The Global Nuclear Energy Partnership: Program Integration at the National Laboratories

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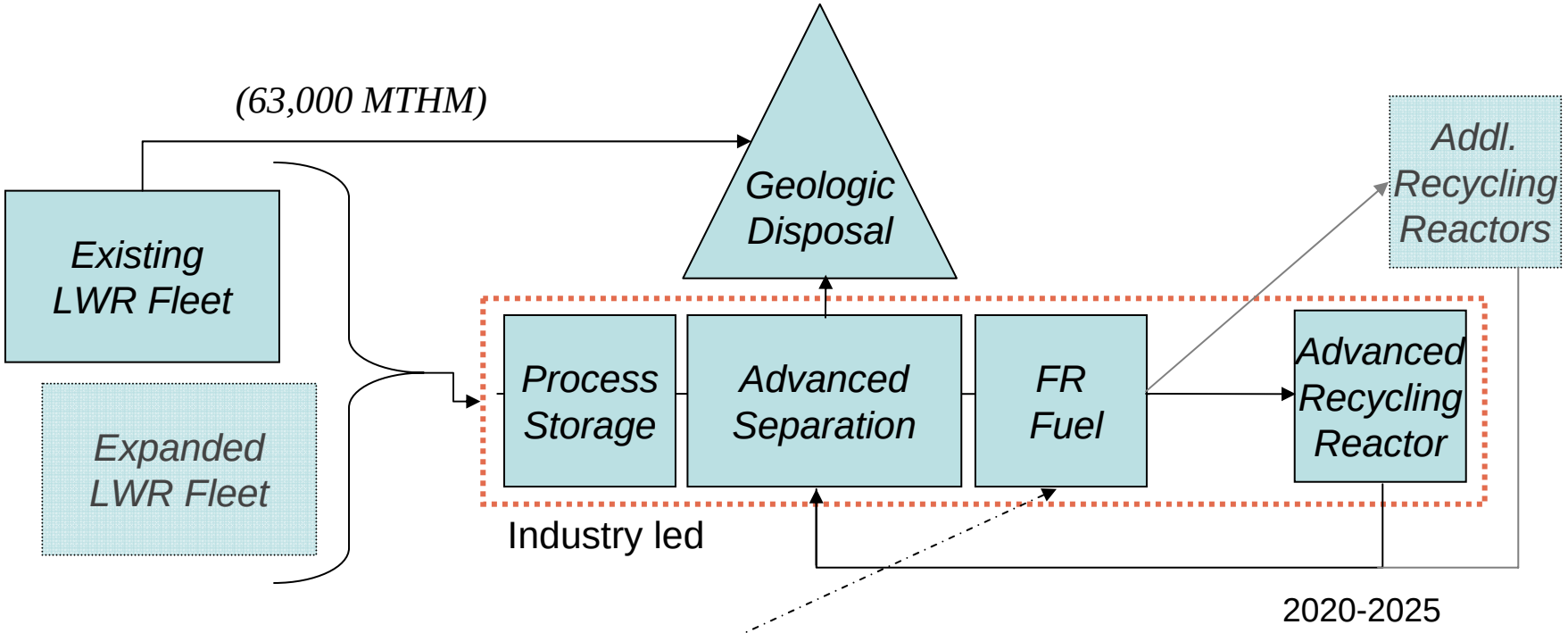
Outline

- **GNEP Architecture**
- **Program Integration Challenges**
- **Review of Multi-lab Activities**
  - Technology Demonstration Program Preliminary Plan
  - Insights from the Multi-Lab Process
- **Critical Technology Issues**
- **Review Processes**
- **Summary**

The Deployement of GNEP Requires the Successful Development and Integration of Several Technologies



Integration of Capabilities and Demonstrated Competence are Critical Element for GNEP Success

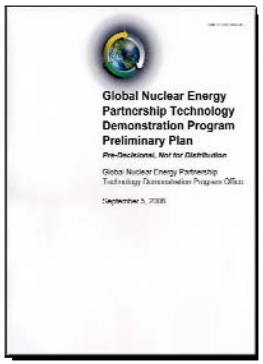
- **A successful GNEP program requires:**
  - An integrated program with a clear vision and measurable goals
  - Participation of industry, laboratories, and universities
- **INL, as the NE lab, was asked to integrate the early GNEP related activities:**
  - Technology Development Requirements based on a systematic Systems Analysis
- **Demonstrated competence:**
  - Involve the foremost national and international expertise
  - A requirements driven process to systematically organize and execute the GNEP

Integration has Several Challenges

- **U.S. nuclear resources are dispersed and aging**
  - All laboratories need to participate
  - Experienced manpower is becoming scarce
  - Many aging facilities, with capabilities that have declined
- **Diversity of technical alternatives**
  - Strong need for systems analysis
  - Critical role of peer review and quality assurance
- **Need to transform the nuclear R&D approach**
  - Define a path from the current empirical approach to science and simulation-supported research methods
- **Need to enable collaboration with industry**
  - Support industrial needs in the short term, drive the technologies for the long term
- **Need to support the regulatory approach**
  - Framework needs to be redefined for new facilities
  - Regulatory expertise needs to be rebuilt

GNEP Technology Demonstration Program Preliminary Plan

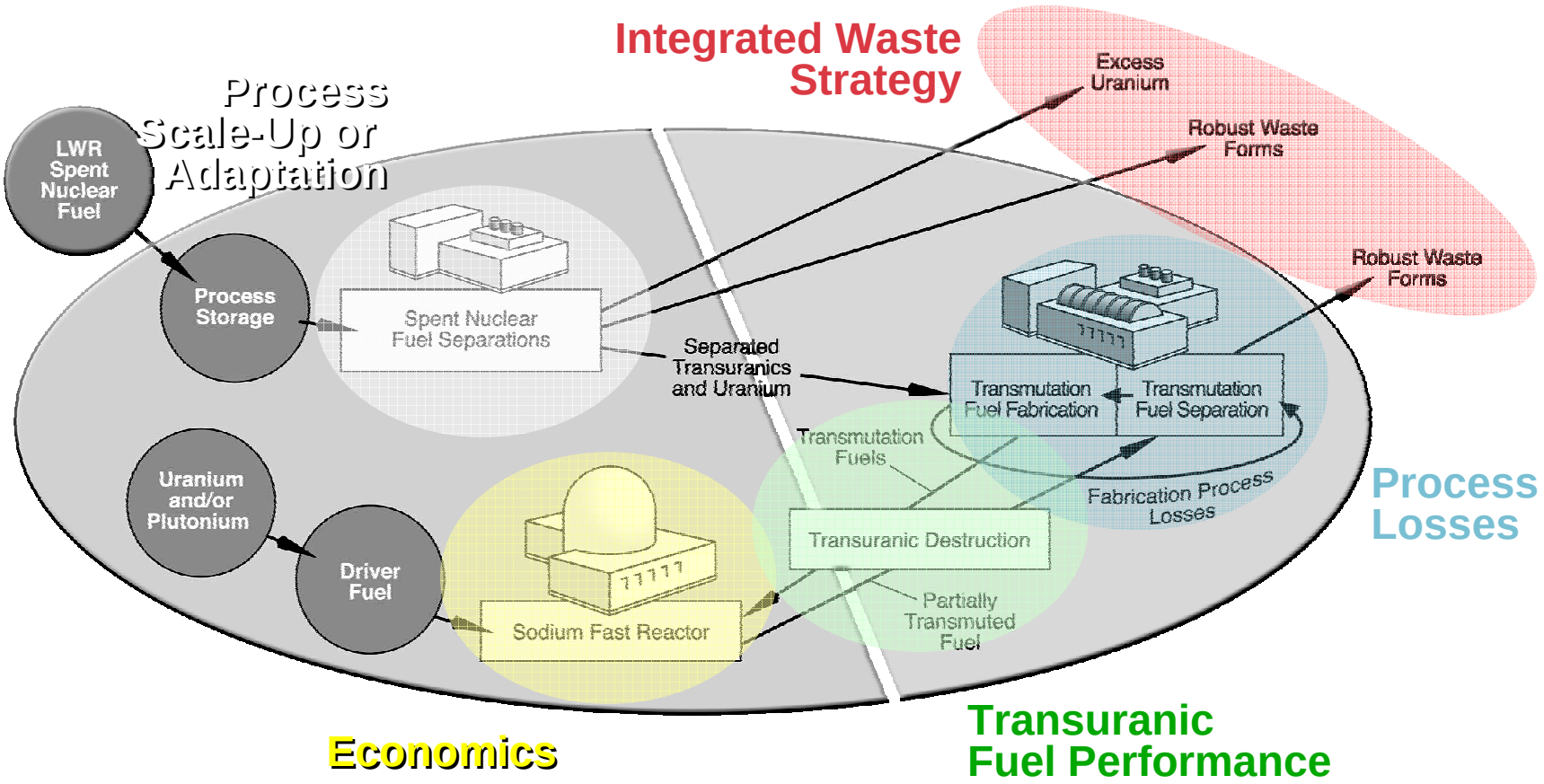
- **Key assumptions**
  - The development model described in the FY 2007 budget request (engineering scale demonstration of reactor and advanced recycling technologies, advanced fuel cycle facility)
    - *Assumed a Secretarial decision in Summer 2008*
    - *Described what needs to be done to demonstrate the GNEP technologies (not who and not where)*
- **10 national laboratories participated in the development of the plan**
- **Red team review by seven senior outside experts representing industry, labs, universities, and the Nuclear Regulatory Commission**
  - Provided external validation of content
  - Membership: Henry Stone, John Sackett, Roger Mattson, Neil Todreas, Salomon Levy, Daniel Wilkins, Doug Chapin



The Multi-Lab Effort Provided Insights for Improved Program Execution

- **Need for basis documents to document the technical underpinnings of GNEP**
  - Deployment System Architecture
  - Systems Requirements and Criteria
  - Demonstration System Facility Timing
  - Proliferation Risk Assessment (NA-24)
  - Support Facility Assessment
  - Technical Basis for Reference Technologies
    - *UREX+1a*
    - *Sodium Fast Reactor*
    - *Oxide or Metal fuel for transmutation fuel*
  - Selection of Fast Reactor Driver Fuel Type
- **Need for an integrated waste strategy**
  - Recognizing the role that waste forms play in the success of GNEP
- **Need for involving non-traditional (AFCI) elements crucial for success**
  - Developed the role of basic science and simulation in formulating the GNEP model

GNEP: Critical Technology Issues



Program Information Undergoes a Multi-Level Review and Validation Process

- The program inputs, processes, tools, and results all require some level of benchmarking or V&V
- Major reports are first reviewed by the originating laboratory (or laboratories), then independently by peers at other laboratories
- The laboratory peer review is often augmented by university participants
- Significant results are further reviewed by DOE technical staff and managers
- This internal review process is being extended to include independent external reviews
- Independent technical advice is provided by the Nuclear Energy Research Advisory Committee (NERAC) via the Advanced Nuclear Transformation Technology subcommittee chaired by Dr. Burton Richter
- A National Academy of Sciences review of the DOE's science and technology R&D program is currently in progress

The Role of Integration will Continue to Evolve

- **The established requirements-driven process will drive execution**
- **Peer review is being emphasized**
- **The technology development plan will continue evolving**
  - To account for programmatic and strategic changes
  - To incorporate alternatives
  - To account for industry involvement
- **The transformation of the R&D process will require multi-level coordination**