



International Atomic Energy Agency

Safety of Decommissioning: International Cooperation under the IAEA Coordination

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WM'09, Session 68 - Panel discussion

IAEA Mission

- The IAEA serves as an intergovernmental forum for scientific and technical cooperation in the peaceful use of nuclear technology worldwide
- The IAEA's programmes
 - Encourage the development of the peaceful applications of nuclear technology
 - Facilitate the application of safety measures in its use
 - Provide international safeguards against its misuse
- Development and **cooperation**
- **Safety**
- **Control**



Decommissioning

- The IAEA objective:
 - to apply a **global nuclear safety regime** to decommissioning
 - to assist Member States in termination of practices and release of facilities and activities from regulatory control
 - by using appropriate technologies in a safe, timely and cost effective manner



International Action Plan on Decommissioning

- Result of conclusions and recommendations from the IAEA International Conference on Decommissioning, Berlin (2002)
- The Action Plan revised in 2007 in accordance with the outcomes of the IAEA Athens conference (2006)
- Establish the IAEA as the **international focal point** to assist all Member States with planning, undertaking and termination of decommissioning in accordance with international Safety Standards and state-of-the-art recommendations
- Focus future IAEA activities on decommissioning, addressing key areas and developing the **international nuclear safety regime** in the field of decommissioning



The Main areas of ongoing and future activities

- **Governmental roles and responsibilities for decommissioning**
- **Decommissioning strategies**
- **Independent review of decommissioning of facilities**
- **Decommissioning of small facilities**
- **Safety standards for decommissioning**
- **Management of material and sites**
- **Funding and cost estimation**
- **Transfer of sustainable technologies**
- **Maintaining competence in decommissioning**
- **Lessons learned from decommissioning as a feedback to improve the design of new facilities**

JOINT CONVENTION on the safety of spent fuel and the safety of radioactive waste management

- First legal instrument to directly address these issues on a global scale
 - Article 26 – Decommissioning
 - February 2009: ~50 contracting parties
- Objectives:
 - to achieve and maintain a **high level of safety worldwide** in SF and RWM, through the enhancement of national measures **and international co-operation, including where appropriate, safety-related technical co-operation**
 - to ensure that **during all stages** of SF and RWM there are effective defenses against potential hazards ...
 - to prevent accidents with radiological consequences and to mitigate their consequences ...
- JC encourages the Contracting Parties to take the appropriate steps to ensure the safe decommissioning of their facilities
- **Exchange of good practices** among the CPs to improve safety
- The IAEA assists the effective implementation of JC by organizing review meetings and promoting the JC through regional workshops and meetings, newsletters, brochures and a web page



International Safety Standards

- **As part of its statutory function, the IAEA has been developing safety standards related to decommissioning**
 - **Decommissioning of all types of facilities**
 - **Release of sites from regulatory control**
 - **Release of material from regulatory control**
 - **Safety assessment**
 - **Management of contaminated scrap metal**
- **IAEA Safety Standards are revised on regular basis in accordance with the experience of Member States and good practices**

International Safety Standards

- **IAEA Statute:**

- Develop safety standards



Nuclear safety
Radiation Safety
Waste Safety
Transport Safety

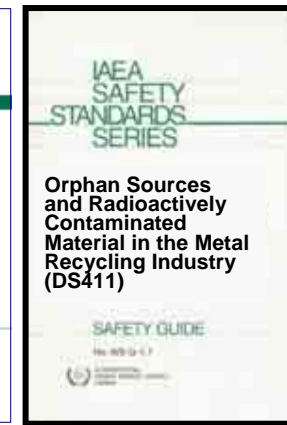
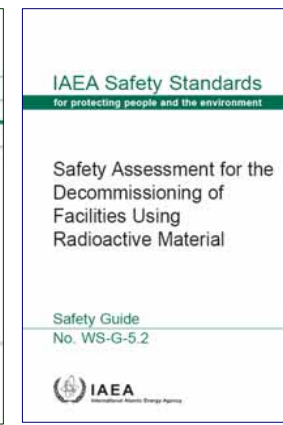
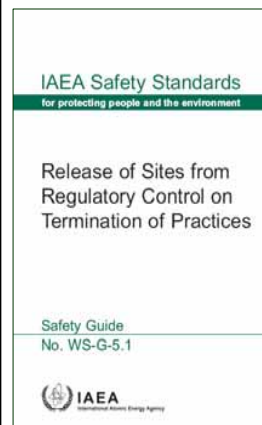
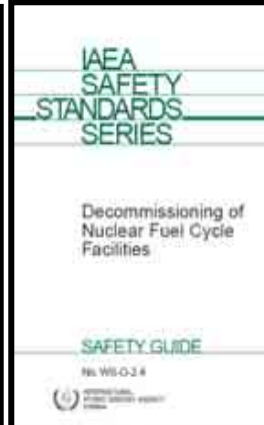
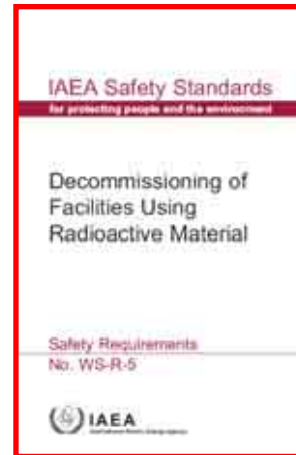
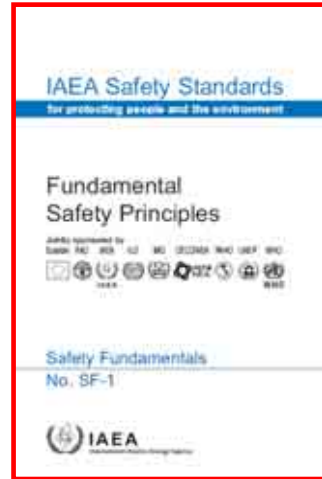
- Provisions for their application and guidance on good practices



Peer reviews
Technical cooperation
Research and development
Training
Exchange of information



Safety Standards on Decommissioning



revision

draft

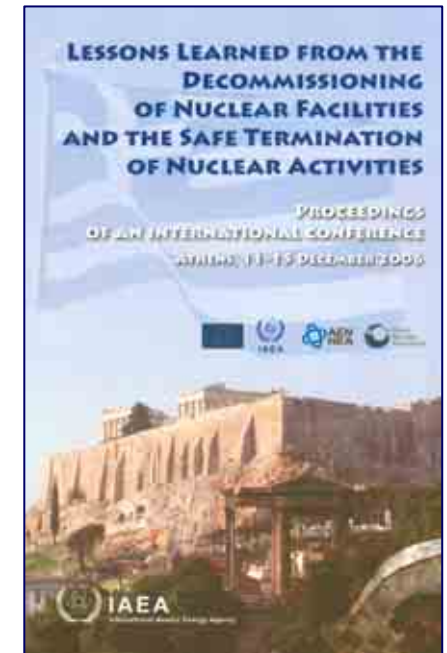
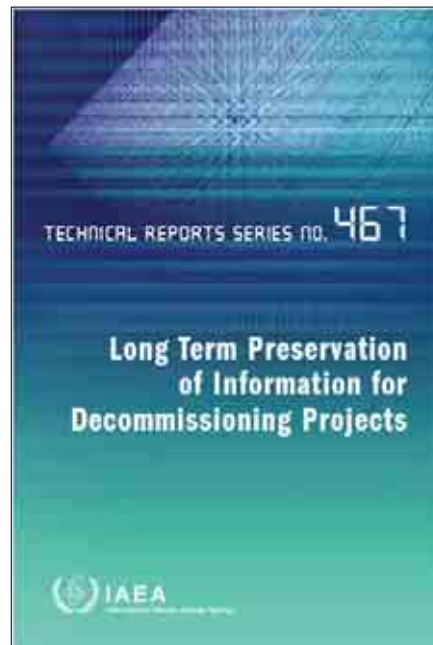
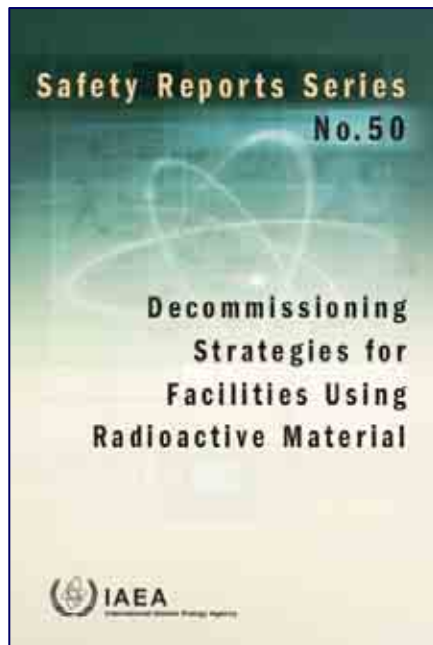


Supporting Safety, Technical Reports and Other Documents

- **Characterization of facilities**
- **Selection of decommissioning strategies**
- **Monitoring of materials and sites for compliance with release criteria**
- **State-of-the-art decommissioning technologies**
- **Cost estimates and financial mechanisms**
- **Planning, organization and management of decommissioning**
- **Development and review of safety assessment**
- **Management of decommissioning waste**
- **Decommissioning of structures, systems and components**



Supporting Documents



Assisting decommissioning projects

- **IAEA Technical Cooperation framework**
- **Assistance to the Member States in the field of planning, implementation and regulation of decommissioning of all types of facilities**
- **Assistance provided according to the needs of Member States, the radiological and physical status of the facility and the stage of decommissioning activities**
 - **Development and review of legal and regulatory framework**
 - **Establishment of decommissioning infrastructure**
 - **Establishment of decommissioning databases**
 - **Technical and managerial training for key-staff**
 - **Development and review of preliminary or detailed decommissioning plans**
 - **Development of cost estimation for decommissioning**
 - **Selection and utilization of adequate technologies**



Technical Assistance on Decommissioning

Heavy Water Research
Reactor, CIAE, China



Chernobyl NPP, Ukraine



Technical Assistance on Decommissioning

**VVR-S Research Reactor,
Magurele, Romania**



**VVR-M Research
Reactor, Tbilisi, Georgia**

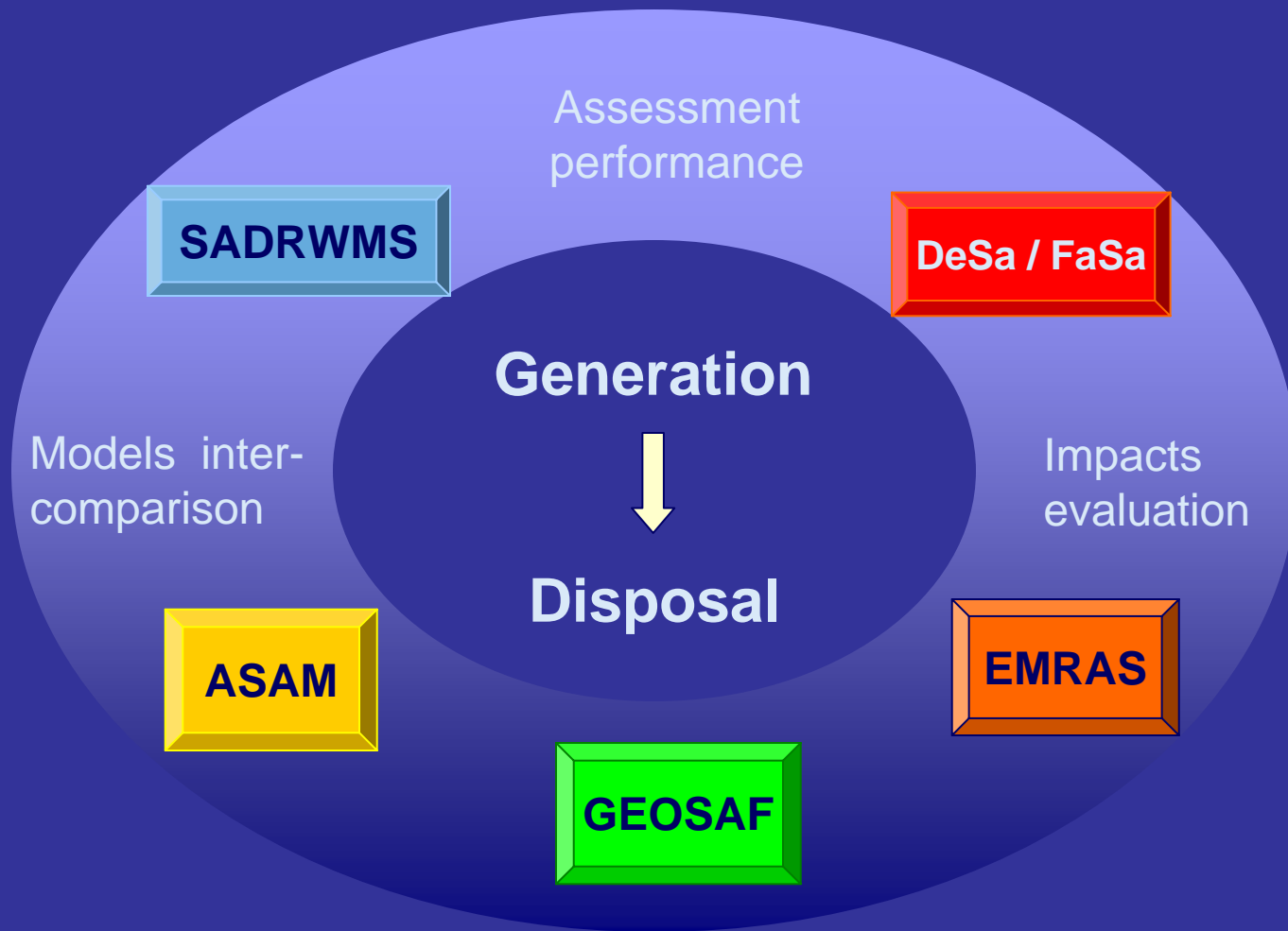


Regional TC Project

- **RER/3/005 Assistance in Planning for Decommissioning of NPPs and Research Reactors – European countries**
- **NPPs and research reactors**
- **Review (expert missions)**
 - **Decommissioning plans (preliminary and detailed)**
 - **Characterisation (incl. databases)**
 - **Cost estimation for decommissioning**
 - **Technologies selection**
 - **Waste management options, etc.**
- **Continuation (2009-2011) - RER3009**

International framework

- **The IAEA also provides assistance to Member States on the application and use of safety standards for decommissioning through coordinating international projects**
- **These projects address specific areas of decommissioning (e.g. technologies, safety assessment, application of graded approach and regulatory review) or decommissioning of Facilities with different complexities and hazards**
 - **Evaluation and Demonstration of Safety during Decommissioning (DeSa project) and application of the SA results (FaSa project)**
 - **Evaluation and Decommissioning of Former Facilities that Used Radioactive Material in Iraq**
 - **Co-ordinated Research Project on Innovative and Adaptive technologies in Decommissioning of Nuclear Facilities**
 - **Research Reactor Decommissioning Demonstration Project (R2D2P)**
 - **Decommissioning Planning for BN350 Reactor in Kazakhstan**



Safety Demonstration Framework for Management of Radioactive Waste and Decommissioning

International Projects

SADRWMS Project

- **Safety Assessment Driven Radioactive Waste Management Solutions**
- **Waste management and decommissioning SA**
- **SAFRAN (Safety Assessment Framework) tool - pre-disposal and decommissioning activities**

EMRAS Project

- **Environmental / Radioecological Modelling for Radiation Safety**
- **Restoration of sites with radioactive residues**
- **Impact of environmental radioactivity on non-human species**



International Projects

ASAM Project

- **Application of Safety Assessment Methodologies for Near-Surface Waste Disposal Facilities**
- **Addressed low and intermediate level waste**
- **Radioactive contaminants but also non-radioactive**

GEOSAF Project

- **Requirement for safety demonstration for geological disposal facilities**
- **Harmonisation of safety assessment and safety case for geological disposal**

PRISM Project

- **Practical Implementation of Safety Assessment Methodologies for Near-Surface Waste Disposal Facilities**



DeSa Project

Evaluation and Demonstration of Safety during Decommissioning of Nuclear Facilities

(Nov. 2004 – Nov. 2007)

● **Scope**

- Safety assessment methodology
- Regulatory review
- Graded approach
- All types of facilities
- All types of decommissioning strategies
- Radiological hazards
- Normal and accident conditions

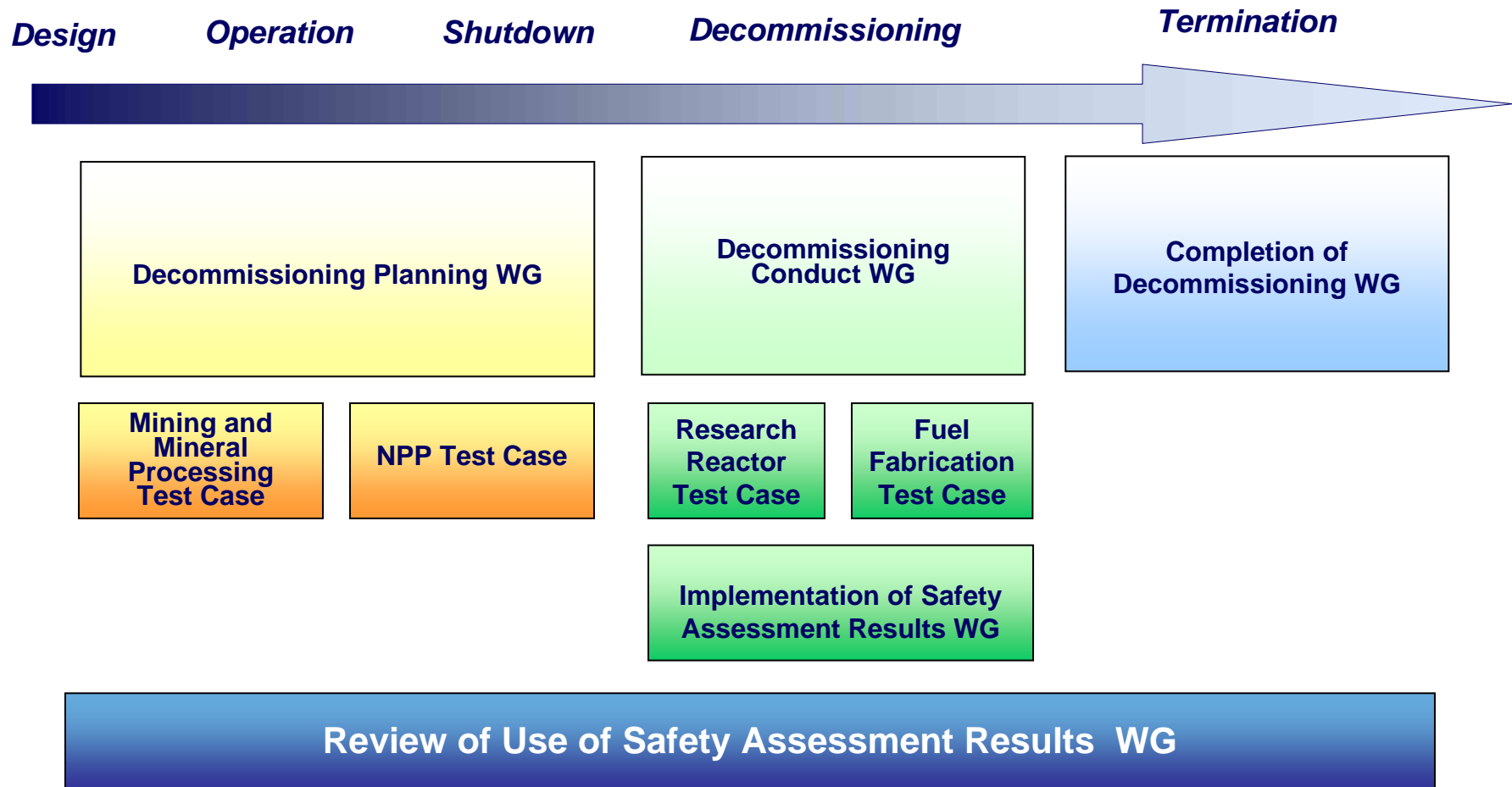
Objectives

- Harmonise safety assessment approaches
- Illustrate the methodology on different types of facilities
- Develop recommendations on the regulatory review of such assessments
- Provide a forum for exchange of information between experts from IAEA Member States



FaSa Project (2008-2011)

Use of Safety Assessment in Planning and Implementation of Decommissioning



Proposed FaSa Test Cases



NPP

WWER

70 MW

1966-1990



**Fuel
fabrication
facility**

MOX fuel

1971-1992



**Complex
research
reactor**

35 MW

**Pool type
reactor**

1963-1997



**Mineral
processing
facility**

**Gold and
uranium**

1987-2002



International Projects

Iraq Project



R²D²P (Philippines)

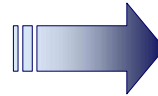


Peer Review Services on Decommissioning Planning and Performance

- The IAEA offers services for independent reviews of activities associated with the planning and undertaking of decommissioning of nuclear facilities
- This review aims to assist regulators and operators from all Member States in decommissioning of nuclear facilities in accordance with internationally agreed safety standards and state-of-the-art practices
 - Decommissioning legal and regulatory framework
 - Decommissioning strategies
 - Decommissioning plans
 - Decommissioning technologies
 - Financial mechanisms

Peer Review Services on Decommissioning

- Increased request for IAEA assistance
- Case by case basis through national or regional technical cooperation projects



**Launched in 2008
(UK, Ukraine)**

Establishment of an international peer review and advice mechanism:

- Different types of facilities (e.g. NPPs, fuel cycle facilities, research reactors)
- At the request of Member States
- Complementary to OSART, IRRS, WANO services



Networking

- **Exchange of knowledge, experience and information between all Member States achieved through organization of technical meetings, thematic workshops, international conferences**
 - **International Conference on Lessons Learned from the Decommissioning of Nuclear Facilities and the Safe Termination of Nuclear Activities, Athens, Greece, 2006**
- **The IAEA International Decommissioning Network to assist in strategic planning and coordination of technology, safety and security in decommissioning among Member States**
 - **Based on ongoing decommissioning projects for different facilities and on technologies used**

Training and Building Competence

- **The IAEA organizes annually about ten national or regional training events related to decommissioning**
- **Main areas covered among others are**
 - **Radiological characterization**
 - **Legal and regulatory framework**
 - **Organization and management of decommissioning**
 - **Optimization of decommissioning**
 - **Decommissioning planning**



Typical Courses / Workshops Based on Previous IAEA Activities

- **Basics of Decommissioning**
- **Decommissioning for Research Reactors**
- **Practical Issues for Decommissioning NPPs**
- **Cost estimation for RR Decommissioning**
- **Preparation of Decommissioning Plans**
- **Characterization for Decommissioning**
- **Safety Requirements and Safety Assessment**



Potential Future “Offerings” Based on Previous IAEA Activities

- **Planning for Transition to Decommissioning**
- **EM / "Peer Review" of Cost Calculation**
- **Release / Reuse of Materials and Sites**
- **Novel Technology for Decommissioning**
- **Difficult Technical Issues in Decommissioning**
- **Social Impacts and Public Communications**



Trainings in 2008

- **Regional events**
 - Regional WS on **ALARA during Decommissioning** – Germany (April)
 - WS on **Decommissioning of Facilities** – L. America (Argentina, October)
 - WS on **WM and Clearance** - ENRESA, Spain (June)
 - Group Scientific Visit to Mol - **Decontamination and Cutting Technologies** (October)
- **National events**
 - WS on **Safety Assessment** - China (May), Bulgaria (June)
 - WS on **Safety Related Documentation** – Ukraine (May)
 - WS on **Cost Estimation for Decommissioning** – China (October)



Trainings in 2009

- **Decommissioning Planning**
- **Decommissioning Technologies**
- **WM and Clearance**
- **Safety Assessment**
- **Cost Estimation**
- **Calculation of Activation Inventory**
- **ALARA and Dose Planning Tools**
- **Decommissioning of Small Facilities**



Coordination and Cooperation with International Organizations

- **The IAEA works closely with other international organizations in a wide range of areas related to decommissioning**
 - organization of international conferences and topical meetings
 - review of national decommissioning programmes
 - development of harmonized regulatory requirements for decommissioning in Europe
 - stakeholders involvement
 - development of recommendations on clearance of material and monitoring of potentially contaminated scrap metal
- **Contact Expert Group for International Radioactive Waste Projects in the Russian Federation (CEG)**
- **UN Economic Commission for Europe (UNECE)**
- **European Commission (EC)**
- **Nuclear Energy Agency (NEA) of OECD**
- **Western European Nuclear Regulatory Association (WENRA)**
- **World Nuclear Association (WNA)**



Summary

- IAEA mission – safety and cooperation
- Global safety regime for decommissioning
- Action Plan
- Joint Convention
- Development and application of the international safety standards
- International framework to assist decommissioning projects
- Network approach and international cooperation
- Training events – priorities according the needs of MSs



IAEA Websites - Decommissioning

- **IAEA Publications**
 - <http://www-pub.iaea.org/MTCD/publications/series1.asp>
- **WASSC web site (draft standards)**
 - <http://www-ns.iaea.org/committees/wassc.asp>
- **Joint Convention**
 - <http://www-ns.iaea.org/conventions/waste-jointconvention.htm>
- **IAEA Conferences and Meetings (2009)**
 - <http://www-pub.iaea.org/MTCD/Meetings/Meetings2009.asp>
- **Technical Cooperation web site**
 - <http://www-tc.iaea.org/tcweb/default.asp>
- **R2D2P Project**
 - <http://www-ns.iaea.org/projects/r2d2project/default.htm>
- **FaSa Project**
 - <http://www-ns.iaea.org/tech-areas/waste-safety/fasa/>





Thank you for your attention