



EPRI Overview and Nuclear Power Sector Issues

**International Nuclear Air Cleaning
Conference**

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EPRI = Collaborative, Integrated R&D Solutions



Large and Successful R&D Collaboration



- Objective, independent **collaborative** electricity and environmental research organization
- Science and technology focus--development, integration, demonstration and applications
- Broad technology portfolio ranging from **near-term** solutions to **long-term** strategic research
- More than 450 participants in over 40 countries
- Technical programs
 - Energy Efficiency
 - Environment
 - Power Delivery and Markets
 - Generation (Fossil/Hydro)
 - Nuclear

Nuclear Research Portfolio

Existing Fleet: Asset Maximization

New Plant Deployment

Material Degradation/Aging

- Corrosion Research
- Water Chemistry
- Steam Generator Management
- BWR Vessels and Internals
- Materials Reliability

Fuel Reliability

- Fuel Reliability Program

Risk and Asset Management

- Asset management
- Safety/risk technology

Non-Destructive Evaluation

- NDE Technology
- Performance Demonstration

HLW/Spent Fuel

- High Level Waste Disposal
- Spent Fuel Storage & Transport

Equipment Reliability

- Instrumentation & Control
- Repair & Replacement Applications
- Nuclear Maintenance Applications
- Plant Support Engineering
- Nuclear Steam Turbines
- Balance of Plant Corrosion

LLW & REM

- Low Level Waste
- Radiation Exposure Management

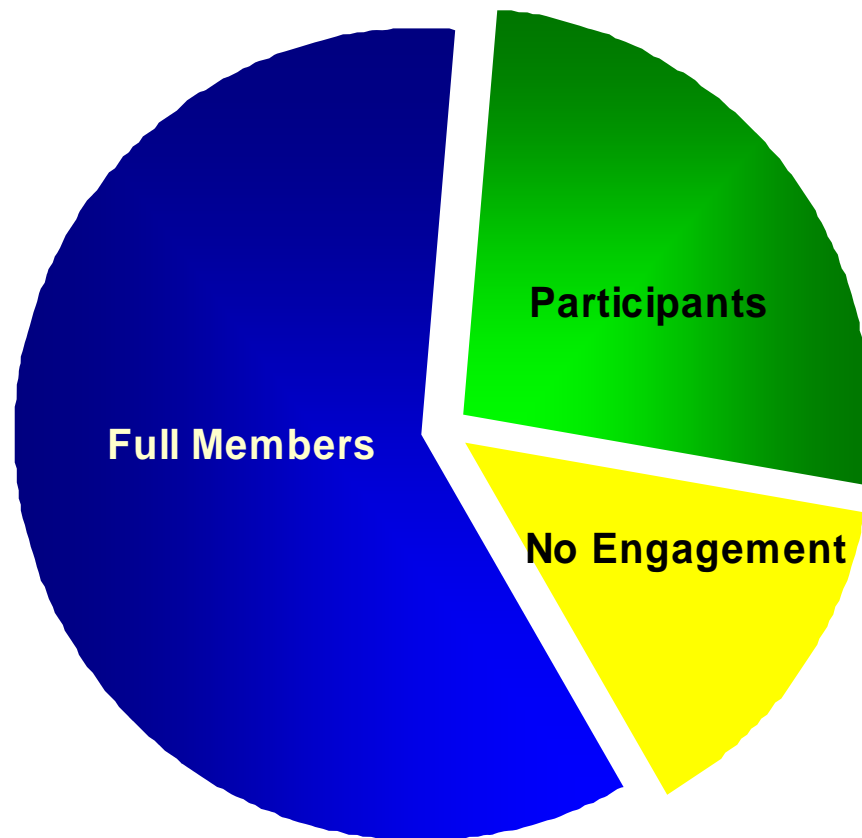
Advanced Nuclear Technology

- New Nuclear Plant Deployment
- Advanced Fuel Cycle
- High Temperature Gas Reactors

EPRI Worldwide Nuclear Utility Participation

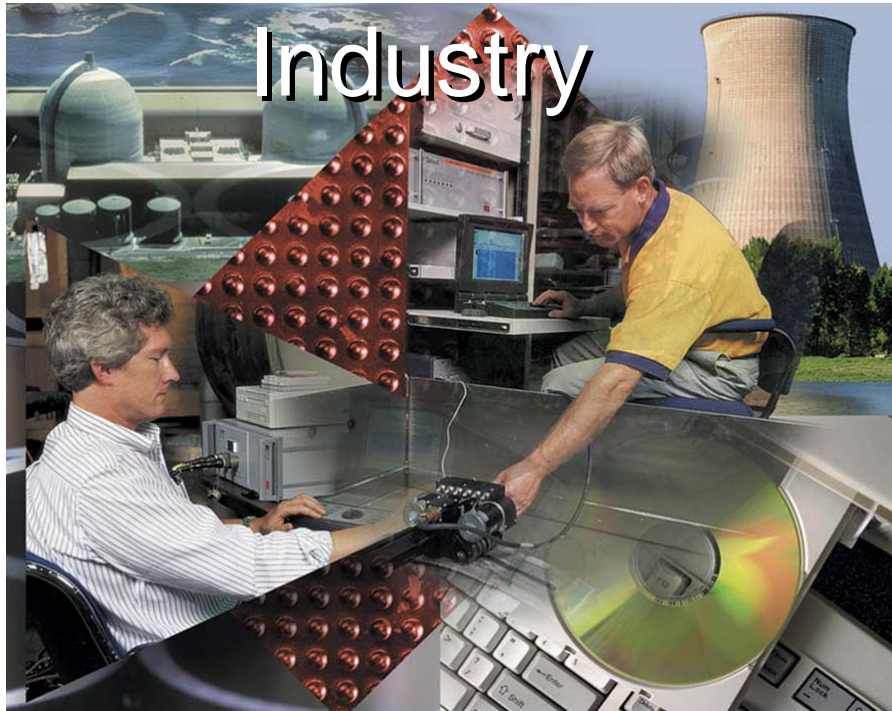
Full Members

All 26 U.S. Utilities
Electricité de France (France)
British Energy (U.K.)
CANDU Owners Group
(Canada and Romania)
Eletronuclear (Brazil)
TEPCO (Japan)
UNESA (Spain)
CFE (Mexico)
Chubu (Japan)
Rolls Royce (U.K.)
Eskom (S. Africa)



Membership and Program Participants Include Over 80% of the World's 443 Operating Commercial Units.

EPRI's Key Interfaces in the Nuclear Industry



- Relationships with DOE, NRC Office of Research, and Idaho National Laboratory
- Cooperation with Vendors, NSSS Owners Groups and Universities
- Global relationships with other research agencies

INPO
Operational
Excellence

NEI
Regulatory/
Public/
Government

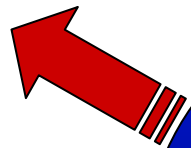
EPRI
Technology

**EPRI has a highly
collaborative role in
nuclear power**

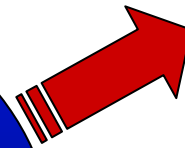
EPRI Nuclear Power

Mission and Core Industry Drivers

**Maximize Carbon
Reductions From
Nuclear Energy**



**Sustain Nuclear
Power as a Safe,
Reliable, and
Cost Effective
Generation Option.**



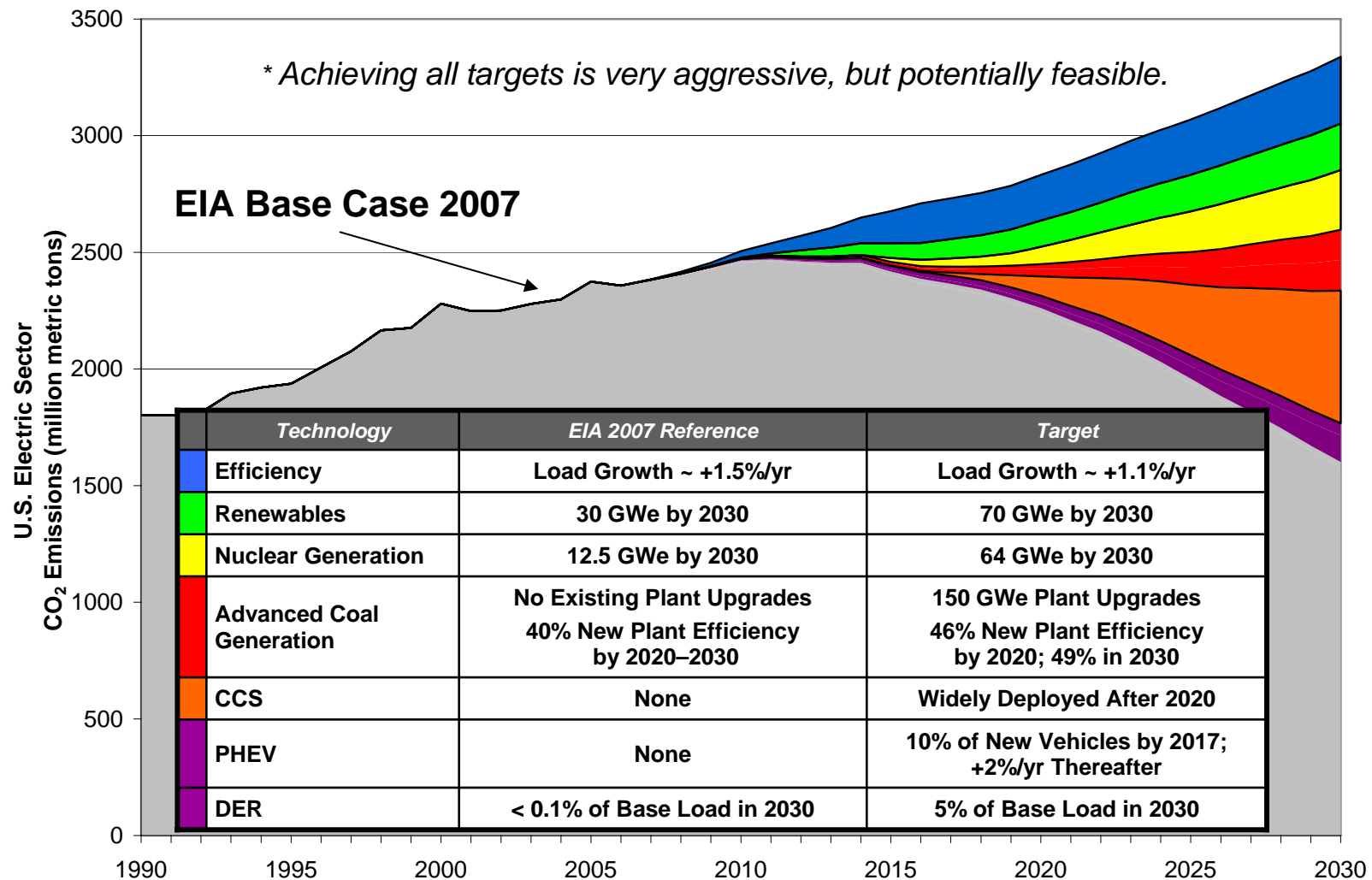
**Ensure Continued
Nuclear Plant
Reliability and Safety**



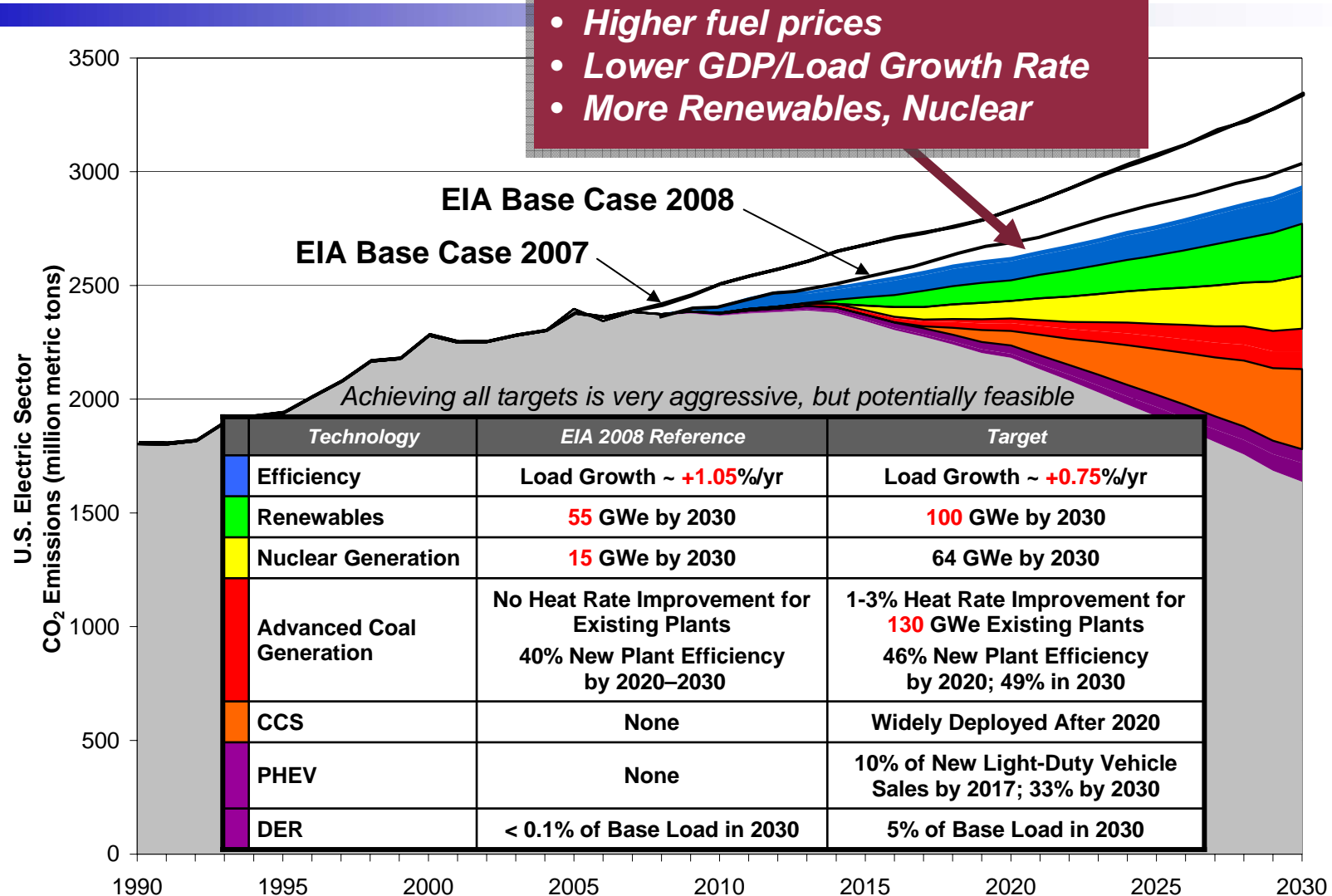
**Inform Operations and
Maintenance Decisions**

EPRI PRISM (2007)

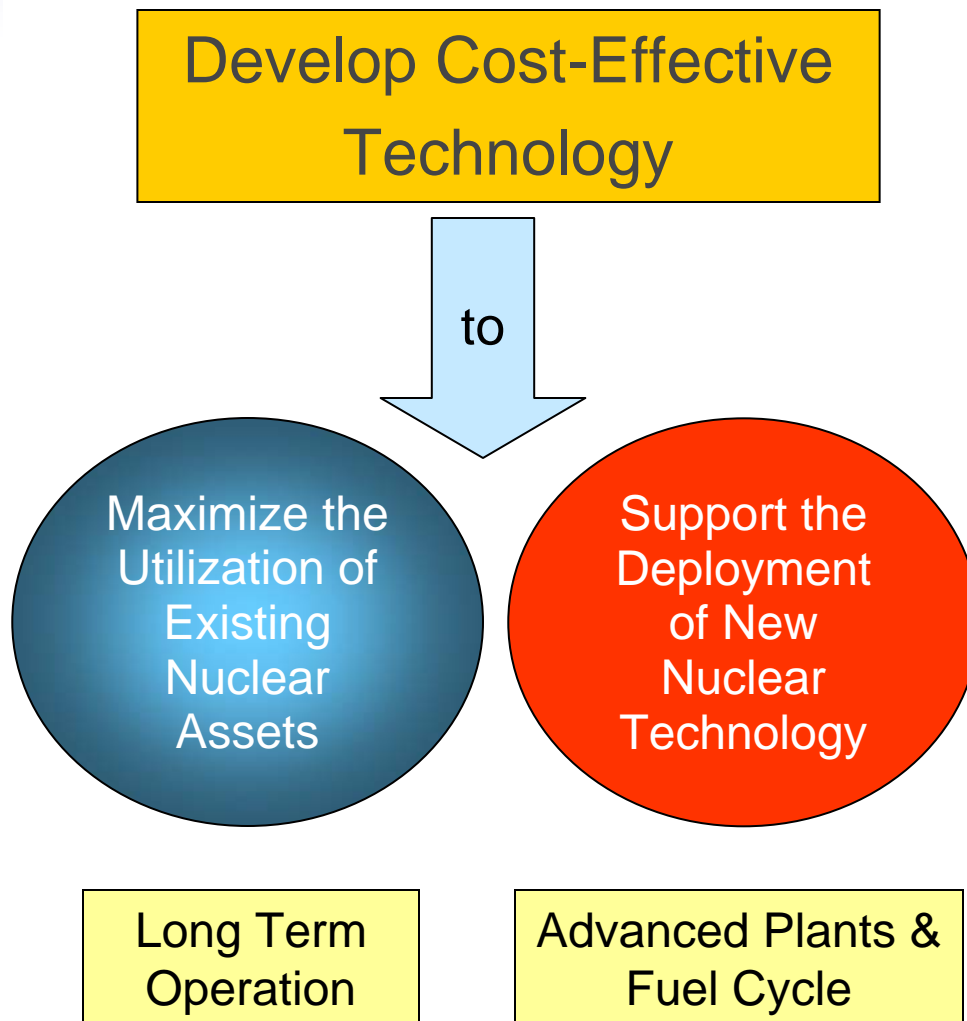
U.S. CO₂ Reductions ... Technical Potential*



EPRI Prism – 2008 EIA with Energy Bill



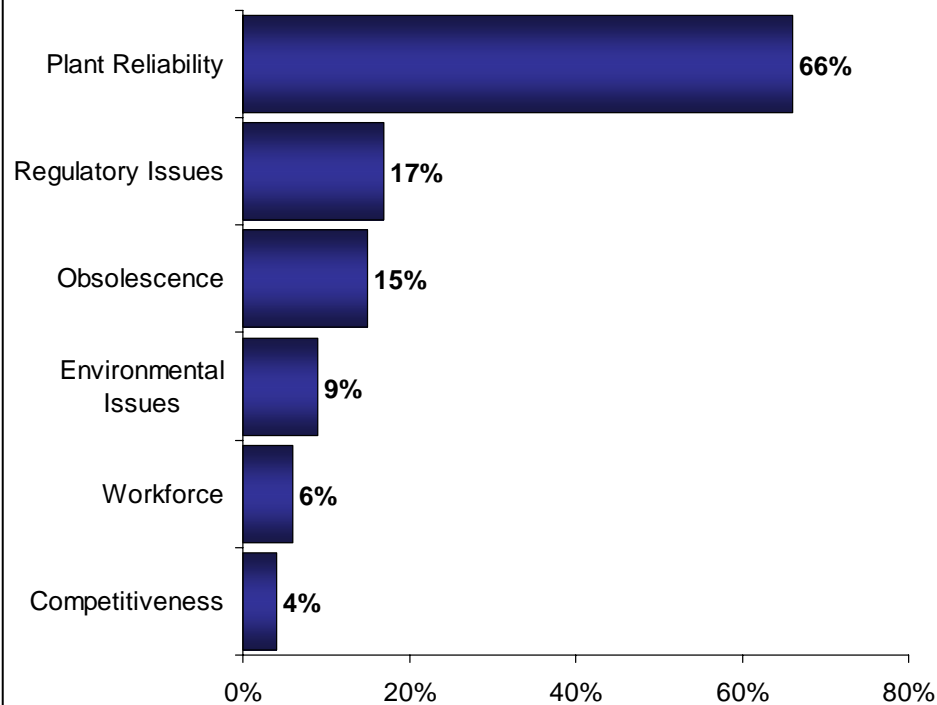
EPRI Nuclear Power Sector Goals and Strategic Focus



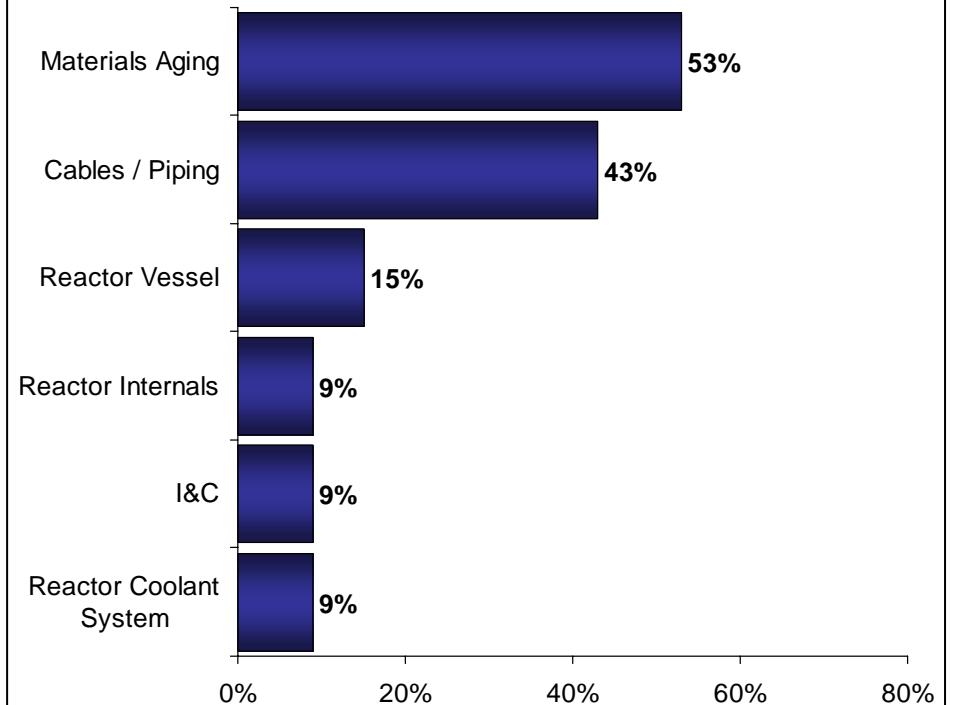
Drivers and Challenges

Top Issues are Technical

Most Challenging Issue



Top Plant Reliability Issues



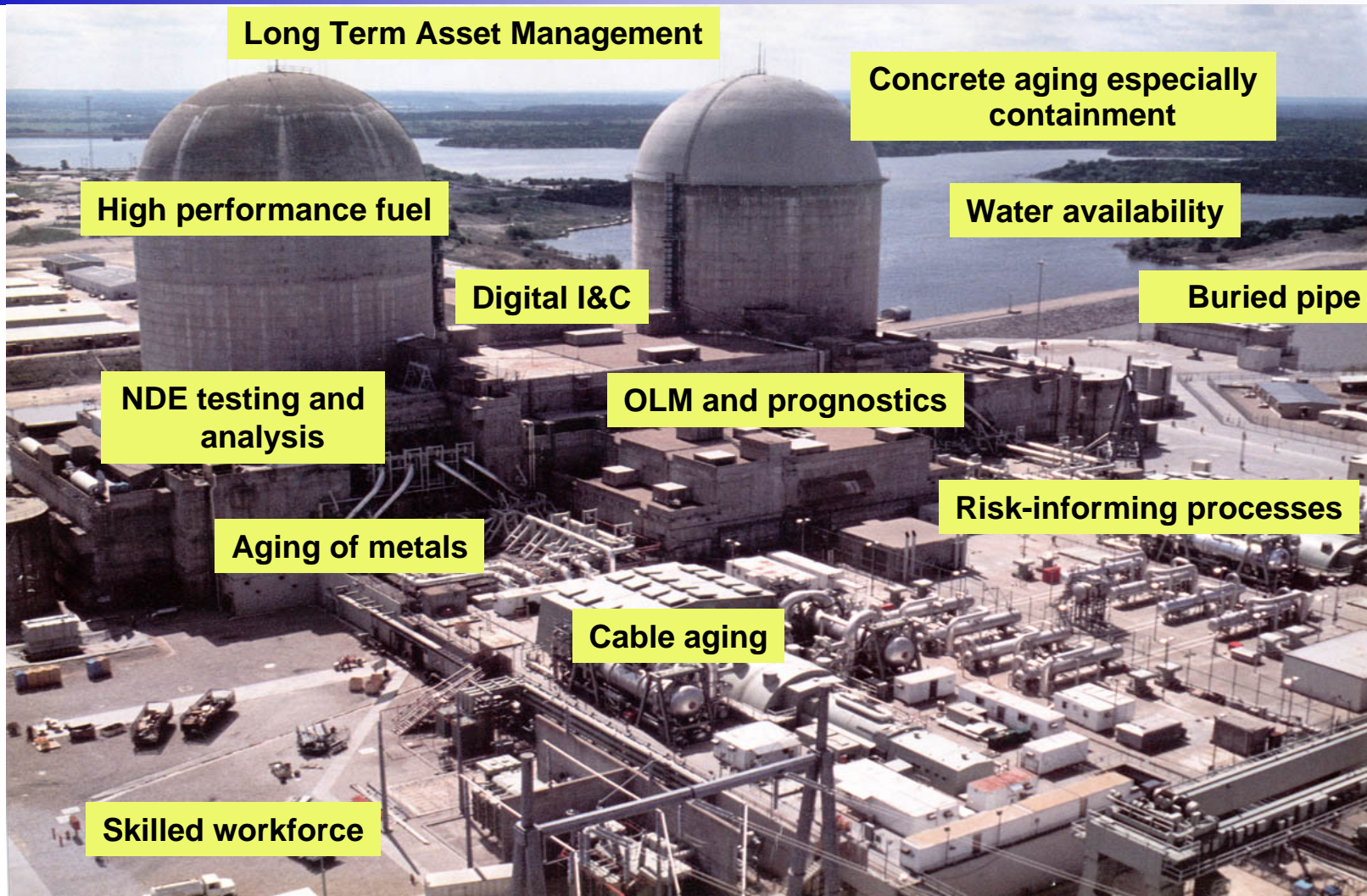
- **Technical challenges trump other business challenges**
- **Plant reliability issues dominated by materials and equipment reliability**

Materials Aging Institute

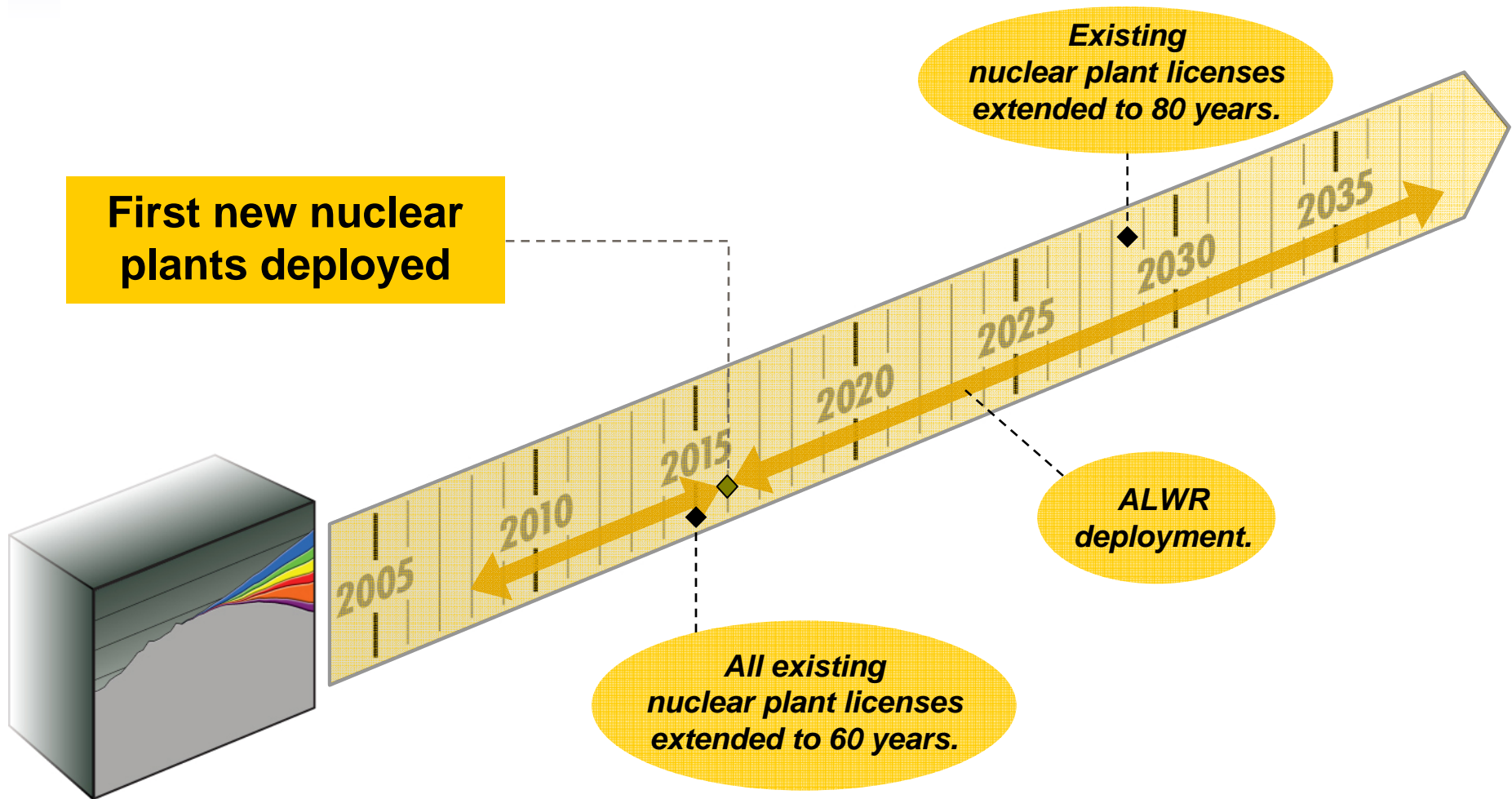
- The Materials Aging Institute (MAI) is an EdF led initiative to preserve and promote the nuclear option
- Extend the life of existing plants
- Design and build the next generation of nuclear plants
- Initial Engagement by EPRI and TEPCO
- Collaborate on broad materials issues

Opportunity for Access to Global R&D for EPRI Members

Issues and Opportunities Require Future R&D



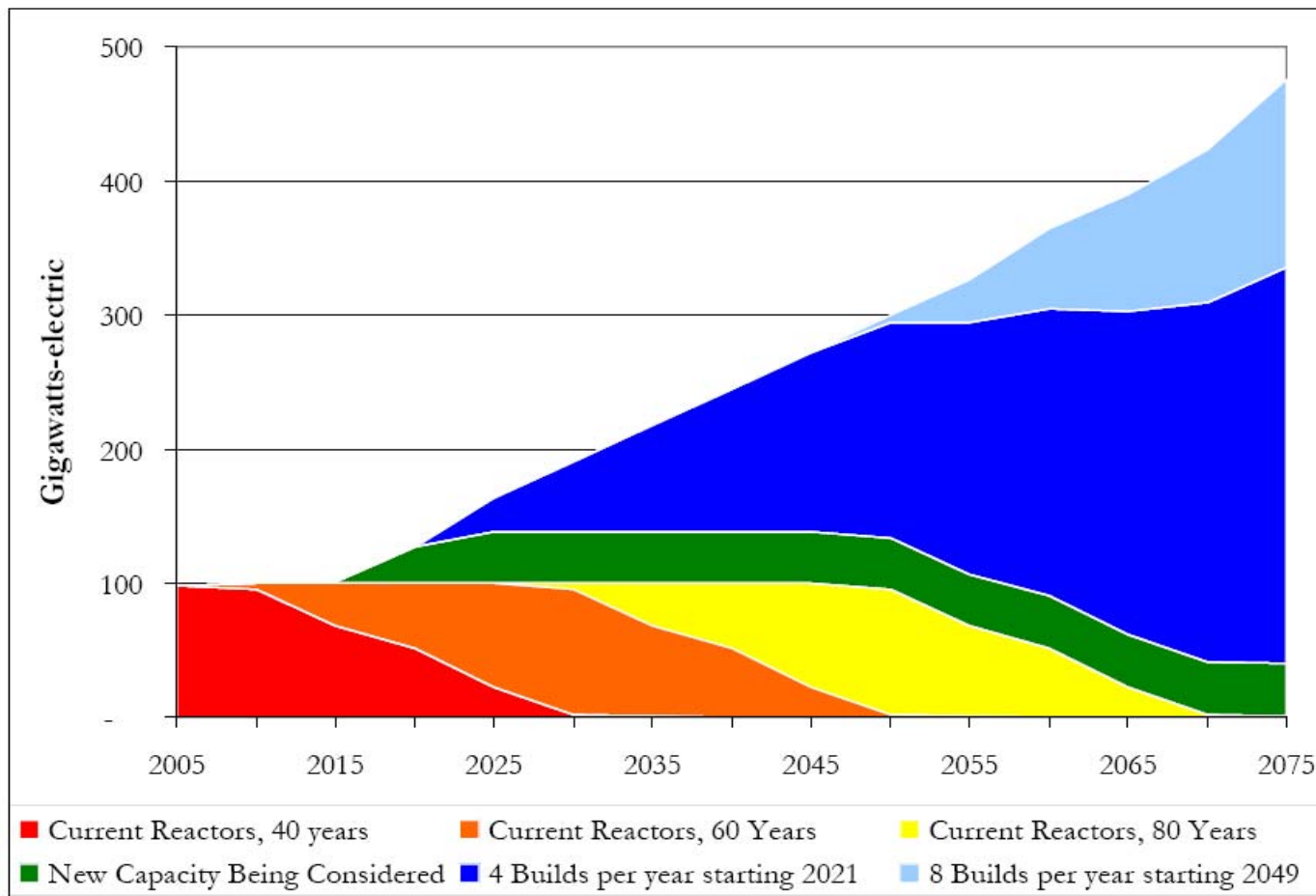
Building for the Future



Importance of Current Plant Life After 60

From DOE Asst Sec. Spurgeon at Feb 2008 DOE/NRC Workshop

Nuclear's potential expansion

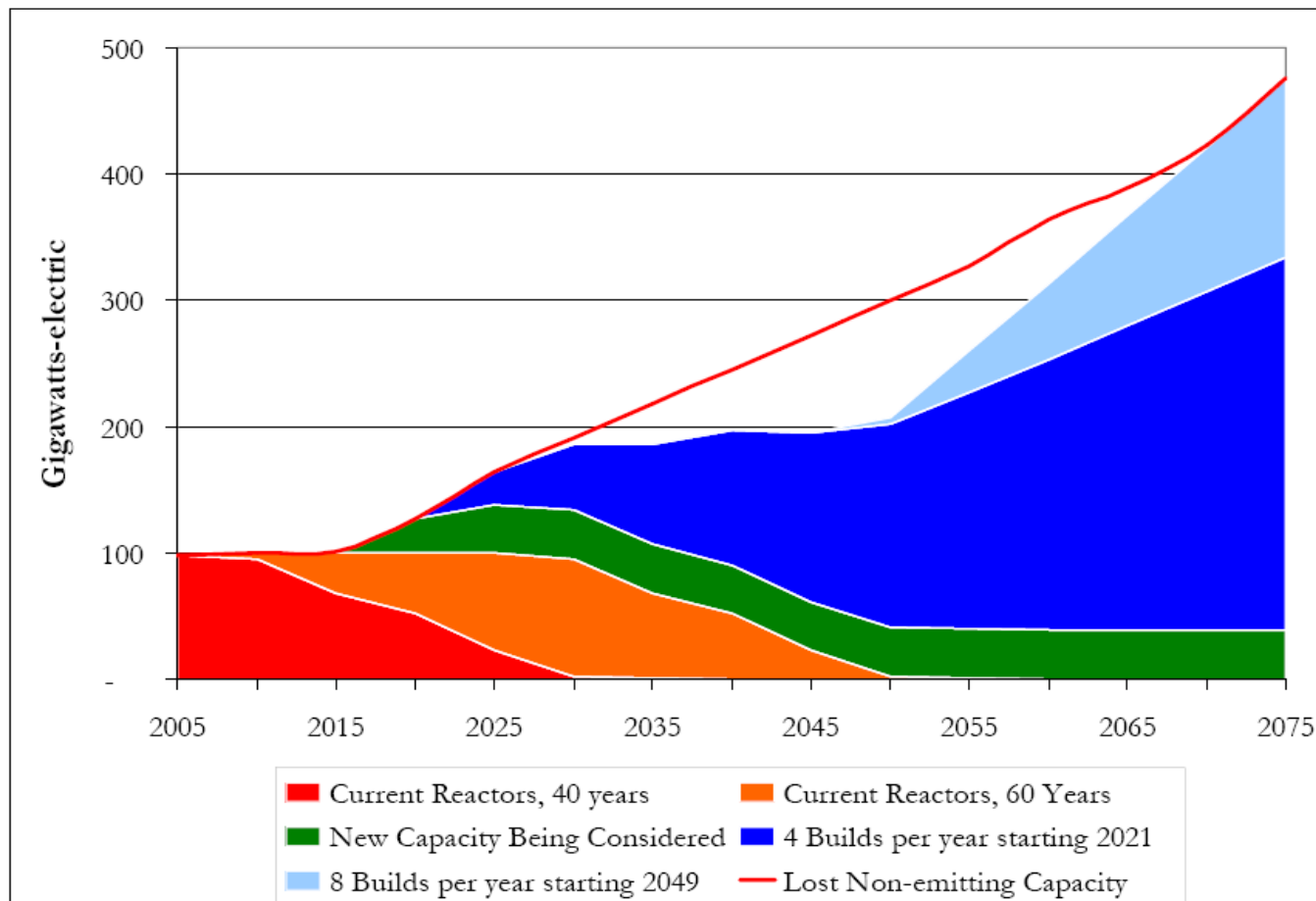


To significantly reduce carbon emissions, the United States will need 300 Gigawatts of nuclear power by 2050.

Importance of Current Plant Life After 60

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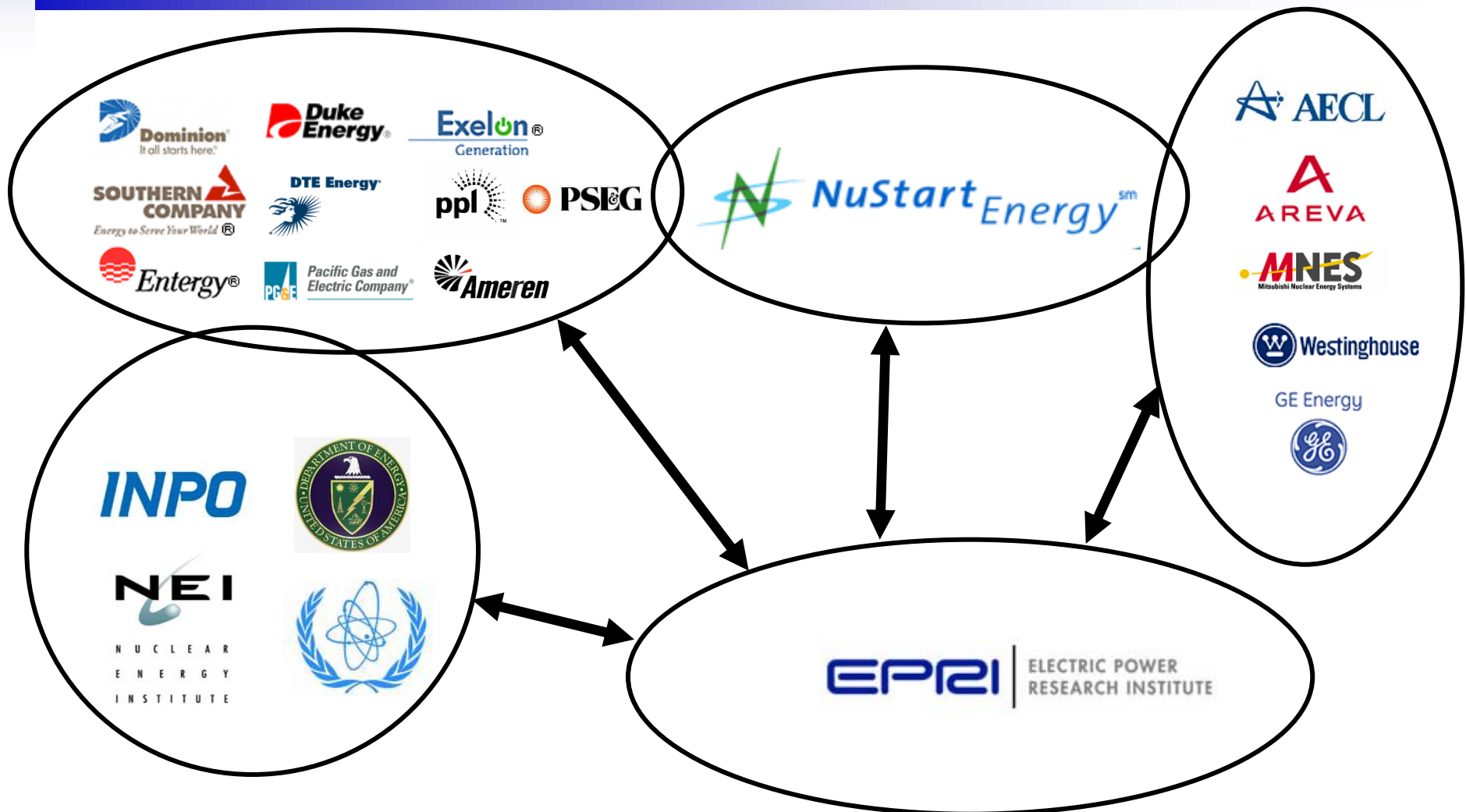
Nuclear without 80 year extensions



In total, 15 Trillion Kilowatt Hours and 12 Billion Metric tons of avoided CO₂ emissions would be lost without license extensions.

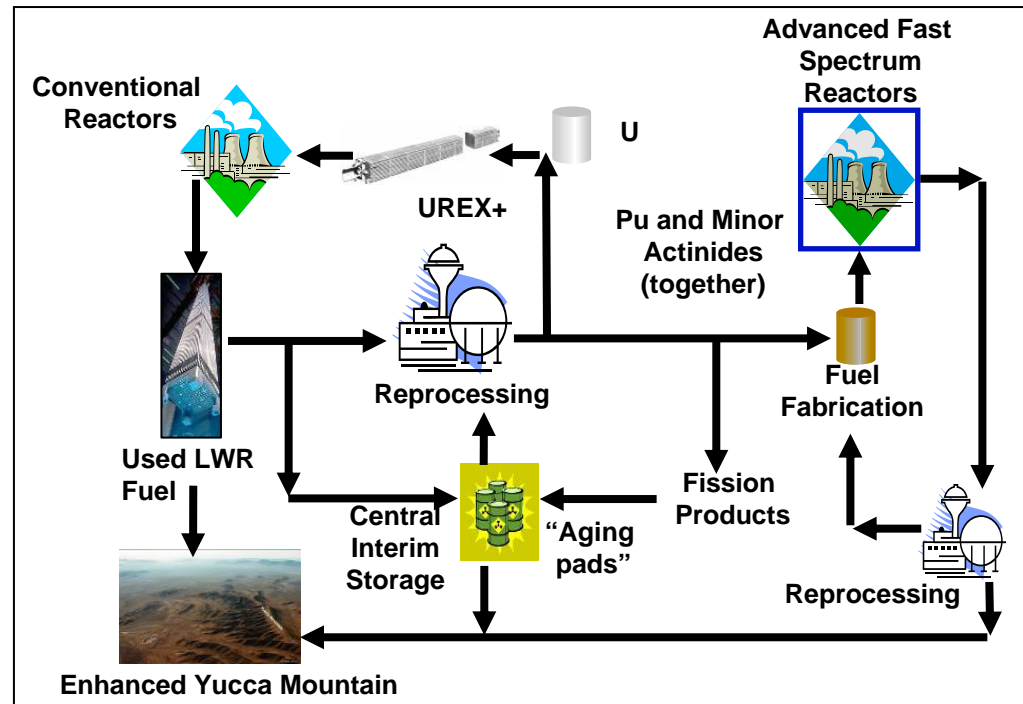
That total electricity output could provide power to over 70 million households for 20 years

EPRI Advanced Nuclear Technology Program... Leveraging the Industry



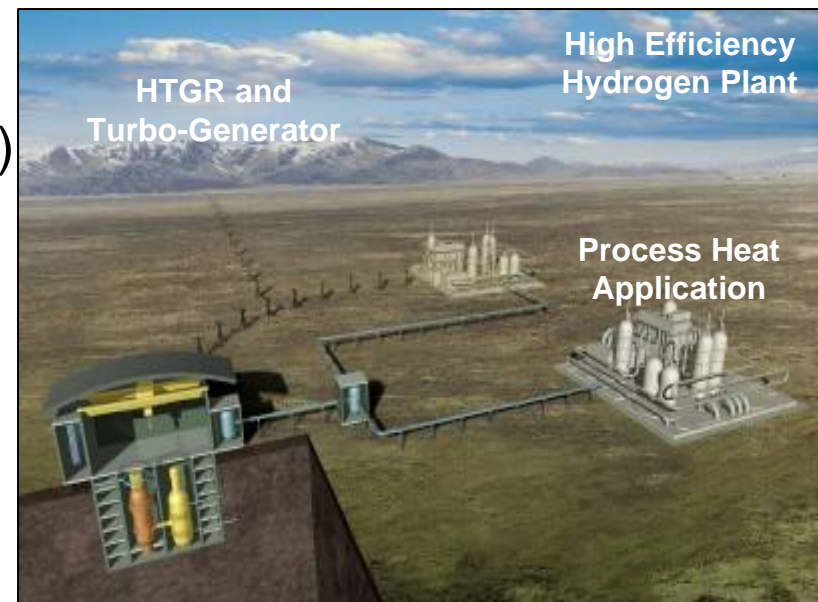
U.S. Integrated Spent Fuel Management

- Large-scale nuclear expansion will require integrated spent fuel management:
 - Central Interim Storage
 - Geologic Repository
 - Transportation Systems
 - Eventual Fuel Recycling
 - Advanced Reactors



Nuclear Energy for H₂ and Process Heat

- Potential future market for high-temperature heat is 5% to 15% of the total U.S. energy market
- High Temperature Gas Reactor (HTGR) can fill industrial and transportation sector needs:
 - Displace >5% of petrochemical natural gas needs
 - Process heat for enhanced oil recovery, oil refining, oil shale and coal to liquids
 - Longer term: Hydrogen for zero-emissions transportation
- HTGRs can also co-generate electricity



NGNP (Next Generation Nuclear Plant) is key first step

EPRI = Collaborative, Integrated R&D Solutions



EPRI.com Past Contributions

- Use of EPRI/NRC-RES Fire Probabilistic Risk Assessment (PRA) Methodology in Estimating Risk Impact of Plant Changes (1013489)
- Support System Initiating Events: Identification and Quantification Guideline (1013490)
- Methodology for Fire Configuration Risk Management (10129488)
- Heat Exchanger Thermal Performance Margin Guideline (1012129)
- A Framework for the Treatment of External Events in Configuration Risk Management: 2004 Configuration of Risk Management Forum Research Task (1009675)

EPRI.com Past Contributions

- ANT Margins and Monitoring (1015388)
- HVAC Testing, Adjusting, and Balancing Guideline (1003092)
- Chiller Performance Monitoring and Troubleshooting Guide (1007361)
- HVAC Fans and Dampers Maintenance Guide (TR-112170)
- Hydramotor (R) Actuator Application and Maintenance Guide:
ASCO NH90 Series Hydramotors (R) for Nuclear Applications (TR-112181)



Together...Shaping the Future of Electricity