

Generation IV Goals and Roadmap Effort

***Dr. John M. Ryskamp
INEEL***

***June 19, 2001
Hyatt Regency Milwaukee***



Generation IV Technology Roadmap

- ***Identify and evaluate most promising nuclear energy system concepts (Oct '00 - Sep '02)***
- ***Advisory group: Generation IV Roadmap NERAC Subcommittee (GRNS)***
- ***Working Groups:***
 - *~50 U.S. experts from industry, labs, academia*
 - *~40 experts from Generation IV International Forum (GIF) member countries and organizations*
- ***R&D Plan to support future commercialization of the best concepts***

Generation IV Technology Roadmap: Goals

Goals

- *Reflect mid-century vision of energy needs (2030)*
- *Provide basis for evaluating nuclear energy systems and identify the most promising concepts*

Sustainability Goals

- *Resource inputs*
- *Waste outputs*
- *Nonproliferation*

Safety & Reliability Goals

- *Excellence*
- *Core damage*
- *Emergency response*

Economics Goals

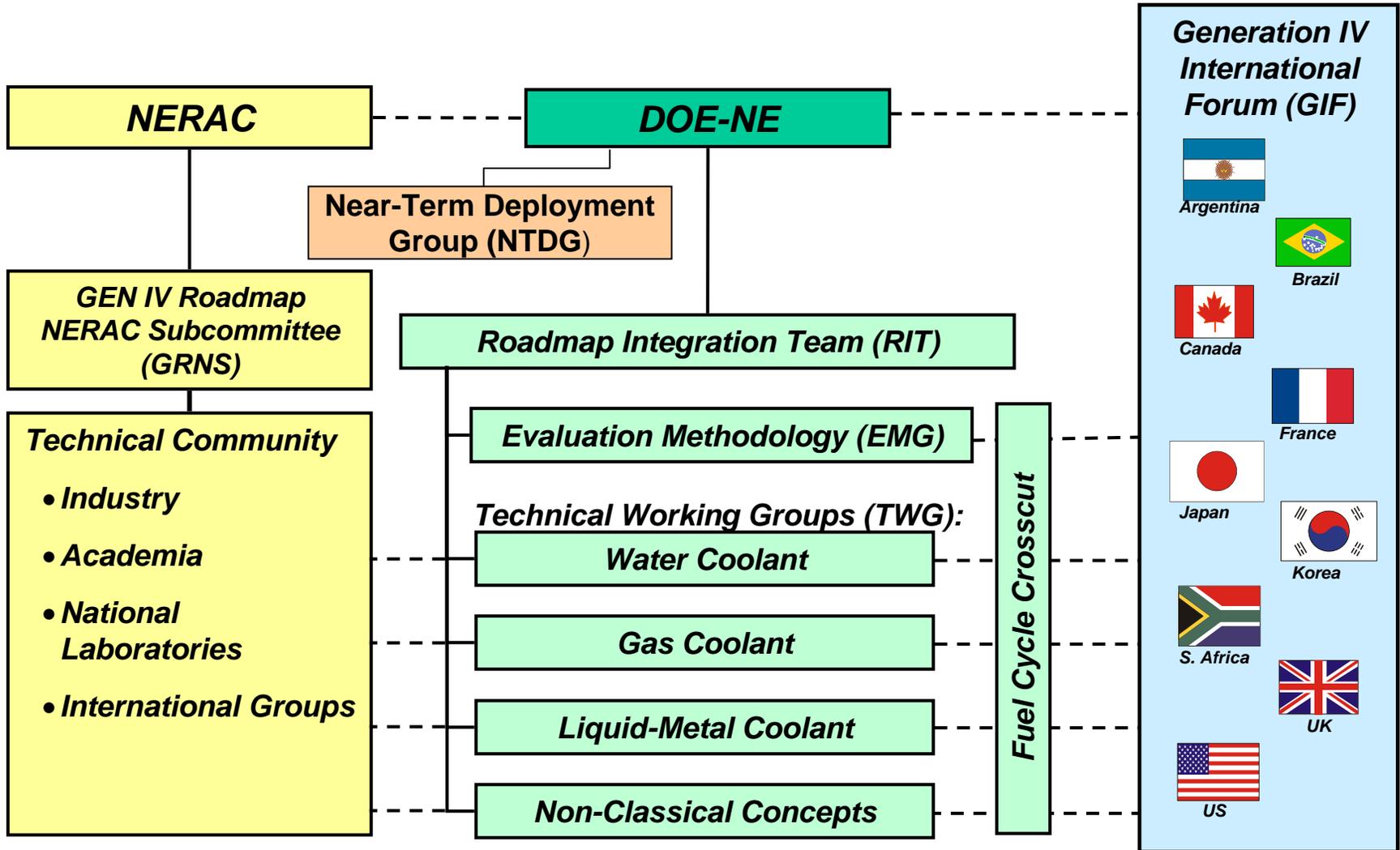
- *Life cycle cost*
- *Risk to capital*

Key Definition: System

Generation IV System:

- **An entire energy production system, including**
 - *nuclear fuel cycle front and back end*
 - *nuclear reactor*
 - *power conversion equipment and its connection to the distribution system*
 - *electricity, hydrogen, fresh water, process heat, district heat, propulsion*
 - *infrastructure for manufacture and deployment of the plant*
- **Limited to systems that are likely to be commercially viable by 2030**
- **Primary energy generators based on critical fission reactors**

Generation IV Technology Roadmap: Organization



Schedule for Producing the Roadmap

Four Phases over Two Years:

Phase I: Initial work

Oct '00 – Jan '01

– Completed

Phase II: Needs assessment

Jan '01 – Jan '02

– Jan '02 Draft Roadmap

Phase III: Response development

Oct '01 – May '02

– May '02 Interim Roadmap

Phase IV: Implementation planning

May '02 – Sep '02

– Sep '02 Final Roadmap

First Steps: Goals and Plans

Derive technology goals based on industry needs

- *Goals have been drafted by GRNS and GIF*
- *Captured in Technology Goals Document*

Plan the activity

- *Roadmap Development Guide drafted by RIT*
- *Working groups have been convened including international participation*

Determine how to measure concepts against goals

- *Develop criteria and metrics for each goal*
- *Continue on to develop evaluation methodology*
- *Conducted by EMG, with the RIT and GRNS*

Next Steps: Concepts

Identify concepts for evaluation

- *Drawn from a broad international base*
- *Concepts adopted or synthesized by TWGs*
- *Concepts grouped into “concept sets”*

Detail the most promising concepts

- *Interactions between TWGs & concept teams/advocates*
- *Active study and comparison of underlying technology*
- *“Screening for Potential” guided by EMG criteria*
- *Evaluations guided by EMG metrics*

Key Definition: Concepts

Concept:

A technical approach for a Gen IV system with enough detail to allow evaluation against the goals, but broad enough to allow for optional features and trades.

Concept Set:

A logical grouping of concepts that are similar enough to allow their common evaluation.

The Second Year: Evaluate and Assemble

Evaluate the most viable concepts

- *Compare concept performance to goals*
- *Identify technology gaps*
- *TWGs lead – RIT/EMG reviews – DOE approves – GIF endorses*

Assemble Roadmap to support the most promising concepts

- *Identify R&D needed to close gaps in areas of crosscutting technology*
- *Assemble a program plan with recommended phases*
- *Groups report – RIT integrates – DOE approves – GIF endorses*

Planned Evaluation Stages

- **Request for information** **March 2001**
Concept elicitation, sorting, and characterization
 - **Screening for Potential** **July 2001**
*Concept studies
(assessment of technical needs by concept)*
 - **Final screening** **April 2002**
R&D plan development
 - **Roadmap completion** **September 2002**
-
- Viability R&D*
- **First down-selection**
Performance R&D (industry participation)
 - **Second down-selection**
Demonstration w/industry, design, regulatory reviews

Backups

Technology Working Groups 1–4

Charter

- *Identify Gen IV concepts for evaluation, evaluate their potential against the goals, their technology gaps and needs, and recommended R&D priority.*

Special Features

- *Groups will author major sections of the roadmap on concepts, technology gaps and R&D needs*
- *Group members will staff the crosscut groups in the second year*

Evaluation Methodology Group

Charter

- Develop a process for the systematic evaluation of the comparative performance of proposed Gen IV concepts against the established Gen IV goals.*

Special Features

- Early delivery of products in Feb/Mar and May 2001*
- Continued refinement of methodology*
- Review of the TWG analyses to assure a consistent approach*

Fuel Cycle Crosscut Group

Charter

- *Examine fuel resource input and waste output from a survey of Generation IV fuel cycles, consistent with projected energy demand scenarios. The survey of fuel cycles will include currently deployed and proposed fuel cycles.*

Special Features

- *Members mostly drawn from the TWGs and EMG*
- *8–10 month time frame for delivery of products*

International Participation in Generation IV Roadmap

	Water	Gas	Liquid Metal	Non-Classical	Eval. Methods	Fuel cycle
Argentina						
Brazil						
Canada						
France						
Japan						
Korea						
South Africa						
United Kingdom						
United States						