Consolidated Fuel Treatment Center
Advanced Burner Reactor
Expressions of Interest
Industry Briefing

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Deployment Approach

- **Baseline Approach**
  - Sequential: applied research & technology development; demonstration-scale facilities; commercial-scale facilities

- **Proposed Two-track Approach**
  - First track
    - Demonstrate light-water reactor (LWR) spent nuclear fuel (SNF) recycle in a Consolidated Fuel Treatment Center (CFTC)
    - Fabrication of Advanced Burner Reactor (ABR) driver fuel
    - Construct and operate ABR, initially using driver fuel
  - Second track (concurrent w/first track)
    - Transmutation fuel development, fabrication, qualification
    - Transmutation fuel in ABR
  - No intermediate demonstration-scale as identified in baseline approach
  - Potentially faster commercial deployment
Expressions of Interest

- Purpose
  - Solicit input from industry’s base of developed and established technology
  - Early participation with and buy-in from industry
  - Produce a more informed design process with industry participation
Expressions of Interest

What DOE Wants to Receive

- Industry’s thoughts on best path forward
- Potential solutions to accomplish GNEP’s objectives
  - Reduce American dependence on fossil fuels and encourage economic growth
  - Improve the environment
  - Recycle nuclear fuel to recover energy and reduce waste
  - Encourage prosperity and clean development worldwide
  - Integrate latest technology for advanced safeguards to further reduce risk of nuclear proliferation
- EOI examples are only guidance
  - Provide some insight to DOE’s thoughts
  - Intended to indicate general expectations
  - Not a committed path forward
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Expression of Interest
Fuel Separation Background

- Support overall GNEP objectives
  - Integral component of a closed fuel cycle
  - Separate spent LWR fuel into fast fuel material for transmutation
  - Improved management of waste streams

- Initial Focus: Demonstrate Engineering-Scale Spent Fuel Separations
  - Based on National Laboratory Demonstration Program
  - Completed pre-conceptual design documents
    - Demonstration design basis document
    - Scoped three generic concept alternatives
    - Focused technology development program on demonstration project
Consolidated Fuel Treatment Center Concept

- **Capabilities**
  - Separate the constituents of spent light-water reactor fuel into reusable material and waste products [track one]
  - Fabricate fast reactor driver fuel, i.e., all non-transmutation fuel [track one]
  - Augment as more advanced technologies become available through R&D
  - Separate spent fast reactor fuel and fabricate fast reactor transmutation fuel [track two]

- **Requirements**
  - No separated pure stream of Pu
  - Separate transuranics for consumption in an ABR to effectively reduce the burden on geologic repository
  - Comply with National Environmental Policy Act
Seeking Industry’s Input

- **Technology Selection**
  - Separate fuel into isotopes for transmutation and waste streams/forms for better management and cost effectiveness
  - Driver and transmutation fuel fabrication capabilities
  - System scale, e.g., min/max throughput
  - Technology development needs: reduce risk; promote commercialization
  - Features to improve reliability and cost effectiveness, e.g., reduced security requirements (Category II or lower); minimize waste generation

- **Provide Details of Participation**
  - Key features of Government and Industry relationship
  - Funding approaches

- **Siting and Regulation**
  - Regulatory framework or requirements
  - Commercial vs. DOE siting considerations; co-location with the ABR; driver fuel capability
  - Appropriate SNF process storage capacity
Advanced Burner Reactor Background

- **Support overall GNEP objectives**
  - Integral component of a closed fuel cycle
  - Expand the use of clean safe nuclear power
  - Produce less spent nuclear fuel

- **Initial Focus: Small-scale test reactor**
  - Reasonable balance between flux level, conversion ratio and cost
  - Nearly completed pre-conceptual design documents
Advanced Burner Reactor Concept

- **Capabilities**
  - Initial startup and operation using conventional driver fuel pending core conversion to transmutation fuel
  - Supports commercial deployment of ABRs as part of a closed fuel cycle
  - Demonstrate transmutation
  - Qualify transmutation fuels and materials
  - Demonstrate fast reactor safety
  - Demonstrate cost reduction design features

- **Requirements**
  - Provide fast neutrons to consume transuranic elements
  - Generates electricity through the net consumption of transuranic material
  - Complies with environmental and nuclear regulatory requirements
Seeking Industry’s Input

- **Technology Selection**
  - Reactor type (sodium cooled, etc.)
  - Reactor size
  - Driver fuel qualification approach and schedule
  - Technology development and R&D needs
    - Reduce risk; promote commercialization

- **Provide Details of Participation**
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- **Siting and Regulation**
  - Regulatory framework or requirements
  - Commercial vs. DOE siting considerations; co-location with the CFTC; source of driver fuel
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Next Steps
Key Challenges

- Domestic nuclear infrastructure
- Aggressive deployment timeline
- Substantial resource commitment
- Integration with existing facilities
Path Forward

- Seek Industry’s participation for commercial-scale CFTC and ABR with EOI
  - Early engagement with industry in a collaborative role to expedite a larger-scale separations, fuel fabrication, and fast reactor
  - Industry perspective on implementation differs from government’s
    - Investment risk
    - Schedule
    - Waste management
    - Enhanced and Advanced safeguards
    - Proven technology with balanced innovation

- Evaluate Expressions of Interest and incorporate into planning

- Make decision regarding issuance of Request for Proposals

- Work with NRC to develop potential license pathways

- Provide information to Secretary of Energy for June 2008 decision on GNEP path forward
Conclusion

- Critical Success Factors
  - Broad collaboration and support
  - Adequate resources
  - Technically sound approach
  - Effective project management

- Questions & Answers