



The Imperative for Innovation

Changing Electricity Industry Landscape

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EPRI

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Electric Power Research Institute

Objective and Independent Research

- Renewable, Nuclear and Fossil Generation
- Transmission and Distribution
- Energy Efficiency and Utilization
- Environmental Studies



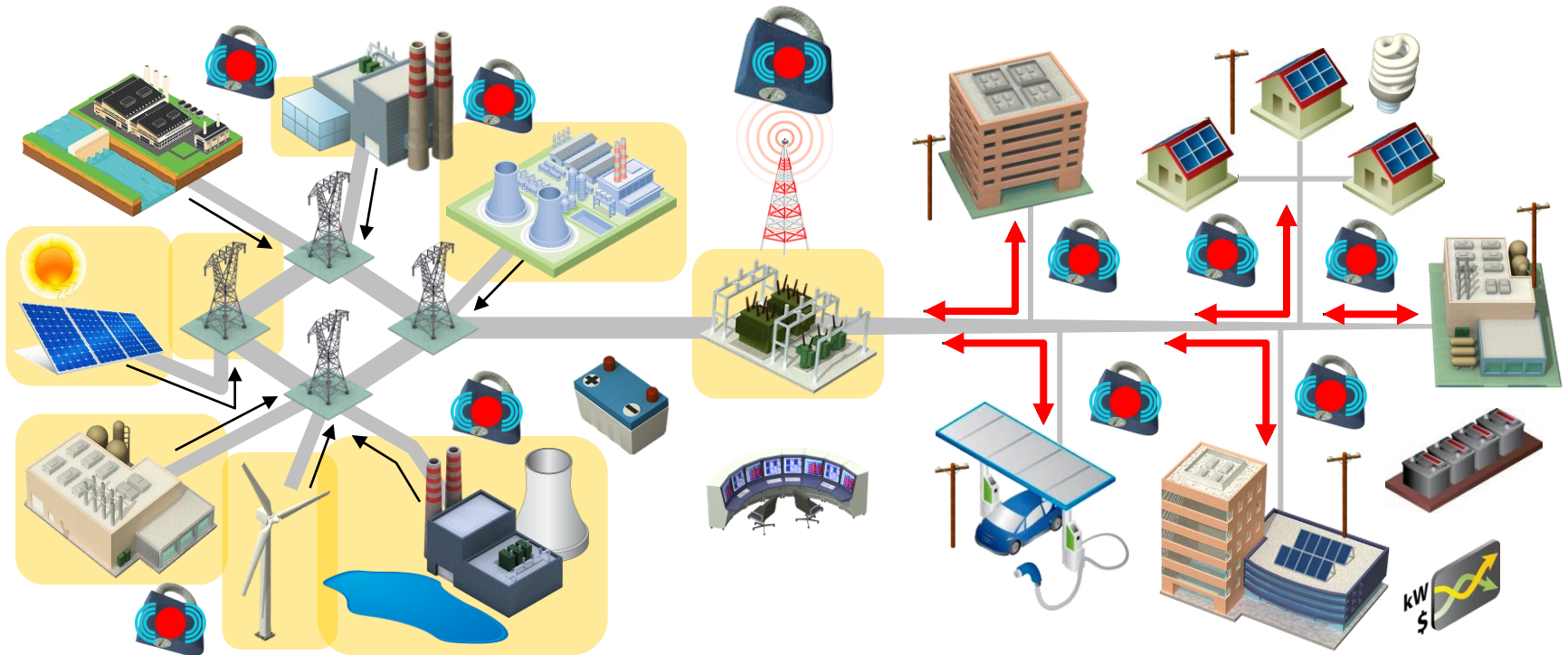
500 EPRI engineers and scientists working with 1,400 electric utility industry experts across 30 countries to
Shape the Future of Electricity

Today's Discussion

- The Challenge – Transformational Change
- Meet the Challenge – Technology Innovation
- Drive to Success – Global Collaboration



Vision defines the challenges



**Future Power System will require new technologies,
infrastructure, and control systems**

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Strategic Technical Issues

Smart
Grid



Energy
Efficiency



Long-Term
Operations



Renewable Resources
and Integration



Near-Zero
Emissions



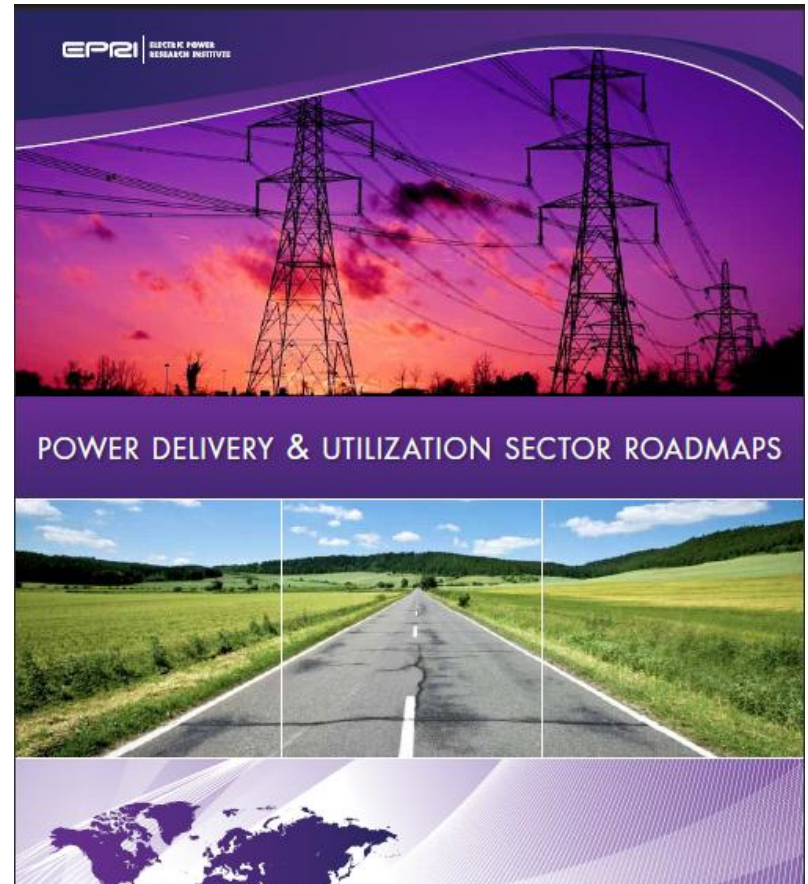
Water Resource
Management



Significant Challenges – Innovative Solutions

R&D Roadmaps – Developing Research Priorities

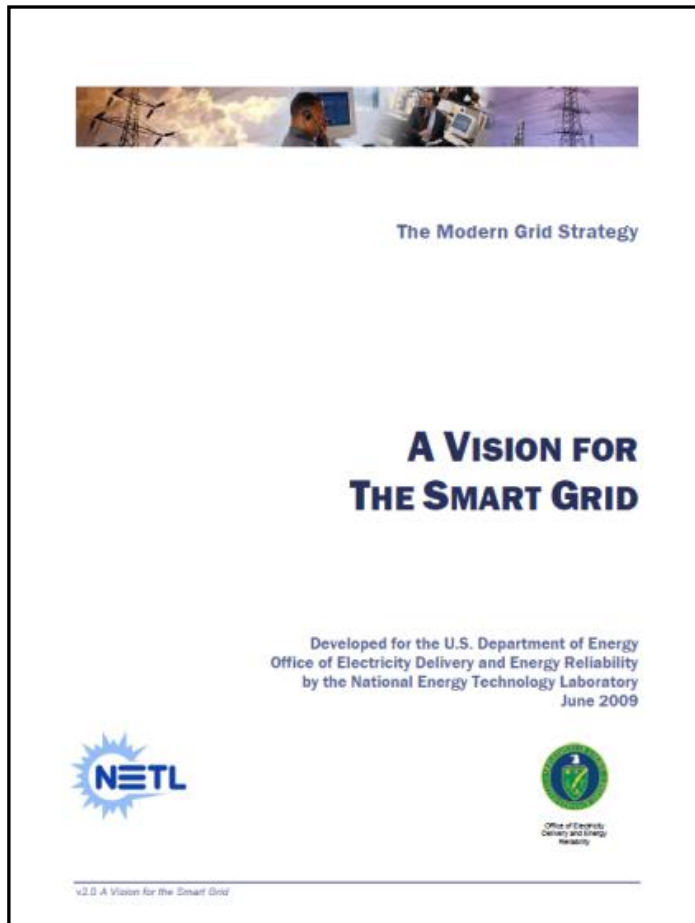
- Strategic issues that need to be addressed
- Action plans
- Research portfolio
- Coordination with other research organizations
- Coordination with industry



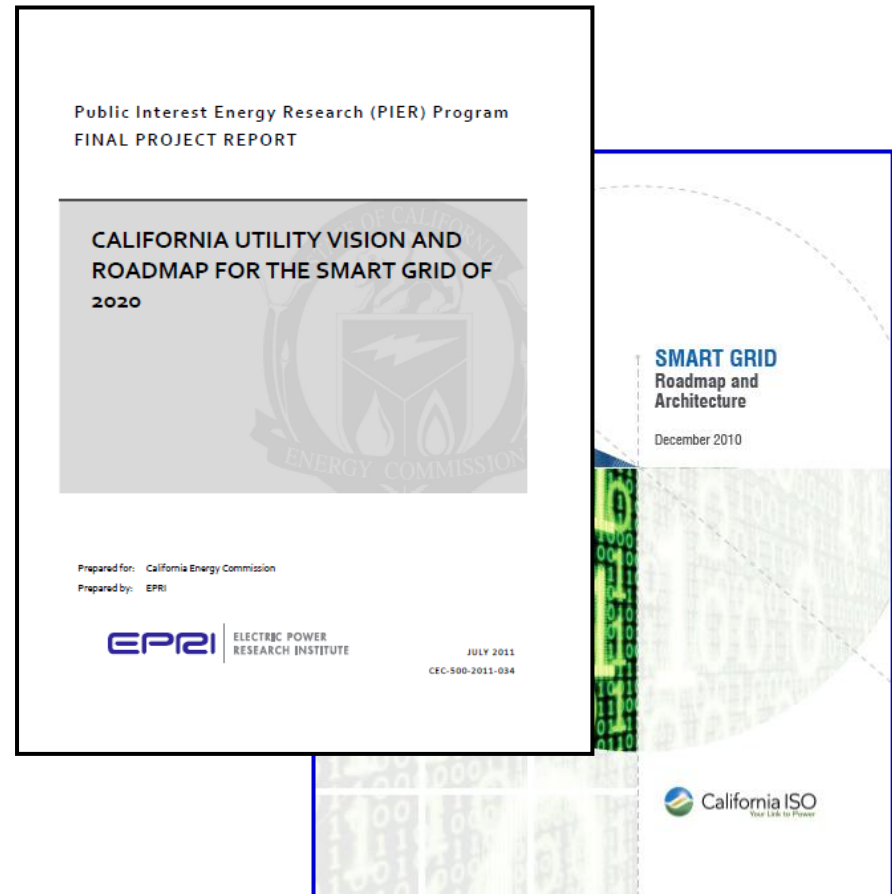
Roadmaps are living documents

Coordination with the Industry

Department of Energy



Electric Utility Industry



Innovation Challenge – Flexibility



Smart Appliances



Distributed Energy Storage



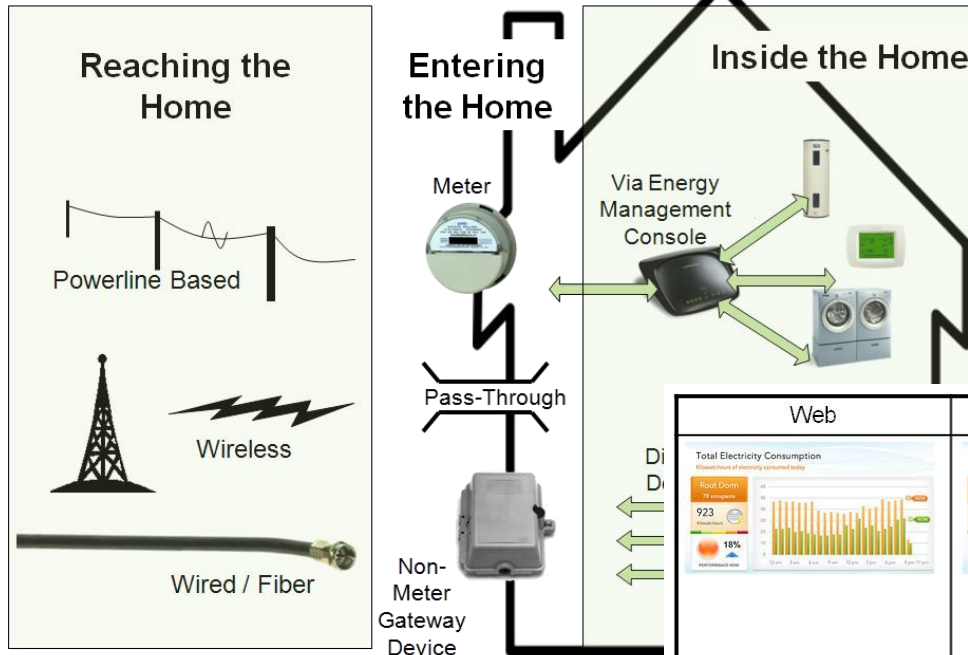
Renewable Generation



Electric Vehicles

Integrated with DMS and EMS

Innovation Challenge - Integrating the Customer



Customer engagement is critical!

Web	Web + IHD Basic	Web + IHD Advanced	Web + IHD + PCT
<p>Total Electricity Consumption</p> <p>Known hours of electricity consumed today</p> <p>Root Cause 12 messages</p> <p>923</p> <p>18%</p> <p>PERFORMANCE NOW</p>	<p>Total Electricity Consumption</p> <p>Known hours of electricity consumed today</p> <p>Root Cause 12 messages</p> <p>923</p> <p>18%</p> <p>PERFORMANCE NOW</p>	<p>Total Electricity Consumption</p> <p>Known hours of electricity consumed today</p> <p>Root Cause 12 messages</p> <p>923</p> <p>18%</p> <p>PERFORMANCE NOW</p>	<p>Total Electricity Consumption</p> <p>Known hours of electricity consumed today</p> <p>Root Cause 12 messages</p> <p>923</p> <p>18%</p> <p>PERFORMANCE NOW</p>

Innovation Challenge - Grid Modernization



Reliability Assurance with an Aging Infrastructure

Innovation Challenge – Grid Resiliency



Physical Infrastructure



Information Infrastructure

Key to Resiliency: Prevention, Recovery, Survivability

Coordinating R&D with Demonstrations and Deployments

Communications and IT

Communication Infrastructure

Information Systems Integration

Security

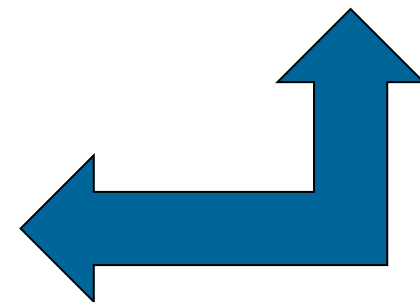
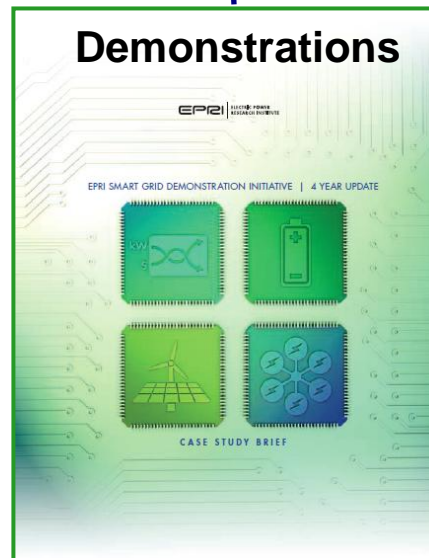
Applications and Technology

Technology Assessments

New Technologies

New Applications and Systems

Smart Grid

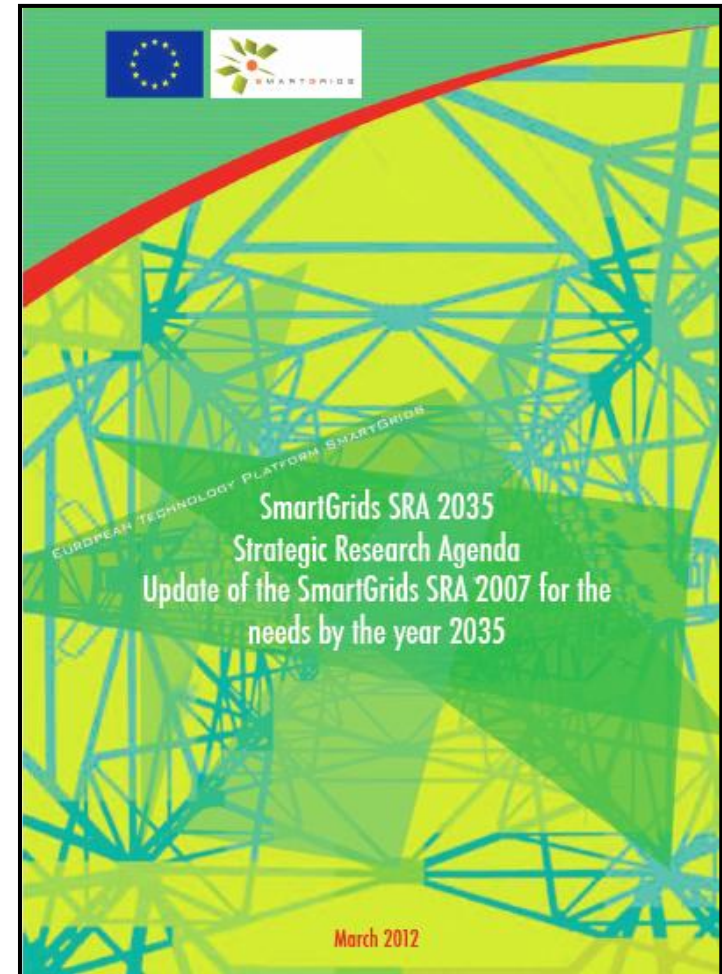
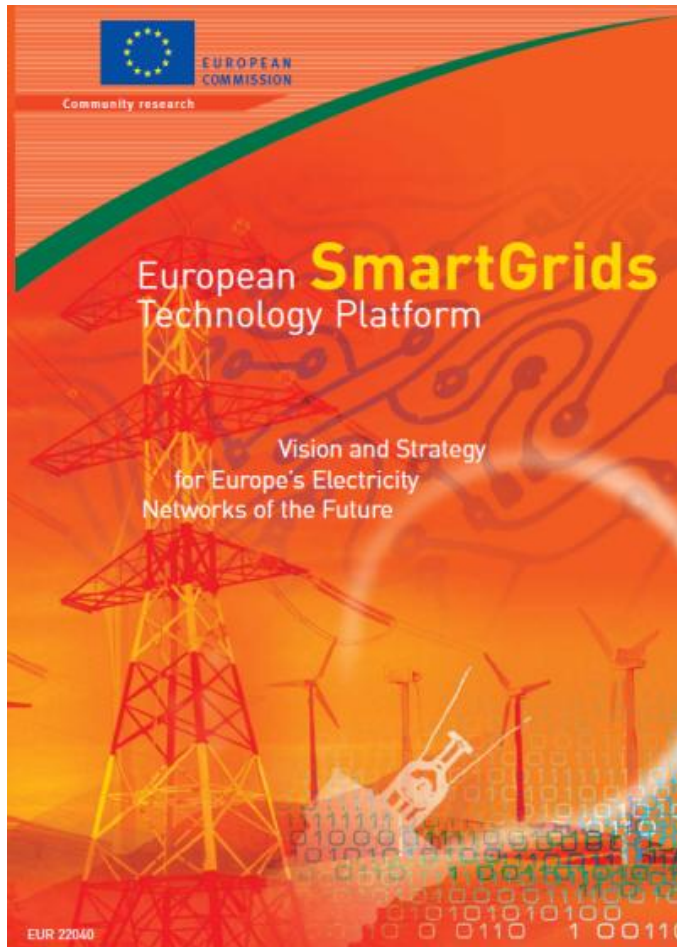


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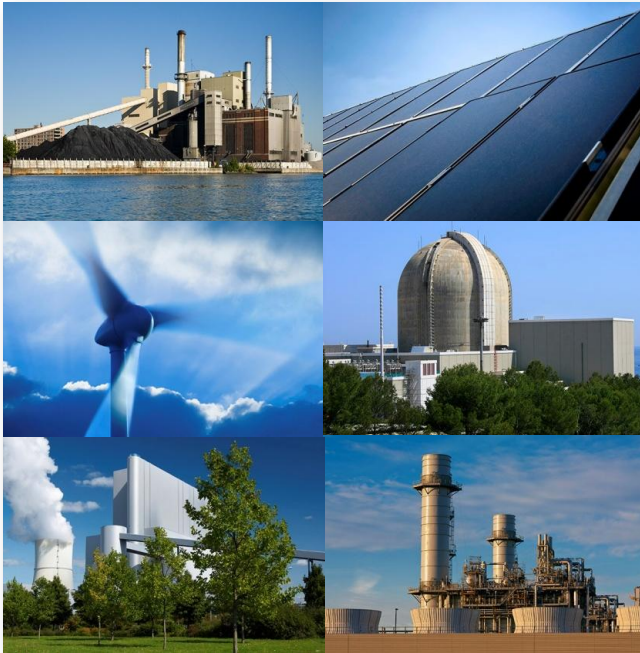


International Collaboration is Critical



The Power System of the Future

*The Challenge: Provide Society with Electricity that is
Reliable, Affordable and Environmentally Responsible*



Generation



Delivery



Customer

Together...Shaping the Future of Electricity