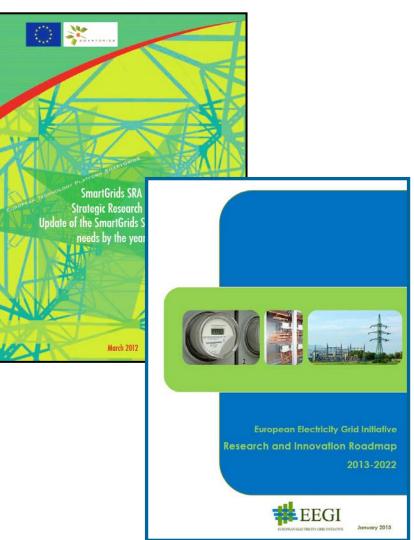


4. Informed Policy and Regulation

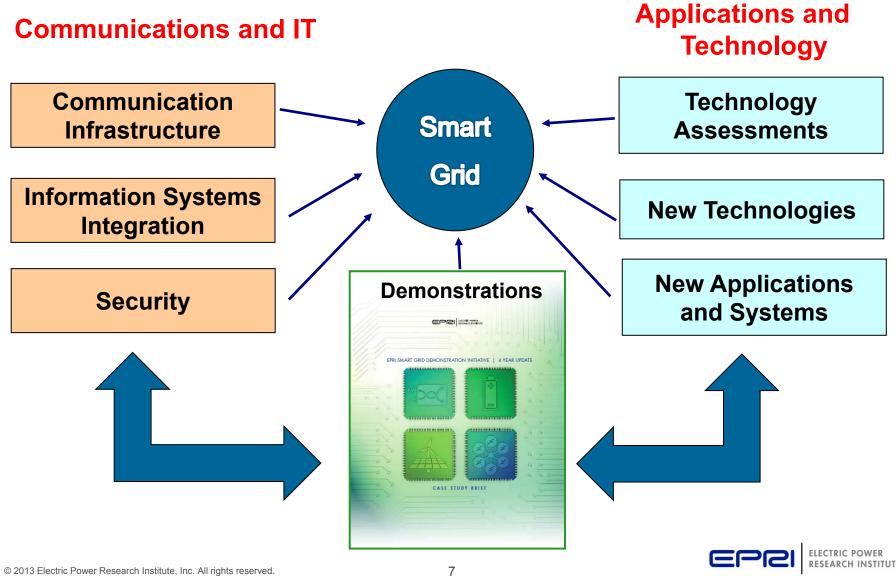


# **Coordination Opportunity – Roadmaps**



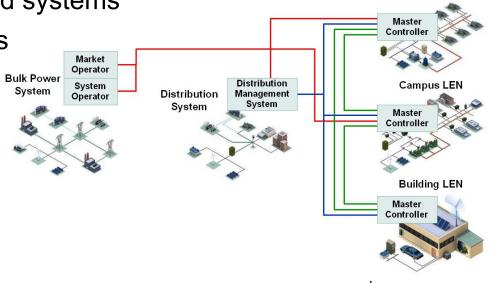


## **Coordination Opportunity – Testing and Demonstrations**



### **Moving from DEVICES to SYSTEMS**

- Automation technologies
- Smart inverters
- Energy storage and energy storage control systems
- Combined energy systems, thermal storage
- Advanced voltage control technologies and systems
- Sensors and integration
- Communications technologies and systems
- Distribution management systems
- Model verification
- . . .



Community LEN

### **Coordination of Testing Labs - Examples**

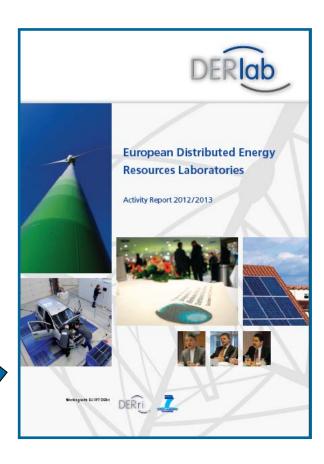
- Database/library of lab capabilities and activities for coordination
- Contacts
- Test protocols and objectives
- Methods of testing for systems
- Model verification and industry standard models

• . .



#### **Testing Labs**

- SCE Advanced Technology Labs
- PG&E Technology Center
- SDG&E Integrated Test Facility
- Ameren T&D Test Bed
- <u>Duke Energy Envision Center</u>
- AEP Dolan Labs
- EPRI Distribution Test labs
- ENEL Smart Grid Test System
- NEETRAC
- NREL ESIF
- Sandia National Labs DETL
- IREQ (Hydro Quebec)
- PowerTech Labs (BC Hydro)
- Fraunhofer DERLab
- Iberdrola Bidelek Sareak Test Bed
- EDF Concept Grid
- Strathclyde Power Networks Demonstration Centre





## **Summary - Many Challenges**



Coordination and Collaboration will be critical







## Together...Shaping the Future of Electricity

www.smartgrid.epri.com

www.epri.com/Our-Work/Pages/Integrated-Grid.aspx