

**ICEM 2009**  
**Shared, regional repositories:**  
**developing a practical implementation strategy**

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## **Summary**

The basic concept within both EC funded SAPIERR I and SAPIERR II projects (FP6) is that of one or more geological repositories developed in collaboration by two or more European countries to accept spent nuclear fuel, vitrified high-level waste and other long-lived radioactive waste from those partner countries. The SAPIERR II project (Strategic Action Plan for Implementation of Regional European Repositories) examines in detail issues that directly influence the practicability and acceptability of such facilities. This paper describes the work in the SAPIERR II project (2006-2008) on the development of a possible practical implementation strategy for shared, regional repositories in Europe and lays out the first steps in implementing that strategy.

## **1. Introduction**

Soon after the peaceful use of nuclear energy began to spread in the 1960s and 70s there were proposals for multinational solutions to providing front and back-end fuel cycle services to power plant operators. However, little progress was made, especially as interest in nuclear power appeared to be declining.

Interest revived in the late 1990s, driven both by the high costs of geological repository programmes and also by the security concerns associated with the prospect of fissile material being widely distributed across the world. Although several initiatives were proposed, none led to success, partly because the proposed approaches were judged to be premature and too commercial. Accordingly, in 2002, the not-for-profit organisation, Arius (Association for Regional and International Underground Storage), was established to help partner organisations from various countries explore the possibilities of shared disposal facilities. The current growing worldwide interest in initiating or expanding nuclear power programmes further emphasises the need for all countries to have a credible disposal strategy. For many, especially new or small programmes multinational cooperation leading to shared facilities could be an attractive option, since it optimises use of financial and human resources. For the international community, global environmental and security benefits can be achieved by having fewer repositories for spent fuel and/or high level wastes.

## **2. SAPIERR I and II**

In Europe, the Parliament and the EC have both expressed support for concepts that could lead to regional shared facilities being implemented in the EU. The EC has funded two projects that can form the first steps of a staged process towards the implementation of shared regional or international storage and disposal facilities. In the period 2003 to 2005, the EC funded the project SAPIERR I (Support Action: Pilot Initiative for European Regional Repositories), a project devoted

to pilot studies on the feasibility of shared regional storage facilities and geological repositories, for use by European countries. The SAPIERR I project looked at the basic technical and economic feasibility of implementing regional, multinational geological repositories in Europe. The studies indicated that shared regional repositories are feasible and that a first step could be to establish a structured framework for the future work on regional repositories. The recently concluded SAPIERR II project (Strategic Action Plan for Implementation of Regional European Repositories) examined in more detail specific organisational, legal, societal economic, safety and security issues that directly influence the practicability and acceptability of such facilities.

## 2.1 SAPIERR II work plan

The work plan was designed as a stepwise approach to development of a practical implementation strategy. The tasks performed in the project are listed and described below. Each task translates into a work package (WP) within the work plan:

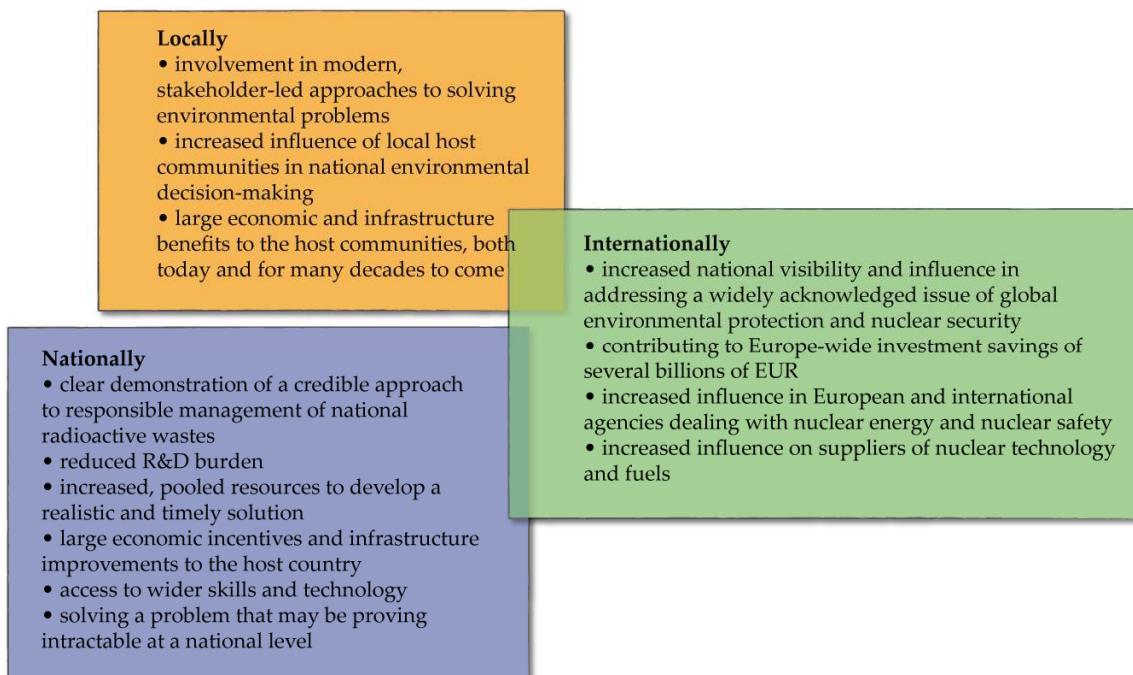
1. Preparation of a management study on the legal and business options for establishing an European Repository Development Organisation (ERDO) leading to one or more proposed frameworks (options) for such an organisation.
2. A study on the legal liability issues of international waste transfer within Europe. Even in national disposal programmes, the issues associated with long-term transfer of liabilities are complex. For a regional repository, the challenges are still greater. Immediate transfer of all liabilities and shared responsibilities reaching out to far future times are two extremes that bracket the possibilities to be considered.
3. A study of the potential economic implications of European regional storage facilities and repositories. The study analyses the economic implications for potential users of such facilities and also for host countries. The study examines not only the costs of disposal facilities but also the benefits, both economic and societal, that a host country and community could gain.
4. Outline examination of the safety and security impacts of implementing one or two regional stores or repositories relative to a large number of national facilities. The radiological safety comparisons are based on existing performance assessments.
5. A review of public and political attitudes in Europe towards the concept of shared regional repositories. This is based on input from literature studies by representatives of organisations participating in SAPIERR II, complemented by a review by project team members of the situation in other European countries and by limited specific questioning of relevant groups. The work is linked to Work Package 3 since public attitudes can be strongly affected by local and national benefits.
6. Development of a Strategy and a Project Plan establishing of the ERDO. The first tasks of an ERDO would be agreeing a progressive, staged strategy that would lead to the definition of potential host countries and eventually, to potential repository sites and definition of a parallel science and technology programme that could be addressed by the ERDO after its initiation. The ERDO itself would be established only after an exploratory Working Group has clarified key open issues.
7. Management and dissemination of information. Contact and consultation with appropriate national bodies and with EC staff is essential to gather the necessary policy and technical input for the project and before judging the feasibility of any proposals for future collaboration.

## 2.2 Results

The most obvious advantages are economic benefits to partner countries. It is estimated that partner countries could each save of the order of 500 million to 1 billion EUR by sharing development costs

rather than having to implement a national geological repository. If a regional facility is able to offer disposal as a commercial service to other European countries after the repository has become operational, the original partner countries may be able to manage their own current and future wastes with further significant cost reductions. There will be specific economic benefits to the host country and community. The country and community that hosts a repository will benefit from large initial inwards flows of capital during the development period and, eventually, of revenues and taxes from operating the facility over a period of many decades. The sums involved are expected to be of the order of several billion EUR. A European regional nuclear facility is likely to attract other international, high-technology activities to the region and can form the basis for a regional economic development plan.

Figure 2. The benefits to partner countries will be felt at local, national and international level



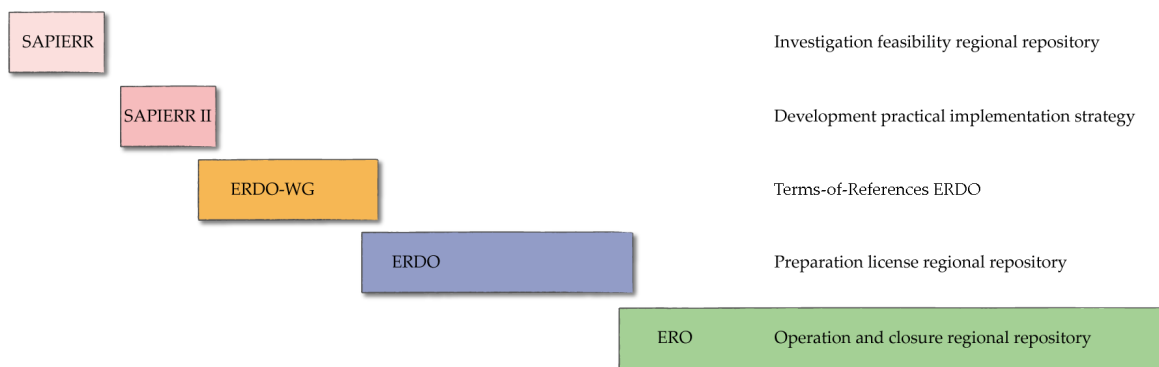
Most of the problems of developing a shared regional repository are analogous to those of developing a national repository. In both national and multinational programmes, finding suitable sites remains the biggest challenge. Since the early 1980s, siting radioactive waste repositories has proved immensely difficult in every country, but real lessons have been learned in the last decade and a modern, inclusive process has emerged that is widely accepted today as a model for dealing with difficult environmental issues. The approach advocated for a European repository will find a site that is demonstrably environmentally safe and secure. It also aims at working with local communities that are interested in the project and that may wish to become actively involved in its development. The approach involves partner countries initially agreeing on excluded areas that are clearly technically unsuitable for a geological repository. Communities from all other areas would then be invited to express interest in the project and a community-level and national-level discussion and evaluation process would be initiated to find a suitable site. No national declaration of willingness to be a repository host is necessary to join the exploratory Working Group or the ERDO itself. Potential host countries will emerge only after extensive interactions have taken place, involving interested communities within the country. Potential host countries can withdraw from the siting process at any time up to the point where a final commitment is needed. Shared regional waste management facilities will have to meet the highest standards of environmental safety. This will be assured by the national regulatory agencies in the partner countries working closely

together. The high profile and level of interest worldwide in the project indicate that it would be valuable to involve the IAEA and the European High Level Expert Group, in a wide overview and regulatory capacity.

### 3. Development of a practical implementation strategy

Over the last four years, the SAPIERR projects have investigated what would be needed to make a regional approach viable and to identify the benefits that would accrue to partner countries – as well as realistically acknowledging the challenges faced by repository implementers (see [1] for description of the work and related reports). The final stage of SAPIERR II was to explore with the governments of potential partner countries and the EC their attitudes to, and possible interest in, launching a new initiative. Based on the organisational, legal, societal economic, safety and security issues carried out within the SAPIERR II project, a staged, adaptive implementation strategy and organisational structures for an European Repository Development Organisation (ERDO) was proposed (figure 2).

Figure 2. A staged, adaptive implementation strategy for regional repositories.



#### 3.1 The ERDO Working Group

If shared repositories are to become a reality, a dedicated multinational waste management organisation will be required that can work towards the goal on the extended timescales that national disposal programmes have shown to be necessary.

Even before the founding of the multinational waste management organisation, there are many important decisions to be taken by the potential partners. These include the size of the organisation, the legal form, the domicile, the staffing policy, the budget, etc. All of these decisions require prior debate amongst participants to arrive at a consensus that all can support. To bridge the gap between research projects (SAPIERR I and II) and political decisions to join a multinational organisation, an interim step has to be taken: the ERDO working group (ERDO-WG). The working group will be charged with the task of carrying out pre-cursor work to enable a consensus model (the terms-of-reference) to be agreed for a ERDO, using the SAPIERR findings as a starting point. This model will then be presented to potentially interested countries in about two years' time, so that they can decide whether and when to set up the ERDO and whether they wish to be part of it.

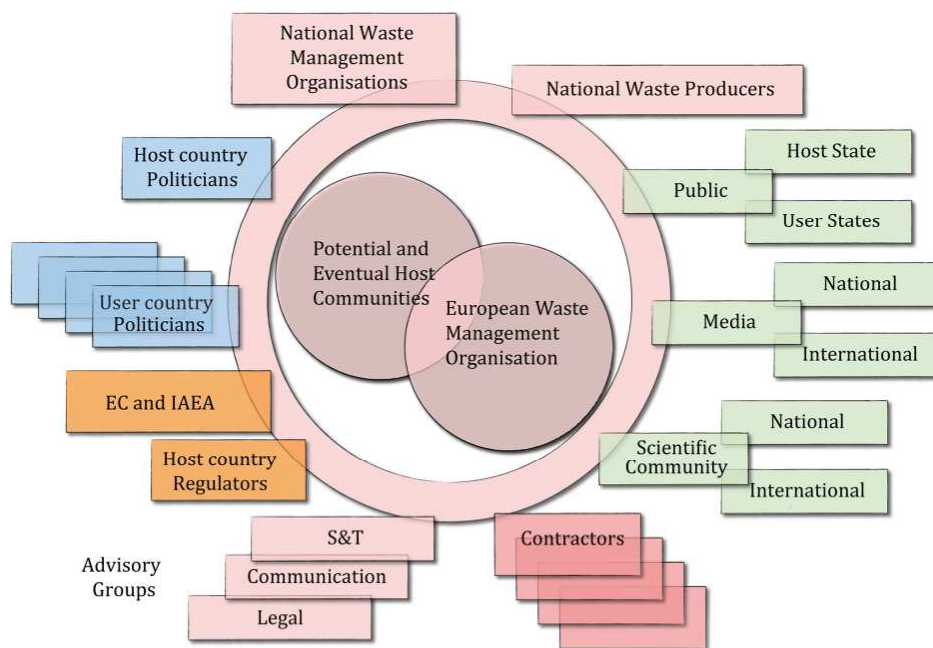
Participation in the working group and the follow-on organisation ERDO not only has benefits in terms of multinational disposal. It will also provide to opportunities to enhance national competence in the waste disposal area in all member countries and to build a valuable symbiotic relationship with national programmes that will be on-going as members states often follow a “dual track” approach. The pooling of resources and transfer of knowledge that will result from the ERDO

should enhance the overall effectiveness of each national programme. A key point is that participation in the ERDO-WG does not commit Member States to being partners if an ERDO is formally established.

### 3.2 The ERDO

A multinational waste management organisation faces much wider challenges than does a national waste management body, not least because of the extended range of stakeholders. The figure below gives an impression of the multiple stakeholders to be managed.

Figure 3. Interfaces to be managed by an ERDO (and ERO).



Moreover, the challenges may change in the course of the implementation process, particularly when the license application period ends and repository operation begins. Therefore in the strategy two types of organisations are considered for performing the work leading to implementation of a regional repository in Europe: A European Repository Development Organisation (ERDO) and a European Repository Organisation (ERO).

The European Repository Development Organisation (ERDO) is the initiating, non-profit organisation for a shared geological disposal facilities project. Its objective is to establish the systems, structures and agreements and carry out all the work necessary for putting in place a shared waste management solution and geological repository (or repositories). This work would continue through the investigation of potential sites and up to the point of license application to begin the construction of a repository. It is assumed that this may take about 10+ years. At this point the ERDO may decide to transform into or separately establish the ERO that would implement shared geological repositories in Europe.

### 3.3 The ERO

The European Repository Organisation (ERO) is the implementing organisation for waste disposal. The ERO would be the license holder for the repository and responsible for all subsequent operational activities in a host country that has agreed to dispose of wastes from other European countries. The form for the ERO will be chosen at a future date by the members of the ERDO, assuming that they come to the conclusion that the ERDO organisation needs to be altered. The choice will also be strongly influenced by the preferences of the country or countries that have been identified as repository hosts. The ERO could be either non-profit or commercial in structure.

## 4. Progress

On 27<sup>th</sup> of January 2009, the SAPIERR II project held its final symposium in Brussels. The results of studies on the viability of shared, regional European geological repositories were discussed with 50 participants from 21 countries. The aspects considered included organisational and legal issues, economic impacts, safety and security considerations, and public and political attitudes to multinational repositories.

The pilot meeting of potential participants in this Working Group took place on the day after the SAPIERR meeting. 32 Representatives from 14 European countries<sup>1</sup> were present, all of whom had been nominated through their national governments, as well as observers from the IAEA, the EC and American foundations. The Group also agreed on possible dates for a next meeting, tasks to be completed before the next meeting, and on agenda items. The key tasks were for:

- the secretariat to prepare, iterate with WG Members, and finalise a formal Agreement document to be sent to participant countries
- the secretariat to prepare draft Terms of Reference (ToR) for the ERDO-WG and to solicit proposal for a Chairperson
- the WG (potential) Members to take the necessary steps to clarify the final national position, make the necessary financial arrangements and obtain a signed Agreement if a positive national consensus were reached

In the intervening period, the first and most of the second tasks have been completed. However, not surprisingly, finalisation of the formal Agreements has been progressing at very different rates in the EU Member States. This was to be expected since, as agreed at the end of the SAPIERR precursor project, the ERDO-WG represents a step beyond the technical aspects and towards a more comprehensive strategic cooperation that must be sanctioned at the appropriate levels. Because of the complex structures and divided allocation of responsibilities in several countries this is a slow process.

Up to now (i.e. June 2009) around half of the countries represented at the ad-hoc meeting have given definite confirmation of their participation in the ERDO-WG and have arranged the financial contribution. The second meeting of the workshop is not expected before September 28/29. The meeting will be held in the Czech Republic at the invitation of the national waste agency, RAWRA.

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<sup>1</sup> The countries represented were: Austria, Bulgaria, Czech Republic, Denmark, Estonia, Ireland, Italy, Latvia, Lithuania, Netherlands, Poland, Romania, Slovakia, and Slovenia.

## **5. Acknowledgements**

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## **References**

- [1] [www.sapierr.net](http://www.sapierr.net)