

## **Generation IV Nuclear Energy Systems Technology Roadmap Draft Technical Working Group (TWG) Charter**

The goal of the Generation IV initiative is to work on an international basis to identify, assess, and develop nuclear energy technologies over the next three decades. These technologies will be chosen based on their ability to compete in all markets with the most cost-efficient technologies expected to be available, while further enhancing nuclear safety, minimizing the impact of nuclear waste, and further reducing the risk of proliferation.

The ultimate goal of a Generation IV program is to have one or more next-generation nuclear energy system designs certified and deployable by 2030 or earlier.

### The Generation IV Nuclear Energy Systems Roadmap

A first step in the Generation IV technology development program is to develop a Technology Roadmap to guide Generation IV R&D. The research called for in the Roadmap will support the development of several promising Generation IV nuclear energy system concepts.

The purpose of the Generation IV Roadmap is to: 1) Identify nuclear energy system concepts and associated integrated fuel cycles that offer the greatest potential for meeting long-term energy needs; and 2) Set forth a research, development and demonstration plan for those concepts and fuel cycles. The Roadmap will evaluate all reasonable concepts for meeting these needs, including nuclear energy systems that produce non-electricity products such as process heat, hydrogen, and desalinated water.

Before the Roadmap is prepared, goals will be established that Generation IV nuclear energy systems should strive to meet. DOE has assigned this task to the Nuclear Energy Research Advisory Committee's (NERAC's) Generation IV Roadmap NERAC Subcommittee (GRNS). After the goals are established, an Evaluation Methodology Group (EMG) will develop a process for the systematic evaluation of the comparative performance of proposed Generation IV concepts and associated potential fuel cycles against the Generation IV goals. Appropriate metrics will be developed for use in measuring these concepts against the NERAC goals.

### Technical Working Groups – Workscope and Deliverables

The concept evaluations will be conducted by four Technical Working Groups (TWGs) – one each to examine water-cooled, gas-cooled, metal-cooled, and non-classical reactor systems.

The main responsibilities of the TWGs are to:

- With the assistance of the Roadmap Integration Team (RIT), gather information on reactor concepts that could meet the goals of Generation IV.
- Apply expert judgement to pre-screen concepts that, under closer scrutiny, do not appear to have a reasonable chance of satisfying the goals.
- Implement the concept evaluation methodology developed by the EMG, to identify the most promising candidates to meet the Generation IV goals.
- Recommend research and development plans, schedules, and priorities to the RIT, to guide the development of these promising concepts.

The work of the TWGs will be conducted in three phases, each ending with the production of a major TWG deliverable. The first phase is the survey and initial concept screening process. This process will start with

a broad solicitation of concept proposals from industry, national laboratories, academia, and international groups. This initial information gathering phase will supply enough information to allow screening concepts that appear to have no reasonable chance of meeting the majority of the Generation IV goals. Only those concepts that appear to hold sufficient promise will be carried to the next phase. The TWGs will each issue a report summarizing their analysis and the reason(s) why certain concepts will be excluded from further analysis.

In the second phase, the TWGs will determine what additional information will be necessary to conduct a detailed evaluation of the concepts using the methodology established by the EMG. The TWGs will request this information from concept proponents in the summer of 2001, and will use this information to identify technical uncertainties associated with each concept, and identify gaps in the current technology and associated R&D targets. This phase is complete when a consensus analysis is developed and documented on the technical needs and gaps and R&D targets. This analysis will be documented by the TWGs and submitted to the RIT for inclusion in a Generation IV concept analysis and technology needs report, which will be issued in January 2002.

In the third phase, the R&D needed to mitigate the technical risks and close the technology gaps for each promising concept will be identified. The R&D scope, duration, necessary infrastructure, and approximate R&D costs will be specified for each promising concept. In early 2002 the TWGs, with assistance from the RIT and EMG, will use this knowledge of technology gaps to systematically evaluate the proposed energy system concepts and potential fuel cycles for their comparative performance against the established Generation IV goals. This process will be conducted using the evaluation methods established by the EMG, and will rely extensively on the expert judgement of the TWG members. As the final step in this phase the TWGs will develop structured R&D plans, which will include initial recommendations regarding the transition of the technology to industrial partners to enable each concept and associated potential fuel cycle to be deployed no later than 2030. The roadmap will be complete when the final concept evaluations and R&D plans are incorporated into the document, and after opportunity is provided for public comment on the draft Roadmap. The Roadmap Report will be issued by September 2002, then revised as needed.

To allow completion of the roadmap by September 2002, the schedule for TWG deliverables is:

- Summary of results of initial concept screening – September 2001
- Analysis of technology needs, gaps, and R&D targets – December 2001
- Report on concept evaluations and R&D plans – August 2002