Grid Modernization Challenges and Developments

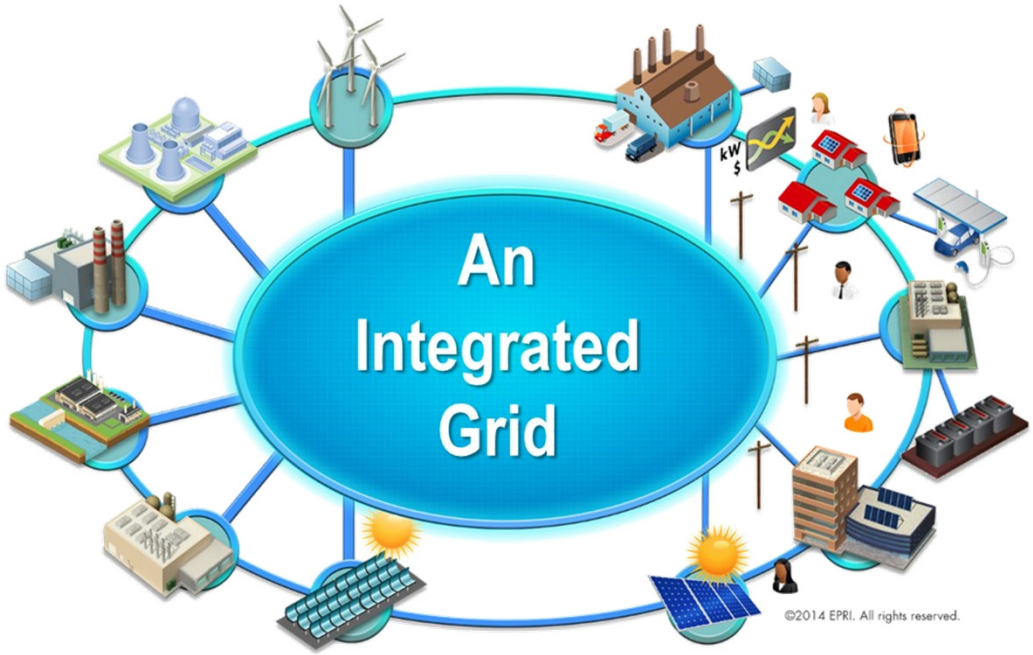
Mark McGranaghan
VP, Distribution and Utilization
Electric Power Research Institute

Wednesday 10 May 2017

Modern Grid Technology and Leading Practices Workshop
State of Modern Grid Panel Session

Key Challenges for the Integrated Grid

1. Architecture
2. Planning Models and Tools
3. Real Time Operations
4. Integrating Distributed Controls
5. Flexibility – Energy Storage
6. Reliability and Resiliency – Microgrids
7. Integrating the Customer
8. Communications Infrastructure
9. Cyber Security
10. Regulatory and Market Models



Industry Developments - US

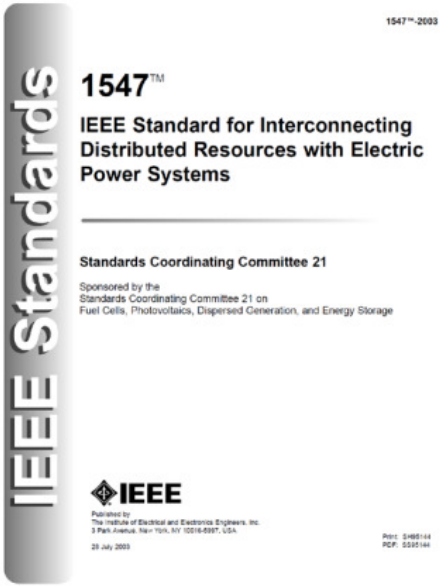
REV is a strategy to build a clean, resilient, and affordable energy system for all New Yorkers.

REV is transforming New York State's energy policy and initiatives to make sure energy efficiency and clean, locally produced power are at the core of the State's energy system.

REV is changing the way government and utilities work to make clean energy financially beneficial to everyone. And most importantly, REV is putting customers first by designing new initiatives to impact real people and provide individuals and communities with the opportunity to take an active role in achieving the following State energy goals by 2030.

Why SRP's controversial demand charge unlocks a huge opportunity for solar-plus-storage

The utility wants customers to help with peak demand but they may buy batteries instead of more grid power.

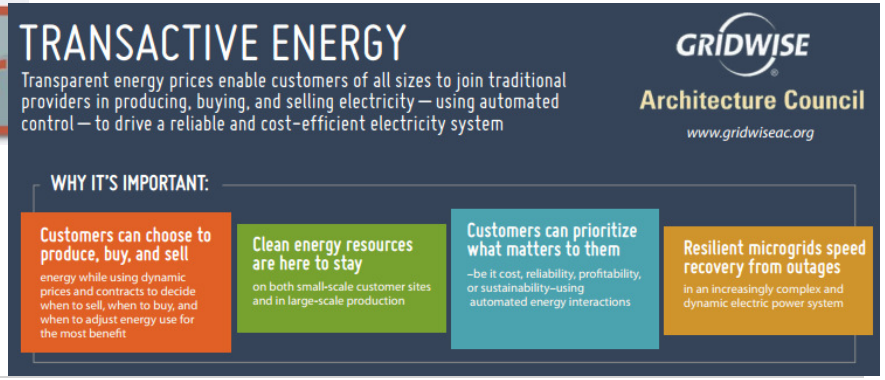


A VIRTUAL POWER PLANT IN GLASGOW, KY

Virtual Peaker

How California's biggest utilities plan to integrate distributed resources

New plans filed with state regulators show where DERs should go and how much they are worth to utilities



European Coordination

EMPOWER

P2P - smarTest

FLEXICIENCY

SmarterEMC2

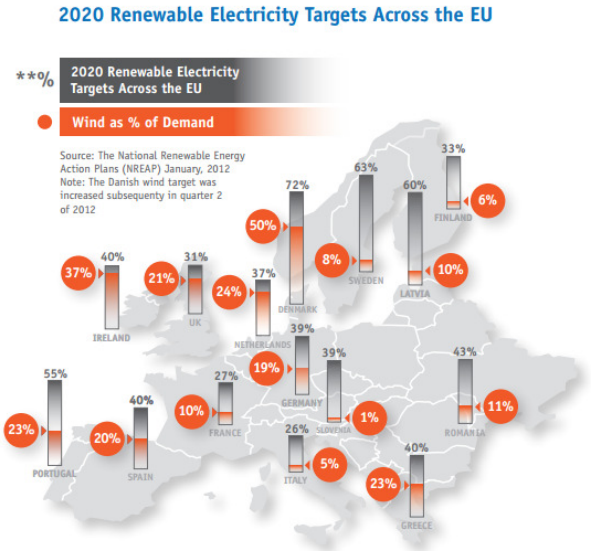
BRIDGE (29 Projects)

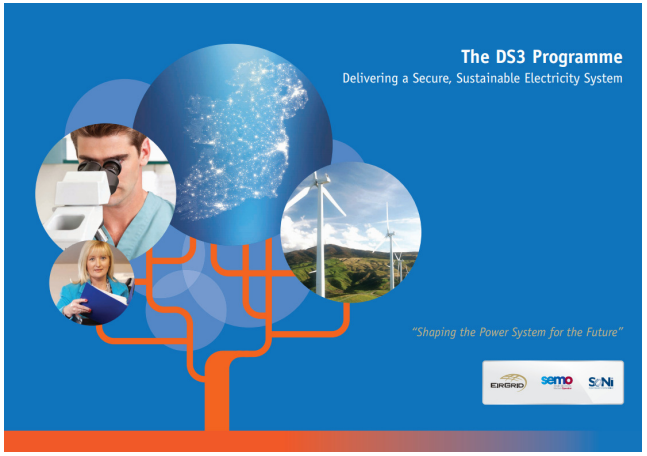
- **Customer Engagement**
- **Business Models**
- **Regulations**
- **Data Management**

Nobel Grid
Smart energy for people

Flex4Grid
Prosumer Flexibility Services for Smart Grid Management

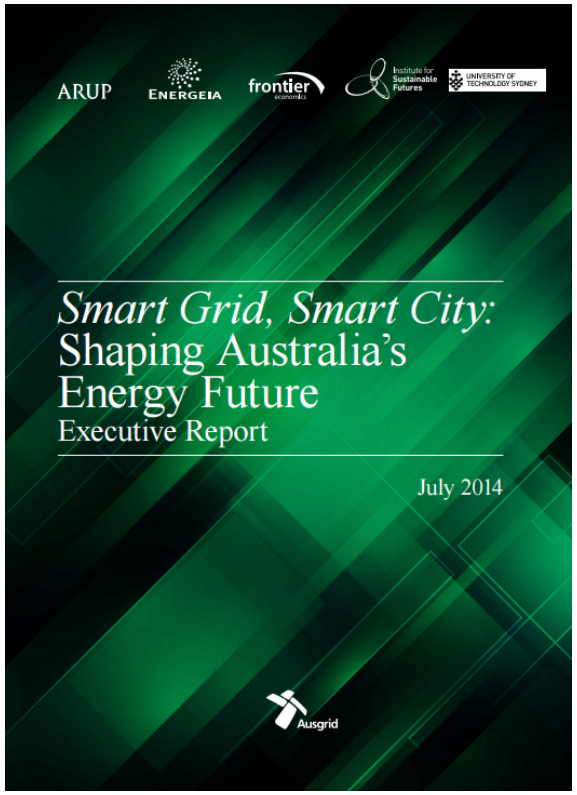
RealValue

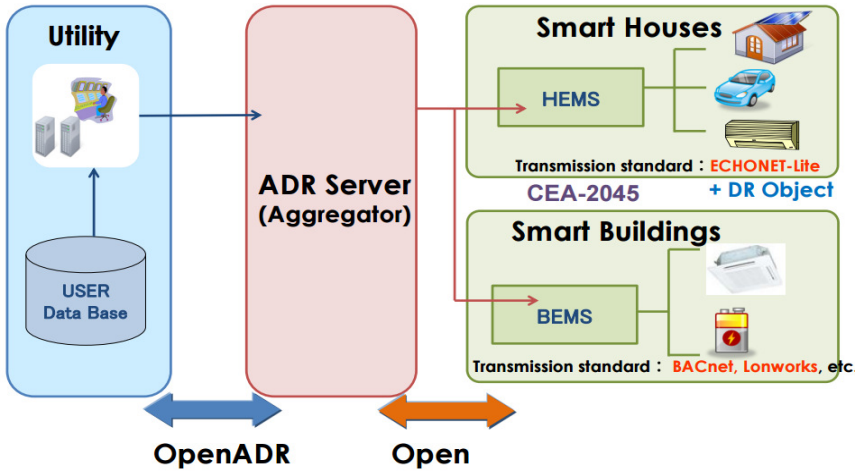


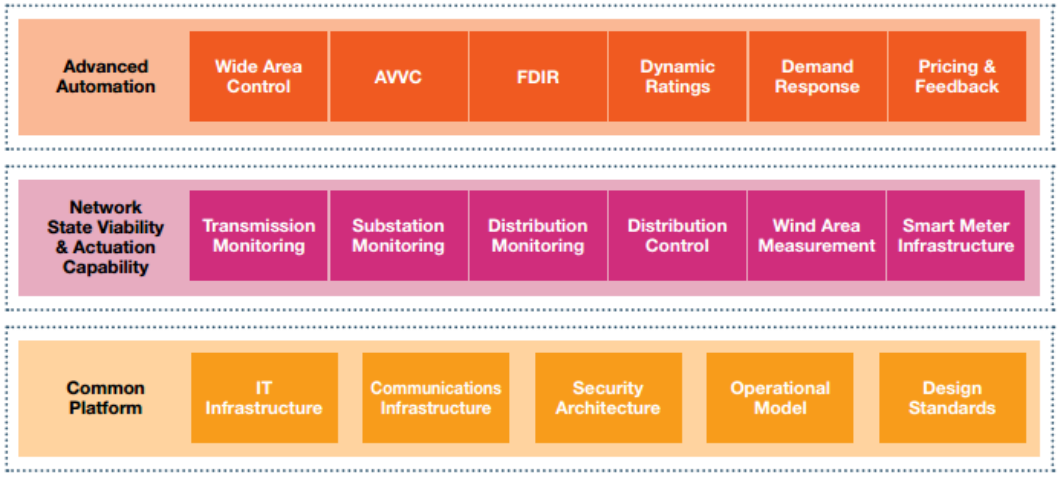


EPRI ELECTRIC POWER RESEARCH INSTITUTE

Japan and Australia







Together…Shaping the Future of Electricity