



U.S. DEPARTMENT OF
ENERGY

Nuclear Energy

Status of NEAC Recommendations

**John Kotek
Principal Deputy Assistant Secretary
for Nuclear Energy
U.S. Department of Energy**

**Nuclear Energy Advisory Committee
June 26, 2015**



U.S. DEPARTMENT OF
ENERGY

Nuclear Energy

NEAC Recommendations Status

-
- **Review of Nuclear Reactor Technology, Facilities and NEAMS recommendations status.**
 - **Fuel Cycle R&D and International recommendations status update will be discussed at the next NEAC meeting.**



Nuclear Reactor Technology

■ LWRS

- Industry Advisory Committee (IAC) suggests that LWRS identify and engage owner/operator decision-makers, explain LWRS and get their input (recognize that these positions would be different between merchant plants versus regulated utilities) (*NRT SC encourages DOE-NE to consider these IAC recommendations*)

Status: Complete. DOE has established broad engagement with industry decision-makers.



Nuclear Reactor Technology

■ IRPs

- *Develop a set of metrics to evaluate IRP benefits (and NEUP generally)*
- *Involve the universities in research topic selection (and NEUP workscopes)*
- *Develop strategy for continuing/graduate the successful IRP's (and NEUPs)*

Status

- Now that NE has completed its large-scale efforts to integrate its competitive research and infrastructure investment processes, an Innovative Nuclear Research Program Plan will be developed by the end of CY 2015 to identify success metrics for associated programs, including NEUP.
- Universities, national laboratories, industry, and international research entities now have the standing ability to provide input to DOE.
- NE has incorporated into the PICS:NE program execution management system new modules to require and formally document annual go/no go reviews on ongoing competitively-awarded research, as well as transition review(s) timed to support decisions related to the successful continuation/graduation/completion of such research projects.



Nuclear Reactor Technology

- **The subcommittee recommends that the NE-75 staff seek to re-establish a DOE-NASA partnership in this area and propose an MOU to clearly delineate the scope and task details for the Fission Power Systems efforts.**

Status: In Progress. DOE is working with NASA to enhance our partnership.

- **The Reactor Type Options**

- A demonstration reactor that would be a prototype to evaluate several aspects of a selected advanced reactor technology, e.g., licensing process, safety case, operating characteristics, etc.;
- A test reactor to obtain data to support more rapid RD&D of innovations for the existing fleet of LWRs and/or advanced reactors concepts; e.g., new fuel forms, new cladding or advanced materials.
- A dual purpose reactor that employs new technology for the reactor itself, and also enables testing of concepts/materials that might apply to reactors other than the test/demo reactor itself.

Status: In Progress. DOE is working closely with the NEAC NRT Subcommittee and has held a series of meetings.



Fuel Cycle R&D

- Without additional validation data, NEAMS developers should acknowledge the limitations that exist with new Fuel Product Line (FPL) tools, e.g., their applicability may be limited to interpolating between available engineering scale data.

Status: NE's primary response to this recommendation has been a concerted and broad-based effort to obtain, develop, and use validation data for NEAMS tools, which includes validation assessments that address the validation basis, applicability, and limitations.



NEAMS

- **NEAMS requires a stronger and more compelling requirements definition process**
- **Program should adopt a more formal and rigorous requirements “flow-down” process to coherently integrate program around “milestones” that meet user predictive capability needs**
- **Program MUST integrate computational efforts with requisite experimental activities to support validation**
- **Milestones should demand successful simultaneous execution of both computational and experimental efforts**
- **Fuels effort should inform “accident-tolerant fuels” development , post-BRC long-term storage effort**
- **NEAMS needs to articulate a compelling “business case” to its stakeholder community**

Status: NEAMS has implemented all of these recommendations, and continues to improve and prioritize program efforts in these areas.



Facilities

- **The DOE-NE pilot program for a virtual user facility, which began in 2007, should be expanded to include the use of all facilities important to DOE NE's programs in nuclear technology research and development.**
 - That program, the "ATR"-National Scientific Users Facility (NSUF) has proven its worth and provides an effective means for identifying, prioritizing and making available facilities at national laboratories, universities and industry.

Status: A significant effort has been initiated and continues to evaluate the options to determine the most effective role for and scope of the NSUF.



Facilities

■ The scope of the user facility should be expanded beyond its present emphasis on materials development.

- As modeling and simulation of nuclear systems has become an increasingly important aspect of nuclear technology development, the importance of validation and verification through testing has also become increasingly important. The user facility could underpin this need.

Status: NSUF investment in trailing-edge high performance computing capability is being pursued as part of the FY 2016 budget to expand NSUF capabilities to support M&S and V&V.



Facilities

- **The “NNSUF” should be prominent in the next update of the DOE-NE Roadmap for nuclear technology R&D as the coordinating mechanism for nuclear-facility use and prioritization.**
 - The name of the user facility, namely the Advanced Test Reactor (ATR) – National Scientific User’s Facility (NSUF) reflects its origins but is not representative of its current status or our recommendation.

Status: NSUF is featured in the draft of the next update to the NE R&D Roadmap as part of the list of current major NE programs. Also, the roadmap identifies NSUF as part of the solution to the identified need to expand the User Facility Concept for Experimental Integration. Also, in response to this recommendation, the user facility name was changed to Nuclear Science User Facilities (NSUF) to reflect the evolution of the user facility to its current status while retaining the NSUF brand.



■ Expansion of scope is recommended

- Materials
- Thermal Hydraulics
- Code development to include V&V
- Advanced fuels
- Fuel cycles
- Nuclear Engineering in the broadest terms.

Status: In Progress

■ The expanded role goes well beyond ATR

- Proposed revised name “Nuclear Scientific User Facilities” (NSUF)

Status: Completed. Revised name is Nuclear Science User Facilities



Facilities

■ **Identify all critical facilities, across the complex, of importance to NE Missions and develop an integrated “User Facility” framework (a virtual set of User Facilities)**

- Hot cells
- PIE
- Criticals Experiments
- Etc.

Status: Completed. Obtained input on high priority infrastructure needs via a Request for Information that closed on June 19th.



Facilities

■ A new model for NSUF should be prominent in the next DOE-NE roadmap

- Encourage Student and faculty use of facilities in NE Science R&D
- Increased Engage industry in cooperative R&D
- Assure focus on important Industry needs
- Envision next gen. Reactors, fuels, fuel cycles, etc.
- A user organization needs to be emphasized
 - Integration across programs will overcome any double Jeopardy between NSUF and NEUP

Status: NSUF is featured in the draft of the next update to the NE R&D Roadmap as part of the list of current major NE programs.



Facilities

■ High Performance Computing is an essential dimension for a successful NE Future

- The value proposition for CASL needs to be articulated
- NEAMs must focus on developing insights into performance and safety for both current and new systems: provides guidance for experimentation
- Experimental facilities must provide validation and verification of new codes

Status: NSUF investment in trailing-edge high performance computing capability is being pursued as part of the FY 2016 budget to expand NSUF capabilities to support M&S and V&V.

■ The committee recommends leveraging the success of the original NSUF to build a model of multiple new user facilities

Status: In Progress



Facilities

- **Strong Industry engagement is essential: a closer relationship is deemed necessary**

Status: NSUF illustrated the importance it places on industry engagement by opening up its major awards to industry (and national laboratories) in FY 2015 and NSUF is hosting an industry engagement meeting on June 30-July 1 at the EPRI office in Charlotte, NC.

- **Strong university engagement is essential: NEUP must become an effective aspect of industry engagement**
- **INL relationships with both Industry and Universities must be secure and thriving**

Status: In Progress