



RIC 2010
**International Activities in Long
Term Research Projects**

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EPRI Nuclear Sector Background

- **Mission**
 - To conduct research on key issues facing the electricity sector on behalf of its members, energy stakeholders, and society
 - Develop and provide the nuclear industry with safe, reliable, economic, and environmentally responsible technologies that maximize existing asset value and enable advanced plant deployment
- **Broad portfolio – all aspects of nuclear plant design, operations, maintenance and support**
 - Near Term (less than ~ 5 years)
 - Longer Term (greater than ~ 5 years)



Five to ten years out—what does industry want in the plant—and will NRC agree?

- **In-Core Fuel Performance Regimen**
 - Higher burnups
 - Higher enrichments
 - Silicon carbide cladding
 - New fuel matrix—metal-fuel composite



Five to ten years out—what does industry want in the plant—and will NRC agree?

- **Spent Fuel Management**
 - Spent fuel pool criticality – demonstration of appropriate benchmarking of criticality codes
 - Spent Fuel Casks – license for > 60 years
 - Independent Spent Fuel Storage Installation security requirements be risk-informed
 - Used Fuel Shipping Requirements – permit transportation of high burn up spent fuel



Five to ten years out—what does industry want in the plant—and will NRC agree?

- **Control, Process and Monitoring Systems**
 - Exclusively Digital I&C systems – without any analog backup
 - Wireless in-situ monitoring of structures, systems and component performance (in Safety Related Systems)



Five to ten years out—what does industry want in the plant—and will NRC agree?

- **Analytical Capabilities and Tools**
 - Reload and Safety Analyses based on new high performance computing modeling & simulation tools
 - Confirmation of validation and quantification fidelity
 - Acceptability of predictive results in lieu of empirical data
 - Probabilistic Risk Assessment (PRA) methods & data that are truly ‘best estimate’
 - Refined safety margin characterization – account for life cycle management / aging mechanisms – assure same level of safety for life of plant



Five to ten years out—what does industry want in the plant—and will NRC agree?

- Long term operations is continuous *high performance* operation of the current nuclear plants worldwide to 2050 and beyond
 - Measured by availability, reliability, safety, and cost
- Concurrence on the technical basis, criteria, inspections, and programs for the next phase of License Renewal (beyond 60 years) for
 - Reactor internals
 - Concrete and containment
 - Instrument and power cables
 - Etcetera—issues list is being evaluated and refined



Five to Ten years out—what does industry want in the plant—and will NRC agree?

- **New Plant Deployment**
 - Demonstrate workability of 10CFR52 in current Design Certification (DC) and COLA approval for near-term deployment of GEN III/III+ designs
 - Demonstrate workability of current licensing structure for DC of the NGNP (HTGR) technologies for cogeneration of electricity and process steam
 - Develop a longer term, standard “administrative regulatory licensing structure” to accommodate future reactor concepts
 - Assure predictability in the Design Centered Review Approach providing there is a high level of standardization