

# **NGNP PHASE I REVIEW**

**NEAC REACTOR TECHNOLOGY SUBCOMMITTEE**

**CURRENT STATUS**

**DECEMBER 9, 2010**

# **EPACT 2005 REQUIREMENTS**

- **FIRST PROJECT PHASE REVIEW—On a determination by the Secretary that the appropriate activities under the first project phase under subsection (b)(1) are nearly complete, the Secretary shall request the NERAC to conduct a comprehensive review of the Project and to report to the Secretary the recommendation of the NERAC concerning whether the Project is ready to proceed to the second project phase under subsection (b)(2)**

# **NGNP PROJECT PHASES**

**(1) FIRST PHASE.—A first project phase shall be conducted to—**

- (A) select and validate the appropriate technology under subsection (a)(1);**
- (B) carry out enabling research, development, and demonstration activities on technologies and components under paragraphs (2) through (4) of subsection (a);**
- (C) determine whether it is appropriate to combine electricity generation and hydrogen production in a single prototype nuclear reactor and plant; and**
- (D) carry out initial design activities for a prototype nuclear reactor and plant, including development of design methods and safety analytical methods and studies under subsection (a)(5)**

**(2) SECOND PHASE.—A second project phase shall be conducted to—**

- (A) continue appropriate activities under paragraphs (1) through (5) of subsection (a);**
- (B) develop, through a competitive process, a final design for the prototype nuclear reactor and plant;**
- (C) apply for licenses to construct and operate the prototype nuclear reactor from the Nuclear Regulatory Commission; and**
- (D) construct and start up operations of the prototype nuclear reactor and its associated hydrogen or electricity production facilities.**

# Scope of Work for Review

- Review Phase I reports in the following areas:
  - Market case and public-private partnership
  - Status of NGNP licensing activities
  - Status of industrial infrastructure for NGNP
  - Status of R&D program and international efforts
- Review of the Conceptual Design Reports
- Assess readiness to move into Phase II
- Provide report to NE-1 and briefings as needed

# NEAC Subcommittee Approach

- September 30<sup>th</sup> Meeting reviewed:
  - Charge given to the committee from the DOE;
  - Draft review criteria provided to committee by DOE;
  - Identification of NGNP project requirements to successfully proceed to Phase II ;
  - Background of the NGNP project since its inception;
  - Perspective of potential customers and commitment;
  - The market case for the NGNP project;
  - The current design specifications for the NGNP project.

# NEAC Subcommittee Approach

- November 15<sup>th</sup> Subcommittee Meeting:
  - NGNP program plan, which includes all Phase II activities, decision points, time schedule, cost estimates, and needed products.
  - The NGNP licensing strategy with input from NRC
- The program plan is key element to provide a clear understanding that should encompass all Phase II activities.

# STATUS of PHASE I ACTIVITIES

- Select and validate the appropriate hydrogen production technology;
- Determine if it is appropriate to combine electricity and hydrogen production in a single prototype nuclear reactor and plant;

***Finding: The NGNP role to produce hydrogen, has been expanded by a broader role to produce process heat for a variety of applications (including hydrogen production) as part of the mission. Process heat applications are more general in scope and can significantly expand the market and improve the business case.***

# STATUS of PHASE I ACTIVITIES

- Carry out enabling research, development, and demonstration activities on technologies and components (Energy conversion, Fuels and Materials); ***Subcommittee will review; but based on overview we see no impediments to the project***
- Carry out initial design activities for a prototype nuclear reactor and plant, including development of design methods and safety analytical methods and studies

***Finding: Phase I design activities unfinished and NEAC subcommittee still to review the remaining design***



# STATUS of PROJECT MANAGEMENT

**PROTOTYPE PLANT SITING** — The prototype nuclear reactor and associated plant shall be sited at the INL. *However, the business case to optimize NGNP use for process heat applications and electricity indicates that a site in proximity to a wide range of industrial uses is more appropriate. A site at INL will not support a partnership agreement with industry as required by EPACT.*

**LICENSING ACTIVITIES** – DOE (and its contractor) in collaboration with the NRC has developed a licensing strategy to use 10CFR52 process and submit a combined operating license (COL) and is well underway *Such an approach requires a sufficiently detailed design so that the COL can be submitted to the NRC in a timely fashion. However, given the limited scope and duration of the current conceptual design activities, it seems unlikely that any vendor could complete a sufficiently detailed design to obtain a license for a NGNP without a partnership in place with the vendors as part of that team.*

# STATUS of PROJECT MANAGEMENT

## INDUSTRIAL PARTNERSHIPS AND COST SHARING:

EPACT-2005 directed the DOE to have the INL organize a consortium of appropriate industrial partners that will carry out cost-shared research, development, design, and construction activities, and operate facilities, on behalf of the NGNP Project. The activities of industrial partners funded by the Project would be cost-shared in accordance with section 988 of the EPACT; i.e., a 50/50 cost share for the project.

*Currently, there is no public-private partnership in place to carry this project forward. Also, no potential customer has indicated a willingness to commit to share in the cost of construction of a first-of-a-kind NGNP at the currently requested 50/50 cost share on an annual basis.*

*Moreover, at current “low” natural gas prices, a failure to internalize the social cost of carbon emissions, and the perceived high initial capital cost of the first few reactor plants deployed, the current reluctance of vendors and customers to commit to substantial cost sharing in the NGNP development is unlikely to change in the near term.*

# STATUS of PROJECT MANAGEMENT

## PROJECT PLAN:

The DOE has developed a project plan for the Phase II activities. The plan would issue a call for a public-private partnership to be formed by the end of FY2012. This approach would mean that any additional detailed design activities would occur after the partnership is formed and a cost-share is determined.

*Given the absence of a partnership and the limited amount of conceptual design work that will be completed, it does not appear that a COL can be submitted by September 2014, or construction completed by 2021 as defined in the revised project plan.*

# OVERALL STATUS and PATH FORWARD

At this time the project is not ready for a decision to proceed to authorization of the complete set of Phase II activities.

However, we consider it would be practical to proceed with a portion of the Phase II activities suggested in EPACT (i.e., continue with Phase I efforts, initiate a partnership and begin design activities required to support NRC licensing).

We believe that NE should continue supporting the development of the NGNP at an appropriate level. We do not see a credible path forward within the constraints imposed by the 2005 EPACT and the current lack of potential vendors and customers willing to make substantial up-front funding commitments for the NGNP.

***Consequently, DOE- NE should:***

***1] Revise the NGNP program plan to reflect the current situation,***

***2] Accelerate the formation of a public-private partnership as soon as practical to obtain end-user input into design activities, and fund additional design activities to support this effort, and***

***3] Engage the NRC for necessary licensing activities to ensure that the regulatory framework for this new reactor technology is ready to support commercialization.***