Topic 2
Proven Technology
What is innovation? What is proven technology?

2010 February 4

- Definitions
- Insights gained
- Challenges
- Recommendations
What is Innovation?

• Evolutionary design is a minor enhancement to an existing design that improves performance, safety, or other desirable characteristic.

• Innovative design is a radical system change that offers new approaches and significant improvements that usually have to be validated by a demonstration or prototype plant.
What is proven technology?

- For this discussion we are limiting the definition to technology for export.
- For innovative reactor designs the consensus is that a reference plant must be built, licensed, and operated in a location before export (Gen-IV, PBMR, IPWR).
- For evolutionary designs it may be acceptable to operate precursor versions of a similar plant (e.g. APR ROK-UAE, EPR France-Finland).
Proven Technology: Moving from ideas to concepts to markets

• How is technology developed and implemented?
• How do you know if it is “proven” or “mature”?
• Can you measure or evaluate maturity?

• Technology holders (vendors) use a structured approach to developing new technology
• Customers need assurance that technology is safe, reliable, economic, sustainable.

• Is nuclear held to a higher standard? Do buyers require a higher level of proof.
Insights Gained

• For domestic deployment each country has it’s own national system of research, development, design, demonstration, and commercialization

• Evolutionary designs can be exported based on precursor reactor performance but innovative designs require demonstration first (operated as a system)

• Some countries apply the same standard for both evolutionary and innovative designs of building, licensing, and operating of the same design before import
Insights Gained (con’t)

• For near-term (5-15 years) deployment of a countries' first NPP most will not choose innovative reactor designs
• For longer-term deployment (15-50 years) or for expansion of an existing Nuclear Energy System countries will consider innovative technologies after demonstration
• Many countries are highly interested in the advantages and applications that innovative technologies can offer
• Innovative SMRs may be deployed earlier than 15 years in some countries to better fit their grid size and to limit economic investment
Challenges

- Process heat applications need to be developed (economic); desalination
- Resource constraints (human, materials, components, etc)
- Energy security; security of supply
- Need technology transfer and infrastructure
- Approaches to waste management including regional approaches
- Shared Liability within risk management (cost?)
- Timeframe – “fast track” versus traditional
- Business models
Business Models

Traditional Approach
- Establish infrastructure
- Technology transfer
- 19 steps (milestones)

“Fast Track” Approach; e.g. state owned, Independent Power Producer (BOO), shared
- Safety, security & safeguards
- Operating risk by owner & operator
How do we collectively manage and share the risk of deploying technology?

Need to manage risk:

- Licensing
- Construction (e.g. Schedule)
- Operation
- Waste Management
- Decommissioning

---------------

- Liability
- Safety, Security, Non-Proliferation
- Technical and Economics
**Recommendations**

- Process, criteria and assistance for assessment of technology readiness?
- Facilitate international approaches; e.g. secure supply of fuel
- Facilitate Regional approaches; e.g. spent fuel management

**Business models**
- Traditional approach
  - Manage risk – facilitate dialogue between vendors and users
- “Fast Track” approach
  - What are basic responsibilities that a country needs to take?
  - How is risk managed? Developer, Vendor, EPC contractor, operator, fuel supplier, country (regulator, utility, etc)
  - Liability and decommissioning