International Collaboration for Development of Accident Resistant Light Water Reactor Fuel

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OECD/NEA Workshop on Accident Tolerant Fuels of LWRs

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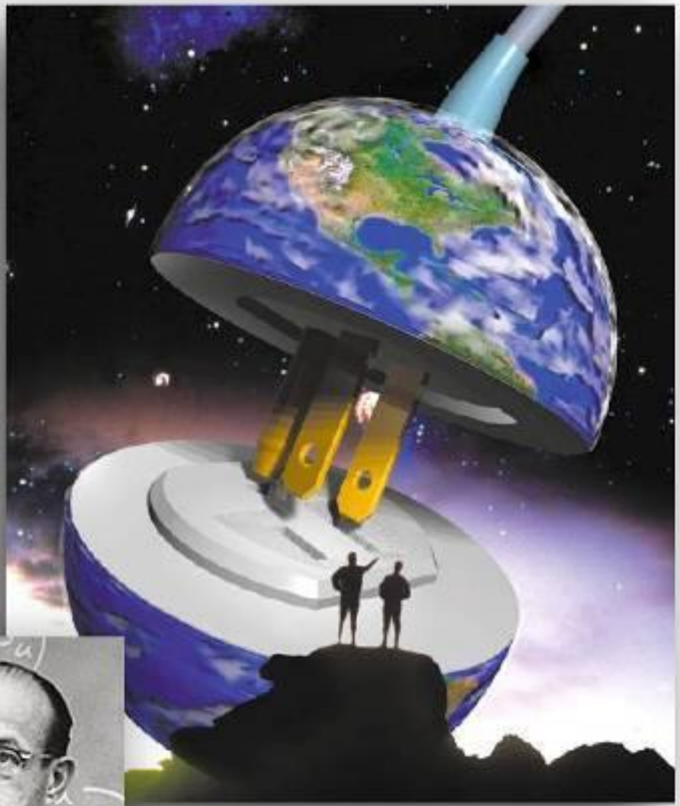
About EPRI…

Mission – To conduct research on key issues facing the electricity sector… on behalf of its members, energy stakeholders, and society.

- Collaborative, independent nonprofit center for public interest energy and environmental research
- More than 75% of worlds commercial nuclear units participate in EPRI research programs



Chauncey Starr
EPRI Founder

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Imagine Fukushima without…

Goal: Accident Resistant LWR Fuel by 2030

- Approach: Build upon proven light water reactor experience
  - Transformational results via incremental implementation
  - Compatible with commercial operation of reactors
- Perspective: Continued confidence in nuclear technology demands commitment to continuous improvement
- Applicability: Global

Challenges are many. Barriers are high. A billion $ effort?
No single entity or group will succeed alone.

How Do We Define Success?

Three Pillars

Extend core coolability under loss of coolant conditions

Eliminate or significantly reduce hydrogen generation

Maintain acceptable or improve fuel performance

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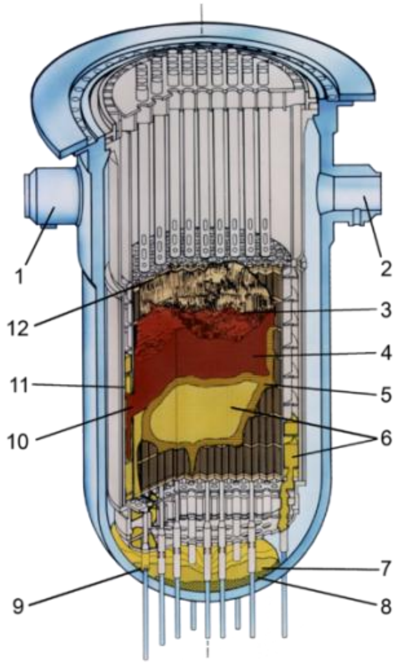
Broader View: Accident Resistant Cores?



TMI-2 Core End-State Configuration (Source: NRC)

- Priority has been cladding and fuel
- Other relevant components and hardware:
  - BWR fuel channels (significant Zr inventory)
  - PWR control rods and BWR control blades (criticality control)
  - Fuel assembly hardware (grids, guide tubes, nozzles, etc.)
  - Reactor internals susceptible to loss of integrity and affecting desired outcomes and functions (*e.g.*, core coolability)

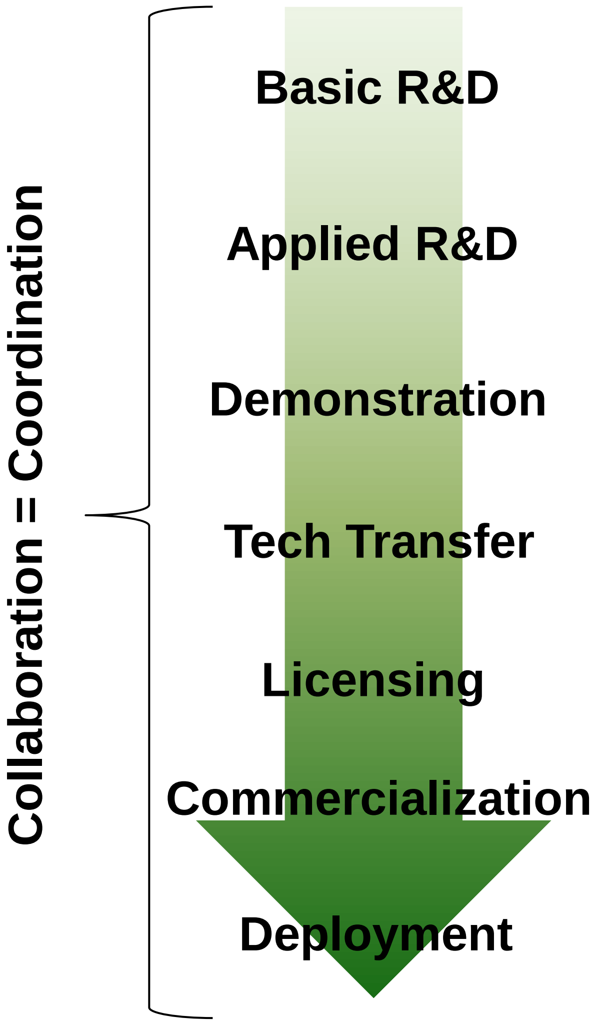
Potential for multiple paths to "success" that are also compatible with deployment in commercial reactors.

Global Collaboration for a Global Challenge

- Leverage resources on a global scale
- Facilitate sharing of information, insights and experience
  - Who is doing what?
  - What are technology gaps?
  - What R&D is needed to fill gaps?
- Create an environment for innovation and cooperation
- Foster necessary partnerships and arrangements

Eventually, must develop a compelling case for commercial investment in new technology.

Many Potential Players and Roles



- International organizations
- Governments
- Academia
- Government, industry, and independent research organizations
- Technology vendors
- Regulators
- Utilities

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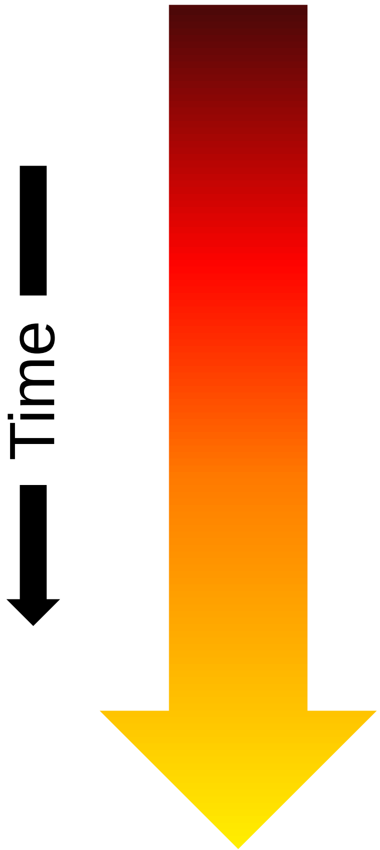
Emerging R&D Picture

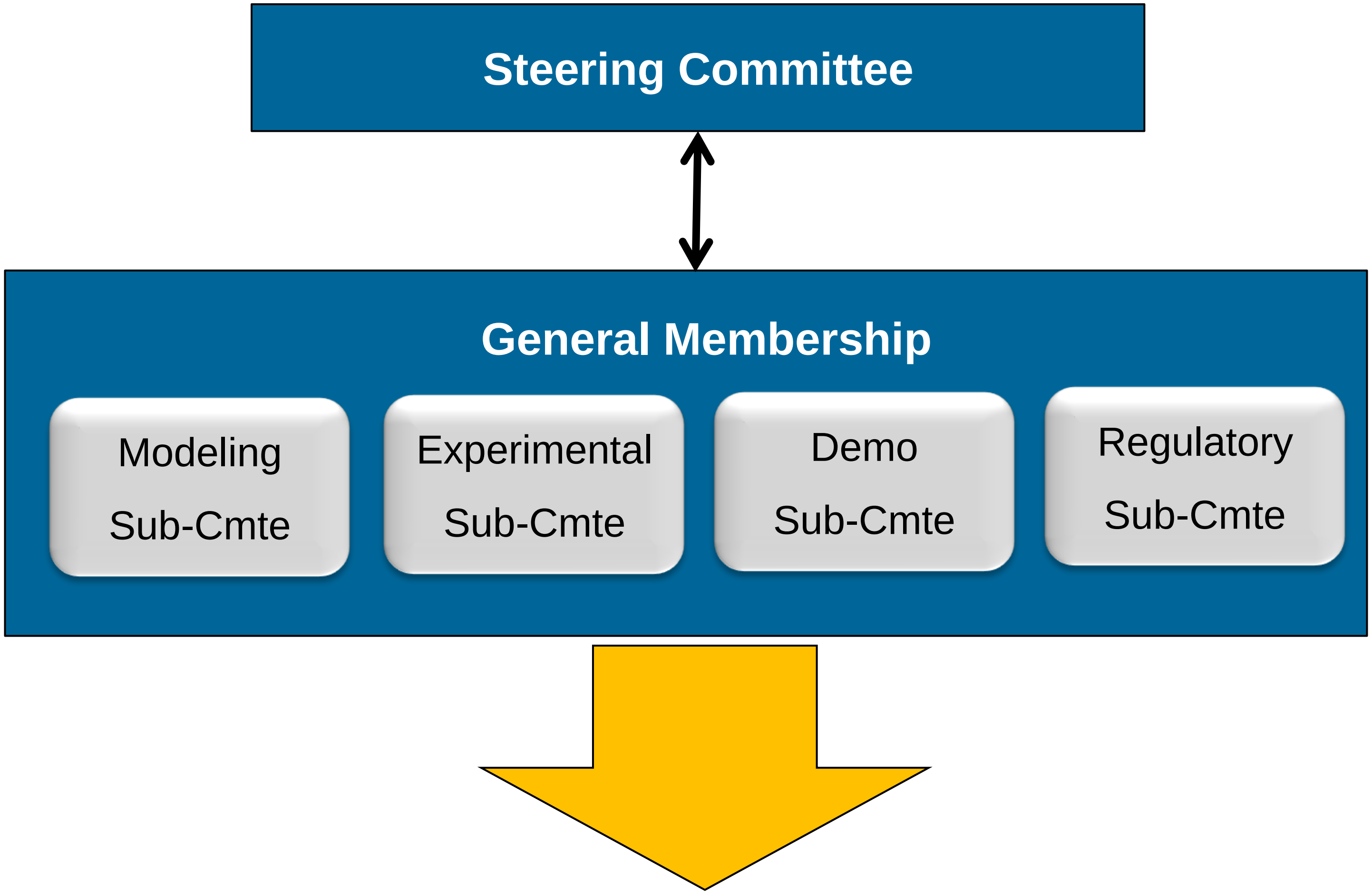
- U.S. Department of Energy – targeting lead test assembly (LTA) in a commercial reactor within 10 years
- EPRI – funding independent work on Mo-based alloys and layered-cladding concepts and SiC BWR channels
- OECD/NEA Nuclear Science Committee (NSC) and Committee on Safety of Nuclear Installations (CSNI)
- IAEA Nuclear Fuel Cycle and Materials Section – potential topic for IAEA Coordinated Research Project (CRP)
- Others…

Expected Evolution of Collaboration



- Initially: voluntary, non-binding, open, flexible structure
- Transition: create environment for engagement, innovation, and more structured arrangements
- Maturity: more formal arrangements, agreements, partnerships

Proposed Structure for Collaboration



Interface with More Formal Structures and Proprietary Efforts

Time for Action is Now: Proposal for Early 2013

- January or February: convene initial meeting of "core" players - embryonic Steering Committee
  - Define vision
  - Map out acceptable collaborative model/structure
  - Establish roles
  - Develop participant target list for first collaborative workshop
- February or March: Steering Committee launches broader communication and outreach effort
- March or April: host first collaborative workshop
  - Define action plan and road map

Accident resistant fuel by 2030:
Collaboration is the path to success.

Together…Shaping the Future of Electricity

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