



## **Global Nuclear Energy Partnership Technology Demonstration Program**

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**May 19, 2006**

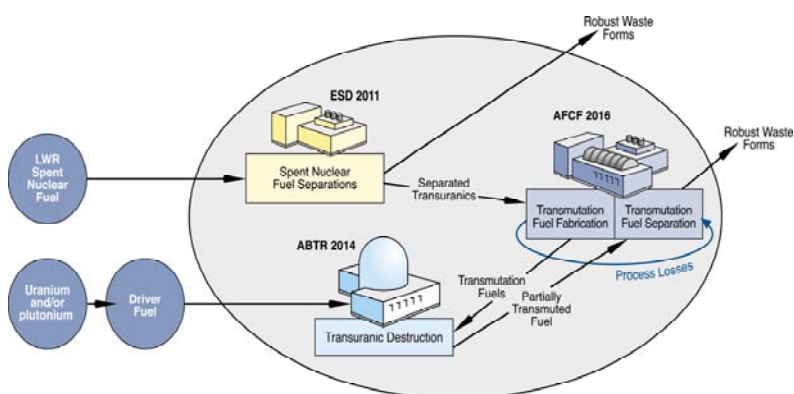
## **Global Nuclear Energy Partnership (GNEP)**



- GNEP announced in President's budget in January 2006
  - A new paradigm for the next evolution of global nuclear energy
  - Nuclear nonproliferation is a cornerstone of GNEP
- GNEP Technology Demonstration Program (GNEP-TD)
  - Focus on domestic demonstration of key technologies
  - International partnerships in technology development
  - Embedded university program
- 5-year technology plan under development
  - 9 U.S. national laboratories involved
- Provision of intellectual basis for GNEP-TD decisions

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## GNEP Technology Demonstration Facilities



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## GNEP-TD Facilities



### ■ Engineering-Scale Demonstration (ESD)

- Demonstration of the UREX+1a process
- Source of supply of transuranic elements for Advanced Burner Test Reactor
- Suitable for process optimization
- Size is to be determined from performance requirements

### ■ Advanced Fuel Cycle Facility (AFCF)

- Demonstration of transmutation fuel fabrication and processing
- Modular research laboratory
  - Aqueous separations demonstration at up to 25 metric tons per year
  - Pyrochemical separations demonstration at 1 metric ton per year
  - Recycle fuel fabrication development and demonstration
  - Supporting R&D laboratories including advanced safeguards demonstration, evaluation, etc.

### ■ Advanced Burner Test Reactor (ABTR)

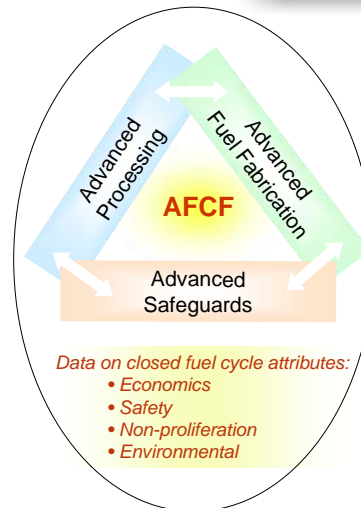
- Demonstrate performance of transmutation fuel
- Size is to be determined from performance requirements

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### **AFCF is a multi-purpose facility for bench-scale to engineering-scale technology development & demonstration**



- Remote fuel fabrication development and demonstration. Fabrication of transuranic (TRU) -bearing transmutation fuels at the rod and subassembly scale.
- Integrated aqueous process development and demonstrations of spent fuel treatment using Light Water Reactor (LWR) spent nuclear fuel (SNF).
- Integrated dry process development and demonstration of fast reactor (FR) spent fuel treatment.
- Development and proof-testing of advanced safeguards instrumentation and methodology.
- Process improvements, either in the form of new flow-sheets or advanced process equipment.
- Flexibility to facilitate the development and demonstration of recycling methods for advanced fuel types that can support a number of fuel cycle strategies.



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### **GNEP: Advance a New Paradigm**



- Minimize the risk of:
  - State sponsored proliferation of nuclear materials and technology for weapons purposes;
  - Nuclear / radiological terrorism
- ..... And do so efficiently and effectively while building global confidence through multi-lateral development
- Develop technologies that enable new or improved institutional measures implementing:
  - Materials accountancy
  - Containment & surveillance
  - Process authentication, validation & monitoring
  - Secure information management and communications
  - Assessments for undeclared activity

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## **Risk Reduction: A Systems Approach**



- Individual technologies are critical
  - Improved fissile measurement accuracy, speed, cost reduction, etc
  - Broad range of technology exists
- Optimization of system performance is transformational
  - Forgiving system: No single point of failure
- Critical attributes:
  - Accuracy (materials accountancy and process validation)
  - Efficiency (cost, maintenance, people, etc)
  - Speed
  - Transparency (confidence)
  - User acceptance
- Challenges
  - Undeclared Activities; Advanced pyro / UREX; Operational impact, Advanced fuels / fuels commerce; Accuracy / throughput, etc.

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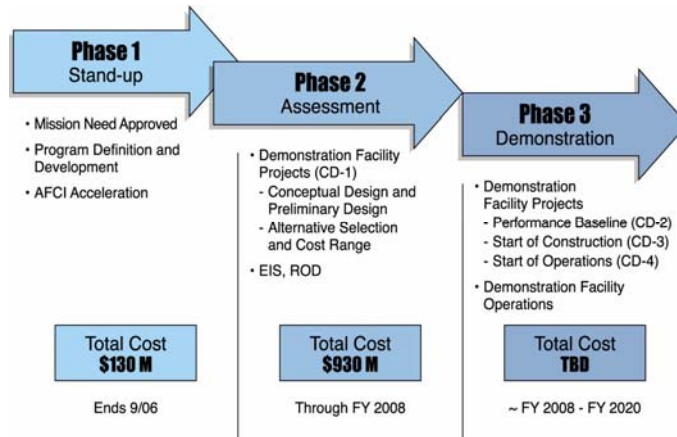
## **Risk Reduction by Design – Enabled Through Technology**



- Enhance intrinsic features (inherent features)
  - Risk optimization as a design parameter (proliferation and physical security)
  - Optimize physical layout, facility structure, process flowsheets, materials employed
  - Enhance signatures of interest to match technology capabilities
- Advanced extrinsic features
  - Intelligent monitoring and control utilizing rapid measurement + simulation driven analyses
  - Advanced information and process security tools = improved remote / automated monitoring and verification
  - Physical protection technologies
- Demonstration and validation of techniques and technologies a pre-requisite to adaptive global regime

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## GNEP-TD development plan



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## GNEP-TD Key Milestones and Planning Dates



- EIS Record of Decision (June 2008)
- Secretarial Decision on proceeding with demonstration (June 2008)
- ESD operational (September 2011)
- ABTR operational (September 2014)
- AFCF operational (September 2016)

DATES PROVISIONAL—To be determined through Technology Development plan

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## ***GNEP-TD Stand-up phase: Progress to date***



- GNEP announced in Presidents budget (January 06)
- 20M\$ moved from Office of Civilian Radioactive Waste (RW) to Office of Nuclear Energy, Science, and Technology (NE) (February 06)
- Advanced Notification of Intent for site studies (March 06)
- CD-0 (Mission Need) granted (April 06)
- Report to Congress (April 06)
- 5 Year Technology Development Plan (due May 06)
- RFP for site studies (due May 06)
- GNEP-TD program management plan (due September 06)

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## ***SUMMARY***



- GNEP is a redefinition of the U.S. nuclear energy strategy
  - Set the agenda for years ahead
- GNEP-TD is the domestic demonstration program to support GNEP goals
- Proliferation risk reduction is a primary objective of GNEP-TD
  - Risk reduction through design optimization (Intrinsic)
  - Deployment of advanced systems of technologies
  - Demonstration and validation
- FY06 is the stand-up phase for GNEP and GNEP-TD
- Technology development geared to Summer 08 Secretarial decision
- Discussions have taken place with a number of countries on cooperation
  - a key to GNEP success

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