

**NUCLEAR ENERGY AGENCY
RADIOACTIVE WASTE MANAGEMENT COMMITTEE****STRATEGIC PLAN 2011-2016 FOR THE RADIOACTIVE WASTE MANAGEMENT COMMITTEE**

This strategic plan for RWMC was adopted at the RWMC meeting of March 2011. It expands and details the planning given in the Strategic Plan of the Nuclear Energy Agency for 2011-2016 that was approved in April 2010 by the NEA Steering Committee.

The RWMC Strategic Plan takes into account the work already performed by the RWMC and the expected developments and challenges in the fields of radioactive waste management and decommissioning over the next 5-10 years. The purpose of the strategic plan is to identify the role of RWMC with respect to the different challenges that member countries face and to describe the areas where RWMC plans to focus its work in future years. The detailed planning of work will be developed and updated continuously in the biennial Programme of Work.

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1. FOREWORD

The NEA Radioactive Waste Management Committee (RWMC) is a unique international forum of senior representatives of waste management organisations (implementers), regulators, policy makers, and R&D institutions engaged in the management of radioactive materials and waste, working together to assist member countries. The Committee promotes safe approaches and practices and provides objective guidance on solutions concerning the management of radioactive waste and the decommissioning of nuclear facilities.

This strategic plan for RWMC expands and details the planning given in the Strategic Plan of the Nuclear Energy Agency for 2011-2016 that was approved in April 2010 by the NEA Steering Committee. It takes into account the work already performed by the RWMC and the expected developments and challenges in the fields of radioactive waste management and decommissioning over the next 5-10 years. The purpose of the strategic plan is to identify the role of RWMC with respect to the different challenges that face the member countries and describe the areas where RWMC plans to focus its work in future years. The detailed planning of work will be developed and updated continuously in the biennial Programme of Work (PoW).

2. INTRODUCTION

Radioactive waste is associated with all phases of the nuclear fuel cycle in the production of electricity, and with the use of radioactive materials in industrial, medical, research or education, and defence-related applications. A significant legacy of waste also exists, especially in some countries, from past military applications and from past R&D, dating from even before nuclear power became commercially viable. All these wastes must be managed safely and in a manner that protects humans and their environment. The safe and effective management of spent fuel and radioactive waste from nuclear power production and from other applications of nuclear technology is a key prerequisite for the present and future utilisation of nuclear energy. The eventual safe disposal of all categories of radioactive waste is, however, a necessity with or without any further construction of nuclear power stations.

It is the experience of RWMC that the success of the individual countries in addressing these matters can be greatly enhanced through international efforts and cooperation. Sharing of experiences, positive and negative, and developing international common understanding across the variety of countries and the several audiences that the RWMC represents is of recognised value.

Radioactive waste and materials exist in countries with and without nuclear power programmes. Waste and materials, as well as obsolete facilities, need to be managed responsibly and in an integrated fashion, to protect the health of both present and future generations. This management must take into account a broad and complex range of issues: science and technology, safety and environmental protection, non-proliferation and safeguards, economics and finance, and ethical and societal aspects. Significant progress has been achieved on the scientific and technological aspects of waste management, and considerable experience is available in member countries on waste and materials processing, conditioning, storage, transport and disposal, as well as on decommissioning. Significant progress has been achieved also in understanding the societal dimension of radioactive waste management. One of the main challenges in radioactive waste management, and thus for RWMC, is to integrate these dimensions in a balanced way.

The representation in RWMC of waste management organisations, safety authorities, research, and governmental policy bodies from the countries most advanced in radioactive waste management and the

wide range of external expertise it is able to muster, make the RWMC a uniquely placed international forum to address all issues concerning the management of radioactive materials and waste, including the final decommissioning and dismantling of the nuclear facilities. For a brief history of the RWMC and its main accomplishments see Box 1. A two-page flyer downloadable from the RWMC internet web page, www.oecd-nea.org/rwm/, reviews the structure of working parties and the recent accomplishments of the committee.¹

Box 1: Brief overview of the history and accomplishments of the RWMC

Since its inception in 1978, the RWMC has addressed both strategic and technical issues in waste management, especially for disposal of high level waste or spent nuclear fuel and decommissioning of nuclear facilities. A major re-organisation of the committee took place around the year 2000, with the creation of four groups that today constitute international references. Each advises the RWMC in its area of expertise.

- (a) the Integration Group for the Safety Case (IGSC), concerned with repository safety and implementation, was formed from two previous groups dedicated one to modeling (PAAG) and another to experimental activities in the field of disposal (SEDE). The IGSC and its forerunners are the origin of the modern concept of safety case for disposal.
- (b) the Forum on Stakeholder Confidence (FSC), which has been very active in bringing together the technical and non-technical audiences, which is paramount for societally-acceptable decisions in the field of waste management. The FSC organises national workshops (eight as of 2011) that are appreciated as a unique source of learning and of building bridges amongst constituencies of varied worldviews and interests. The FSC website likely is the most complete and user-friendly one in the field of governance of radioactive waste.
- (c) the Working Party on Decommissioning and Dismantling (WPDD), which has been creating a common international culture in the field of decommissioning. The WPDD is releasing (2011), with IAEA and EC colleagues, the International Structure for Decommissioning Costing that will serve to harmonise cost estimation and reporting practices. The WPDD administers the Cooperative Programme on Decommissioning Projects (CPD), the largest group of such projects worldwide (59 in 2011).
- (d) the RWMC Regulators' Forum (RF), which has been very active in bringing about an understanding of the complexity of the regulatory function and in examining the basis of regulation for deep disposal of radioactive waste. The RF has pointed out ambiguities in the international ICRP recommendations on radiation protection criteria for geological disposal, and the ICRP has launched a project to update guidance in this area. The RF is constituted of the regulatory members of the RWMC.

The RWMC has successfully promoted international peer reviews of disposal safety studies. Most major national programmes have requested and received such reviews. Upcoming in 2011 is the review of the SKB's site study supporting the application for the construction of a spent fuel repository in Sweden. It will be the first such repository in the world, if the license is granted.

The RWMC has also been active in reaching out to decision makers and political leaders through sponsoring an international series of high-level conferences on geological repositories. The latest such conference "Common Objective, a Variety of Paths" was held in Berne, 2007; the next one "National Commitment, Regional/Local Confidence" will be held in Yokohama, 2011.

¹ Waste Management and Decommissioning at the NEA (2010), downloadable at <http://www.oecd-nea.org/rwm/>

Analysing strategic needs for the future of waste management, the RWMC has been at the forefront worldwide in examining e.g., the topic of Reversibility and Retrievability. The Committee has launched recently a project on the Preservation of Records, Knowledge and Memory across Generations.

Finally, thanks to its broad membership, the RWMC has been able to produce authoritative collective statements providing confidence to member countries that the long term management of radioactive waste is in hand, whether or not geological disposal facilities have yet been built for high level waste. The latest collective statement of the RWMC, affirming the need to move forward in the area of geological disposal, was issued in 2008.

The objectives of this Strategic Plan are to:

- ensure alignment of the Committee's Plan with the NEA Strategic Plan;
- define the Committee's mission and main challenges in radioactive waste management and decommissioning in the next 5 years or so and outline the focus areas to respond properly to those challenges; and
- identify the roles and responsibilities of the Committee and its working parties and the coordination with other NEA Committees and with other international or multi-national organisations.

3. MISSION

The mission of RWMC is to assist member countries in the development of safe, sustainable and broadly acceptable strategies for the long-term management of all types of radioactive waste, particularly long-lived waste, and spent fuel considered as waste. (NEA Strategic Plan 2011-2016)

The Committee will strive to continually improve the effectiveness of radioactive waste management and decommissioning in member countries by helping develop and define best practice and by bringing about a common international understanding in these areas. This will be facilitated through sharing expertise in subject-oriented working parties and through joint undertakings that allow the leveraging of resources. The RWMC mandate is given in Annex 1.

In light of the number of countries seeking to expand or introduce nuclear power and collaborating with the NEA, the Committee will also interact with non-member countries, at the request of the NEA Steering Committee, to promote the sharing of experience and results of RWMC work.

4. SCOPE OF THE COMMITTEE

The mission of RWMC provides a broad scope of areas that should be considered. It includes management, in an integrated and systematic manner, of all types of radioactive waste from waste production through its treatment, conditioning, storage and transport up to its disposal. Emphasis is placed on the long-lived waste and spent fuel if declared as waste. More specifically the Committee will cover:

- Strategies and technologies for spent fuel (SF), high level waste (HLW) and Intermediate Level Long-lived waste (ILW) management towards disposal (incl. long term storage and the impact of developments of advanced fuel cycles)
- Disposal of HLW, SF and other long-lived waste

- Management of low level waste (LLW) and very low level waste (VLLW) (incl. special types of waste, e.g. waste that is also chemically toxic), and in particular their disposal avenues.
- Decommissioning and the management of waste and other materials from dismantling.

For each of these areas there are a number of aspects that need to be considered, e.g. effective organisation, technology development and technology implementation, safety assessment and safety case, regulatory and implementation processes or approaches, economy and financing, confidence building (including stakeholder interaction) and knowledge management. Some of these issues are cross-cutting and can best be addressed in a horizontal approach, while others are more specific to the different types of waste and activities. In all cases the key goal is international progress through shared understanding of the issues and of the commonalities and differences amongst programmes building on best practice and where appropriate cooperative approaches.

Given the wide scope, it will not be possible to cover each area with the same depth. The RWMC will thus spend proportionately more resources on those areas where it can provide the highest added value. In order to keep abreast of overall developments and identify emerging issues, the RWMC will continue to hold special topical sessions or request specialists' reports from both within and outside the Committee.

The main beneficiaries of the work of the RWMC are regulators, implementers, R&D specialists and decision makers in the NEA member countries and those countries associated to the RWMC. In recent years a wide range of local stakeholders from potential or actual waste management sites have also benefitted from RWMC work. In addition the advice provided by the RWMC will also be useful to other countries operating nuclear power plants or considering introducing nuclear power.

The work of the RWMC is complementary to and reinforces work performed by other international bodies, e.g. the IAEA and the European Commission. The latter is a member of the RWMC, while the IAEA participates in RWMC officially as observer. Mechanisms are in place between the IAEA and the NEA to be aware of both agencies' work programmes so as increase synergy and, also, avoid duplication. The roles and expectations of each institution are described in the document NEA/RWM(2006)11/REV1.

5. MAIN CHALLENGES

The Committee recognises the evolving status of the nuclear industry in general and waste management activities in particular (see Annex 2) and the challenges that implementers, regulators and governments will need to address over the next five to ten years. The main challenges in the radioactive waste management field that are discussed in this chapter will serve to focus the RWMC activities. For other challenges, the RWMC will only keep a watching brief in order to identify if needs arise for more detailed attention. The emphasis of the work of the RWMC will continue to be on disposal of HLW/SF and long-lived ILW and on decommissioning and optimised waste management. The main challenges in the waste management area and for RWMC are listed below. For each of them the role of the RWMC is listed at three levels, immediate focus points (*focus on*), coming focus points (*consider*) and points to keep abreast of (*continue to be informed of*).

1. Organisation of a comprehensive waste management system, including its financing

The management of radioactive waste is a long-term undertaking that requires effective and robust planning and financing. The stable organisation of the responsibilities and of the work has proven to be of utmost importance for the successful implementation of a waste management system. All types of radioactive waste in the country need to be considered and an adequate funding system needs to be

developed taking into account that, in many cases, the costs will occur long after the benefits have been generated. Management frameworks differ between countries due to political and social culture, but there are also many commonalities. Although radioactive waste has been managed and disposed of for more than 50 years there are still possibilities for optimisation and for changes in the emphasis of the factors that determines the approaches to waste management.

The Committee will include the following considerations when determining its programme of work:

- Development of national waste management plans
- What waste types should be addressed, including those of both NFC and non NFC-origin, uranium mill tailings and TENORMs.
- What are the experiences of different approaches to organising waste management activities, e.g. centralised vs. non centralised, state responsibility vs. industry responsibility...
- What are the interactions between the national and international levels in waste management, and the possibilities for joint actions internationally.
- Driving factors for the implementation at economic, environmental and radiation protection levels.

RWMC actions

- The Committee will focus on the possibilities for international cooperation.
- The Committee will consider the specific needs associated with managing NORMs and TENORMs (e.g. responsibilities, strategic choices, financing approaches).
- The Committee will continue to be informed of experiences in different countries on the organisation of radioactive waste management and consider positive and negative lessons learned, taking into account work already performed in the context of the Joint Convention.
- The Committee will continue to be informed of different financing systems for radioactive waste management.

2. Development of robust and optimised roadmaps for spent fuel and radioactive waste management towards disposal, including transportation

Spent fuel and radioactive waste management are long-term undertakings. The success of these will depend on the development of roadmaps that are comprehensive, involving all steps up to and including disposal, optimised with regard to safety, security and utilisation of resources, flexible to address changing circumstances, and robust with regard to political and public acceptance. The roadmaps will differ between different types of waste and between countries. The most crucial roadmaps will concern the management of spent fuel, which can include long term storage, transports, direct disposal of SF and/or reprocessing, recycling and disposal of HLW and long-lived waste (LLW). A point of special interest in this context is the impact of possible future advanced fuel cycles and advanced reactors, with regard to both today's planning and the future need to manage new waste types etc. As many of these developments to better utilise the uranium resource are still in an early phase it is not clear when and if they will become commercially available.

The implementation at the local level of a waste management system has historically raised public concern and opposition. The ongoing process of developing societal confidence in and acceptance for the siting and construction of facilities, in particular of disposal facilities has in most countries been very long and involves stakeholders at different levels. The experiences in different countries have a lot of commonalities

but also several issues which are country specific. Over the years the RWMC have been a forum for exchange of experiences and learning from best practices. This has been the specific task of the Forum for Stakeholder Confidence (FSC). Issues of importance are a clear, transparent and stable policy and a stepwise or phased decision making process, and an open outreach to citizens including a strong involvement of stakeholders of different kinds. One conclusion of the FSC is that confidence is earned and emerges when institutional actions are visible and understandable, the actors are accessible and accountable, the roles and responsibilities are clear, and the process is flexible, responsive, and as collaborative as possible. Confidence requires nurturing and continuous maintenance.

Disposal of radioactive waste is perceived very differently by different stakeholders. There is thus a strong need for finding efficient and clear ways of describing what a disposal system is, and for ensuring that it can be viewed as a clean industrial facility for the protection of present and future generations, beneficial to society and the local community. There is an equal need for continuing to foster understanding and good practice in forming multi-stakeholder partnerships that can contribute in a fair and competent way to decision making.

Transportation of waste is also an important issue for stakeholder confidence. It may impact large parts of a country and questions arise from a multiplicity of stakeholders.

The Committee will include the following considerations when determining its programme of work:

- Developments around the world of waste management strategies, in particular for SF and HLW and ILW, and experiences from long-term storage of SF, reprocessing and waste management, including the political implications of a wait-and-see policy.
- Analyses of implementation of programmes at different level of maturity.
- Developments in advanced fuel cycles and recycling.
- Developments in advanced reactors.
- Experiences from the decade-long work of the FSC, including an understanding of the policy and decision-making processes and the public outreach activities.
- Improved understanding of the issues of concern to the public and specific stakeholders, the different meaning of transparency in different countries and different political systems and social contexts, and the importance of local value added by waste management facilities.

RWMC actions

- The Committee will continue to focus on exchange of experiences in different countries from the establishment of stable policy and stable and transparent decision-making processes in particular for the siting of facilities, covering legal background, public consultations and stakeholder involvement and, in particular the changing dynamics over time.
- The Committee will focus on the driving factors for planning and implementing a radioactive waste management system and in particular the optimisation of the system and its time schedule, including the safety and security aspects and the prospects of new advanced fuel cycles.
- The Committee will focus on tools and processes that can help society prepare and manage decisions through stakeholder involvement.
- The Committee will focus on different ways of ensuring local and regional added value.

- The Committee will consider the pros and cons of long-term storage and a delayed decision on the next step and the potential conflict between this approach and the need to demonstrate the feasibility of disposal through implementation.
- The Committee will consider the role of media, and internal and external communication for stakeholder confidence.
- The Committee will continue to be informed about developments connected to transports of spent fuel and radioactive waste, including the possible use of the same containers for storage, transport and disposal.

3. Licensing the first geological repositories for HLW/SF and for other long-lived wastes

A key challenge over the next 5 -10 years will be the licensing of the first repositories for HLW and SF in Finland, France, and Sweden. France, Germany, Canada and Japan may also achieve their first repository for ILW. Although much work has been devoted over the years to prepare for this challenge by development of safety standards and extensive discussions about different aspects of the safety case, e.g. how to handle uncertainties in the long term, these applications will be the first real cases. One of the key activities for RWMC over the years has been to formulate the modern concept of safety case for geological disposal – in the mid to late 90s – and then to improve on it and further the development of the scientific bases that are needed for a robust safety cases. This work has been performed within the Integration Group for the Safety Case (IGSC). The safety case will be of paramount importance for the licensing.

From the work of the RWMC Regulators' Forum it is clear that an international broad common understanding on the interpretation of all aspects of the safety standards has not yet been reached. Reaching such common understanding would be important for building confidence in the regulatory process as well as in the disposal concepts themselves. A close cooperation between the concerned regulatory authorities can be expected, but it will also be important that an open dialogue is held between implementers and regulators. Such a discussion should also include the notion of optimisation of the repository system. The Committee will include the following considerations when defining its programme of work:

- Differences and similarities in approaches for different geological media.
- Differences and similarities in requirements in different countries, e.g. reversibility and retrievability, quantitative vs. qualitative safety assessment, and cut-off times in long term considerations, and in the legal structure, e.g. mining laws and nuclear laws.
- Developments of national safety cases in the most advanced member countries.
- On-going and planned RD&D programmes to support the safety cases, and in particular weaknesses identified.
- Level of knowledge required for licensing decisions.
- Time-schedules for licensing in the concerned countries.
- Availability of competence in the regulatory authorities and Technical Support Organisations.

RWMC focus

- The Committee will focus on the direct cooperation between regulatory authorities and the possibilities of widening their discussion to include the implementers.

- The Committee will focus on improving the common understanding on the interpretation of safety principles and standards and their application, and also identify where different interpretation will be reasonable (e.g. differences in emphasis on engineered barriers in a salt and a granite repository).
- The Committee will focus on a discussion between regulators and implementers on the notion of optimisation of the repository system and what such optimisation encompasses.
- The Committee will consider establishment of principles and practicalities in the long-term licensing process (e.g. defining hold points for dialogue with interested parties).

4. Industrial implementation of deep geological disposal

Over the next decade several member countries are planning to evaluate and select sites, license, construct and operate geological repositories for HLW and/or SF and their associated packaging plants. This will imply important changes in the organisation of work in the waste management organisations. The work on disposal will go from being mainly RD&D oriented to an industrial implementation. Although most of the waste management organisations have experiences from similar transitions for LLW the scope of the change will be more substantial when it comes to geological disposal and to higher activity waste. New issues include operational safety and reliability, increased demands on human resources, quality assurance activities, requirement management system and effective construction project management (incl. procurement activities) with due consideration to the careful way of excavating and operating in the underground in a manner that would not disturb the long term safety.

With several programmes coming closer to implementation some new aspects of the scientific bases will come to the forefront. These include development of design specifications and the continuous work on design optimisation, building links between technical aspects and the scientific information, and quality assurance issues both for the technical implementation and the scientific background for the safety case. To be useful for the implementers there will also be a need for RWMC to consolidate the knowledge in different areas and to make the results publicly available and ensure that the information is understandable for a variety of audiences. Research, development and demonstration (RD&D) will not stop with the submission of a license application, but will continue far into the future. The role of and the needs for continued RD&D to support both technical optimisation and recurrent safety assessments will evolve with the status of the development of the disposal system.

The Committee will include the following considerations when determining its programme of work:

- Experiences from planning and implementation at an industrial level in the most developed national programmes for HLW/SF disposal.
- Conflicting priorities between effective construction project implementation and long term safety aspects.
- The role of RD&D during different stages of repository development and implementation, e.g. for establishing design specifications and design optimisation.

RWMC focus

- The Committee will focus on preparing its various constituencies for the preparation of the construction license of future deep geological repositories.
- The Committee will focus on exchange of experience and information on the successive steps from RD&D to industrial implementation and the way of organisation of the work in different member

countries (incl. e.g. project management, human resource management, procurement system, nuclear and non-nuclear regulatory involvement, safeguards aspects).

- The Committee will focus on the evolving role of the safety case and the needs for stronger integration of engineering and operational issues in the long term safety performance and on the role of scientific information for establishing design specifications and for the continuous design optimisation. In this context the Committee will consider special issues that are critical to the safety assessment to enhance the understanding and demonstration of the safety, e.g. to reduce uncertainties and to improve the evaluation of safety margins.
- The Committee will consider the system needed for management of requirements and changes in requirements, when disposal projects come closer to implementation.
- The Committee will consider the potential conflicts between effective construction project implementation and ensuring that safety functions are not disturbed.
- The Committee will consider operational aspects of repository implementation, both connected to the operational safety and the impact on the long-term safety (after closure).
- The Committee will consider the changing role of RD&D as repository programmes progress from R&D to industrial implementation and the requirements resulting from the needs for recurrent safety assessments and a continuous design optimisation.

5. Effective decommissioning

Decommissioning and dismantling of nuclear facilities is becoming a mature industry. Large decommissioning projects have been successfully concluded. Service companies offer full decommissioning services. The RWMC has over several decades emphasised the exchange of experiences from decommissioning projects and addressed issues like costing, technology development and waste management, including use of material clearance. This work has been performed within the Working Party on Decontamination and Decommissioning (WPDD). Given the industrial and competitive nature of dismantling activities it is more and more difficult to obtain economic and technical information. A shared understanding of important cost items and factors that may or may not affect decommissioning is important for governments and other stakeholders. Information exchange on costing and technical development thus remains important, as well as issues connected to radioactivity characterisation of the plant, volume reduction of the waste, site management and release, including brown field strategies. The need has also been identified, within the WPDD, to review and revisit technologies for performing decommissioning in a safer and more effective manner.

The Committee will include the following considerations when determining its programme of work:

- Decommissioning experiences in member countries.
- Considerations of the objectives of site decontamination, e.g., in view of its reuse.
- Optimised waste management and material routes.
- Decommissioning considerations in design of new reactors.
- Decommissioning considerations for plant that underwent a major accident.

RWMC focus

- The Committee will focus on continued exchange of information and experiences from decommissioning projects in member countries.
- The Committee will focus on plant and waste characterisation and waste volume reduction.

- The Committee will consider the needs for R&D in decommissioning and dismantling.
- The Committee will consider different aspects of site release and reuse, including the possibilities for conditional reuse.

6. Management of LLW and special types of radioactive waste

A comprehensive radioactive waste management system must take into account all kinds of radioactive waste from nuclear power production and other applications of nuclear technologies. Over the last decade the emphasis of RWM work has been on management of SF and HLW and long-lived ILW and on decommissioning. Considerations of LLW and VLLW have mainly been connected to management of decommissioning waste. It can be noted that in several member countries all steps for management of LLW and VLLW from nuclear power production is implemented on an industrial scale. However, in many cases there are still issues connected to special types of radioactive waste, e.g. mixed waste and graphite, that require further consideration.

The Committee will include the following considerations when determining its programme of work:

- Developments and implementation of national systems for management of LLW and VLLW.
- Development of new processes for treatment and conditioning of LLW and ILW.
- Developments of new disposal facilities for LLW.

RWMC focus

- The Committee will focus on the management and disposal of specific waste types, e.g. graphite and mixed waste.
- The Committee will continue to be informed about the experiences of conditioning, storage, transport and disposal of LLW, in particular new experiences from the licensing and construction of new disposal facilities.

7. Knowledge management and long-term preservation of records, knowledge and memory

Development of a final disposal facility is a long term undertaking that will span several generations before the disposal has been completed. After that the waste will remain dangerous for very long time periods and recurrent safety assessments might be required even after the final closure of the repository. It is thus of great importance to ensure that relevant information and knowledge is being kept as well as the adequate skills to perform safety assessments and to take into account new knowledge as it develops. It will also be important to ensure in the shorter term (during the phase from development to implementation) that people with adequate education and training will be available. In particular, the availability of a comprehensive and sufficiently detailed waste inventory is essential for the definition of management solutions for each relevant type of waste and their subsequent implementation. This also requires to preserve data over significantly long time spans before waste management has reached its ultimate disposal step. It is therefore of utmost importance that all potentially required waste data are identified, recorded in real time, near real-time or periodically, as appropriate, and to the extent necessary and preserved for long time spans. There is, however, a wide variety in the implemented approaches.

The Committee will include the following considerations when determining its programme of work:

- Activities on knowledge management in the nuclear field in general in the member countries.
- Development of waste management education and training possibilities in member countries.
- On-going activities and discussions on information preservation and selection of information to be preserved.

RWMC focus

- The Committee will focus on the issue of knowledge management and transfer, as well as the challenges connected to using the most up to date knowledge at every time for the repository, including the long term follow-up.
- The Committee will consider the competencies necessary for management of spent fuel and radioactive waste.
- The Committee will consider the competencies necessary for preparing to face major accidents that may result in special waste management and decommissioning challenges, such as the recent Fukushima accident.

6. CONSISTENCY WITH NEA STRATEGY

To accomplish its mission, the NEA Strategic Plan provides high-level guidance for NEA activities on radioactive waste management. Listed below are the strategic areas of work given in the NEA Strategic Plan for 2011-2016, and the alignment of the main challenges described in this RWMC Strategic Plan. The specific activities to address the challenges will be detailed in the biannual programmes of work for the Committee.

1. *Bring about a shared and broad-based understanding of the management of radioactive waste and materials, particularly in the long-lived waste area taking into account legal and economic considerations*

Associated challenges:

- Organisation of a comprehensive waste management system, including its financing
- Development of robust and optimised roadmaps for implementing spent fuel and radioactive waste management towards disposal.
- Licensing the first HLW/SF repositories.

2. *Facilitate the elaboration and implementation of waste management and decommissioning strategies at national and international levels.*

Associated challenges:

- All challenges given above;

3. *Help elaborate common understanding of regulatory approaches in the management of radioactive waste*

Associated challenges:

- Licensing the first HLW/SF repositories.

4. *Provide international peer review to ensure that best practices are a continued feature for regulatory and technical approaches in waste management and decommissioning*

Associated challenges:

- Those given above provide bases for international peer reviews in specific areas.

5. *Explore the implications of very long time frames and the related challenges of knowledge preparation and memory keeping*

Associated challenges:

- Industrial implementation of HLW/SF disposal.
- Knowledge management and long term memory.

6. *Identify specific issues of interest on which involved institutions and other stakeholders can learn from each other, and provide a platform for discussing those issues*

Associated challenges:

- All those mentioned in the preceding chapter, justifying the modus operandi of the RWMC, which includes the conduct of scoping studies, workshops, special sessions, conferences and peer reviews.

7. ROLES AND RESPONSIBILITIES

The role of RWMC is to be a vehicle for information exchange and communication between national organisations involved in radioactive waste management and decommissioning. Preferred outputs are strategies, state-of-the-art assessments and position papers.

The focus of RWMC activities is to provide sound assessments of the situation around the world and to identify issues where international cooperation is essential as a basis for the development and licensing of radioactive waste management systems and decommissioning projects. It should provide sound and timely technical and social bases for system development and implementation, safety assessments and regulatory decisions, including lessons learned from experience of waste management systems development in the member countries. When found necessary RWMC should promote research on specific issues. A two-page flyer downloadable from the RWMC internet web page, www.oecd-nea.org/rwm/, reviews the structure of working parties and the recent accomplishments of the committee.²

The RWMC currently has three working parties, as follows:

- The Forum on Stakeholder Confidence (FSC)
- The Integration Group for the Safety Case (IGSC)
- The Working Party on Decommissioning and Dismantling (WPDD)

In addition RWMC has a special sub-group for regulatory cooperation called RWMC Regulators' Forum (RWMC-RF).

² Waste Management and Decommissioning at the NEA (2010), downloadable at <http://www.oecd-nea.org/rwm/>

The Committee implements a programme of work in radioactive waste management and decommissioning that:

- fosters a shared and broad-based understanding of the state of the art and emerging issues;
- facilitates the elaboration of management strategies that respect societal requirements;
- helps to provide common bases to the national regulatory frameworks;
- takes advantage of scientific and technical knowledge, e.g., through joint projects and specialist meetings;
- contributes to knowledge consolidation and transfer, e.g., through the publication of technical reports, consensus statements and short flyers; and
- helps to advance best practice, e.g., by supporting international peer reviews.

8. WAYS OF WORKING TOGETHER –COORDINATION WITH OTHER INTERNATIONAL ORGANISATIONS AND INSIDE NEA

An important challenge for RWMC is to find ways of best directing the existing resources in order to take advantage of the work that is performed by other forums at multilateral, European or international level and not duplicating it. For each of the challenges mentioned in Section 5, scrutiny will be made to establish the added value of treating it by RWMC. Considering the human resources issues, maximising the added value of any international initiative is of key interest for all member countries. Mechanisms exist for co-ordination with organisations such as the International Atomic Energy Agency (IAEA) and the European Commission (EC-EURATOM). Furthermore, the IAEA is invited as an observer to most RWMC activities, and the EC is a member of the RWMC. A more detailed discussion about this cooperation can be found in NEA/RWM(2006)11/REV1.

Co-ordination with other NEA committees, in particular with the Nuclear Science Committee (NSC), the Nuclear Development Committee (NDC) and the Committee on Radiation Protection and Public Health (CRPPH) is important and will continue to be supported.

9. IMPLEMENTATION OF THE WORK PROGRAMME

The Working Parties are integral parts of the RWMC. The result of their work is discussed at the annual meetings of RWMC and instructions for further activities are provided based on suggestions given by the Working Parties. The RWMC-RF has a separate status, as it involves only regulators, and normally meets in advance of the RWMC meeting. The results of RWMC-RF are then regularly reported to the RWMC for further discussion. Additionally, there will be initiatives taken up directly by the RWMC, such as the recent project on Reversibility & Retrievability and the ongoing project on the Preservation of Records, Knowledge and Memory Across Generations.

Technical reports and documents developing a common understanding, conferences and workshops, joint projects and peer reviews, will be part of the panoply of RWMC tools to carry out its programme of work.

Annex 1

RADIOACTIVE WASTE MANAGEMENT COMMITTEE
(RWMC)

Date of creation: 23 June 1975

Duration: 31 December 2016

Mandate:

“The NEA has an acknowledged role in developing a global strategy for considering aspects of sustainability concerning the use of nuclear power and nuclear materials. The general objective of the NEA in the field of radioactive waste management is to assist member countries in the development of safe, sustainable and broadly acceptable strategies for the long-term management of all types of radioactive waste, particularly long-lived waste, and spent fuel considered as waste (NEA Strategic Plan 2011-2016). In this context, the mandate of the Radioactive Waste Management Committee (RWMC) shall be:

1. To provide a forum of senior representatives from national agencies, regulatory authorities, policy-making bodies, research and development institutions with responsibilities in the management of waste and materials, as well as other government-nominated specialists, for the exchange of information and experience on waste management policies and practices in NEA Member countries, and for advancing the state of the art on the technical and societal aspects in this area.
2. To contribute to the dissemination of information in this field through the organisation of specialist meetings and the publication of reports and consensus statements summarising the results of joint activities for the benefit of the international scientific community, competent authorities at national level and other audiences generally interested in the subject matter.
3. To develop a common understanding of the basic issues involved, and to promote the adoption of common philosophies of approach based on the discussion of the various possible strategies by keeping under review the state of the art in the field of management of radioactive waste and material at the technical, scientific, regulatory and societal levels, and in public acceptance matters.
4. To offer, upon request, a framework for the conduct of international peer reviews of national activities in the field, such as R&D programmes, safety assessments, specific regulations, etc.
5. To promote co-operative efforts such as the setting-up of joint R&D projects, or the development of databases, and to promote initiatives to maintain relevant competencies and knowledge.

For developing its work programme, and in its *modus operandi*, the RWMC will rely on discipline-oriented working parties in the areas of disposal, decommissioning and associated societal issues. RWMC members delegated from regulatory authorities meet also in the RWMC Regulators’ Forum (RWMC-RF) to exchange specific information on issues of specific regulatory significance. The RWMC-RF maintains appropriate links with the CNRA.

In the fulfilment of its responsibilities, the RWMC will interact with relevant NEA Committees, OECD directorates, scientific bodies and international organisations.”

Annex 2: Expected Developments around the World over the next 5-10 years

Nuclear power and waste management

An increasing number of countries are considering nuclear power to be part of their solution for covering the increasing demand for energy, while limiting the environmental effects from greenhouse gas emissions. It can therefore be expected that the number of nuclear power plants (NPPs) will increase. Most of this expansion will take place in countries already operating NPPs. In some of these countries renewed discussions about waste management and in particular on the issue of HLW/SF disposal can be anticipated before a decision on new build.. NPPs can be expected to be built also in a few countries that are presently not operating NPPs, e.g. Poland, Turkey, Vietnam and others. These countries will be interested to learn about progress internationally in waste management for their own strategic planning and for the organisation of their work.

Spent fuel management

Options for spent fuel management are likely to be kept open. Those countries already reprocessing can be expected to continue that practice³, while other countries are likely to prolong the spent fuel storage time to allow time for further study and consideration of the alternatives before reaching a decision on a national strategy. An important input for such decision will be the developments for fast reactors and their possible commercial introduction. It is not likely that there will be a firm input on this within the next 10 years. Other factors will also influence continued long term storage, e.g. small volumes of waste in the country, difficulties with transports or site selection, or inadequate availability of funding. It is thus likely that long term (> 40 years) storage of spent fuel will be a reality in most countries. There will, however, always be a need for geological repositories for disposal, no matter, what option that is chosen. In particular, reprocessing results high-level waste and other residual radioactive wastes that must be safely managed over the long term.

Advances in Geological Disposal

License applications for disposal facilities for HLW/SF and other long-lived waste and their accompanying packaging facilities will be submitted in Sweden 2011, Finland 2012 and France 2015. This will have important implications internationally. In particular, it will start an intense period for the regulatory authorities and will have important implications internationally.

In developing geological repositories, countries will continue to respond to policies and technical design features to meet societal expectations. For example, the Reims conference in December 2010 has shown that a number of countries have requirements on waste retrievability and reversibility of decisions and before the French license is approved the French Parliament is expected to issue guidance on how reversibility should be considered.

In several other countries work on disposal of HLW and SF will intensify. Activities and investigations will be restarted in Gorleben (Germany). Site selection processes in Canada, Japan, Switzerland and the UK and perhaps some other other countries will move forward. At the EU level the Implementing Geological Disposal Technology Platform (IGD-TP) will help streamline research towards the first disposal facility in Europe.

³ This can be expected for the next 5-10 years for France, Japan, the Netherlands, India and to a certain extent Russia, and the UK for the fuel they are presently reprocessing

In France and Japan also the licensing for disposal facilities for ILW at moderate depth may be submitted towards the middle of the decade. In Canada, a licensing process to construct a deep geologic repository for low and intermediate level waste from Ontario's nuclear reactors is expected to conclude in 2012/2013, with construction to follow. Also the Konrad repository in Germany will be developed for non-heat emitting waste, including ILW. In the US the NRC will continue its preliminary assessment of the license application for the Yucca Mountain repository, although the application itself has been asked to be withdrawn.

Development of advanced fuel cycles

Studies of fast reactors and their associated advanced fuel cycle or other advanced fuel cycles for water cooled reactors can be expected to continue with increased intensity with the aim to better utilise the uranium resource. Cooperation takes place e.g. within the Generation IV International Forum (GIF), the IAEA's INPRO project and the European Sustainable Nuclear Energy Technology Platform (SNE-TP). These studies, with the main goal to improve the economy and sustainability of nuclear power will also involve the waste management aspects, including the geological disposal. Examples of such developments are increased burn-up, introduction of non-oxide fuels, advanced recycling in fast reactors with or without P&T). New fuel cycle and reprocessing schemes may result in new waste streams as well.

Management of LLW

All management steps for LLW have been implemented on a commercial scale in many countries. This includes treatment and conditioning, storage, transport and disposal. Technology development can be expected to take place, but not expected to influence strongly the management options. Disposal facilities are already in operation in many countries and under development in others, both near surface and at depth. License applications can be expected within the next few years in a number of countries, e.g. Belgium, Canada and Hungary. A special issue will be the removal of all LLW from the Asse facility in Germany for characterisation and disposal elsewhere, possibly in Konrad.

Decommissioning

Most reactors will be operated longer than originally planned (for 60 years and even more). This means that the number of new reactors to be decommissioned will go down in the next decade. Actual dismantling of the already decommissioned reactors will, however, continue. There is a tendency around the world towards early dismantling. Also decommissioning of past research reactors and facilities and nuclear fuel cycle facilities will continue to increase.

Important factors for the choice of strategy are the availability of disposal routes for the different types of waste from decommissioning and the availability of adequate earmarked funding. Special disposal sites for VLLW, as in France and Spain, can be expected in other countries, as well as dedicated actions for managing irradiated reactor internals and graphite. The possibilities to recycle material will remain limited.

Prepare for the unexpected

The experience from earlier decades in the waste management area is that one has to be prepared for delays and radical changes in strategy that can influence the waste management activities, e.g. the restart of the Canadian programme, the changing direction of the UK programme, the moratorium in Germany and the recent reconsiderations in the USA. A flexible approach taking different options into account will thus be necessary.