Nuclear Regulatory Commission Briefing

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for Nuclear Energy

March 5, 2007

Presentation Topics

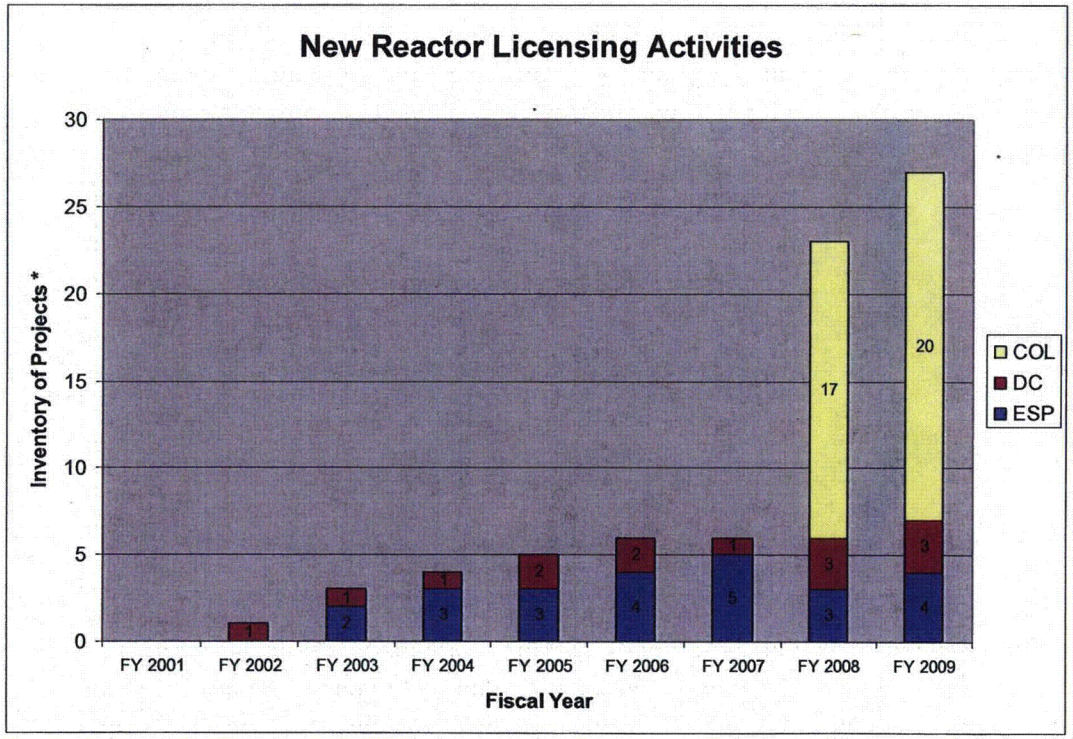
- Introduction
- Restate Vision of the Office of Nuclear Energy
- Program Goals
  - NP2010
  - EPAct 2005 Incentives for Nuclear Power
  - Generation IV
  - Nuclear Hydrogen Initiative
  - GNEP
  - University Nuclear Science and Engineering Support

Nuclear Power 2010
Priority Demonstration Projects

- **Early Site Permit (ESP)**
  - Clinton
  - Grand Gulf
  - North Anna
- **Combined Construction and Operating License**
  - NuStart
    - Grand Gulf (ESBWR)
    - Bellefonte (AP1000)
  - Dominion
    - North Anna (ESBWR)

U.S. Nuclear Power Interest Is Growing

- As a result of the EPAct financial incentives and the Nuclear Power 2010 program, interest in new nuclear plants is growing
  - Additional ESP projects underway and planned
  - Indications that 14 power companies plan to submit 20 COL applications for as many as 30 new nuclear units

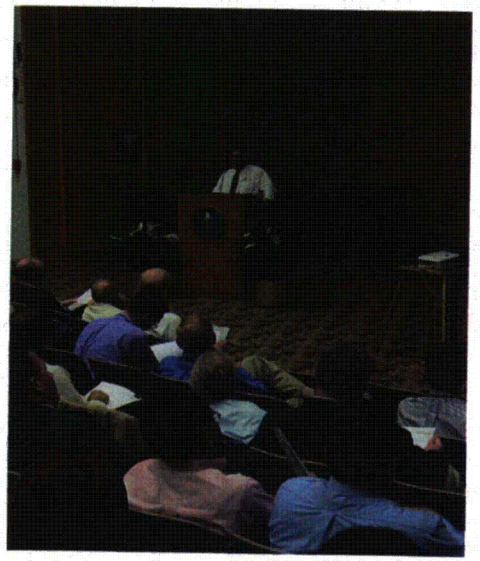


- 9 of these companies are direct participants in NP 2010 demonstration projects
- Foreign reactor vendors pursuing U.S. markets
- States legislatures and public utility commissions increasingly receptive to new nuclear plants

DOE Actions to Accelerate New Nuclear Plant Licensing

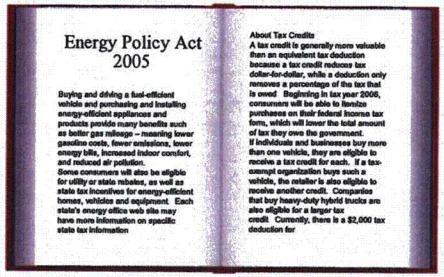
- **COL Project Restructuring – Supports NRC's Design-Centered Review approach**
  - Separate current COL projects into four individual cooperative agreements:
    - Focus power companies on activities on COL application preparation and NRC review
    - Focus reactor vendor activities on completion of standardized nuclear plant designs
    - Fund NRC review and approval of one reference ESBWR and one AP 1000 reference COL application

- **Supported new reactor technology training**
  - Sessions for DOE and NRC staff
    - AP1000 (Westinghouse)
    - ESBWR (GE)
    - EPR (AREVA)
    - ABWR (GE) being planned for Spring 2007



Status of EPACT 2005 Incentives

- **Provides a Variety of Incentives that Reduce Regulatory and Financial Uncertainties for "First Movers"**
  - **Loan Guarantee – Summer 2006**
    Status: DOE issued guidelines for small-scale loan, and anticipates issuing a rule for program in 2007
  - **Standby Support – Summer 2006**
    Status: DOE issued final rule outlining process to obtain risk insurance; will complete drafting standard conditional agreement by Summer 2007.
    Agreement is first step to obtain risk insurance
  - **Production Tax Credit – Spring 2006**
    Status: Department of Treasury published Notice in IRS Bulletin with guidelines for allocation and approval process of tax credit
- **Encourages the Deployment of Nuclear Energy**
  - **Reduces first of a kind economics**
  - **Indemnifies first six plants for delay related to NRC scheduled review approvals and litigation that could delay full-power operations**
  - **Provides economic boost for the first 6 GWe of capacity once plants are generating electricity**



Generation IV Nuclear Energy Systems (update)

- **U.S. Gen IV program managed as part of an international collaboration**
  - Progress in GIF R&D planning activities:
    - SFR and VHTR System Research Plans Signed
    - SFR Project Arrangement on Advanced Fuel signed (Jan 2007)
    - Other Project Arrangements in Negotiation
- **NGNP/VHTR**
  - Progress in NGNP Licensing Strategy
    - First PIRT workshop held in February (27/28)
    - Detailed Licensing Strategy report outline completed at staff level with collective staff review in late March
    - Next step is to hold second PIRT workshop in April/May and obtain management approval of Licensing Strategy outline
  - Progress in R&D
    - First fuel irradiation test initiated in ATR (Dec 2007)
    - Pre-conceptual design contracts awarded to Westinghouse, AREVA NP, and General Atomics (September-November 2006)
    - New R&D plan based on pre-conceptual design data needs to be completed by end of the fiscal year

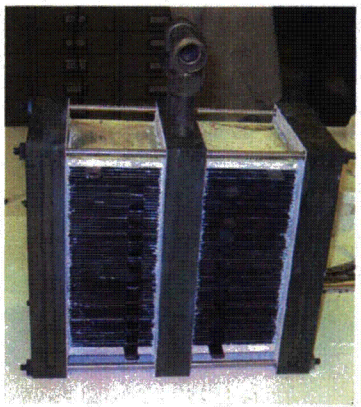
GEN IV International Forum

Jul '01	GIF Charter
Feb '05	GIF Framework Agreement
	GIF System Arrangement System Steering Committee System Research Plan
Feb '06 Nov '06	SFR System Arrangement VHTR System Arrangement
	GIF Project Arrangement Project Management Board Project Plan
Jan '07 Ongoing:	SFR Advanced Fuel SFR Design and Safety SFR Component Design and BOP Global Actinide Cycle International Demonstration VHTR Materials and Components VHTR Hydrogen Production

Nuclear Hydrogen Initiative

- **Objective**
  - Develop greenhouse-gas-free hydrogen production technologies that are compatible with nuclear energy systems (thermochemical and high-temperature electrolysis)
- **Major Program Milestones**
  - FY 2007: Complete construction of integrated laboratory-scale hydrogen production experiments
  - FY 2011: Complete design and construction of pilot-scale hydrogen production experiments and commence testing
  - FY 2019: Demonstrate commercial-scale hydrogen production system for use with nuclear reactors
- **Recent Major Accomplishments**
  - July 2006: Sandia National Laboratories developed and successfully tested an innovative new sulfuric acid decomposer for inclusion in the Sulfur-Iodine integrated laboratory-scale experiment
  - September 2006: Idaho National Laboratory completed 2040-hour test run using laboratory-scale high-temperature electrolysis equipment averaging 700 liters per hour hydrogen production

H_2SO_4 Decomposer



High-Temperature Electrolysis Stacks

Global Nuclear Energy Partnership

- ☐ GNEP Status in April 2006
- ☐ GNEP Progress Since April 2006
- ☐ GNEP Strategic Plan
- ☐ Safety and Security
- ☐ Next Steps for GNEP

At the time of the last update in April 2006, GNEP had just been initiated

- CD-0 (Mission Need) was approved by the Deputy Secretary on April 28, 2006.
- DOE had just released a request for Expressions of Interest with regard to siting integrated spent fuel recycling facilities for GNEP technology demonstrations.
- An Advanced Notice of Intent was issued in March 2006 for three demonstration projects.

GNEP has made substantial progress since the April 2006 NRC update

- Industry has expressed considerable interest in GNEP with 18 Expressions of Interest in August 2006

- In the past 60 days, DOE has:
  - announced a Notice of Intent for a GNEP Programmatic EIS;
  - Released the GNEP Strategic Plan; and
  - awarded over $10M for GNEP Siting Grants for integrated spent fuel recycling facilities

The GNEP Strategic Plan released in January 2007 calls for specific actions

- ***Obtain input from U.S. and international industries and governments on what technology and policy issues must be resolved, and what business obstacles must be overcome.***

- ***Develop a detailed GNEP technology roadmap for demonstrating solutions to the remaining technical issues in order to support commercial GNEP facilities.***

- ***Pursue industry participation in the development of conceptual design and other engineering studies that support both a nuclear fuel recycling center and an advanced recycling reactor.***

By June 2008 the Secretary of Energy will make a decision on the path forward for GNEP.

- A decision to proceed with a government-industry partnership to build a nuclear fuel recycling center and a prototype advanced recycling reactor, assumes that:
  - A credible technology pathway has been developed and satisfactory progress has been made in its implementation;
  - a credible business plan exists;
  - there is reason to believe that a government-private partnership can be formed to build the GNEP facilities that are in the best interests of the Nation and all parties;
  - relevant NEPA requirements are satisfied;
  - nonproliferation criteria are defined and met; and
  - international agreements are in place to demonstrate support and participation in the GNEP mission.

Safety and Security are key elements of GNEP

- **NSPD-17**
  - (U) ***"The United States will continue to discourage the world-wide accumulation of separated plutonium and to minimize the use of highly-enriched uranium. As outlined in the National Energy Policy, the United States will work in collaboration with international partners to develop recycle and fuel treatment technologies that are cleaner, more efficient, less waste-intensive and more proliferation-resistant."***

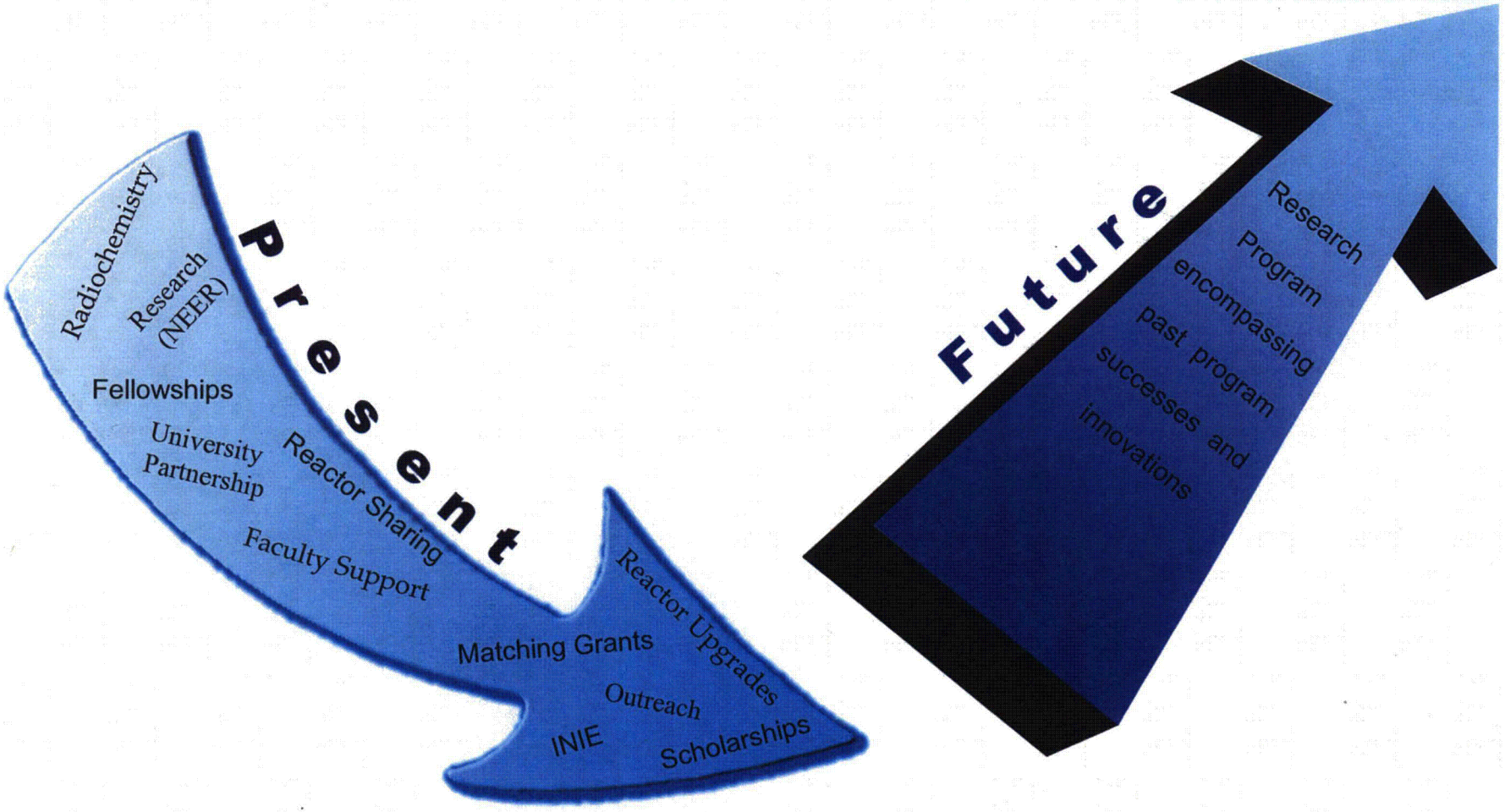
- **Key non-proliferation and security GNEP objectives**
  - **No separated plutonium**
  - **Nuclear material forms that cannot be readily made into a nuclear device**
  - **Advanced nuclear safeguards**
  - **Reliable fuel services**

Near-term work for GNEP includes technical, business, and regulatory actions.

- A technology roadmap needs to be developed that identifies key technology development activities for advanced separations and transmutation fuel fabrication.
- Industry needs to be engaged to provide input on conceptual design approaches and business plan options.
- Scoping meetings for the GNEP Programmatic EIS will be completed in March 2007.
- The MOU/IA with NRC is being developed.

A Revised Approach:
University Program FY 2007

Changing Our Approach to Nuclear Engineering Universities

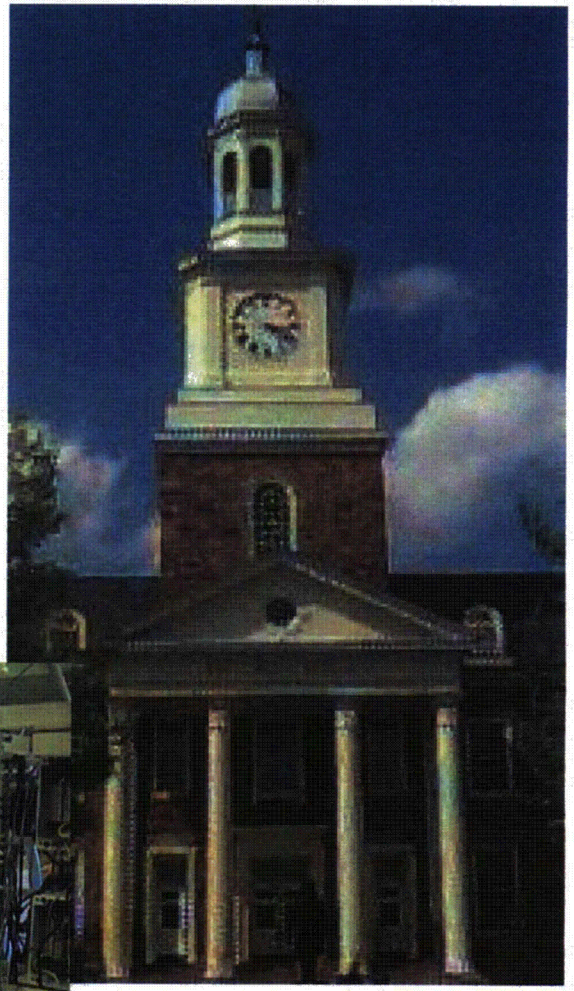


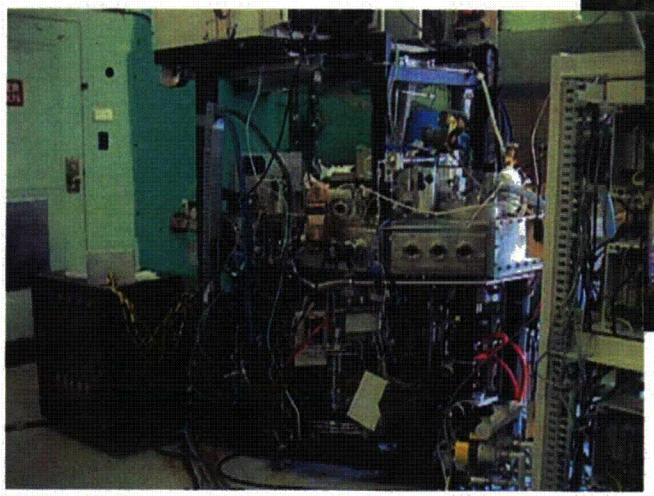
Why Change?

- DOE/NE R&D-related university-based research will be beneficial to DOE and university community
- The Office of Nuclear Energy knows the importance of nuclear engineering education to the nation
- Research-based approach under a broader Nuclear Energy Research Initiative program should help develop an improved education network among universities, laboratories, the nuclear industry and government

Nuclear Energy Research Initiative (NERI)

- Provide research to Universities in support of NE program's applied R&D goals
- Funding will be provided by NE Research Programs
- A modified NERI solicitation is being developed to include capability support





Steps to Transition Program

- Continue to fund many of the original University and NERI activities for much of FY 2007
- Hold Workshop to introduce Universities to the NERI during which:
  - Current NE program areas of research will be presented
  - New solicitation and peer review process will be discussed
  - Peer review process will be discussed
- Issue a new solicitation

Conclusion: NE Supports Universities

- Total support for university activities in FY 2006 was approximately $50M
- This funding level of $50M will remain unchanged based upon our anticipated FY 2007 budget under the Continuing Resolution
- Based on our FY 2008 budget request we expect growth in our university funding commensurate with the growth in GNEP