



Power Uprate Support

EPRI Power Uprate Supplemental Project and Associated R&D



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DOE UPRISE Meeting
5/27/2026

Supplemental Project: Facilitating Power Upgrades (3002025839)

Objectives & Applicability

- Identify solutions for Barriers preventing upgrades
- Applicable to all NSSS & BOP designs
- Applicable for plants that have not implemented previous upgrades and those that want to go beyond EPU
- Ensure Resiliency and LCM a part of the solution
- Build in margin improvement and hardening



Proposed Results

- Technology solutions to eliminate or mitigate barriers
- New methods for analysis
- Efficiency Improvements
 - House Loads
 - Turbine Replacements
- More resilient NPPs

Industry Exchange Benefits



Monthly Technical Advisory Group (TAG) Meetings

- Routine “round table” discussions on project issues

Annual Power Upgrade Workshop

- Attendees from across the US and international industry
- Over 200 attendees in 2025

Project Update

- Still Signing up Members
- Currently 12 members have joined
- September 2026 Workshop planning in progress
- Margin Management Tool release 5/31/26
- Training projects in-progress

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Feasibility Study Guideline



Rehabilitated Power Plant Uprate Database (PPUDB)

EPRI Power Plant Uprate Database

Search

Use the controls below to build a keyword-based query or leave them blank to include all keywords.

Keyword Search [[Need Help?](#)]

Keyword 1 10

And Keyword 2

And Keyword 3

Note: Hold down the CTRL button to select multiple categories.

Limit by Plant Type

- Nuclear - PWR
- Nuclear - BWR
- Coal - Pulverized
- Coal - Fluidized Bed
- Gas Fired Boiler
- Combustion Turbine - Simple Cycle

Limit by Plant System

- Access
- Admin. Bldg. Environmental Cntrl. Sys.
- Administration Building
- Air Supply System
- Annunciator System
- Aux. Bldg. Environmental Control System

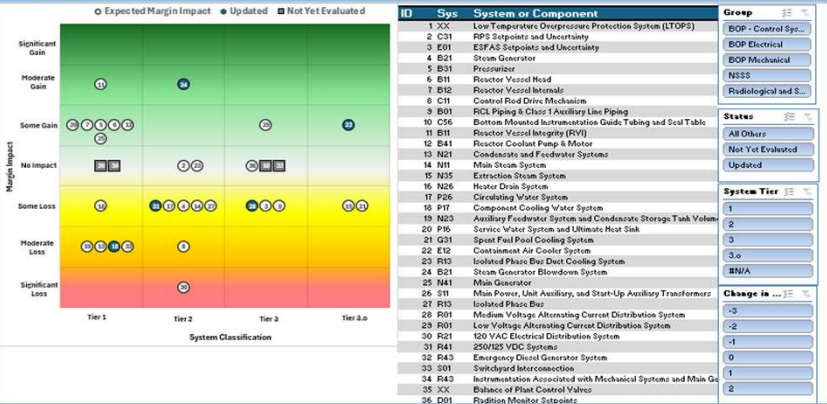
Limit by Plant Components

- Air Dryer
- Air Lock
- Air Receiver
- Alarm
- Annunciator Module
- Battery

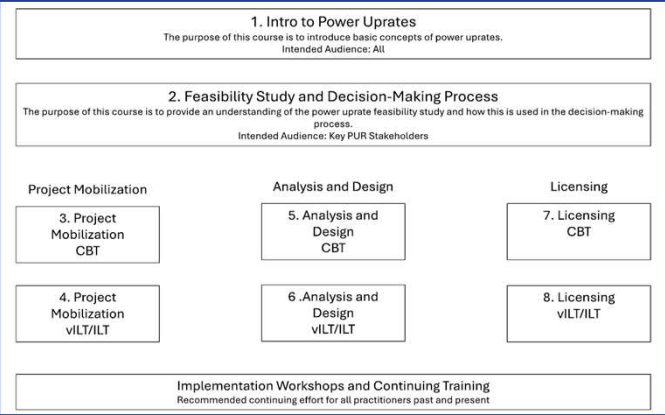
Limit by Plant Categories

- BOP evaluations
- Feasibility Study
- Flow Induced Vibration
- Implementation (resources, logistics, proo
- Margin Management
- Modifications

Margin Management Tool (May 2026)



EPRI Training Courses (2027)



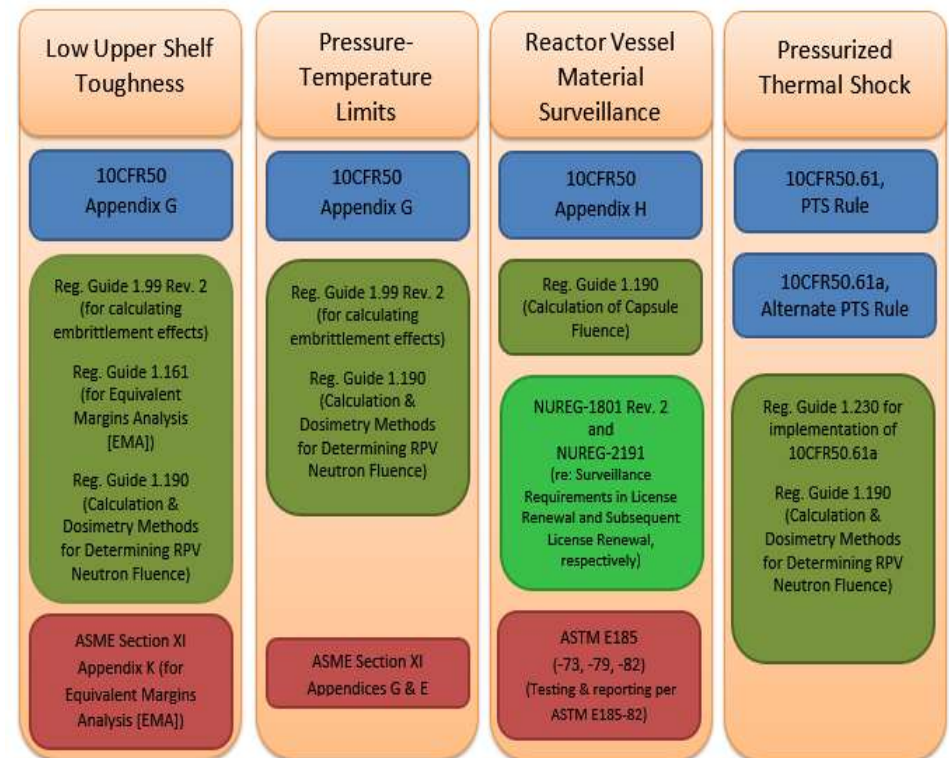
Additional EPRI R&D to Support Upgrades

- Plant Reliability and Resilience (PRR)
 - Thermal Performance / Heat Sink Performance
 - Extreme Environmental Impacts on Cooling Systems
 - EPRI Report 3002018337, "Use Of Data Validation And Reconciliation Methods For Measurement Uncertainty Recapture: Topical Report"
 - Outage preparation and execution
- Risk and Safety Management (RSM)
 - Risk Informed Transition Break Size (TBS) / Loss of Coolant Accident (LOCA) Research
 - Additional Risk Informed Methodologies (e.g., RI Non-Destructive Evaluation (NDE) to support upgrade evaluation for High Energy Line Breaks (HELB))
- Nuclear Fuel Performance Optimization (NFPO)
 - Accident Tolerant Fuel, Higher Burnup, and Higher Enrichment Fuel
 - ALS (Alternative Licensing Strategy) – A risk-informed regulatory framework to address large break LOCA-induced fuel fragmentation, relocation, and dispersal (FFRD) (PWRs only)
 - FFRD consequences evaluations
 - Coated cladding evaluations
 - Time-at-temperature (t@T) – Improve fuel margins and allow plants to implement higher power upgrades and improve fuel cycle economy while maintaining safe operation
 - Fuel Reliability and Performance Evaluations – perform fuel inspections to assess fuel reliability and performance margins after implementing 24-month fuel cycles and power upgrades
 - Optimization of Current Fuel Designs and New Fuel Concepts to Support EPU+ and Further Capacity Expansion
 - CRAFT - a structured forum to address fuel issues through coordination among various industry stakeholder and drives to accelerated resolution of fuel issues such as FFRD and t@T R&D while avoiding duplication throughout the industry via collaboration.

Additional EPRI R&D to Support Upgrades

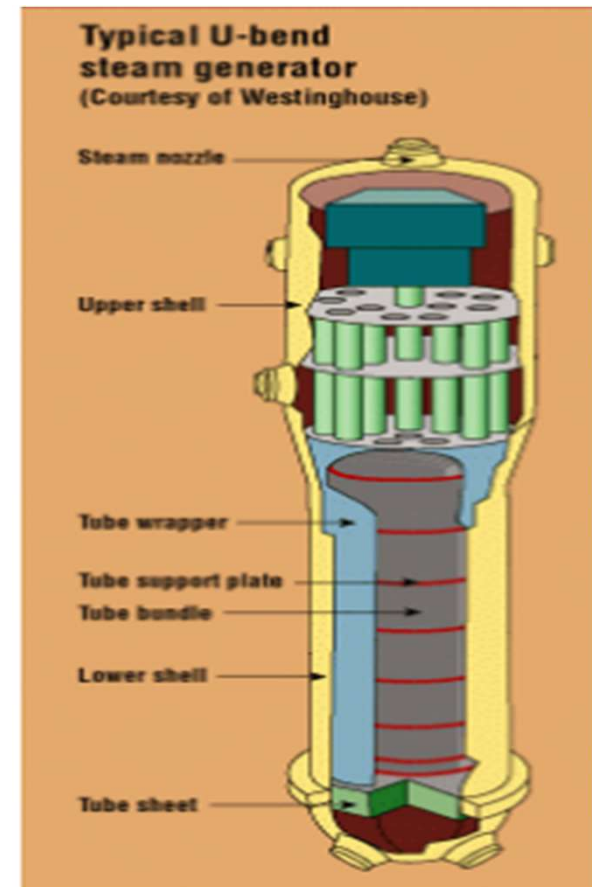
- Materials Reliability Program (MRP)
 - Reactor Pressure Vessel (RPV) Integrity Approach: RPV Life Extension and Upgrade Analyses
 - MRP-227 Revision 2-A: guidance on the 'Fuel Management strategy' for the PWR units
 - Need to consider EPU changes as part of continued planning for operating in L.R. Period of Extended Operation
 - Potential R&D on Flow Induced Vibration (FIV) and resultant fatigue failures

- Primary Reactor Vessel Integrity Regulations



Additional EPRI R&D to Support Upgrades

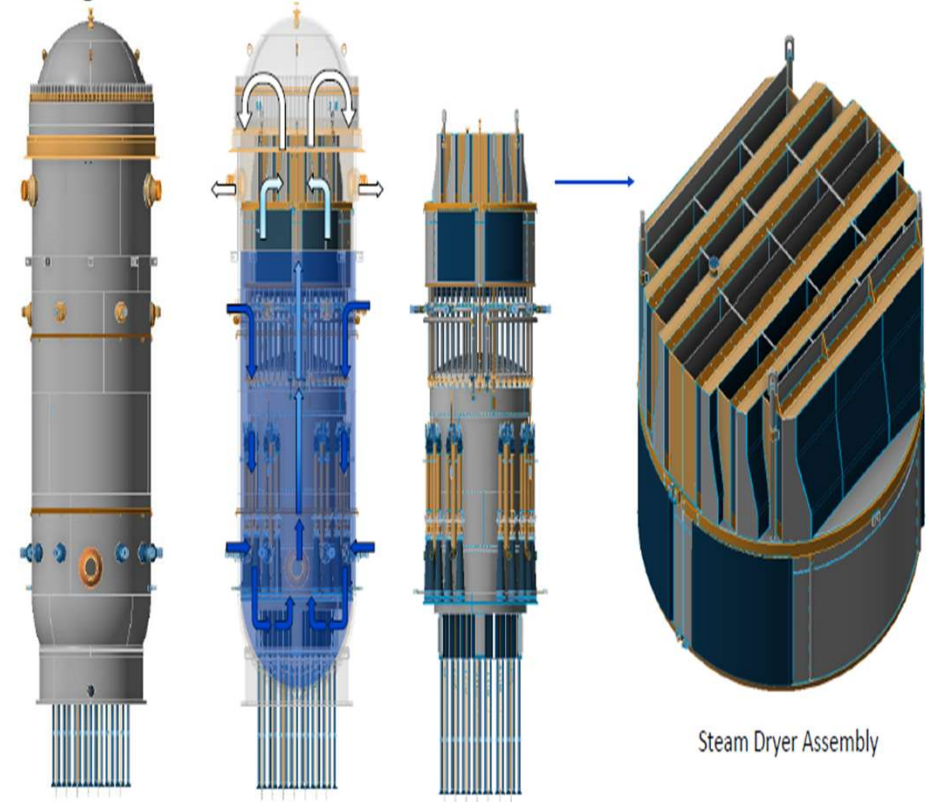
- Steam Generator Management Program (SGMP)
 - Stress corrosion cracking (SCC) is thermally driven and an increase in temperature is expected to result in an increase of SCC for plants with susceptible alloys.
 - Power upgrades increase the temperature, pressure, and flow rates in the secondary side, accelerating degradation including in the steam separating components.
 - Higher steam and feedwater flow rates can lead to increased vibration, resulting in wear related tube degradation which could result in primary-to-secondary leakage or failing regulatory requirements.
 - Increased load may accelerate plant aging, potentially requiring more frequent inspections and earlier component replacement.



Additional EPRI R&D to Support Upgrades

- BWR Vessel Internals Program (BWRVIP)
 - Previous EPU lessons learned for BWR steam dryer vibration
 - Multiple operating BWRs experienced significant fatigue cracking during operation at EPU conditions
 - BWRVIP-182-A provides guidance to members for demonstrating steam dryer integrity for power uprate (2%-20%)
 - New R&D for ex-vessel vibration monitoring for RPV internals (BWRs and PWRs)

Boiling Water Reactor Overview



Water and Steam Flow Path in Vessel

Steam Dryer Assembly

Advanced Nuclear Technology (ANT) Program Focus

MISSION: Accelerating the deployment of nuclear power around the world.

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Project
Development
& Execution

Advanced
Manufacturing
& Materials
Qualification

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GOAL

Enable **existing** and **future** nuclear plants to **participate in energy markets beyond the practice of generating baseload electricity.**



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