

## **Partitioning and Transmutation: IAEA Activities**

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### **Abstract**

The importance of partitioning and transmutation (P&T) processes for sustaining nuclear energy growth in the world has been realised in several countries across the world. P&T processes aim at separation and recycling of actinides including minor actinides (MAs) from the spent fuel or high-level liquid waste. The objective of these processes include reuse of separated fissile materials from spent nuclear fuels to obtain energy, enhance resource utilisation, reduce the disposal of toxic radio-nuclides and improve long-term performance of geological repositories. R&D programmes have been launched in many of the Member States to develop advanced partitioning process based on either aqueous or pyro to recover MAs along with other actinides as well as automated and remote techniques for manufacturing fuels containing MAs for the purpose of transmuting them either in fast reactors or accelerator driven hybrids. A number of Member States have been also developing such transmutation systems with the aim to construct and operate demo plants and prototypes in the next decade.

The International Atomic Energy Agency has a high priority for the activities on partitioning and transmutation and regularly organises conferences, workshops, seminars and technical meetings in the areas of P&T as a part of information exchange and knowledge sharing at the international level. In the recent past, the Agency organised two technical meetings on advanced partitioning processes and actinide recycle technologies with the objective of providing a common platform for the scientists and engineers working in the areas of separation of actinides along with MAs from spent nuclear fuels and manufacturing of advanced fuels containing MAs in order to bridge the technological gap between them. In 2010, the Agency concluded a Coordinated Research Project (CRP) related to Assessment of Partitioning Processes. The Agency also conducted a first CRP on Studies of Advanced Reactor Technology Options for Effective Incineration of Radioactive Waste between 2002 and 2007 which was followed in the years 2005-2010 by a more specific CRP on Analytical and Experimental Benchmark Analyses of Accelerator Driven Systems. In parallel the status of the ADS technology for high level waste transmutation has been the focus of a study carried out by all the national and international organizations with an active programme on ADS, under the guidance of the IAEA Technical Working Group on Fast Reactors and ADS (TWG-FR). Finally, the benchmark analysis of two BN-600 reactor cores loaded with MOX fuel containing weapons-grade Pu and MOX fuel containing Pu and minor actinides from spent LWR fuel have been recently published. This paper will present the main results of these P&T activities as well as some new initiatives which have been discussed in recent meetings of the Technical Working Group on Nuclear Fuel Cycle Options (TWG-NFCO) and TWG-FR.