



JAEA – Sixth Symposium on U.S.-Japan Nuclear Research Cooperation

EPRI Research Focus Areas

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International Collaboration to Enhance Safety and Performance

EPRI Membership 2023

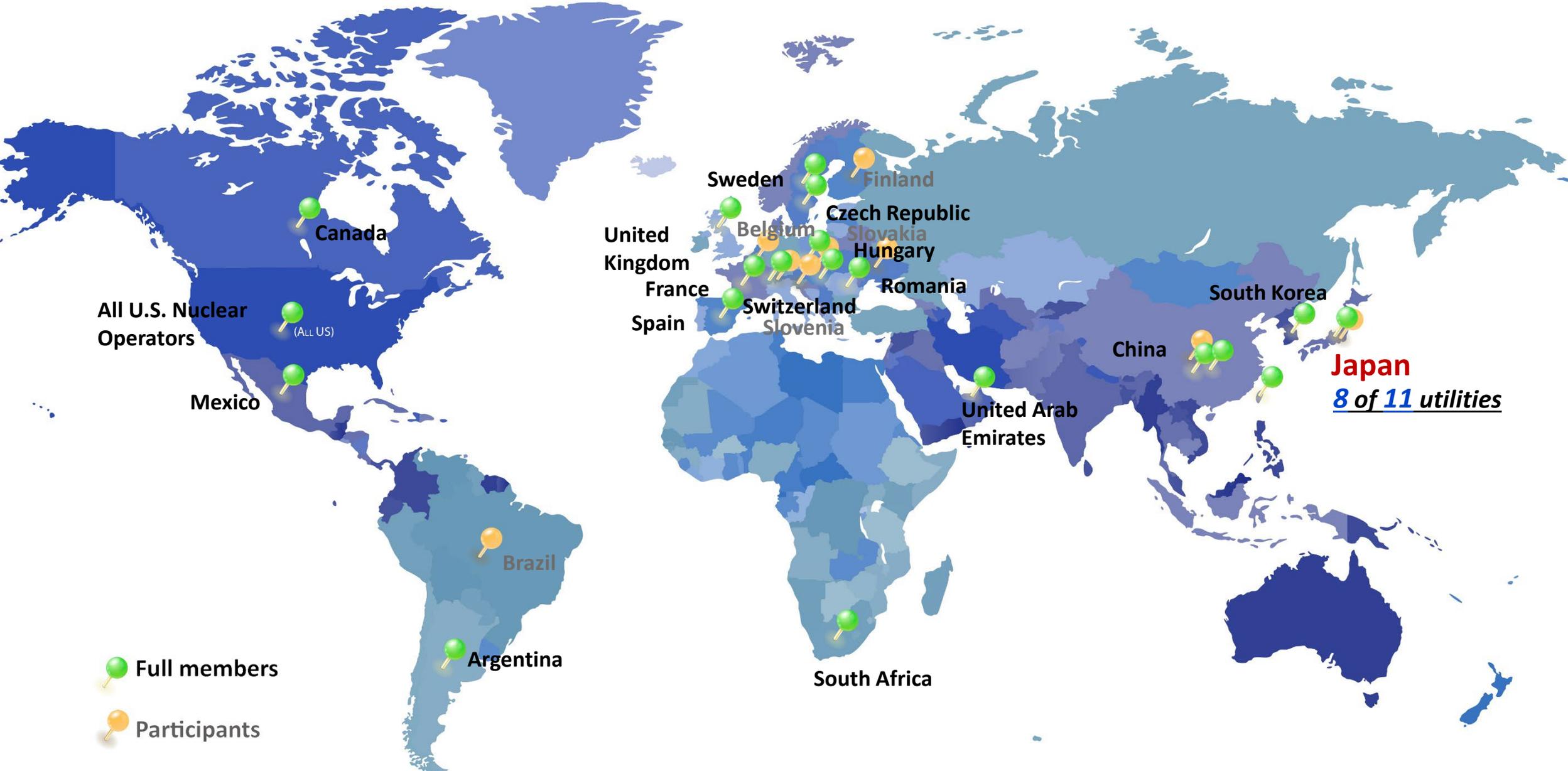
- **48** full members:
 - **22** U.S.-based
 - **26** International



>360 reactors worldwide

Opportunity to add new members in 2023/2024

Global Reach



Critical industry issues we're focused on in EPRI Nuclear

**Plant Life
Extension**

**Climate
Resiliency**

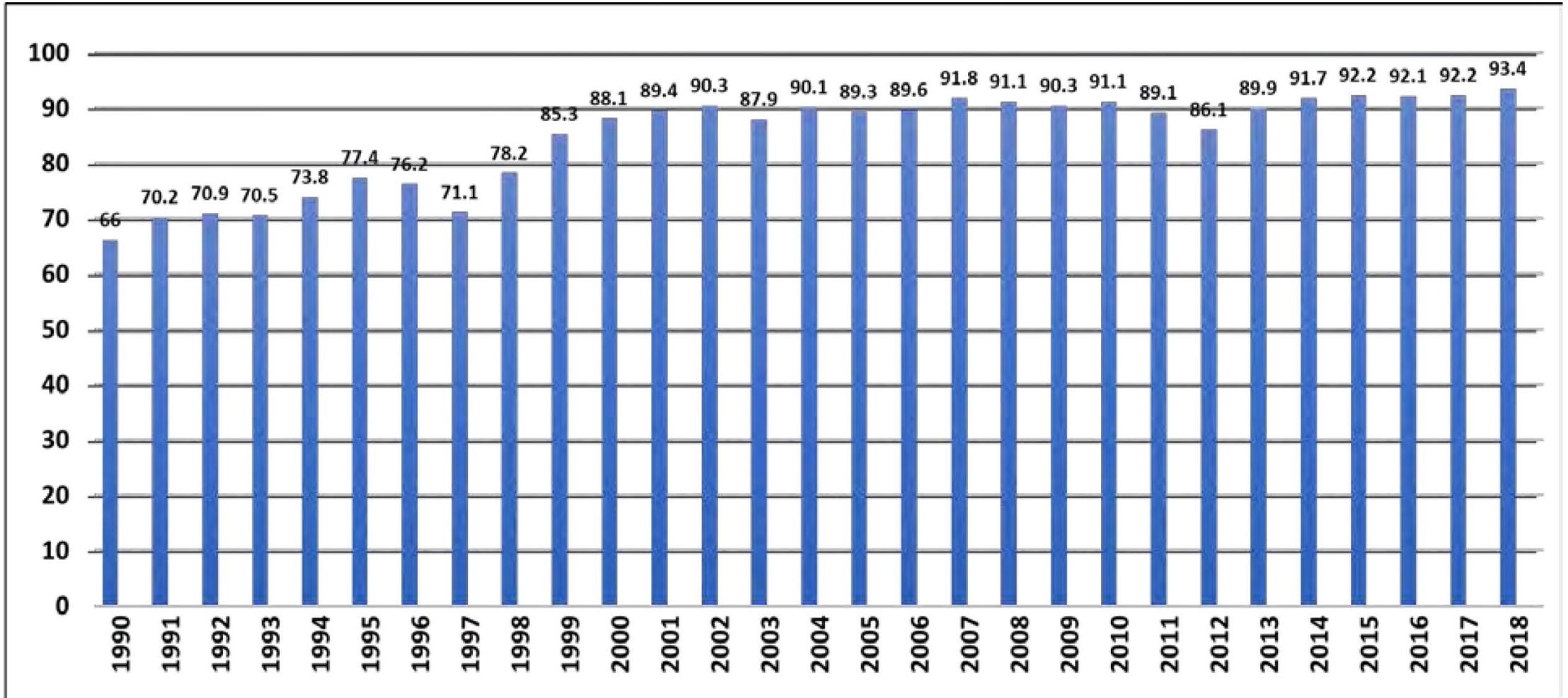
**Advanced
Reactors
Roadmap**

**Workforce
Development
& Retention**

**Advanced
Manufacturing**

Fusion

U.S. Capacity Factor



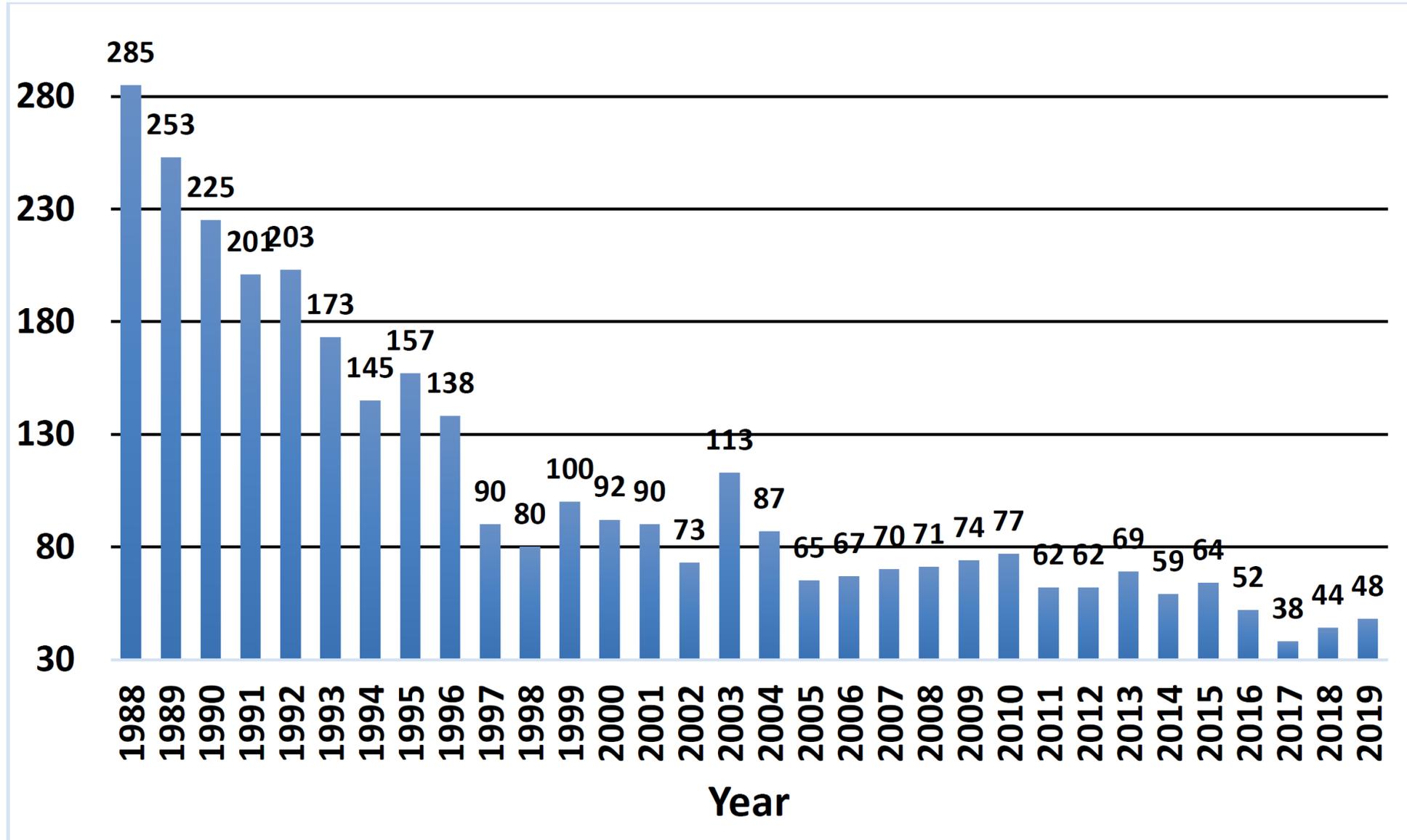
2021:
92.7%

Source: [NEI](#)

Source: Energy Information Administration

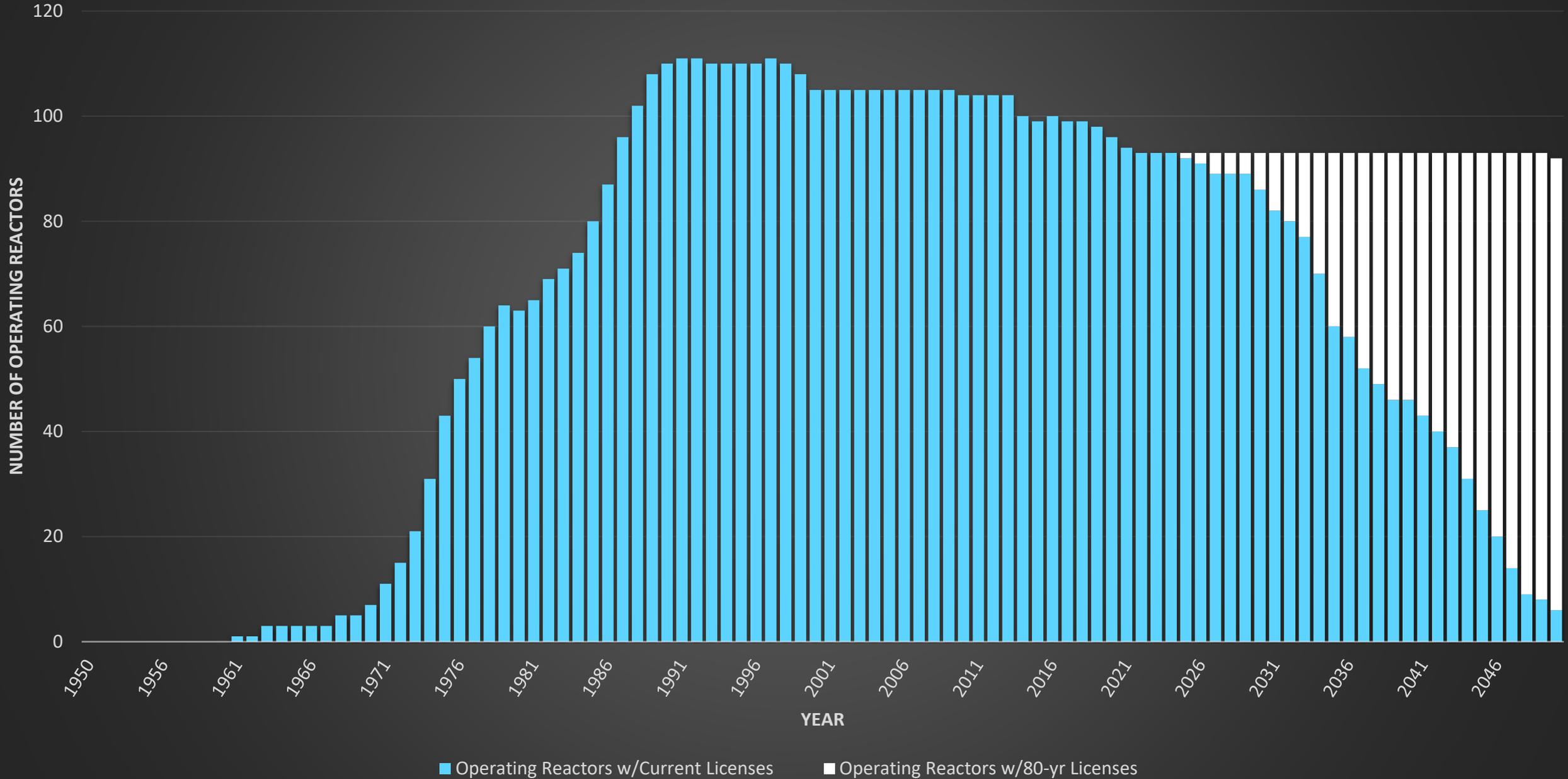
U.S. Nuclear Plant Capacity Factor (%)

U.S. Unplanned Reactor Shutdowns



Source: [American Nuclear Society](#)

Number of Operating U.S. Reactors: 1950 – 2050



U.S. License Renewal

U.S. NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment
October 2021

U.S. Operating Commercial Nuclear Power Reactors License Renewals Granted



Note: The NRC has issued a total of 94 initial license renewals: 9 of these units have permanently shut down.
Data are as of July 2021. For the most recent information, go to NRC Web page at <https://www.nrc.gov/info-finder.html>

- **94** Initial License Renewals (ILR) issued
- **2** ILR under review
- **2** ILR expected in next two years
- **6** Subsequent License Renewals (SLR) issued
- **10** SLR applications under review
- **8** SLR applications expected in next three years

Focus: Plant life extension



What to Watch For

Digital Transformation (DX) can address aging, reliability and efficiency through digital controls, communications backbones, and IT infrastructure to **analyze data and inform O&M**.

Challenge: Due to differing architecture, communications protocols, data standards, and security concerns, some components and systems are digital with rich data, while others are not, and the data is not widely available within a plant.



EPRI's Role

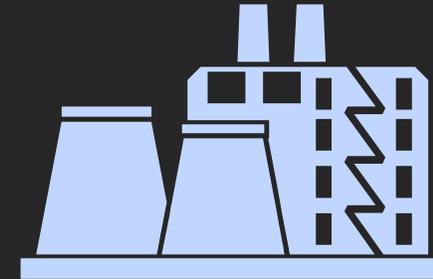
R&D dedicated to **increasing productivity** throughout **phases of a plant's life**

The Plant Modernization Toolbox helps **identify and evaluate cost savings** through business case analyses and technology assessments focused on:

- **Digital upgrades**
- **Wireless connectivity**
- **Software application integration**
- **Business process automation**
- **Condition based maintenance**
- **Automated chemistry monitoring**
- **Physical security**
- **Emergency planning**
- **Radiation monitoring**
- **Structural health monitoring**

Industry Impact

As NPP lifetimes are extended, plants must manage **aging degradation of critical plant structures and components**, prevent **safety significant operational events**, and demonstrate acceptable (and even improved) **safety**.



EPRI DEVELOPED THE TECHNICAL BASIS AND GUIDANCE TO INFORM PLANT LICENSE EXTENSION FOR LTO. THIS EXPERTISE HAS BEEN LEVERAGED TO DEVELOP THE MODERNIZATION FRAMEWORK AND CROSS-SECTOR DX EFFORTS TO GUIDE THE INDUSTRY IN EXTENDED PLANT LIFE AND OPERATIONAL OPTIMIZATION.

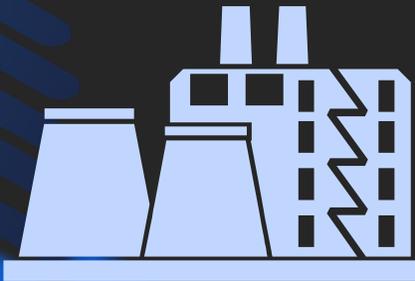
Focus: RSM Activities Post-Fukushima



EPRI's Related Work

RSM has performed significant work related to insights post-2011

- **Seismic**
- **External Flooding**
- **Combined External Hazards**
- Other External Hazards: **High Winds PRA, External Hazards Data Collection**
- **Severe Accident, MAAP, SAMG, and GOTHIC**
 - ✓ Fukushima accident analysis and forensics to aid decommissioning
 - ✓ Provided technical basis for current updated SAMG
- **Human Reliability Analysis (HRA) for External Hazards**
 - ✓ Addressing HRA for portable equipment activities
- **Risk-Informed Decision-Making (RIDM)**



Additional info: [EPRI 10-Year Fukushima Anniversary Retrospective Insight Report](#)

Highlights: Recent activity

Extended interval for Steam Generator Tube Inspections

50+

U.S. units will or have submitted for permanent extension



Average savings of

\$3M USD
per inspection

EPRI performed research and documented technical justification for longer interval

Extended interval for

Steam Generator Welds

Estimated plant savings of

\$660K USD



Increased inspection interval from

10 to **30**
years

Research leads to elimination of

Reactor Vessel Threads- in-Flange inspection

Saved

4 - 6 hours

of critical path work at each unit



Boral Testing

leads to

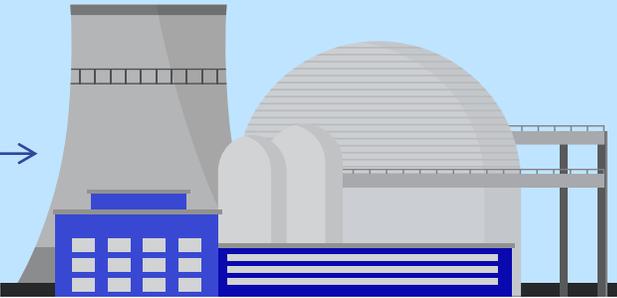
Extended Operations
of **Neutron Absorbers**



Simplified long-term operation and monitoring

Advanced Nuclear Technology (ANT) Program Focus

MISSION Accelerating the deployment of nuclear power around the world



 Informing Resource Planning

 Technology Development

 Reducing Deployment Costs

 Supporting Plant Startup

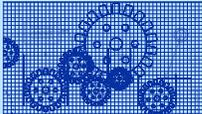
 Training

Siting and Owner Requirements



 Energy Economics

Design and Engineering



 Technical Basis

Construction Optimization



 Advanced Manufacturing

Commissioning

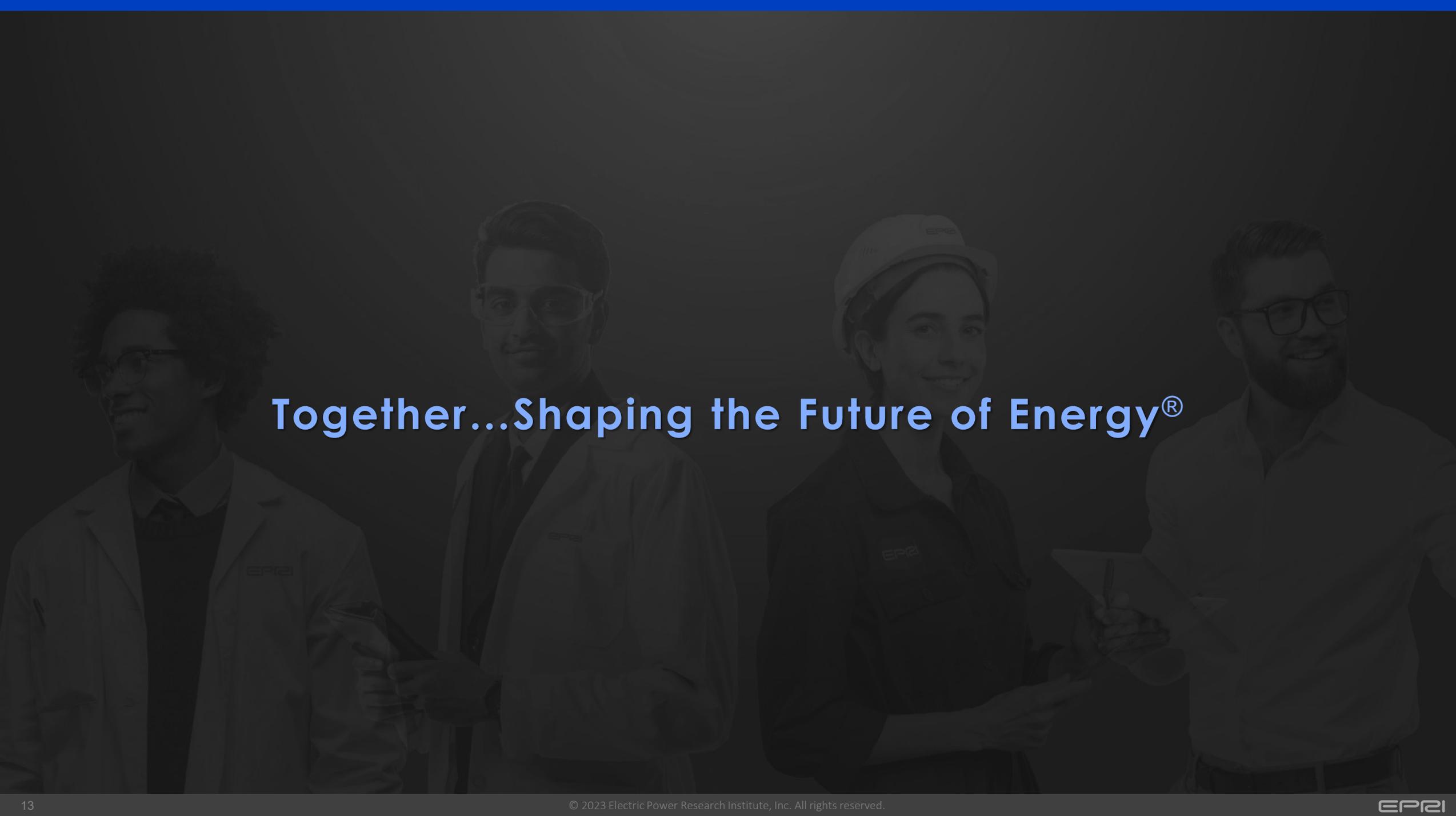


 Initial Operations

More than 80 companies make up the broadest advanced nuclear collaborative

From project initiation through initial operation
ANT is an extension of your team

Extensive Portfolio
40+ Ongoing Projects
200+ Past Products

A grayscale photograph of four people, two men and two women, standing in a row. They are all wearing white lab coats with the EPRI logo on the chest. The woman on the far right is also wearing a white hard hat. They appear to be in a professional or research setting, possibly a laboratory or office. The background is dark and out of focus.

Together...Shaping the Future of Energy®