



**The International Framework for Nuclear Energy
Cooperation (IFNEC)**

Infrastructure Development Working Group

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Key Considerations for IDWG Activities

- **Established to facilitate the development of the infrastructure needed for worldwide nuclear energy expansion in a safe, secure and peaceful manner.**
- **The IAEA document - “Milestones in the Development of a National Infrastructure for Nuclear Power” established 19 infrastructure elements which we use as a basis for looking at the Group's activities.**
- **Consensus messages**
 - All members are experiencing infrastructure development challenges.
 - Human Resource development is a central issue.
 - Providing a forum for exchange of experience, lessons learned, and resource information is beneficial to members.



Infrastructure Development Working Group

- **Focuses on seven key areas:**
 - Human Resource Development
 - Radioactive Waste Management
 - Small Modular Reactors
 - Support for Participant Countries, including Assessments and Financing Approaches
 - Interaction with Specialist Organizations
 - Online Resource Library
 - Infrastructure Needs for an International Nuclear Fuel Services Framework



IDWG Meetings and Workshops: Defining Activities, Summarizing Results, Sharing Information

- **IDWG meetings:**
 - 2008, 2009, 2010 (2x/year)
 - April 2011 in Paris



- October/November 2011 in Vienna



- ✧ Peer-to-peer engagement
- ✧ Lessons-learned exchanges and workshops
- ✧ Interaction with industry, educational community and specialist organizations
- ✧ Fast-track activities to complement a strong base of IAEA and bilateral efforts



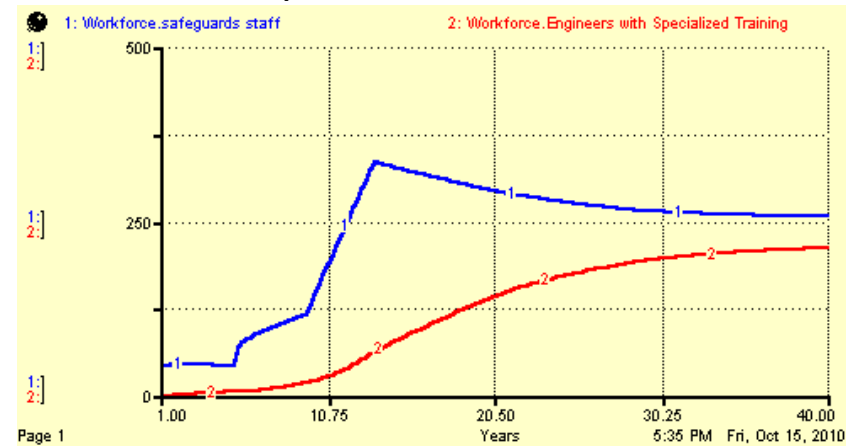
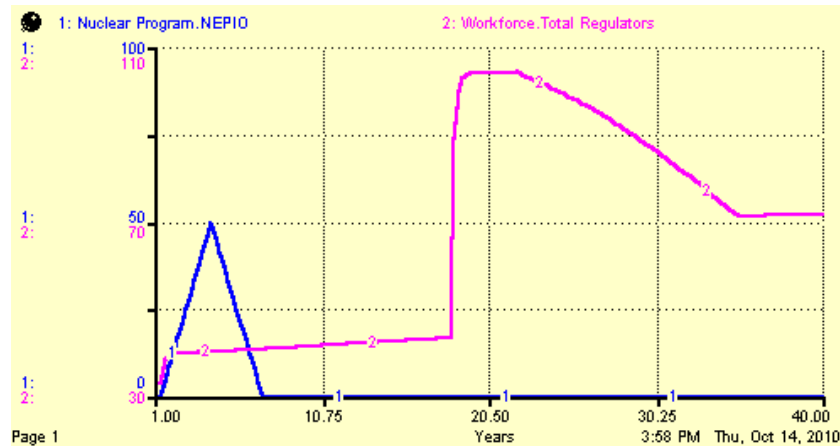
Exchange Programme

- Program Summary
 - Facilitates sharing of knowledge and lessons learned critical to infrastructure
 - Provides opportunities for recent graduates, professors, and secondary educator exchanges
- Exchanges to date include
 - UK nuclear graduates program with USDOE, IAEA and others
 - Other exchanges between Texas A&M & Bulgaria
 - Educational exchanges NPI with Italy & France;
 - Estonia with US-Russian worksop



Human Resource Development Modeling Tool

- Recent model development has focused on regulatory agency workforce and safeguards capabilities
 - Workforce for a nuclear regulatory body based on the US NRC is now included in the model
 - Opportunities for specialized training such as safeguards are now represented in the model



Trial Review with the IAEA - Oct 2011

- Final review of tool documentation and training course materials

Pilot the Tool with Selected Member States

- First IAEA Training Session - Jan 2012



Economic Study for SMRs

- **Preliminary Findings of Independent Ongoing Study of Economics of SMRs**
 - Construction learning can bring down overnight cost.
 - Predictable and streamlined regulatory and construction schedules that includes strong stakeholder involvement and support can reduce the cost of capital, which in turn can reduce levelized cost.
 - Building multiple units at a site will bring down average cost per unit.
 - In some cases SMRs can be competitive with large plants
 - In some cases SMRs can be competitive with natural gas
 - Transferring significant capital costs from the site to the factory can be one of the principal factors to reduce contingency costs.
 - Standardized, certified designs can reduce duration risk, which is also a key factor reducing the cost of capital.
- **“Economies of Small and Modular” can be Competitive with “Economies of Scale”**
- **Waste Management Issues are of Interest**

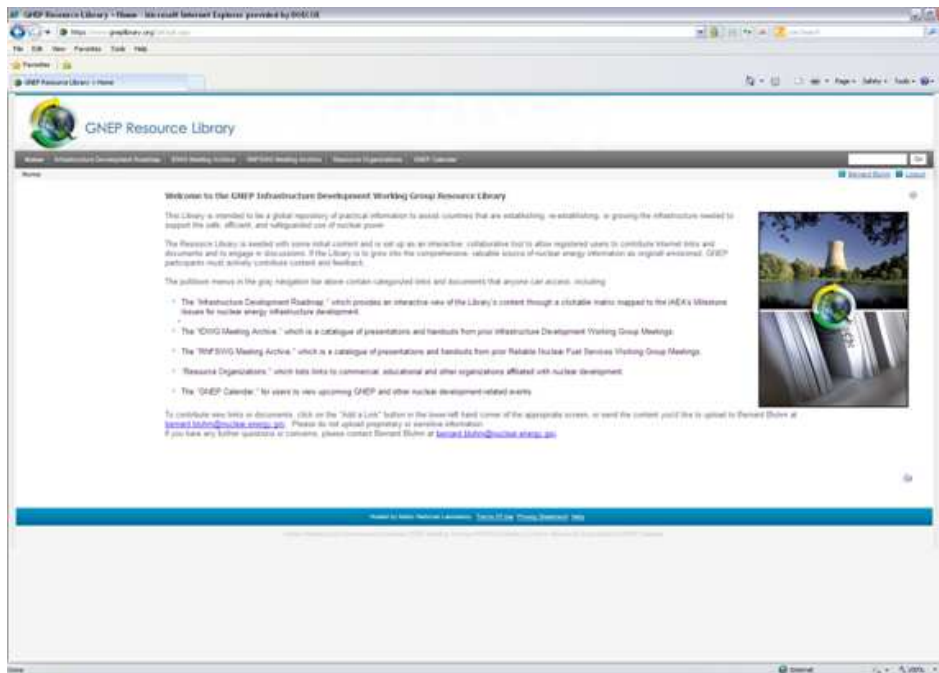


IFNEC Resource Library

- **An integrated on-line source of existing infrastructure development references, programs, tools, and pooled Participants' resources**



- Education and training sources
- Assessment tools
- Conference and event information
- Best practice references
- Operational data
- Services information
- Vendor information
- Past meeting presentations



- **Now the unified source for all non-public IFNEC data, including IDWG, RNFSWG, and Steering Group presentations**
- **Resource Library calendar is regularly updated to reflect ongoing civilian nuclear energy-related events**



Radioactive Waste Management

- **Radioactive Waste Management Subgroup (chaired by the UK) reinforces the importance of radioactive waste management**
- **Working from a consolidated topic list**
 - Research and Development
 - Funding and institutional arrangements
 - Interactions with stakeholders
 - Safe and secure storage and transport of used fuel and radioactive waste prior to disposition
 - Opportunities and constraints for regional and/or shared disposal facilities
 - Opportunities for changing how human resources are developed
 - Will be addressing waste issues for Small Modular Reactors



Workshop on Emergency Preparedness and Response

- **Ensuring Effective Emergency Preparedness and Response as an Aspect of Infrastructure Development**
- **International Framework for Preparedness and Response to Nuclear and Radiological Emergencies**
- **IAEA Guidance, Tools and Programmes in the Area of Emergency Preparedness and Response**
- **Case Study on Experience in Developing an Emergency Preparedness and Response Capability While Establishing a National Nuclear Power Program**
- **IAEA Guidance on Emergency Preparedness and Response: Considerations for States Embarking on a Nuclear Power Programme**
- **Making the Best Use of IAEA and Member State Assistance Programmes Assistance Programs**



Industry Engagement

- AdSTM Inc
- Advance Uranium Asset Management
- Ansaldo
- Areva
- Argonne National Laboratory
- Atomstroyexport
- Babcock & Wilcox
- Barclay's Capital
- Cameco Corporation
- Curtiss-Wright Flow Control Company
- Deutsche Bank
- EDF
- Emirates Nuclear Energy Corporation
- Enel (Italy)
- Energopomiar (Poland)
- Eni (Italy)
- Fitch Ratings
- GE Hitachi Nuclear Energy
- International Nuclear Services
- Hyperion Power
- JAIF International Cooperation Center
- Korea Atomic Energy Research Institute
- Korea Hydro & Nuclear Power Company
- Kozloduy NPP Plc.
- Lightbridge Corporation
- Lithuanian Electricity Organization
- National Skills Academy for Nuclear (UK)
- Nuclear Assurance Corporation
- Nuclear Energy Institute
- NuScale Power
- Oak Ridge National Laboratory
- PNTL
- SKB
- Société Générale
- Sogin
- Towers Perrin
- Toshiba Corporation
- UK National Nuclear Laboratory
- Urenco
- U.S. Export-Import Bank
- U.S. Civilian Research and Development Foundation
- Ux Consulting Company
- Westinghouse
- WM Mining



Educational Community and International Organization Engagement

- Czech Technical University
- CIRTEN
- Igor Kurchatov Vocational School
- Kuwait University
- North Carolina State University
- Politecnico di Milano
- Sapienza University of Rome
- Texas A&M University
- University of California-Berkeley
- University of Manchester
- University of Sofia
- University of Tartu (Estonia)
- ARIUS
- EDRAM
- European Nuclear Education Network (ENEN)
- Organization for Economic Cooperation and Development (OECD)
- World Association of Nuclear Operators (WANO)
- World Institute for Nuclear Security (WINS)
- World Nuclear Association (WNA)



Joint Workshop: Backend Management Summary Points

- **General, relating to infrastructure support for CFS**
 - Timeframes for radioactive waste management & decommissioning are longer than operational reactor life
 - Setting a full (reactor, sf /rwm, decommissioning) lifecycle strategy, complete with decision-making points, is key
 - Ethical, socio-political aspects of storage & disposal (& transportation) important
 - Much joint work being done and useful to transfer experiences but no universal formula for successful progress e.g. on siting
 - Technical aspects are generally well understood and issues are manageable
 - Again much joint research being undertaken
- **Specific to multinational approaches for storage / disposal**
 - These may appear attractive but
 - Similar issues to the above general points
 - Political/ public support lacking & difficult to tackle
 - a main barrier to progress?
 - But this should not prevent constructive discussion, particularly if no host country is identified at the beginning of the process



Joint Workshop: Backend Management Recommendations Going Forward

- **The WGs should continue to work together & share experiences, technologies in storage, transportation and disposal in approach to infrastructure support for CTG**
- **Continue discussion on Regional Co-operation (recognising sensitivities) within the IFNEC context**
 - In line with Joint Convention / IAEA Principles etc.
 - Recognising positive and negative impacts on infrastructure (including financing rwm, regulatory and legal frameworks)
 - Recognising countries could consider dual track approach – national / international
 - but not one at the expense of the other, i.e. “wait and see” not acceptable
 - Could/ should/ would a country or a group of countries “volunteer”?
 - Recognise “issues” such as liabilities, economics, financing etc
 - IDWG to draft papers
 - Recognise aspirations of new countries and manage expectations in policy / strategy development for either single/ dual-track approach
 - Assistance in establishing infrastructures, especially legal and regulatory framework
 - Partnership building between regulators, and also partnerships between site operators or organizations
- **Continue engaging with industry (i.e. the implementers/ service providers)**
 - Role of Industry in a public/private partnership needs further exploration
 - RNFSWG to redesign and re-circulate industry survey