"CATT" A project on Co-operation and Technology Transfer on Long-Term Radioactive Waste Management for EU Member States with Small Nuclear Programmes

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ABSTRACT

Many of the European Union's (EU) 25 countries have considerable inventories of long-lived radioactive waste that will remain potentially hazardous for many thousands of years. Of these, several have advanced concepts and programmes for the treatment and disposal (and other long-term management options) for spent fuel and long-lived radioactive waste. Collectively, these Member States have spent the equivalent of many billions of euros in developing such concepts and some have further developed the concepts into proposed operational facilities.

Member States with small nuclear programmes, face the expensive and daunting prospect of developing their own concepts for dealing with their spent fuel and high level waste. One answer would be to seek solutions which could take advantage of the investment costs in the technology and underpinning science already incurred in the more established programmes.

Thus technology transfer between Member States in areas of high level waste and spent fuel encapsulation, repository development etc. would allow the establishment of disposal facilities within any Member State for it to deal with its own wastes.

The national waste management organisations of the UK (Nirex), Sweden (SKB), Germany (DBE), Lithuania (RATA), Bulgaria (DPRAO) and Slovenia (ARAO), together with JRC of the Netherlands, are to undertake a project under the auspices of the EU's 6th R&D Framework Programme (FP6). The 18 month project will examine the technical, intellectual property, legal, financial and societal implications of the idea. It goes by the acronym "CATT" - "Co-operation and technology transfer on long term radioactive waste management for Member States with small nuclear programmes".

This paper describes the CATT project which will look at technology transfer methodologies by which Member States could co-operate. It covers the potential issues which may arise and how these may be addressed.

INTRODUCTION

The proposed EU Council Directive on the safe management of spent fuel and radioactive waste [1] and the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management [2] encourage international co-operation on the long-term management of radioactive waste. Such co-operation in the form of an international or regional repository is an aspect which is being addressed by the EU supported study SAPIERR [3].

However, the CATT project described here ("Co-operation and technology transfer on long term radioactive waste management for Members States with small nuclear programmes") helps facilitate the option of adopting national solutions, in line with the proximity principle of disposal of waste nearby to its site of arising. This will be done through co-operation between those Member States with advanced concepts for long-term radioactive management, and those Member States with small nuclear programmes and which may not have the financial or human resources to develop and implement their own concepts.

Many European Union countries have considerable inventories of long-lived radioactive waste that will remain potentially hazardous for many thousands of years [4]. Within the enlarged community of 25 Member States, there are several with fairly advanced concepts and programmes for the treatment and disposal (and other long-term management options) for spent fuel and long-lived radioactive waste. Collectively, these Member States have spent the equivalent of many billions of euros in developing such concepts and some are being further developed into proposed operational facilities.

Member States with small nuclear programmes, particularly amongst the new members, may face the expensive and daunting prospect of developing their own concepts for dealing with their spent fuel, HLW and other long-lived wastes. They may not have the human, technical or financial resources available to develop their own solutions. One way to support these Member States would be to seek solutions which could take advantage of the investment costs already incurred in the more advanced programmes.

There is an opportunity within the new enlarged Community to develop protocols which in the future would allow the transfer of technology and establish training programmes on waste encapsulation and geological disposal (or other long-term management option) between Member States.

In order to assess the feasibility of technology transfer scenarios within the EU, the national waste management organisations of the UK (Nirex), Sweden (SKB-IC), Germany (DBE TEC), Lithuania (RATA), Bulgaria (DPRAO) and Slovenia (ARAO), together with the EU's Joint Research Centre in the Netherlands, will undertake a feasibility study. This 18 month project will be a Specific Support Action (SSA) within the EU's 6th Euratom Framework Programme for nuclear research and training (2002 – 2006) and commence in January 2006.

The acronym for the project is "CATT": "Co-operation and technology transfer on long term radioactive waste management for Members States with small nuclear programmes". The 18-month study will explore the viability of implementing technology transfer between Member States with advanced disposal concepts, referred to as Donor Member States ("DMS"), and Member States with small nuclear programmes, referred to as Recipient Member States ("RMS").

OBJECTIVES

General

The overall objective of the CATT study is to investigate the feasibility of the RMSs implementing long-term radioactive waste management solutions within their national borders, through collaboration on technology transfer with the DMSs.

The study will:

a) explore the viability of implementing technology transfer arrangements between DMSs and Member States which may not be able to develop their own long-term radioactive waste management solutions, for various reasons such as:

   i) insufficient financial or technical resources to cater for the amounts of waste involved;

   ii) a lack of suitably qualified human resources; or

   iii)its geology may dictate expensive engineering solutions.

b) examine staff training requirements for implementing solutions for Recipient Member States, and / or the development of regional staff teams; and

c) assess the feasibility of developing these ideas further to enable implementing a multinational co-operation programme under FP7 and propose such a specific project if appropriate.

Various scenarios of collaboration may be envisaged and the project will develop models or protocols for these, taking account of technical, legal, financial and societal issues. The study will concentrate on high-level waste (HLW), spent nuclear fuel (SF) and associated long-lived intermediate wastes, if any, which would require deep disposal.

Specific

The specific objectives of the study are:

i) To provide efficient and effective project management and co-ordination services to the participants to ensure the project is run to time and cost.

ii) To elicit and compile quality information from potential DMSs, RMSs and financial institutions.

iii) To produce a baseline of information to be used in the rest of the project, covering radioactive waste management in Belgium, France, Germany, Netherlands, Spain, Sweden UK, Bulgaria, Czech Republic, Hungary, Lithuania, Romania, Slovakia and Slovenia, and large project funding mechanisms.

iv) To construct a website together with appropriate and jointly agreed Information System templates, information comparison tools and ways of information presentation.

v) To analyse the information gathered above in order to understand and interpret the key factors that would support the development of the collaboration models for technology transfer and present this for review at an interim workshop.

vi) To gain the views of stakeholders of the analysis through presentations and critical discussion at a workshop.

vii) To reflect stakeholder views in producing a final analysis based on the outcome of the workshop.

viii) To make recommendations on the feasibility of utilising long-term management concepts in RMSs based on those developed in the DMSs.

ix) To develop collaboration models or protocols for technology transfer for the collaboration scenarios and present these for review at the final workshop.

x) To gain the views of stakeholders of the models through a workshop.

xi) To reflect stakeholder views in producing a final model based on the outcome of the workshop.

xii) To make recommendations on how the collaboration models could be applied in practice possibly through implementation as a Technology Platform in FP7 if that is the appropriate instrument.

In summary, the project will compile information reports for each potential RMS and DMS and produce analyses as described above which will be reviewed at a workshop. The collaboration model will then be developed to be itself reviewed at a final workshop.

MODUS OPERANDI

The project will be carried out under five work packages:

Work Package 1, Information Gathering, will involve gathering information on radioactive waste management from all Member States with civil nuclear power programmes, principally through their Waste Management Organisations or equivalent. The study will analyse the basic steps of spent nuclear fuel and HLW management in both DMSs and RMSs to determine which components will benefit from such collaboration. The financial and human resources requirements for RMSs will be analysed and recommendations made on concepts capable of being implemented in those countries based on existing DMS concepts

Work Package 2 will develop the website and the web-based Information System. An important aspect of all EU funded R&D is the way in which results and information are disseminated to wider audiences.

Work Package 3, Information Analysis, will take the information provided from WP1 to derive analyses. WP3 will be rounded off by an interim workshop, the purpose of which will be to present to the participants the information and test the analyses derived during the course of the work package utilising the Information System.

The information and analyses derived in Work Packages 1 and 3 will be used to build collaboration models under WP4. Potential methods of financing the schemes through, for example, the EU, EBRD and other funding initiatives will also be explored. Recommendations on the training requirements for the RMSs will also be made. A final workshop will present the models and review these with participants.

Work Package 5 will be devoted to the preparation of a report describing how the models could be applied in practice and an activity and resource requirements analysis for practical application of the models, possibly to be undertaken in collaboration with the European Commission.

CO-OPERATION SCENARIOS

The types of technologies that could be transferred would include transport, encapsulation or conditioning of spent fuel, and storage and disposal concepts which could be adapted to local conditions accordingly.

The fundamental principle that underpins the idea is that the waste should ultimately be disposed of in the country of origin. However, this would not preclude the use of existing or proposed encapsulation services in the DMS countries. Alternatively, encapsulation facilities could be constructed in the RMS or indeed regional encapsulation facilities could be built.

Regardless of which scenario(s) is eventually considered, it will be very important to gain a very good understanding of both the technologies that the DMSs have to offer and the specific requirements of the RMSs. Further, it is also necessary to have a full understanding of the full implications and effects of the scheme.

ISSUES

Implementing such schemes will undoubtedly give rise to issues and challenges from many different aspects. These may be classified under the following sub-headings:

Transport Safety

Utilising regional or existing encapsulation services outside of the RMS would mean transporting waste between Member States. This could either be over land or by sea, or through combinations of both.

Bearing in mind that spent fuel is already transported in such a fashion, there should be no challenges which have not been addressed before. Nevertheless, it is recognised that safety and security will have to be assessed for specific proposed routes.

Siting of New Facilities

The implementation of one or more new encapsulation or disposal facilities in the RMSs will undoubtedly give rise to siting issues within the host country. Therefore it will be important to obtain for each potential RMS an understanding of the "site-ability" of facilities, taking into account relevant factors such as geology, demography, locations of existing nuclear sites and their communities, history of siting other nuclear facilities, legal framework, public attitudes to nuclear and radioactive waste nationally and locally, history and prospects of political decision-making, and international co-operation.

Government Policies

The agreement of individual governments and regulators will be required for any scheme to be implemented. Therefore, government policy on long-term radioactive waste management will be required to be fully understood by the relevant parties.

Costs and Financing
The costs associated with implementing various scenarios in specific cases will need to be estimated. This will need to be compared to the financial provisioning potentially available through existing funding mechanisms. For RMSs which do not have adequate financial resources the potential for additional funding mechanisms would need to be explored.

Human Resources
It is widely recognised that the nuclear and radioactive waste industries within Europe may suffer a shortage of appropriately qualified personnel in the future, with the decline in new build in recent years. This is true of both the DMSs and the RMSs. However, the DMSs have the advantage that their technologies have been largely developed whereas the RMSs are still dependent on finding the human and financial resources to develop their own.

It is thus recognised that the RMSs may not have the required human resources available in order to undertake near-term implementation of their existing long-term radioactive waste management strategies. Therefore, an understanding of resources currently available and are predicted to arise in future years will need to be obtained.

Different scenarios will have different human resource needs. For example, implementing encapsulation services on a regional scale would only require resources for one facility. It is also envisaged that these staff would be trained in existing facilities.

Legal and Commercial
The various scenarios described will throw up a number of legal and commercial issues regarding technology transfer which should not be underestimated.

In terms of the legal aspects, transboundary movement of waste already takes place under existing EU radioactive waste legislation. However, spent fuel for reprocessing is currently not covered (as it is not waste), but proposed new legislation will now include it and the study will have to take cognisance of this aspect. Furthermore, nuclear third party liability, safeguards and insurance indemnification issues will also need to be considered.

The transfer of technology or the provision of other goods and services between any two parties also implies a transfer of intellectual property. The DMS companies (and shareholders) involved undoubtedly would like to see some kind of financial return on their investments, whether this is payment for direct services or a return for providing both hardware and designs etc. associated with the technologies.

Financial Benefits
There will be positive financial impacts for both the DMSs and the RMSs. The exploitation of intellectual property and provision of services will provide a financial return for the DMS companies. Further, there will be provision of technically defined and cost-effective solutions for the long-term radioactive waste management in the RMSs through reducing costs of developing individual solutions for their own countries. In addition the European Union will benefit from seeing a return on its previous investments in R&D Framework Programme projects.

Social Benefits

Implementation of technology transfer in the ways described will have a number of social and ethical implications for Europe. The RMSs will remain responsible for their own wastes, in line with the proximity principle, and thus there will be less reliance on the need to find a regional repository with concomitant impact on achieving public acceptance. Irrespective of the last point, realisation of the project may help acceptance issues in both the DMSs and RMSs with the de facto international endorsement of the concepts. A further social benefit would be that a highly skilled pool of expertise will be created in the RMSs which can only be beneficial for the Member States involved and which may have additional secondary benefits such as encouraging more young people into the industry.

CONCLUSIONS

The study will examine the ideas and issues surrounding the transfer of radioactive waste management technologies between Member States. If the ideas are implemented, this could enable Member States to put in to practice long-term radioactive waste management solutions within their own national boundaries. Such a solution may be more publicly acceptable and in line with the proximity principle of disposing of waste near to its site of arising. The principle of exporting waste to other countries is contentious, but the idea of importing technology to deal with it in the country of origin may be less so.

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