Opportunities for Continuous Improvement and Research for New Plant Projects

Design Development

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WNA New Build Licensing Conference
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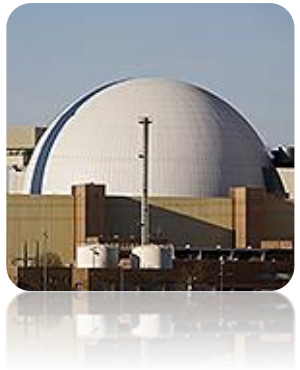
EPRI's Mission

Advancing ***safe***, ***reliable***, ***affordable*** and ***environmentally responsible*** electricity for society through global collaboration, thought leadership and science & technology innovation

Nuclear



Environment

Generation

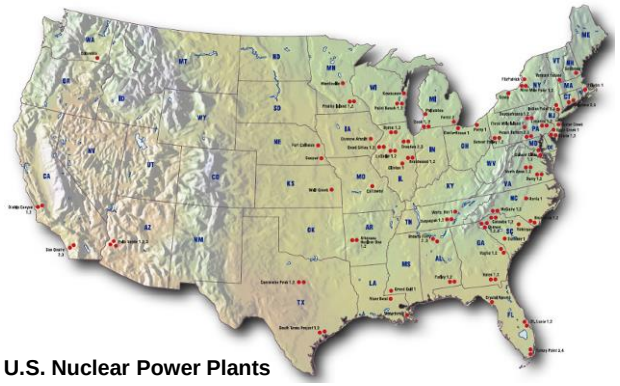
Power Delivery and Utilization

Independent – Nonprofit – Collaborative

EPRI ELECTRIC POWER RESEARCH INSTITUTE

Nuclear Sector Membership

U.S. Participants



U.S. Nuclear Power Plants

Source: NEI Website, 2009

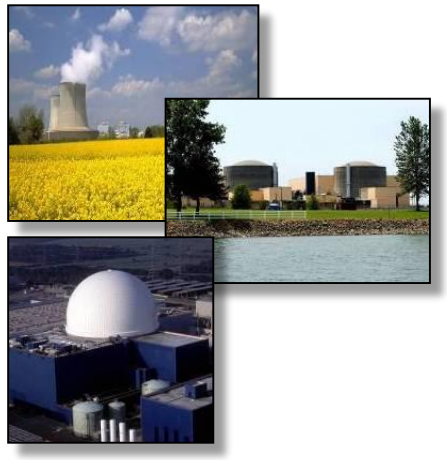
All U.S. nuclear owners/operators

(100 reactors)

Non-U.S. Participants

20 countries, >220 reactors

Global Breadth and Depth

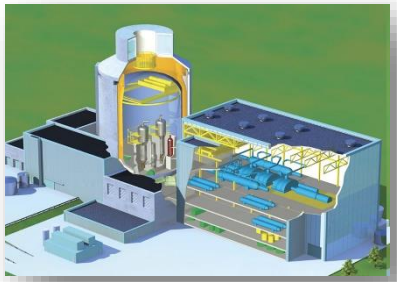


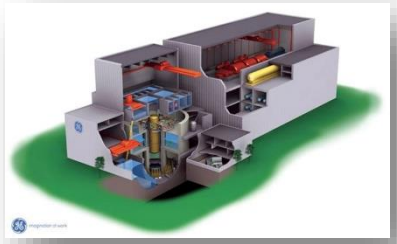
~80% of the world's commercial nuclear units

Participants Encompass Most Nuclear Reactor Designs

ANT Program Overview

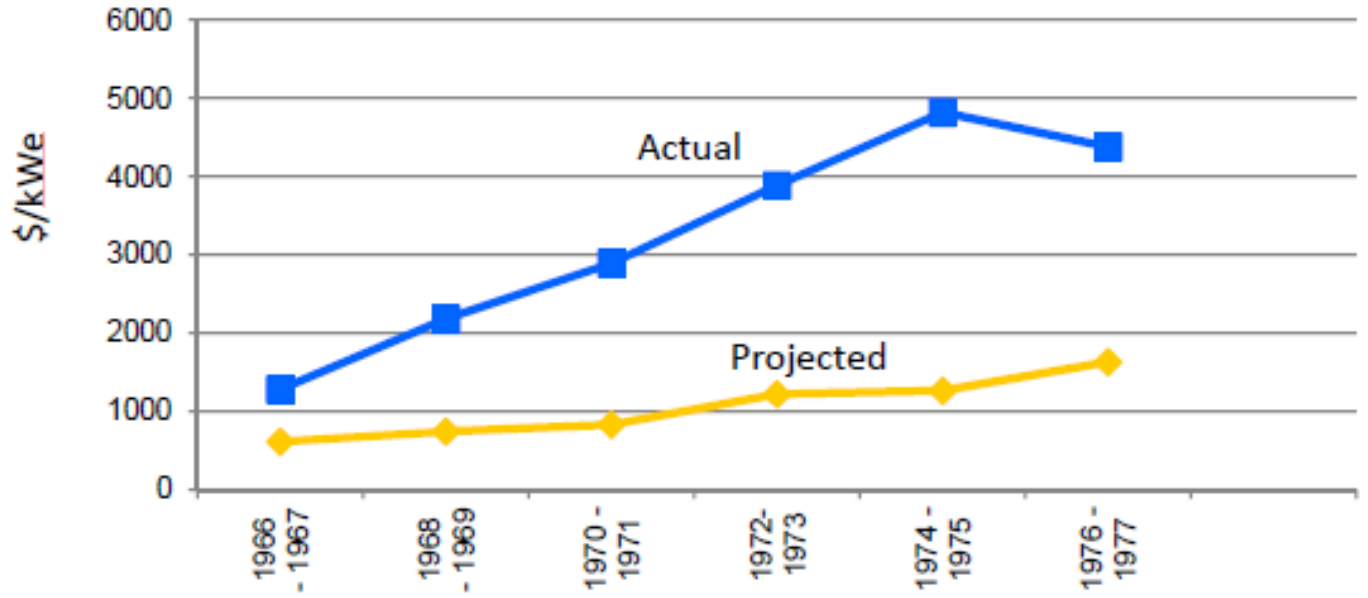
- **Accelerates and focuses work targeted at new plants**
  - Work not already being done in other areas of EPRI
- **Primary focus is on light water reactor designs**
  - Gen III, Gen III+, and light water Small Modular Reactor (SMR) designs
- **Minor focus on longer term designs**
  - Gen IV and non-light water SMRs
- **Address Multiple Stakeholders**
  - Global Issues and Various Stages of Deployment
- **Target issues where EPRI can have an impact**
  - Clear value in our collaborative environment





Design Change Impact and Cost

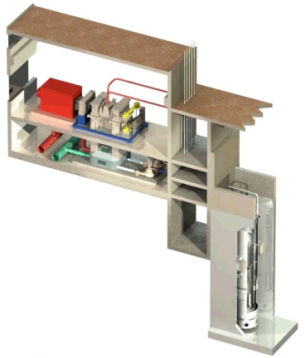
- Cost and schedule overruns – many new build issues …
  - Construction speed and quality
  - Risk management
  - Dormant supply chain
  - Integration challenges
  - Outdated Codes
  - First of a generation construction issues



Source: RAND Corp. Study, 1981

Part 52 Process and Regulatory Oversight

- Many variables in play when considering new nuclear
- Demonstration of Part 52 licensing ... and licensing stability
- New licensing challenges, new construction/operating paradigms
- What was once “minutiae” is now common for evaluation
- ITAAC issues
  - Systems engineering approach

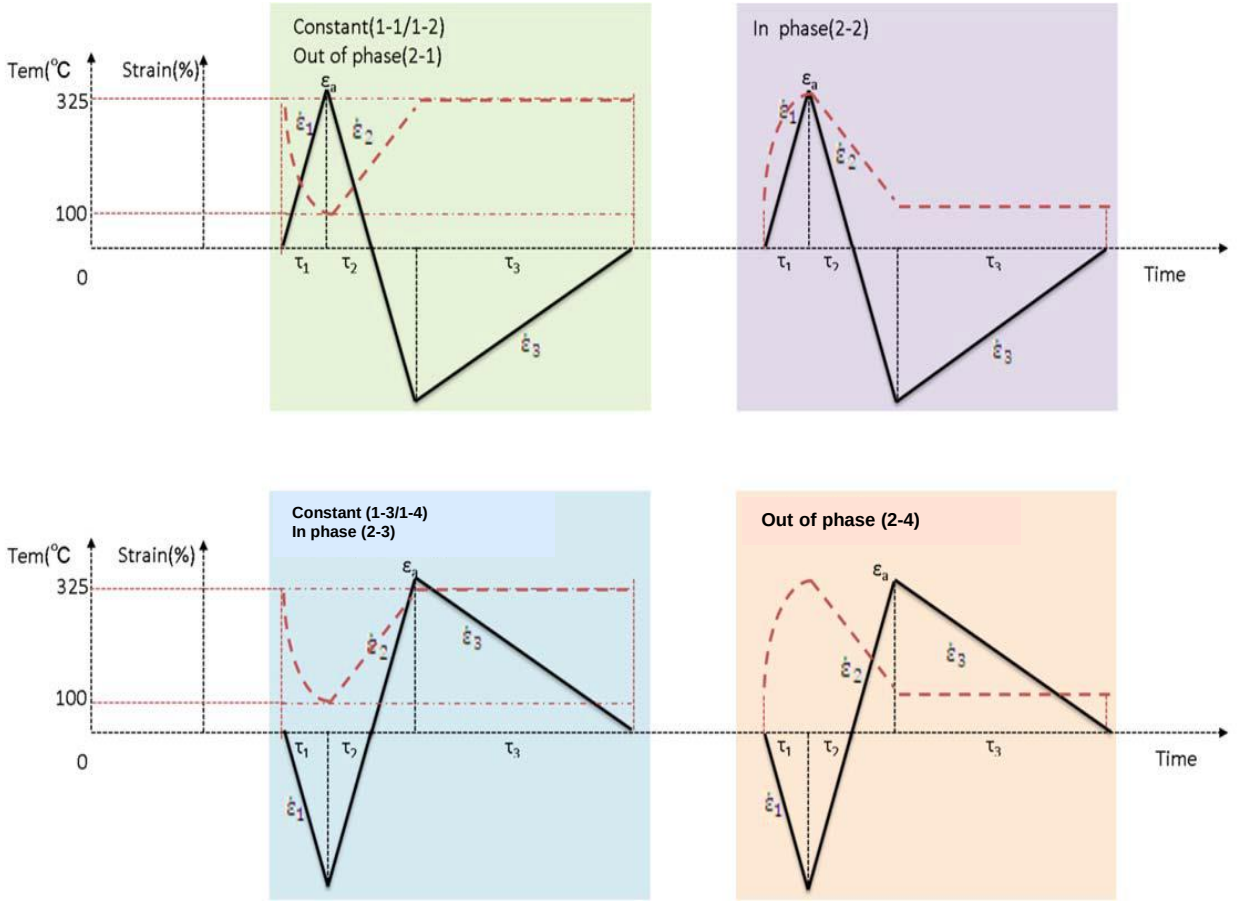


The Role of Research: Design Change Management

- Opportunities to …
  - Inform industry and regulatory positions
  - Proactively address issues
  - Identify technical improvements impacting licensing
  - Continuous improvement in approach

Environmentally Assisted Fatigue (EAF)

- Industry-wide appeal to reduce conservatism
- Strategy: demonstrate material improvement through testing
  - Work with industry, standards bodies, and regulators
  - Update the Codes
  - Improve licensing process



EAF: U.S. Governing Documents

10 CFR 50.55

- Code of Federal Regulation is federal law and utilities are bound by their license to strictly adhere to it.
- 10 CFR 50.55a(c) requires components of the reactor coolant pressure boundary to meet the requirements of ASME Code for Class 1 components in Section III

ASME Boiler and Pressure Vessel Code

- Section III “Rules for Construction of Nuclear Power Plant Components”

Regulatory Guide 1.207

- Provides guidance for determining the acceptable fatigue life of ASME pressure boundary components with consideration of LWR environment
- Reg. Guide 1.207 *is not* law or regulation.

NUREG/CR-6909

- Provides the technical basis for the F_{en} method recommended in Reg. Guide 1.207

Design Maturity and Moving Forward

- Managing project risk
- Comparative understanding of licensing process
- Looking for harmonization in design and process
- On the horizon: Small Modular Reactors

Together…Shaping the Future of Electricity