Closing the Fuel Cycle: Beyond Current Initiatives

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2009 Fuel Cycle Information Exchange

Back-end: Where Things Stand Today

- Storage of used fuel is safe for many decades
  - Dry casks; on site and/or centralized consolidated
- Uranium abundant (for about a century), but not unlimited at low cost
- Deep geologic disposal will ultimately be needed
- Government liability for not taking used fuel in 1998 at $11B if Yucca opens in 2020; liability growing

Challenges of Shifting the Back End Paradigm

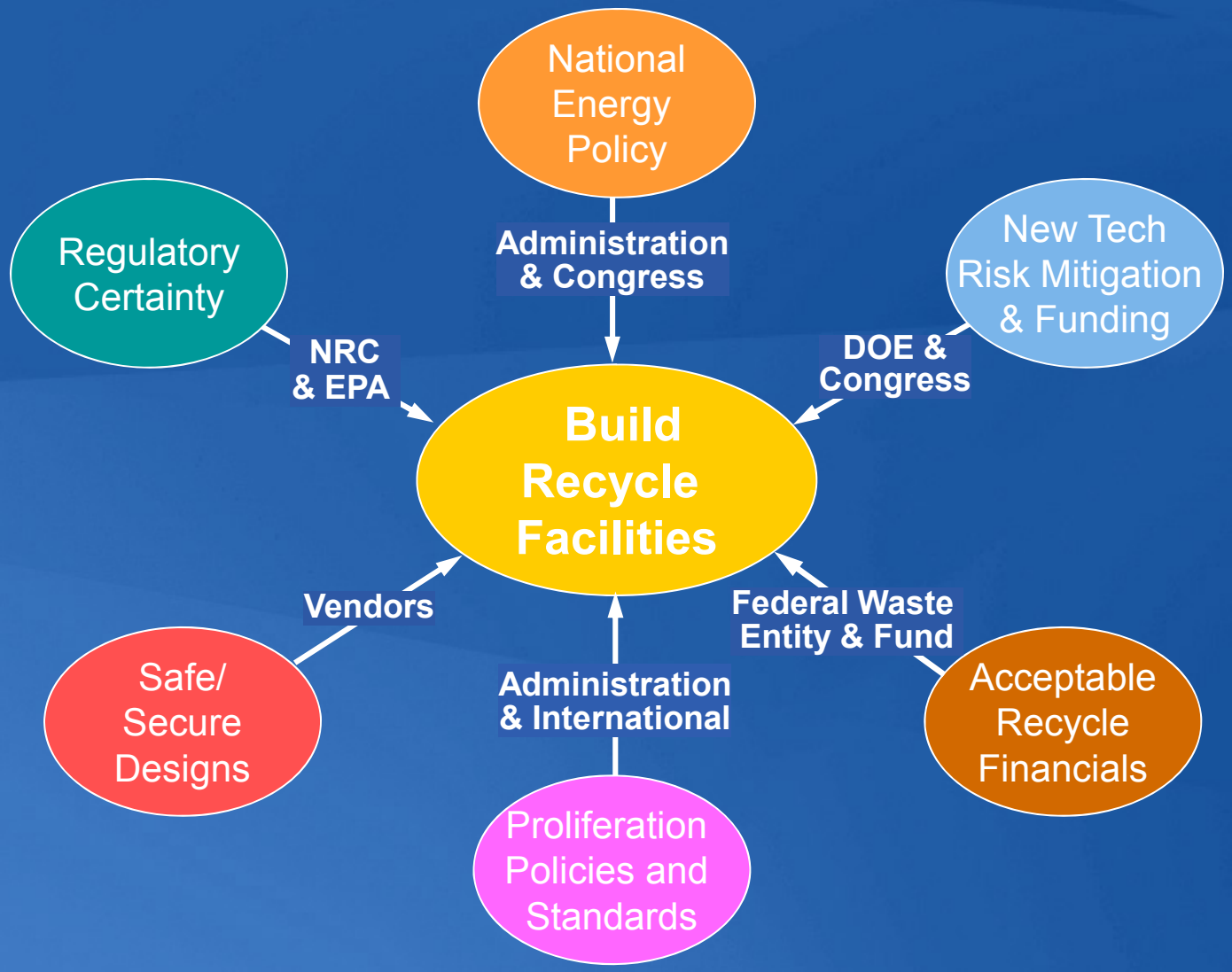
- Government funding likely to be limited
- Political support is uncertain
- Industry not yet committed to particular recycle solution
- Closed fuel cycle uncertainties a huge detractor and an easy target

But a solution is still needed

Back-end: What We Want

- Real progress…more than just studies and panels
  - Pursue used fuel management alternatives/develop options
- Option #1 – Geologic repository
  - NRC should continue to review DOE's Yucca Mountain license application
  - Confirm technical suitability based on sound science
- Option #2 – Consolidated interim storage
  - Legislation, policy, regulatory alignment needed
  - Voluntary host state and local community needed
- Option #3 – Recycling

Many Dynamics of Recycling Policy



Years of Experience Allows a Direction to be Set

- Recognize that even an aggressive program will take decades to fully implement…
- Perfection is the enemy of the good - current technology applied in evolutionary ways is OK to start
  - Expecting breakthrough R&D is not a solution, but focused R&D can make a good approach better over time
- Phase in developmental activities over time, making adjustments as appropriate
- Utilize existing LWR technology
- Begin near term because development horizon is long
- Learn from the experiences of others

Recycling First Steps

- Regulatory framework development
- MOX lead use and acceptance
- Align Government policy and governance infrastructure
- Improved security and waste management research and development

Recycling: Appropriate Near-Term Activities

Regulatory Framework Development

- Revise regulations for licensing reprocessing and MOX fabrication facilities
  - New regulations issued by 2012
- 10 CFR Part 73/74: regulations for safeguards, security and material control and accountability
  - DOE review of "material attractiveness" and update of graded safeguards table (GST)
  - NRC adoption of GST approach
  - Potential revision in 2011 time frame
- 40 CFR Part 190: EPA regulation regarding radioactive releases from fuel cycle facilities

Recycling: Appropriate Near-Term Activities (cont.)

Recycle MOX Fuel Qualification Program

- Lead assembly demonstrations of multiple fuel vendor designs in different reactor types
  - Would qualify MOX use across the U.S. fleet
- Addresses transportation, security, and public acceptance hurdles to MOX use
- Provides a tangible measure of progress on closing the fuel cycle to the Administration & Congress

Recycling: Appropriate Near-Term Activities (cont.)

Government and International Policy Role

- U.S. influence on international community may require implementing best current technology now.
- A Federal Government Entity responsible for managing the back end of the fuel cycle can create a more stable environment for utility commitment and project financing
- Statutory policy reinforcement indicating support for closing the fuel cycle will likely be needed

Recycling: Appropriate Near-Term Activities (cont.)

Technology Development

- DOE fund technology development and demonstrate processes that improve security, waste management and protection of the environment
  - Radioactive gas capture, waste form development and disposal
  - Enhanced material control and accountability
- Industry and Lab collaboration will result in DOE funding being relevant and used

Appropriate DOE Roles for Longer Term Demonstration and Improvements

- Advanced recycling technologies
- Advanced recycle reactor
  - Design, license, build, operate
- Actinide transmutation
  - Commercial role still to be decided
- Geologic Storage Alternatives

Summary of Key Points

- Solution needed and recycling presents a good option
- R&D important but not required to start
- Start phased closed fuel cycle approach now

Recycling Used Nuclear Fuel Makes Sense

- Supports long-term sustainable nuclear energy: meeting global energy demand without contributing to climate change
- Conserves valuable nuclear fuel resources
- Reduces environmental impact of the wastes requiring geologic disposal – reducing repository requirements/costs
- Provides a path for used fuel management solution
- Impact on electricity prices appears relatively small

Given nuclear energy's importance to energy/national security, it is consistent with good public policy to support nuclear fuel recycling through structures, incentives and regulations and begin well in advance of obvious need.