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ASSUMPTIONS AND CONSIDERATIONS UNDERLYING CURRENT APPROACHES IN NUCLEAR WASTE MANAGEMENT

Authors: Britt-Marie Drottz Sjöberg, University of Stavanger
Phil Richardson, Galson Sciences Ltd
Ole Andreas Engen, University of Stavanger
Jozef Prítrský, DECONTA

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LIST OF CONTENT

1. RISK COMMUNICATION - THE WP4 FRAMEWORK

1.1 BACKGROUND AND INTRODUCTION

The Work-package no. 4 is focused on risk communication and integrated into the larger framework of the ARGONA project. This report presents the context of the work and results from the first year, i.e. from November 2006 to the end of October 2007, focusing on WP 4.1. It is the report described as D5 in the contract regarding assumptions and considerations underlying current approaches in nuclear waste management. The overall objectives of WP4 are described below, followed by the descriptions of the sub-packages and the work contents.

Objectives of WP 4

Sub WP 4.1 To compare and summarize different countries' approaches to, and utilization of, risk communication strategies in the managing and storing of nuclear wastes.

Sub WP 4.2 To develop a study to communicate to different stakeholders' uncertainty and risk associated to different nuclear HLW disposal realistic alternatives.

Sub WP 4.3 To create a carefully-planned programme aimed at improving public awareness about risks associated with nuclear waste.

Description of work

Sub WP 4:1: Risk communication: Strategies, Implementations and Results.

Two years of data collections (interviews and focus groups) in at least two countries will include scientific expert groups, central and local authorities, as well as specific interest groups and provide the basis for cross-cultural comparisons of approaches, policies and actual work results with respect to nuclear waste management. The third year will focus on discussions of, and feed back on, preliminary findings before the final analysis is produced.

Sub WP 4.2: Communication to different stakeholders of uncertainty and risk associated to different nuclear HLW disposal realistic alternatives

Many people see the disposal of High Level Nuclear Waste (HLW) and Spent Nuclear Fuel (SNF) as one of the most complicated problems to solve in the area of nuclear waste management. The most likely technical solution for this type of radioactive material is the disposal in deep geologic formations (eithergranite, salt or clay). Performance Assessment (PA) is the tool used by engineers and scientists, to study the suitability of a given site to dispose of nuclear waste. Many sources of uncertainty arise when implementers have to perform a PA for a HLW and SNF repository. Some of those sources of uncertainty are reducible and some are not. Uncertainties in the inputs propagate through the PA models and do have an impact on the output uncertainty. Using uncertainty assessment and sensitivity analysis techniques, the risk associated to a given repository may be estimated; we may also assess uncertainties about the estimate of the risk and identify what inputs do affect the output most. Moreover, the ways in which results are reported in a PA are guided by national regulations and scientific interpretation of terms.

On the other hand, different stakeholders may have different concerns about the disposal of HLW and SNF. The way they see the problem and what worries them, do not necessarily fit

the standard definitions and formats for reporting about uncertainty and risk in the technical and scientific arena. In fact, there is a need to bridge the gap between the way engineers and scientists assess the safety of a repository and what different stakeholders demand from them to enable them to correctly understand risk estimates and uncertainty in those estimates. The work proposed in WP 4.2 tries to bridge this gap.

Sub WP 4:3: Integrated approach to risk communication.

The results of approaches 1 and 2 will be integrated to a systematic approach to risk communication.

1.2 WORK DESIGN AND SCHEDULE

The first year's work started with a joint ARGONA meeting in Stockholm in November 2006. Presentations and discussions of central contents in the work-packages, expectations from the participants and coordination activities facilitated a more concrete planning of the work in WP4. Mainly through phone and e-mail contacts, and one telephone conference, an interview guide was prepared. It was expected to cover several background areas as well as the central theme of risk communication aspects, and the final version thus included a large number of themes and questions. The main sections are listed below:

1. Historic and national settings
2. Definitions, risk and safety issues
3. Status of current information
4. Risk communication
5. Current national debate
6. Probable future development
7. General background information

In addition to the interview questions there were three short lists of questions to be rated on paper by the respondents, i.e. on the themes of extent of discussion of specified issues, provision of materials from organisation, risk and communication issues. The complete interview guide is provided in Appendix 1.

The function of the interview guide was to structure the interviews so that the main parts and included themes were brought up in the interview sessions. The presentation order of the specific themes or questions in the interviews, however, was of secondary importance. Similarly it was to be considered in the work that different interviewees represented very different organisations and possess different kinds of expertise, and thus to allocate more time for discussing themes central to the respondents. This approach was possible due to the format of individual interviews, also when more than one person from an organisation participated in the same interview or if an interview was conducted by telephone.

The work performed during spring 2007 involved selecting, and agreeing on, types of organisations for the interviews, followed by contacts with the respondents. The collection and study of background materials on organisations, and on risk communication and the nuclear waste management situation more generally, started also early in the project year. The interviews were conducted during the early summer and autumn of 2007, in the United Kingdom (seven respondents, often with one or two persons in the same interview), in Sweden (five personal interviews and three telephone interviews), and in Slovakia (seven

respondents, who for convenience reasons used the interview guide as a questionnaire form and three meetings with two or three persons in the same interview setting).

1.3 INTERVIEW WORK CONSIDERATIONS AND RESPONDENTS

It was clear at an early stage of the project that the context, the organisational structure, the history and experiences related to risk communication in nuclear waste management differed widely across countries. There are even different definitions in various countries of what nuclear waste legally involves (to be outlined below), and based on this premise, what nuclear waste management can involve. Historic decisions or circumstances of importance to nuclear waste management, development of attached organisations, specific events affecting the management of nuclear waste in a country, and other differences in national cultures highlighted early on the potential obstacles and biases emanating from the restricted cultural knowledge and experience of the interviewers. It was therefore agreed that at least two interviewers from different countries would conduct several interviews together in each participating country. Thus, this was done (in English) in collaboration between Galson Sciences Ltd and the University of Stavanger in UK, Galson Sciences Ltd and the University of Stavanger in Sweden, and between the University of Stavanger and DECONTA in the Slovak Republic. For practical reasons this collaboration was not carried out for telephone interviews or in situations where the respondents were uncomfortable using the English language. However, the main part of the collected materials from the interviews emanates from interviews in English with two interviewers conducting the interview.

Those contacted for interviews were a) persons working in governmental authorities, b) persons involved in radioactive waste management as implementers or subcontractors, c) representatives of local communities involved or potentially involved in planning or building radioactive waste repositories, and d) representatives of NGO's, i.e. environmental groups in Sweden.

1.4 CONTENTS OF THIS REPORT

This report gives an overview of the settings of the WP4 work. Three European countries with different historic backgrounds, varying strategies with respect to the utilization of nuclear power and of the management of nuclear waste, and different societal conditions will be presented. Comparisons across countries will focus on this overall setting and tentative results are found in the summary below. We have found it necessary to start this three-year project on risk communication with the overall outlining of country specific conditions and circumstances. This is of specific importance because the project's focus on comparisons and underlying assumptions. It is also important since we are to investigate risk communication embedded in different governance structures.

The following parts will give reviews of a) the national and institutional settings in Sweden, United Kingdom, Czech Republic and Slovakia, b) the situation in the United Kingdom, c) the situation in the Slovak Republic and d) the situation in Sweden. Some of the information gained in the interviews is summarized in this context, but a large amount of details concerning work methods in different countries and organisations, their risk communication strategies, the contents and contexts will be presented and discussed in a following report. Such an outlining of the project work will enable us to pay sufficient attention to similarities, variations, interpretations and results of risk communication strategies in a separate report.

The report presented here, and the materials focusing on risk communication strategies and contents will be used in the focus group work during the second and third years when diverse national and international gatherings of respondents, respectively, will comment on the products.

2. SUMMARY OF RESULTS

2.1 BACKGROUND AND STATUS OF NUCLEAR WASTE MANAGEMENT SYSTEMS

2.1.1 Historic and current situation

The focus on the three countries in this report, i.e. the United Kingdom, the Slovak Republic and Sweden provide a sufficient basis to study cultural differences although all countries are today members of the European Union. The countries have a somewhat similar historic background in the development of nuclear power for peaceful uses in the 1950's, but from that time historic circumstances, political and social systems and the inherent conditions have formed the policies on nuclear waste management systems differently. The materials in the report go into these developments more specifically. The current situation reveals long term, intensive work related to the nuclear waste management issues in the United Kingdom and Sweden, but more recently started work in the Slovak Republic. The long term work in the first mentioned countries today reveals different results, and the United Kingdom have currently been reviewing its organisation of, as well as approach to, nuclear waste management whereas Sweden seems to approach a stage where applications for the approval of concrete nuclear waste facilities are close at hand. The Slovak Republic works on an ambitious program involving both dismantling of reactors and new facilities involving reactors as well as nuclear waste facilities. Some of the major dimensions focusing on dissimilarities, but also revealing similarities, across countries are listed below.

2.1.2 Type of nuclear waste

The nuclear waste management task in the United Kingdom involves storage of low and medium wastes, as well as high level wastes, although not spent nuclear fuel which is reprocessed. The task in Sweden is focused on the planning and building of a final repository for spent nuclear fuel although it also involves the enlargement of the intermediate storage of spent nuclear fuel and strategic planning for materials from dismantling of nuclear power plants. The Slovak Republic has developed a low and medium level waste repository, and yet has to decide on the site and design of a final spent nuclear fuel (SNF) repository.

2.1.3 Economic funding

Sweden has built the financial funding of the nuclear waste management program on fees from the nuclear power producers for many years, and the Nuclear Waste Fund is estimated to cover all related costs. The Slovak Republic has secured funding for its nuclear waste program through international investments and the state Nuclear Fund. The situation in the United Kingdom is less clear but seems to build financial capacity for future developments on industrial as well as state investments.

2.1.4 The current opinion situation

In all considered countries there is agreement that media focuses on negative events and risks. There are differences in reporting depending on type of media, but to be news-worthy it seems to be a common requirement that a risky situation or development is at hand. However, respondents in all countries seem to agree that nuclear power or nuclear waste management is not commonly a "front page" national issue. The differences between countries mainly

concern the depth of the resentment (underlying or expressed), the approach to differences of opinions, and communication strategies.

The picture developing with respect to the United Kingdom is one of stale frustration. Historic accidents and cover ups profoundly influence attempts to "start anew" or to form settings for decision making that may develop ways to deal with an increasingly acute issue of waste management. Long periods of verbal and actual aggression have left deep imprints on those involved. Different positions involving irreconcilable standpoints have had a long time in developing and being put to tests in the media, in the courts and in the streets. Generations and communities have incorporated such experience into their life styles. Media and various political movements use the situation for issues directly or indirectly related to nuclear waste management. Different interests and actors of the situation have comprehensive bases for their positions. The long-term conflicts seem to cause avoidance and detachment rather than to inspire dialogue. For example, it was not possible to include central environmental organisations in these first interviews in the UK. The overall conflict and creating disinterest seem to influence the situation to a large extent, and is of special concern to the Cumbria County and the Copeland Burough where nuclear facilities have dominated the infrastructure for a long time and attached a population working in relation to the nuclear industry.

The situation in the Slovak Republic has similar features with respect to difficulties to create a dialogue between different groups, but for different reasons and in a totally different setting. First of all does the Slovak Republic not have a tradition of insight into and open public debate on nuclear issues due to its historic connection to the Soviet System. From the time of the profound changes in the 1990's and then the agreed independence of the Slovak and Czech republics a multitude of interest groups have come to work on the political arena. These include environmental groups, as presented in this report, that may be engaged in local communities or issues, or that have joined international organisations or pursue such perspectives. The traditionally developed social and political power structures are under intense review and change. This also involves the influences and effects of the international market, and foreign or international companies in the energy sector may play roles in the future strategies of nuclear waste management. The economic structure and development in the Slovak Republic is currently rapidly transformed, and the public is well aware of the importance of effective energy supplies for the enhancement of the economy. The media seem to discuss energy issues in general terms, and issues related to nuclear power, within the sentiments of this overall setting. Regarding the work in the first year of this project, there was not enough time to build trust and working connections to relevant NGO's, but the tasks is of high importance on the agenda for next year's work.

Lastly, the Swedish situation involves deep historic conflicts on the utilization of nuclear power, as well as a long societal tradition where consensus and power sharing are attributes embraced by most of the population. It is of interest that the work in Sweden related to nuclear waste management involve both the Guinness book of record group of longest protest and of guarding of their local community against the implementer SKB, and a large variety of collaborating interest groups playing central roles in the developments of siting policies, in debates on choice of methods for the storage of spent nuclear fuel, and in the consultation processes. There is no consensus with respect to details of the final repository, but there is a general agreement that the responsibility to manage nuclear waste lies with the generations that have used nuclear power. There is also an underlying agreement that concerns for future generations are of vital importance. However, the practical realisations of those concerns are debated vigorously. The Swedish management and responsibility structures are rather clear, and the processes of decision making on a multitude of levels are based on transparency, openness to input, and availability of information and documentation. Reviewing the situation

of the participating countries in this manner poses a question, or possibly a paradox, i.e. that of the relationship between complexities or the multitude of actors and efficiency in the nuclear waste management program. It can be discussed, and we aim at investigating the issue in the following years in this project, if similar or different risk communication techniques are required to advance the nuclear waste management situation if there is a stale, a developing, or a well integrated debate involving fundamental and different standpoints on nuclear issues.

2.2 SIGNIFICANT FUTURE DECISIONS AND THE "RISK COMMUNICATION" APPROACH

The United Kingdom is in the process of evaluating the CoRWM work on public and stakeholder engagement and lays the fundament for future strategies on the basis on voluntarism with respect to siting. The Slovak Republic is focused on strengthening both the safety and production of nuclear power, and to manage high level waste in a multi-organisational context. Sweden keeps working on the KBS-3-method and has started to submit applications regarding physical facilities to the relevant authorities in this respect. All the participating countries are deeply involved with nuclear waste management, but work in different contexts. We see as our task to deepen the investigation of WP4 into including a) the structural or organisational means used in the participating countries to enhance the development of nuclear waste management, i.e. risk communication channels or networks, and b) the specific argumentation or meaning contents that provide obstacles or break through in these developments. The background that the ARGONA project is built on the earlier European Union RISCOM projects is of great importance in this context. Earlier models of organisational relationships (e.g. RISCOM II project; Espejo, 2001) can be used to better differentiate between risk communication requirements and possibilities on various organisational levels or contexts, and of comparing results across countries on such more detailed "communication maps" or pathways within different governance structures. Of special interest are the ideas about systems responsibilities and guardians (e.g. "legal" participants; ownership of process or part of it; systemic guardians of process, governance regimes).

Looking ahead at next year's work we conclude that there are several theoretical as well as practical considerations to take into account. Firstly, the differences we have recognized between the participating countries' traditions and experiences, their ordinary manners of handling issues related to nuclear waste management, and the current standards of dealing with information and communication provide very fertile grounds for comparisons and discussions within (year 2) and across countries (year 3). We therefore foresee that the results of the first year promise interesting reflections and comments from the national focus groups starting their work in 2008. Secondly, we also see that the national differences and the complexity of the issues may threaten the possibility to gain cohesion and an overview among focus group participants not ordinarily working with these issues. The practical matters therefore involve producing of comprehensive overviews and a clear structuring of focus groups' tasks on the basis of the available materials. We found important a meticulous preparation with respect to group composition, group leaders and, not the least, the language(s) chosen for the group discussions. Next year's work will involve:

- Meetings for coordination of the organizing of national focus groups, including how to deal with national languages and cross-country interviewer collaboration.
- Outlining theoretical foci, connecting earlier RISCOM suggestions and experiences of the first year's work in ARGONA.

- Discussions of forms, contents, approaches, participants, etc, for the WP4 package incorporating also case studies on actual understanding and presentation of risk and uncertainty related to the sub-package WP4:2.
- Discussions on how to define the form and contents of the 2008 report.

2.3 CONCLUDING REMARKS

- Risk communication strategies are closely connected to historic and cultural settings (e.g. events in the past and how they are interpreted as well as who is attributed the blame; funding and bases for financing repositories; economic situation of the country and alternative energy sources).
- A major cultural difference is confidence to the authorities based on historical experiences.
- Regarding risk communication there seems to be important dimensions related to:
  a) traditions and practices,
  b) the perceived importance of risk communication among authorities and implementers,
  c) the public interest and trust in the feasibility of communication and participatory processes, and
  d) perceived freedom of expression and its possible consequences (regarding media outputs, discussions among experts/authorities and in relation to e.g. public meetings or encounters).

3. NATIONAL AND INSTITUTIONAL SETTINGS

This chapter has two main purposes: First to give a brief overview of the political systems and the governance structures in Sweden, UK, Czech Republic and Slovakia, and second, to illuminate recent institutional developing trends in the energy sectors in the four countries and to indicate how these different institutional settings appear to affect the area of nuclear power. The latter also necessitates a short discussion of the similarities and differences in public management strategies and comparison of the governance models of the different countries.

The energy sectors in all four countries have undergone radical transformations in recent years. A common description of these transformations is "new public management reforms" (NPMR). NPMR is defined as *"reforms consisting of deliberate changes to the structures and processes of the public sector organisations with the objective - in some sense – to run them better*" (Pollitt & Bouckaert 2004 p. 8).

In general, however, NPMR as institutional practise has to be thought of as a means to an end. It covers a broad range of activities. These include making savings in public expenditure, improving the quality of public services and making government and bureaucracy more efficient and effective. Furthermore, NPMR intends to change institutional practises of a more informal character, i.e. strengthening the control of politicians over the bureaucracy and freeing public officials from bureaucratic constraints that inhibit their opportunities to manage. That means to increase independency and the autonomous roles of relevant institutions and agencies. Finally, the objectives of NPMR are to enhance governmental accountability to the legislature and citizenry for its policies and programmes. The latter could be directly connected to how the different countries' governments handle environmental challenges, risks, security and safety (Pollitt & Bouckaert 2004).

Nevertheless, the point of departure for the four countries was quite different. The United Kingdom became "a first mover" inducing radical institutional changes in the public sector during the period of Margaret Thatcher. This liberalisation was one of the most radical in Europe in the seventies and eighties. Sweden started its renewal of the public sector during the eighties, through privatisation of state owned companies and liberalisation of the energy markets. However, these processes were never as extensive as in the United Kingdom. The Czech Republic and Slovakia were connected as a former communist state and post division had to re-institutionalise their entire societies. Public management and reforms of their energy markets has therefore to be seen in the light of their historically short period as democracies. Nevertheless, public reforms within the energy sectors in the two countries have certain elements in common with similar processes taking place in Sweden and UK, despite some institutional inertia due to the former communist organisation of the economy. The common feature is that all countries are now members of the EU and are thus under institutional pressure to organise their energy markets in accordance with EU-regulations.

The following parts of this chapter will be organised as described in Figure 1. This scheme refers directly to the main purpose of this chapter; namely that we will give a brief overview of the institutional characteristics of each countries and how these characteristics are reflected in the energy sectors.

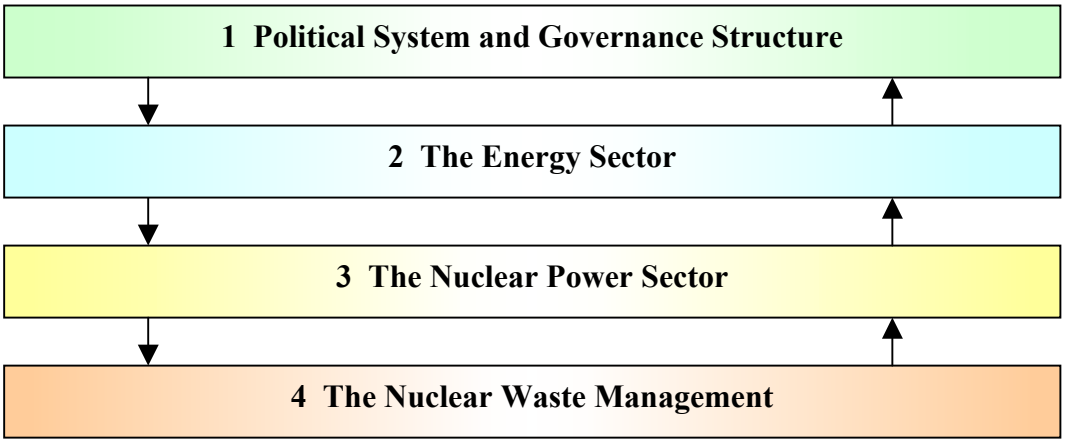


Figure 1. National and institutional settings

3.1 SWEDEN

3.1.1 Political system and governance structure

Sweden's government is a limited constitutional monarchy with a parliamentary system. Executive authority is vested in the cabinet, which consists of a prime minister and 21 ministers who run the twelve government departments. The present Alliance for Sweden government (centre-right majority), led by Prime Minister Fredrik Reinfeldt, came to power in September 2006. King Carl XVI Gustaf (Bernadotte) ascended to the throne on September 15, 1973. His authority is formal, symbolic, and representational. The unicameral Riksdag has 349 members, popularly elected every 4 years, and is in session generally from September through mid-June.

Under the Government, Sweden is divided into 21 counties. Each county (län), and its County Administrative Board, is headed by a County Governor. In addition, Sweden is divided into 20 popularly elected County councils/regions (landsting/regioner) with the power of taxation, and each council has particular responsibility for health, and medical care. There are also 290 municipalities (kommuner). Elected municipal councils are the highest decision-making bodies at the local levels. Between assembly meetings matters are managed by executive committees.

3.1.2 The Energy Sector

The energy politics in Sweden reflect the “social democratic order” that evolved after the Second World War. Swedish energy policy employs a mix of government involvement and lightly-regulated market forces. This implies high energy taxation, dominating state owned energy companies and a consequent and direct policy to phase out nuclear power and encourage innovation and development of renewable energy technologies. However, Sweden chose to follow the economic liberalising movements that took place in all western European countries during the nineties. In particular, the electricity sector has been transformed to a free Nordic market, implying free access for consumers and producers, and a very light-touch approach to the regulation of energy companies.

A milestone of Swedish energy policy was the "Energy Policy Agreement" in 1997. The main political architectures behind this agreement were the Social Democrats, the Centre Party and the Left Party. In 2002 the same political parties continued their collaboration and presented a new bill to the parliament. The guidelines in this bill are highly consistent with those in the 1997 bill, but indicate some shift concerning the direction of the policy instruments, e.g. shorter term initiatives promoting efficient energy consumption. The main objectives of both agreements are thus to secure access to energy and international competitiveness for producers and consumers. To achieve such a goal it is necessary to further harmonise regulations, tariffs and taxes so that producers, irrespective of country, can compete on equal terms.

The agreements of 1997 and 2002 illustrate the mix of government involvement and free market ideologies that characterises current Swedish energy policy. One of the main elements in the new public management is cost efficiency of public goods. Harmonising and standardisation of regulations are important institutional means to attaining minimum costs per unit. On the other hand harmonisation and standardisation require an effective agency to control and maintain such a regulatory framework. It is commonly accepted that the market mechanism is not always a sufficient instrument. Institutional bodies such as a regulatory framework, laws and formal institutions will thus have to develop new routines and procedures in order to guarantee the efficiency of the system.

This leads us further to a basic aspect of NPMR, namely the status of the formal agencies. As we mentioned above, Sweden has a unitary government with active local authorities. It is the Division for Energy and Primary Industries within the Ministry of Industry and Employment and Communication that has the overall co-ordination for Swedish energy policy. Under Division for Energy and Planning is the Swedish National Energy Agency which is the central government body responsible for the main authority functions within the energy area. Agency tasks include planning and running energy and environment, running R&D programmes concerning energy issues, administering trading programmes for support of renewable energy and finally, implementing Sweden's energy efficiency measures. The Swedish National Energy Agency is an important actor. In 2003 a government report was released that proposed greater transparency and independence of the energy regulator. Independence of regulatory bodies is basic when concepts of NPMR are introduced. The idea is that autonomous governance institutions extend the possibilities of achieving legitimacy when inducing and monitoring public reforms. In the case of Sweden it is therefore reasonable to claim that the institutional process of balancing government involvement and market based solutions is an ongoing process.

3.1.3 The Nuclear Power Sector

In Sweden the movement against nuclear power has been substantial for almost 30 years. In 1980, Swedish voters opted by referendum for a delayed phase out of nuclear energy. Based on a law stipulated by parliament in 1997 that made it possible, the two reactors Barsebäck I and Barsebäck II have been closed down in 1999 and 2005 respectively. Almost three decades after the referendum the nuclear phase out still remains a key issue at the forefront of Swedish energy policy. The mix of governance structure in the Swedish energy sector reflects the nuclear sector as well. This mixture may to some extent explain the inertia in finding a solution for how to phase out nuclear energy. The ownership of the nuclear power plants is dominated by the state owned Vattenfall and E.ON.[1] A series of negotiations with the private

1 *Formerly known as **Sydkraft**. On October 30, 2003 , EU gave the go-ahead for Sydkraft to acquire shares in Graninge AB, thereby clearing the way for a complete takeover. The majority shareholding in Sydkraft*

owners and other stakeholders has not been very successful. Nuclear electricity is (2006) the largest domestic electricity supply source.[2] Two governmental authorities have regulatory roles – particularly in relation with safety and radiation protection: The Swedish Nuclear Power Inspectorate (SKI) and the Swedish Radiation Protection Authority (SSI). The regulatory role of SKI includes supervision of all nuclear activities in Sweden, namely nuclear fuel fabrication, nuclear power plant operation and the operation of other technical facilities, transport and waste management and interim storage facilities. They also conduct inspections, analyse reports submitted by the operators, and when appropriate may request the operator to take actions enhancing safety. Serious circumstances may eventually lead to a decision from SKI to close down the entire facility. In the area of nuclear waste, SKI reviews the nuclear power industry's research programme for the final disposal of spent nuclear fuel and participates in the consultation process as a part of the Environmental Impact Assessment as a part of the siting process for the final repository for spent nuclear fuel. SKI also finances extensive research into nuclear issues and informs the public and media about the safety-related work that is conducted.

The Swedish Government announced in April 2007 the intention to merge SKI and SSI by July 2008. The new regulatory body[3] will be given the same tasks as the two earlier authorities.

The liberalisation of the energy markets has challenged the roles of the regulator. Increasing requests for cost efficiency and uncertainty concerning the future of nuclear energy have impacted on the safety culture and the quality of the security systems. However, both SKI and SSI have a focus on R&D that supports safety enhancing technology. Furthermore, Sweden is a signatory to a broad range of international conventions. These include: liability in the field of nuclear energy, early notification of a nuclear accident, assistance in the case of a nuclear accident and finally the safety and management of nuclear waste.

3.1.4 Summing up: Sweden

The institutional setting of Sweden concerning energy policy reflects the balance between the public and the private sectors. Despite liberalisation over the last 15 years, Sweden still is the leading exponent of the Scandinavian economic model – the mixed economy. However in accordance with its concept of public management, Sweden has undergone substantial institutional transformations, including liberalisation, privatisation of large companies and, not least, changes in the role of important governmental agencies. All of these changes fit very well with the recommendations proposed by the EU.

AB had already been acquired in 2001 by E.ON AG. On September 16, 2005, Sydkraft changed its corporate name to E.ON Sverige.

2 *In 2006, nuclear power production was 64.7 TWh while hydro power production was 61.2 TWh. In 2005 Hydropower was the largest domestic electric supply source. The shift was due to a hot summer and low water levels in reservoirs.*

3 The Swedish name for the new authority is 'Strålsäkerhetsmyndigheten'.

3.2 UNITED KINGDOM

3.2.1 Political system and governance structure

The United Kingdom does not have a written constitution. The equivalent body of law is based on statute, common law, and "traditional rights." Changes may come about formally through new acts of Parliament, informally through the acceptance of new practices and usage, or by judicial precedents. Although Parliament has the theoretical power to make or repeal any law, in actual practice the weight of 700 years of tradition restrains arbitrary actions.

Executive power rests nominally with the monarch but is actually exercised by a committee of ministers (cabinet) traditionally selected from among the members of the House of Commons and, to a lesser extent, the House of Lords. The prime minister is the leader of the largest party in the Commons, and the government is dependent on its support.

Parliament represents the entire country and can legislate for the whole or for any constituent part or combination of parts. The maximum parliamentary term is 5 years, but the prime minister may ask the monarch to dissolve Parliament and call a general election at any time. The focus of legislative power is the 646-member House of Commons, which has sole jurisdiction over finance. The House of Lords, although shorn of most of its powers, can still review, amend, or delay temporarily any bills except those relating to the budget. The House of Lords has more time than the House of Commons to pursue one of its more important functions i.e. debating public issues. In 1999, the government removed the automatic right of hereditary peers to hold seats in the House of Lords. The current house consists of appointed life peers who hold their seats for life and 92 hereditary peers who will hold their seats only until final reforms have been agreed upon and implemented. The judiciary is independent of the legislative and executive branches but cannot review the constitutionality of legislation.

3.2.2 The Energy Sector

After the Second World War, the United Kingdom suffered from low energy supply. That resulted in a governmental strategy which involved inviting American oil and gas companies to invest in the North Sea, developing large state owned energy companies and finally developing nuclear power plants. However, during the Thatcher administration institutional reforms took place in almost all public sectors – not least the energy sector. According to the concepts of new public management, the UK can be said to have been a pioneer. It was the first country to liberalise gas and electricity markets. This liberalisation process was accomplished through extensive privatisation, increased competition, and open access to all networks. As mentioned above, autonomous governmental agencies may be important conditions for legitimacy and predictability of the governance structure. The UK case has thus been used as a model by numerous countries. The UK energy regulator, Ofgem, has, for example, set an international standard for independent regulators, which are recognised as essential components of any competitive market.

In 2003, the government laid out its future energy policy in an Energy White Paper published by the Department of Trade and Industry. This White Paper addressed three main issues: The threat of climate change; the fact that UK oil, gas and coal production is being reduced and that the country may shift from being a net energy exporter to a net energy importer; the need to replace and update the UK's energy infrastructure. The White Paper illustrates two things:

The complexity and challenges of the energy markets in the UK and how to organise a liberalised energy sector facing future environmental threats.

As far as possible, the governmental policy in the UK is to ensure that the market instruments reinforce each other - despite the fact that some of the means and goals are conflicting. According to the Energy Review in 2006, it is important to realise that significant damaging climate change is an environmental limit that cannot be ignored. Furthermore, the Energy Review states that energy supplies are fundamental to the economy, but that sustainable development is required, and that energy security must be ensured in both the short and longer term. Nevertheless, according to the Energy Review, the market is still a cornerstone of energy policy and where the market alone does not, or cannot, guarantee efficient equilibrium, the government has to consider the use of frameworks for market intervention.

The mix of energy policy institutions in the UK reflects governmental effort in both accomplishing the NPMR and at the same time considering the objectives of sustainable development and reduction of carbon emissions. We may therefore make a division between governmental/public and independent institutions in the energy sector. No country in Europe has so far established such a mix of institutions to manage energy policy.

GOVERNMENTAL/PUBLIC

- Department for Business, Enterprise and Regulatory Reform (replacing the DTI in 2007)

The Department brings together functions from the former Department of Trade and Industry, including responsibilities for productivity, business relations, energy, competition and consumers, with the Better Regulation Executive (BRE), previously part of the Cabinet Office.

- Department for Environment, Food and Rural Affairs

The main objective of DEFRA is to act in the interests of farmers, the environment and the rural economy. It has the responsibility for policies and measures to reduce energy demand in UK.

- Department for Communities and Local Government

The objective here is to promote community cohesion and equality and to be responsible for housing, urban regeneration, planning and local government. This includes energy infrastructures as well.

- Department for Transport

Due to the main objective of overseeing the operation and development of a reliable, safe and secure transport system, its activities also have a large impact on UK energy demand.

INDEPENDENT

- The Office of Gas and Electricity Markets (Ofgem)

As previously mentioned Ofgem plays a role in facilitating competition and effective regulation of monopoly companies within the electricity market.

- The Energy Saving Trust and Carbon Trust

EST & CT are independent institutions, funded by the government to promote energy saving and reduction of carbon emissions.

- EnergyWatch

The main objective is to protect and promote the interests of all gas and electricity consumers.

- Joint Energy Security of Supply Working Group

JESS is a "joint venture" between DBERR and Ofgem. The main objectives are to monitor the availability of gas and electricity supplies and determine whether market-based mechanisms are bringing forward timely investments.

- Energy Research Partnerships

The main objective is to provide strategic advice concerning UK energy research. It operates alongside the UK Energy Research Centre.

- Nuclear Decommissioning Authority

The NDA is a non-departmental public body with the main objective of taking strategic responsibility for UK's nuclear legacy.

Compared to the other countries, United Kingdom distinguishes itself by possessing a complicated system of public and independent energy actors. The obvious explanation is the scale of the markets, but it is also a result of the public management reforms that have taken place. From an economic point of view, the mix of the regulatory bodies listed above is a result of the requirements for compensating actors in the event of a market failure.

3.2.3 The Nuclear Power Sector

The United Kingdom possesses a sophisticated nuclear power infrastructure. There are 23 nuclear units in operation on 9 sites. The governmental regulatory body is the Health and Safety Executive, answerable to Secretary of State for Business, Enterprise and Regulatory Reform. This institution is accountable to the Parliament for operational safety at the nuclear power stations and other civil nuclear sites in UK.

In contrast to Sweden, the governmental view on the future of nuclear power is ambiguous. The Energy White Paper in 2003 stated that "nuclear power's current economics make it an unattractive option for new, carbon free generating capacity and there are also important issues of nuclear waste to be solved." But it did not reject future investment and use of nuclear energy. Actually it emphasised that the government did not foresee that a requirement for nuclear energy in the future might require increases in the capacity of existing plants as well as a new generation of power plants. Nevertheless, the resistance against such programme is clear and according to the Sustainable Development Commission "there is no justification for bringing forward plans for a new power programme this time".

The Energy Review in 2006 supported the view that there might be a future for nuclear generation. It laid down a number of steps the government would have to take in order to remove barriers to the development of new nuclear capacity. These included plans for long

term radioactive waste disposal deep underground, involving the building of robust interim storage facilities, establishing partnerships between government and local communities and, finally, establishing an institutional independent body to oversee the process of implementation. The latter illustrates how the NPMR of the nuclear sector is in accordance with general governmental management principles. This was also expressed very clearly when the Energy Review stated that managing waste is the responsibility of government while financing new nuclear plants would be left to private investors. Following a judicial review in 2007, the Consultation on the 2006 Energy Review was extended, in order to allow for discussion of the results of the Managing Radioactive Waste safely process, which reported in July 2006, after the publication of the original publication "Managing Radioactive Waste Safely from 2001. This report launched a national debate of UK radioactive wastes. Central to this debate was CoRWM (The Committee on Radioactive Waste Management), a new committee set up in 2003 to provide independent advice to Government on the long-term management of the UK's solid higher activity radioactive waste. A previous committee, RWMAC (The Radioactive Waste Management Advisory Committee), advised government on all aspects of radioactive waste management, a role taken over by CoRWM in late 2007 (with a new membership).

3.2.4 Summing up: United Kingdom

This section highlights the liberal character of the UK energy policy and to a large extent how British energy policy is dependent on the market. This implies that market forces and market tools – individual decision making, price setting between supply and demand and active trading between market participants – factor heavily. Nevertheless, we also see more clearly the contours of what Anthony Giddens (2001) denoted "The Third Way". This describes how strong public institutions become active organisers of the markets but leave direct control and production to independent and private agents. To some extent there is a distance from pure liberalism, but it is also some steps away from the Scandinavian model.

3.3 CZECH REPUBLIC

3.3.1 Political system and governance structure

As formal head of state, the president is granted specific powers such as the right to nominate Constitutional Court judges, dissolve parliament under certain conditions, and enact a veto on legislation. Presidents are elected by the parliament for 5-year terms.

The legislature is bicameral, with a Chamber of Deputies (200 seats) and a Senate (81 seats). With the separation of the former Czechoslovakia, the powers and responsibilities of the now-defunct federal parliament were transferred to the Czech National Council, which renamed itself the Chamber of Deputies. Chamber delegates are elected from 14 regions, including the capital Prague, for 4-year terms, on the basis of proportional representation. The Czech Senate is patterned after the U.S. Senate and was first elected in 1996; its members serve for 6-year terms with one-third being elected every 2 years.

The June 2006 general election resulted in the Chamber of Deputies' 200 seats being evenly divided between three centre-right parties and two parties on the left, with neither side able to form a majority government. The impasse led to months of protracted negotiations during which Prime Minister Mirek Topolánek formed a three-party coalition with the Christian Democrats (KDU-CSL) and the Greens (SZ). The coalition lost its first vote of confidence 96-99 on October 4, 2006. However, seven months after the election, on January 19, 2007, the

coalition succeeded at the second attempt, when two renegade parliamentarians from the opposition Social Democrats (CSSD) abstained.

3.3.2 The Energy Sector

The Czech Republic has undergone a major transformation in the last fifteen years. The country has changed from an economy guided by central planning and intensive government involvement to one driven by market forces. Accordingly, the energy sector has changed substantially over the same period, and energy policy reflects how the Czech Republic has followed the same trends as other countries in Europe. In 2004 The Czech Republic joined the EU. The government has since privatised almost the entire energy sector, implemented market reforms and introduced competition and compliance with EU directives.

Despite a strong movement towards an integrated European common market, there are many elements that remain to be organised in order to comply with NPMR conditions. One important challenge is to implement market mechanisms that work satisfactorily. Most of the physical infrastructure in the energy sector was inherited from the communist period and is more or less outdated. Technical innovations are thus needed in order to upgrade the power plants. Even more important, the energy markets are characterised by institutional inertia. State monopolies still dominate the supply side. In the gas market, for instance, one company (RWE) owns and operates the transportation pipeline network and controls the distribution companies. Corresponding structures exist on the electricity side where one company (CEZ) controls almost 2/3 of the market.

Neither the market structure nor the accompanying institutions are satisfactorily developed. There is a need for institutional development and the establishment of independent agents in the energy markets. Presently there are two such institutions: the regulator ERO and the competition authority, the Office for Protection and Competition. None of these have however yet achieved the same independent status in the Czech economy as the corresponding institutions in Sweden and the UK.

The main objective of Czech State Energy Policy (SEP) was formulated by the Ministry of Industry and approved by a Government Decision in 2004. The main areas that were covered by SEP were independence, safety and sustainable development. The document offers a vision for future development and calls for energy efficiency as the primary priority in the Czech energy sector. These goals are also reflected in a description of the main institutions in the Czech energy sector.

GOVERNMENTAL

- Ministry of Trade and Industry

The Ministry has the principal responsibility for overall energy policy. Two other relevant organisations fall under the auspices of MTI: the Czech Energy Agency. Its primary tasks consist of supporting the environmental use of energy and the State Energy Board, which oversees compliance with energy legislation.

- Energy Regulator Office (ERO)

ERO is the administrative authority for regulation. Its mandate is to protect consumer interests and ensure quality and reliability of energy supplies to consumers. Furthermore, its aims are to support competition through institutional development and promote the effectiveness of the

energy utilities. Finally ERO is to guarantee price stability and grant licences for unbundled activities.

- State Office for Nuclear Safety (SONS)

SONS is responsible for governmental administration in the field of nuclear safety. The institution has an independent position within the Czech central administration and has its own budget approved by the Parliament as part of the National budget.

- Administration of State Material Reserves (ASMR)

ASMR is a state administrative body responsible for the organisation of logistical support for emergency preparedness and for state material reserves.

- Office for Protection of Competition

The main objective for the office is to create conditions for the protection and support of competition, to exercise surveillance over public procurement and to monitor state aid.

This list of formal institutions illustrates an important feature of the Czech energy sector. The state controlled institutions dominate and there are few organisations that may play independent roles towards the energy markets. According to the principles of NPMR, only ERO and SONS can act as independent agents and thereby create appropriate principles for efficiency and institutional legitimacy.

3.3.3 The Nuclear Power Sector

Nuclear Power for electricity production was first introduced in the former Czechoslovakia in 1985. Today there are two nuclear sites, Dukovany and Temelin, with six operating units. Both nuclear power plants are owned by CEZ – the major Czech utility company.

Since partition, nuclear energy activities in the Czech Republic have been exposed to considerable institutional changes. Eighteen regulations have been implemented in the last 10 years in order to completely harmonise with current international requirements and recommendations. The Czech parliament introduced a new atomic act in 2002 in connection with EU accession.

The Nuclear Power sector in the Czech Republic faces several challenges. Firstly, it has to satisfy international requirements and legislation. Simultaneously, the capacity and investment policy has to be balanced towards other alternative energy sources. Even though several inspections have reported that safety is satisfactory, there is still a need to improve safety monitoring in the power plants. Finally, the discussion concerning waste management is also a major issue in the general energy policy of the Czech Republic. There have been strong requests for a more open discussion and for increased public involvement in the decision-making process. Demands for transparency and legitimacy concerning nuclear energy seem to be more emphasised in the Czech Republic context than in Sweden and the United Kingdom.

3.3.4 Summing up: Czech Republic

The energy sector in the Czech Republic is still in a transition period. Bearing in mind the principles from NPMR, the process of restructuring the energy sector could be said to be still ongoing. The liberalisation of the economy is more or less formally completed, but the institutions necessary to utilise the economic advantages of such an economy are immature. To some extent we may say that the Czech Republic suffers from institutional inertia. Nevertheless, this is an ongoing process and because the country is a member of the EU it is required to develop further agencies and institutions in the energy sector.

3.4 SLOVAK REPUBLIC

3.4.1 Political system and governance structure

The Slovak Republic's highest legislative body is the 150-seat unicameral National Council of the Slovak Republic. Delegates are elected for 4-year terms on the basis of proportional representation. The Slovak political scene supports a wide spectrum of political parties, including several social democratic, right-wing and the nationalistic parties.

In January 1999, Parliament passed a constitutional amendment allowing for direct election of the president. On April 17, 2004, Ivan Gasparovic was elected president and inaugurated on June 15, 2004. Virtually all executive powers of government belong to the prime minister, but the president does serve as commander-in-chief of the armed forces, can grant pardons, and has the right to return legislation to Parliament. Parliament, however, can override this veto with a simple majority of the 150 members of Parliament.

3.4.2 The Energy Sector

Slovakia has implemented a range of comprehensive energy reforms. The great effort involved in changing the Slovakian energy sector to market-based principles is reflected in the fundamental acts and institutional reforms that have taken place during the last 10 years.

- The Act of Energy (1998)

These fundamental regulations introduced new concepts into the Slovak Republic energy law and defined the respective role of the state authorities and the rights and duties of those involved in the energy sector. From an institutional and public management point of view these laws can be considered as the basic premises for an energy market functioning in accordance with the EU principles. The The Act of Energy was supplemented in 2001 by the Act of Regulation of Network and Industry (the Regulatory Act) which defines the status and activities of the Regulatory Office for Network Industries.

To comply with new EU energy incentives three additional energy laws were implemented in 2004 or later as follows:

- The Energy Act no. 656/2004 Coll.
- The Act on Thermal Energy no. 657/2004 Coll. (amended by Act no. 99/2007 Coll.)
- Act of Regulation of Network and Industry no. 276/2001 Coll. (amended by Act no. 397/2002 Coll.; Act no. 442/2002 Coll.; Act no. 658/2004 Coll.; Act no. 107/2007 Coll.)

All acts restore the existing Regulatory Act and further emphasise how the Slovak Republic is accomplishing institutional changes and public management reforms. The main objective was to alter the balance between the government and the regulatory authorities. To some extent the laws have set premises for independent regulatory bodies. The new Regulatory Act act no longer defines "state regulation" as a central legal concept, but refers to "the performance of the state administration". The task is now performed under a tripartite structure:

- Ministry of the Economy

The energy act delegates various powers to the ministry that allow some degree of intervention. The ministry may set relevant criteria and procedures for authorisation. The ministry is also responsible for monitoring and reporting obligations to the EU.

- The Regulatory Office

The Regulatory Office (URSO) is responsible for enforcing energy and water regulations. The Energy Act does not integrate the role of URSO with other institutions responsible for guaranteeing the market mechanism, for example the Anti-Monopoly Office. URSO has not yet entered into agreements with the Anti-Monopoly Office, but reports regularly to the European Commission.

- State Energy Inspectorate Board

The board has the power to impose sanctions for non-compliance with the Energy Act. URSO has certain sanctioning powers as well under the Regulatory Act, but co-ordination between URSO and the State Energy Inspectorate Board is based on practise, not on written agreements.

Unlike most other countries, there is no national waste management agency in Slovakia. However, some preparatory works to settle the agency were performed. For the time being, the whole responsibility for the fuel cycle and nuclear facilities rests with holders of licenses. Thus, JAVYS, a.s. is in charge of interim storage of SNF, decommissioning of NPPs, RAW conditioning and disposal at Mochovce site as well as collection, storage and treatment of institutional RAW and orphan sources.

In this context we may say that the Slovak Republic, like the Czech Republic, is experiencing a process of re-institutionalisation in order to comply with EU regulations.

3.4.3 The Nuclear Power Sector

3.4.3.1 Authorities

Nuclear Regulatory Authority (ÚJD)

ÚJD SR, being a successor to the former ČSKAE, was established on 1 January 1993, it is an independent state regulatory authority reporting directly to the Government, headed by the ÚJD SR Chairman appointed by the Government. Independence of the regulatory authority from any other body or agency dealing with the development or utilization of nuclear energy is applied in all relevant areas (legislation, human and financial resources, technical support, international co-operation, enforcement tools).

ÚJD supervises all phases of RAW management at nuclear installations and the final phases of institutional RAW management. ÚJD is a state regulatory body for nuclear safety of nuclear installations, including regulation of the treatment of radioactive wastes, spent fuel and other parts of the fuel cycle, as well as of nuclear materials, including their control and accounting. It takes care of the assessment of the goals of the nuclear energy utilization programme and of the quality of selected facilities and nuclear technology devices, as well as of the commitments of the Slovak Republic under international agreements and treaties concerning nuclear safety of nuclear installations and management of nuclear materials.

Pursuant to Atomic Act (Act No. 541/2004 Coll. LL.), ÚJD is the state regulator in the field of nuclear safety of nuclear installations in particular and is responsible for the following tasks:

- performs inspections of workplaces, places of operation and premises of nuclear facilities, checking on the compliance with the responsibilities under the Atomic Act, regulations issued based thereon, operating regulations, adherence to limits and conditions of safe operation, quality assurance systems as well as the responsibilities arising from measures and instructions issued pursuant to the Atomic Act,
- verifies the compliance with the commitments under international agreements and treaties, in nuclear safety, management of nuclear materials, radioactive waste from nuclear facilities and treatment for disposal and disposal of institutional radioactive wastes, management of spent nuclear fuel, including accounting and control,
- identifies the status, reasons and consequences of accidents, incidents and selected failures, and takes part, being a mandatory body, in the investigations of incidents and accidents led by other authorities,
- checks the performance of mandatory inspections, reviews, operating controls and tests of selected equipment in nuclear facilities,
- orders the elimination of shortcomings impacting upon nuclear safety,
- reviews nuclear safety of nuclear facilities independently of the operator,
- checks the contents and exercise of emergency plans.

ÚJD issues annual reports on the outcomes of regulatory activities and on nuclear safety. The annual summary reports are submitted to the Slovak Government. It has however been recommended that the financial and institutional position of the UJD should be upgraded. The capabilities of the UJD are presently somewhat limited with respect to responsibility for regulation of the entire nuclear sector of the Slovak Republic.

Public Health Authority

State health regulator in nuclear facilities is responsible for the radiation protection inspection of the nuclear facility's employees and of population in the vicinity of the respective nuclear facility. Principal requirements with respect to health protection against radiation are defined by legal regulations. Regulation of nuclear safety when defining safety requirements on technological equipment and operation of nuclear facilities is to the end-effect based on the requirements related to health protection and vice versa. Accordingly, the co-operation of ÚJD SR and the Slovak Ministry of Health is of importance, as well as their complementary functioning. ÚJD SR and the Slovak Ministry of Health entered into the agreement on co-ordination of regulatory activities and providing for their common complementary regulation. A joint committee on the issues of common interest has been established by the agreement.

3.4.3.2 Legislation

Legislative documents relevant to nuclear energy

- Atomic Act (Act No. 541/2004 Coll. LL. on Peaceful Use of Nuclear Energy), amended by Act No. 94/2007 Coll. LL. The Act has laid down conditions of safe uses of nuclear energy for exclusively peaceful purposes, in accordance with international agreements signed by the Slovak Republic. Also, it includes clauses setting financial compensation in cases of nuclear accidents. In terms of the Atomic Act, nuclear installations mean facilities and premises that contain a nuclear reactor utilizing fission reaction, facilities and premises for the production, processing and storage of nuclear materials, facilities and premises for the storage (disposal) of spent nuclear fuel and for the processing, treatment, storage and deposition of RAW. The Act replaced the previously applicable Act No. 130/1998 Coll. on on Peaceful Use of Nuclear Energy.
- Decrees of UJD SR No. 46/2006 - 58/2006
- Act on EIA (Act No 24/2006 Coll. LL. on Environmental Impact Assessment) orders comprehensive expert and public assessment of environmental impacts of selected constructions under preparation, including nuclear installations, and authorize Ministry of Environment of the Slovak Republic to review all suggestions for technical changes of nuclear installations that may evoke environmental impacts.
- Act on National Nuclear Fund (Act no. 238/2006 Coll. LL. on National Nuclear Fund for Decommissioning of Nuclear Installations, Radioactive Waste Management and Spent Nuclear Fuel Management), amended by Act No. 94/2007 Coll. LL. and Act No. 528/2006 Coll. LL. Management of spent nuclear fuel and radioactive waste means their transport, processing and disposal. The Fund that is an independent legal entity managed by the Ministry of Economy. The Fund is financed from several sources, including contributions from nuclear power plant operators, banks, the State, and others.
- Act No. 50/1976 Coll. on Territorial Planning and Construction Order (so-called Construction Act) as amended by later regulations, defines the obligation of the Construction Authority to obtain, prior to the issuance of location permit, building permit and commissioning decision concerning the constructions with the nuclear facility, standpoint of ÚJD SR. ÚJD SR is authorised to condition the issuance of its approval by the fulfilment of specific conditions.
- Decree 545/2007 Coll. LL. of Ministry of Health on Health Protection against Effects of Ionizing Radiation.
- Act No. 355/2007 Coll. LL. on Protection, Support and Improvement of Public Health.
- Act No. 126/2006 Coll. LL. on the Public Health Service.
- Governmental Decision 345/2006 Coll. LL. on the Basic Safety Requirements for Health Protection of Employees and Inhabitants against Effects of Ionizing Radiation.
- Act No. 95/2000 Coll. LL. on Labour Inspection as amended by Act No. 231/2000 Coll. LL. regulating inter alia the about inspection, defines the labour inspection related competence, rights and obligations of legal entities and physical persons including the issuance and disqualification of permits and certificates authorizing the activities on nuclear facilities.
- Act No. 575/2001 Coll. on Organisation of Governmental Activities and on Central State Administration as amended by later regulations defines the framework of tasks and competence of ministries and central state administration authorities.

3.4.4 Summing up: Slovak Republic

The Slovak Republic has gone through a formal institutional transformation – both politically and economically. According to Deegan-Krause (2006) these changes have been more substantial than in the Czech Republic. A totally judicial process concerning regulation of the energy markets and institutional reforms has been implemented and provided the basis for further integration into European energy markets. The institutional process to come will likely be characterised by increasing autonomy for regulatory agents and the harmonisation of the public management system with existing and future EU standards.

3.5 FINAL REMARKS

By way of introduction we have described the different institutional points of departure for the four countries. According to the concepts of NPMR we have noted that there are distinct differences between them. These can be explained by historical, political and economical factors. Despite these differences there are certain interesting similarities. Most obvious is the institutional aspiration for independent regulatory bodies in the energy markets. We have tried above to underline the point that to some extent the development path for the four countries is the same, but that their positions in terms of progress towards meeting EU standards are different. The question is when will the respective countries reach a satisfactory institutional level – seen from the perspective of the EU? However, such a linear understanding of the historical process is misleading. The process of developing a regulatory framework will inevitably involve national characteristics. It is thus reasonable to assume that each country will design a regulatory framework adjusted and adapted to national conditions as well.

4. REPORT ON THE UK

According to the most recent UK Radioactive Waste Inventory, the total volume of radioactive waste from all sources that will require management is 2,270,000 m^3. Of this waste, 90.4% by volume is LLW, (2,060,000 m^3), 9.5% is ILW (217,000 m^3) and less than 0.1% is HLW (1,340 m^3) and most is currently in an unpackaged state [1]. However the scope of the inventory is limited to those materials which have been declared as waste by the waste producers.

About 95% of this radioactive waste is already in existence. Some has been processed, and is being held in stores, but much of it is contained within nuclear sites and will require conditioning, packaging and storing as these sites undergo decommissioning [2].

The 2004 Inventory estimated that following decommissioning and cleanup activities at all UK nuclear sites, the total volume of conditioned wastes from all sources would approach 2,270,000 m^3 [1].

In the UK, radioactive wastes are classified into 3 main categories:

4.1 LOW LEVEL WASTE (LLW)

Under UK regulations, LLW is defined as:
'radioactive waste having a radioactive content not exceeding 4 gigabecquerels per tonne (GBq/te) of alpha or 12 GBq/te of beta/gamma activity' [3].

Overall, the major components of LLW are soil, building rubble and steel items such as ducting, piping and reinforcement from the dismantling and demolition of nuclear reactors and other nuclear facilities and the clean up of nuclear sites. LLW in the form of paper, plastics and scrap metal items is also generated from the operation of nuclear facilities. Most LLW is disposed of to the near-surface LLW Repository near the village of Drigg, in Cumbria, as it arises.

4.2 INTERMEDIATE LEVEL WASTE (ILW)

These are mostly wastes exceeding the upper boundaries for LLW that do not generate sufficient heat from radioactive decay for this to be taken into account in the design of storage or disposal facilities. Included in this category are wastes containing small amounts of plutonium (Plutonium Contaminated Material or PCM) derived from reprocessing of spent nuclear fuel at Sellafield.

4.3 HIGH LEVEL WASTE (HLW)

These are wastes which require active cooling systems due to the high temperatures produced as a direct result of their radioactivity. Such cooling needs must be taken into account in the design of storage or disposal facilities.

HLW is generated from reprocessing spent nuclear fuel at Sellafield. Magnox fuel reprocessing is scheduled to end in 2013, and oxide fuel reprocessing in 2011 [1].

4.4 OTHER MATERIALS

As well as the wastes described above, there are other radioactive materials not currently classified as wastes, but for which management solutions are still required. These include plutonium, uranium and spent nuclear fuel.

There are currently around 93te of separated plutonium in the UK, most of which is held in stores at Sellafield, resulting from reprocessing of spent nuclear fuel at Sellafield and the dismantling of nuclear weapons. There are also various forms of uranium that require management, formed as a by-product of fuel fabrication, reactor operation and nuclear weapons production and dismantling. This uranium is either 'depleted', for example in the form of uranium hexafluoride tailings, or 'highly enriched' from dismantled nuclear weapons.

Following the currently planned cessation of reprocessing activities at Sellafield in 2013, it is estimated that some 3,500 tonnes of spent Advanced Gas Reactor (AGR) oxide fuel will remain in storage there, for up to 85 years under current proposals [4], as well as a further 1,200 tonnes of Pressurised Water Reactor (PWR) fuel at Sizewell B in Suffolk, which will not be reprocessed (5)

Table 2 An overview of main UK events and decisions between 1946 and 2007.

Date	Events	Stakeholder activity	Legislation & Policy
1946			Atomic Energy Act 1946. Makes no mention of waste
1947	Windscale, Cumbria (now Sellafield) identified as site for construction of nuclear reactor for weapons programme	Local people and MP express health and safety concerns, including worries about contamination of milk from dairy cattle and possibility of are being afflicted by an 'industrial disease'.	
1948			Radioactive Substances Act 1948
1949	Sea dumping of radioactive waste begins		
1954			Atomic Energy Act 1954 establishes UK Atomic Energy Authority (UKAEA)
1955	Announcement of first civil nuclear power programme takes Parliament and energy industry by surprise.	Complete absence of any consolation	
1956	First commercial nuclear power station, Calder Hall, opens		Radioactive Substances Advisory Committee established
1957	Drigg site acquired by UKAEA for LLW disposal Reactor fire at Windscale		
1959			Nuclear Installations (Licensing and Insurance) Act 1959
1960			Radioactive Substances Act 1960

			Nuclear Installations Inspectorate (NII) established
1965			Nuclear Installations Act
1970			Radiological Protection Act 1970
1971			Atomic Energy Authority Act 1971 establishes British Nuclear Fuels Limited (BNFL) - formed out of the Production Group of the UKAEA
1972			Safety and Health at Work Committee report London Dumping Convention prohibits the dumping of HLW at sea
1974			Dumping at Sea Act sets out responsibilities for regulation of sea dumping
1975/1976	**UKAEA begins search for sites for test drilling for HLW repository**		
1976			Royal Commission on Environmental Pollution (RCEP) Report Nuclear Power and the Environment (the 'Flowers Report')
1977	Public inquiry into BNFL proposal to build thermal oxide reprocessing plant (THORP) at Windscale	Environmental NGO opposition	Government White Paper Nuclear Power and the Environment Cmnd 6820, a response to the Flowers Report, gives responsibility for RWM policy and coordination of R&D to the Department of the Environment
1978			Radioactive Waste Management Committee (RWMAC) established
1979	Three Mile Island reactor accident receives extensive media coverage		Government reaffirms commitment to drilling investigation for deep HLW repository
1980	Mullwharchar public inquiry rejects UKAEA test drilling proposals	Local council and community opposition - argue that can't separate investigations from consequences of future repository construction	
1981	**Government abandons test drilling plans in favour of desk studies**		
1982	UK Nuclear Industry Radioactive Waste Executive (UK Nirex Ltd) established		
1983	Nirex announces two initial sites for short-lived ILW and	National Union of Seamen take action to stop further sea	Moratorium on sea dumping of ILW and LLW begins. Sea

	LLW repositories: Billingham (ILW) and Elstow (LLW)	dumping of waste	disposal of redundant nuclear submarines discounted
1983 - 1984	Sizewell public inquiry into proposals to build PWR at Sizewell	Intense NGO opposition leads to longest	
1990			Environmental Protection Act 1990
1991	Sellafield site selected for detailed investigations		Amendments to RSA60 under EPA90
1992			OSPAR Convention signed. UK retains opt-out from any permanent ban
1993	Public inquiry into proposal by Scottish Nuclear to construct on-site dry store for spent fuel at Torness and Hunterston nuclear power stations	Scottish Greens generally supportive of proposal as it would eliminate the movement of spent fuel	Radioactive Substances Act 1993
1994	Nirex proposes construction of a geological laboratory (rock characterization facility or RCF) Planning permission for RCF refused by Cumbria County Council	Local opposition. Nirex viewed as arrogant and attempting to exploit Sellafield as 'easy option'	Review of the Future Prospect for Nuclear Power in the UK
1995	Public planning inquiry into proposed Sellafield rock characterisation facility (RCF)	Country Council and NGO opposition. Proposal challenged on technical grounds. Nirex criticised for withholding information. Accused of manipulating selection process by introducing Sellafield site at a late stage (claim later rebutted by Nirex).	Government White Paper, The Prospects for Nuclear Power in the UK Cm 2860 Government White Paper, Review of Radioactive Waste Management Policy: Final Conclusions Cm 2919 Environmental Protection Act 1995 establishes single environmental regulatory body, the Environment Agency
1996	Planning Inquiry Inspector rejects Nirex RCF planning application		
1997	**Secretary of State upholds RFC inquiry decision – RCF plans abandoned**		UK relinquishes its opt-out from sea dumping ban under OSPAR Convention
1998		BNFL National Stakeholders Dialogue commences SAFEGROUNDS network established with DTI support to develop good practice guidance for site remediation	OSPAR Convention comes into force
1999		UK Consensus Conference on RWM	
1999			House of Lords Select Committee on Science & Technology reviews policy on RWM. Considers range of options; comes out in favour

			of deep geological disposal
2000		BNFL's Magnox Decommissioning Dialogue commences Series of Nirex stakeholders workshops commences Industrial-sponsored Safegrounds dialogues process commences	
2001	Nirex publishes report on Lessons Learned (from RCFexperience)	First phase of stakeholder and public consultation on interim storage of laid-up (nuclear powered) submarines (ISOLUS), commissioned by Ministry of Defense.	Government launches Managing Radioactive Waste Safety consultation
2002		UK Consensus Conference on RWM reconvened Consultations with NGOs about proposed NDA	Government White Paper Managing the Nuclear Legacy: A Strategy for Action proposes new Nuclear Decommissioning Authority (NDA) New Committee on Radioactive Waste Management (CoRWM) announced RWMAC suspended
2003		DTI begins a series of local workshops at sites to be decommissioned to enable stakeholder input to the development of the decommissioning programme Second phase of ISOLUS stakeholder and public consultation (MoD) UKAEA conduct Dounreay stakeholder dialogue on Best Practicable Environmental Option (BPEO) for long-term management of LLW from the site	CoRWM members appointed. Committee begins by drawing up a long-list of options for consideration (including those already rejected by House of Lords) Secretary of State announces that Nirex to be made independent of nuclear industry
2004		CoRWM conducts first phase of Public and Stakeholder Engagement (PSE1) to consult on its approach Environment Agency consults stakeholders on applications for its authorisation on Magnox decommissioning	House of Lords Science and Technology Committee report, Radioactive Waste Management, HL Paper 200 Regulatory changes require licencees to assess disposability of waste packaging as part of safety case submission - requires Letter of Compliance from Nirex EU SEA Directive comes into force, requiring assessment of plans and programme The Energy Act comes into force, outlining role,

			responsibilities and structure of NDA Timetable for closure of Magnox power stations announced
2005		CoRWM conducts second phase of Public and Stakeholder Engagement (PSE2) to consult on its shortlist of option National and local stakeholder organisations engaged in development of draft LLW policy for consultation process Existing nuclear site Local Liaison Committees being reconstituted with wider membership and community watchdog role as Site Stakeholder Groups	NDA comes into existence (April) NIREX becomes independent of nuclear industry - now funded by Government via the NDA Review of LLW policy initiated - needs of the decommissioning programme a major driver House of Lords Science and Technology Committee report, Radioactive Waste Management: Government Response, HL Paper 89
2006		CoRWM to conduct its final phase of Public and Stakeholder Engagement (PSE3) to consult on its recommendations, including implementation issues Draft LLW policy document to go out to consultation	July: CoRWM/LLW review to report to Government

Above table taken from Simmons et al 2006, UK Final Report to CARL.

Followed by:

- Publication in July 2006 of CoRWM Final Report, recommending deep geological disposal
- Publication in October 2006 by DEFRA of government response (largely supportive, gives implementation role to NDA and winds up Nirex)
- Nirex merges with NDA on 1st April 2007 and forms the Radioactive Waste Management Directorate within NDA
- Publication in June 2007 by DEFRA of consultation document, outlining proposed method to implement deep geological disposal y means of a voluntarist approach. Scottish Executive does not endorse the document and only supports continued surface storage.

4.5 KEY DATES

(adapted from Simmons et al 2006)

1946 Atomic Energy Act

1948 Radioactive Substances Act

1954 Atomic Energy Act: Establishes UK Atomic Energy Authority (UKAEA)

1959 Nuclear Installations (Licensing and Insurance) Act

1960 The Radioactive Substances Act

1965 Nuclear Installations Act: Establishes the nuclear licensing system

1970 Radiological Protection Act: Provided for a public authority to be called the National Radiological Protection Board to advise on safety within the UKAEA.

1971 Formation of BNFL out of the Production Group of the UKAEA
Atomic Energy Authority Act 1971; establishes British Nuclear Fuels Limited (BNFL). Became a plc in 1984 but continued to be known as BNFL, with UK Government as sole shareholder. (As of 1st April 2005 all the UK assets have been transferred to the NDA) Authority).

1972 Safety and Health at Work Committee Report; Formation of the Health & Safety Executive (HSE).

1976 Royal Commission on Environmental Pollution (RCEP) Report, Nuclear Power and the Environment

1982 Nirex established, with mandate for management of ILW only

1987 Her Majesty's Inspectorate of Pollution (HMIP) established

1990 Environmental Protection Act (EPA90)

1991 Amendments to RSA60 under EPA90

1993 Radioactive Substances Act (RSA93)

1995 Government White Paper, Review of Radioactive Waste Management Policy: Final Conclusions (Cm 2919) published, and announces that there will be a resumption of research into geological disposal of HLW and spent fuel that had been abandoned in 1981.

1995 Environmental Protection Act (EPA95): Formation of the Environment Agency

2002 Government launches the Managing Radioactive Wastes Safely programme (MRWS) following wide consultation

2003 Committee on Radioactive Waste Management (CoRWM) established, to examine available options for waste management and make recommendations to government

2006 CoRWM recommends deep geological disposal as preferred option, with site chosen by volunteer process in partnership with local community; government accepts recommendation

2007 Government launches public consultation on implementation process based on voluntarism

Source

Simmons P et al 2006; CARL Country Report – United Kingdom, Final, July 2006

4.6 KEY ACTORS IN THE UNITED KINGDOM

National Government

- Department of the Environment, Food and Rural Affairs
- Department for Business, Enterprise and Regulatory Reform (formerly Department of Trade and Industry)
- Ministry of Defence
- Scottish Executive
- Welsh Assembly Government Department for Environment, Planning and Countryside
- Department of the Environment Northern Ireland
- House of Lords Select Committee on Science and Technology
- House of Commons Select Committee on Environment Food and Rural Affairs

Implementing Bodies

- **Nuclear Waste Management Directorate (Nuclear Decommissioning Authority)**

Regulators

- **Nuclear Directorate of the Health and Safety Executive**
- **Nuclear Waste Assessment Team of the Environment Agency**
- Scottish Environment Protection Agency

Advisory Bodies and Groups

- **Radiation Protection Division of the Health Protection Agency**
- Committee on Radioactive Waste Management (CoRWM)
- Radioactive Waste Management Advisory Committee (RWMAC) - defunct

Waste producers

- **British Nuclear Fuels Ltd**
- UKAEA

Local Government

- Nuclear Legacy Advisory Forum (NuLeAF)
- **Environment and Planning Section of Cumbria County Council**
- **Nuclear and Sustainability Department of Copeland Borough Council**

NGO's

- Friends of the Earth (FoE)
- Greenpeace
- Scotland Against Nuclear Dumping (SAND)
- Wales Anti-Nuclear Alliance (WANA)
- Cumbrians Opposed to a Radioactive Environment (CORE)

4.7 RESULTS FROM UK - UK ORGANISATIONS INTERVIEWED IN 2007

4.7.1 Nuclear Waste Management Directorate (Nuclear Decommissioning Authority

[taken from Press Release on NDA website dated 02 04 07]

In its response to the Committee on Radioactive Waste Management's (CoRWM's) recommendations in October 2006, the UK Government and the Devolved Administrations (Government) decided that responsibility for securing geological disposal of higher activity radioactive waste should fall to the Nuclear Decommissioning Authority (NDA). Formed in April 2007 the Directorate therefore incorporates the activities and capabilities formerly contained within UK Nirex Ltd, with whom the responsibility for management of ILW formerly resided. The majority of Nirex staff have been transferred to the NDA ensuring that the necessary skills, knowledge and experience are protected.

The NDA will use the new Directorate to design and build an effective implementing organisation to deliver a safe, environmentally sound, publicly acceptable, geological disposal solution. It is envisaged that in due course this new organisation will become a wholly owned subsidiary of the NDA. Once a suitable site has been selected the subsidiary can develop into the repository Site Licence Company.

4.7.1.1 Radioactive Waste Management Directorate of the NDA (Interview held on 2nd July 2007)

Probably the most important recent date was the Inquiry decision in 1997, as Nirex never had a 'Plan B'. Stakeholder involvement developed from the recommendations in the 1999 HoL report and the subsequent launch of the MRWS process in 2001 really started the new approach, with the establishment of CoRWM in 2003, their report in 2006, the government response and now the Consultation Document in June 2007.

There are now 2 parallel processes, MRWS for high-active wastes and the new LLW programme following the new 2006 policy statement. Of course, Scotland has refused to support the repository programme, instead preferring continued storage. Public and industry buy-in to the MRWS process will be vital in the future, with emergence of hopefully more than one volunteer site. Further development of the strategy will take place in November 2007 following the current consultation, with policy issued in 2008 and then a call for volunteers. Al this assumes continuation of the current plans.

There was an amnesty for collection of spent sources in 2005, and these are stored at Harwell.

The CoRWM process has increased public understanding of radwaste issues, although even then that public is only a small fraction of the general public. Mostly it consists of local authorities, some campaign groups and a few individuals. There is increasing involvement of Site Stakeholder Groups at existing nuclear sites also. There has not been very much coverage of the MRWS process in the media. Journalists tend only to cover controversial issues. There has been more coverage in association with the Energy Review. News stories tend to cover specific incidents rather than developing work etc. Stories are always at a very high level, and don't examine issues in detail.

Responsibility for radwaste management now rests with us, inside the NDA. Exact responsibility for implementation has yet to be finalised, but will probably resemble the contractor-led model of the NDA for decommissioning work. The Environment Agency regulates discharges and long-term disposal aspects whilst the NII regulate storage and operation of existing facilities. The Department for Transport covers movements of waste and physical security is regulated by the Office of Civil Nuclear Security.

Development of the implementation process will be crucial to the success of the programme, although the Scottish decision may rekindle the debate about storage vs. disposal. Government will hold a number of public workshops over the summer to explain its proposals. There are however a huge number of uncertainties remaining, especially regarding the timing of the process and the progress that we can achieve. As regards development of a safety case for deep disposal, we bound uncertainties within internationally agreed limits and carry out multiple assessments with variable parameter values, to assess all likely 'what-if' scenarios. However, we admit that data uncertainties exist, especially as regards the long-term future. However, our work is subject to intense international peer review, and we follow agreed international guidelines.

For the purposes of assessment, safety is regarded as in terms of risk x dose. We use ICRP conversion factors to address the consequences of predicted doses, but aim to refer to safety rather than risk, in relation to waste management. Acknowledging that there are also programmatic risks, especially in relation to economic aspects, we maintain a risk register, which is updated monthly.
Safety of waste management must comply with a regulatory risk target of any individual receiving a radiation dose, of 1×10^{-6} (1 in a million). This is actually 1×10^{-2} below background levels and is considered to be very stringent. In reality, risks of doses from transport activities are probably higher, yet even then many more people will die from other risky activities than from radwaste-related ones. However, people still associate dread and risk with radwaste and its transport (see the Cricklewood Dialogue, for example).

We assess repository safety over a period of around 1 million years, and intend to introduce overlapping time periods in future assessments, in order to minimise uncertainties going forward in time.

CoRWM approached its work in terms of a series of ethical requirements. Future work should follow this methodology, and ensure that risks to future generations are no greater than those we experience today, as is required by current regulations.

There no national standards in the UK as regards provision of information about radwaste management, and no legal requirements to do so, other than that required by regulators as part of their work. All the agencies issue information about their activities, regulators, government, NGO's, local stakeholder groups etc. Some local authorities include information in their strategic planning. Various professional bodies (Royal Society, Geological Society, Society for Radiation Protection etc) sometimes hold meetings and issue statements. The HPA issues information on various aspects, but tends to concentrate on risks related to radon, rather than radwaste. Other advisory groups, such as the National Dose Assessment Working Group only deal with liquid discharges.

Each agency endeavours to communicate in 'plain English'. Whilst we are bound, under the Freedom of Information Act, to respond to questions in an open and honest way, information may be available, but it is not always easily accessible or understandable.

NDA presents information via a wide range of media, from websites to written reports. Data is presented in 4 groups (General; Summary Reports; Technical Reports; Research Reports). We also meet local stakeholders at regular intervals in specially convened National Stakeholder Group meetings. We feel we trust our colleagues to supply reliable information both to us and to the public, and we feel we have confidence in our working approach.

There is a general lack of basic information concerning radwaste management in the public domain, a view shared by many people. There could be scope for TV coverage and better leaflets and brochures about what is proposed, above and beyond the Consultation Document. The new Directorate is still developing, so these may be produced in the future. The situation will probably change considerably when potential repository sites are identified. It is important to show that the waste problem already exists, and we need to mange them now. There must be interaction with existing host communities as well as with potential repository hosts.

NDA offers staff training in general communication skills, but not with specific reference to risk. We aim to identify good communicators during the interview process. Communication of risk is best done face to face, supported by reliable and accessible documentation. Above all it is important to be honest about the potential uncertainties. In public discussions we address these by use of 'what-if' scenarios, but we continue to ask people what their concerns are and where we are examining them satisfactorily. We also model these scenarios by setting large bounding values, which help us to focus on those factors which can have the most significant impacts.

The current situation could be improved by the use of better information, more public presentations to explain the current situation as regards waste management and in the future, closer involvement in existing storage communities and potential repository hosts. It will be important, once the implementation process has been established and agreed through consultation, to explain more fully the details of the proposed technologies to be used in a repository.

We must maintain contacts with local NGO's, even if the national groups do not engage in the process.

4.7.1.2 British Nuclear Group

Important dates cover the Nirex site investigations in the 1990's and the 1997 inquiry result. The whole episode demonstrated the lack of trust amongst local people in radwaste management at that time. The start of the CoRWM process was then the next significant date, which was good in that it examined all possible options and involved a wide range of people. Although not perfect in some ways, it made an important contribution in the way it involved as many people as possible and built on an ethical framework. It has developed a degree of public acceptance of the need to find a solution; we now seem to have a clearer path ahead to follow.

There are wastes of all types in the UK, especially ILW, with the majority of higher-active material at Sellafield. The national LLW repository near Drigg is filling up, and we will need a replacement, the question is where? A new operator is to be appointed with a mandate to help reduce waste volumes requiring disposal. Wastes are continuing to be developed at Sellafield, but there seems to be a policy vacuum at the moment regarding the future of the repository. It is unclear whether new facilities will be developed near to existing sites. It seems that the local community would like to see the authorities taking a strong line against

importing of wastes from elsewhere as part of the general cleanup process, thereby reducing the demand on the repository.

Politics is now likely to enter the post-CoRWM process, once a siting programme begins. 60% of wastes are already at Sellafield, but it is likely that new stores will be needed at existing sites, as they are decommissioned. It is unclear as to whether some sites will be restored to entirely greenfield status, or whether stores will remain in the long-term. There is a lack of clarity as to how local communities will be involved, bearing in mind that the Environment Agency has the final say as regards new stores etc. and there is a new planning regime being introduced.

People in west Cumbria appear strongly supportive of both normal reprocessing operations and the cleanup activities at Sellafield, although there are worries about jobs in the aftermath of decommissioning. There is a need for local people to be able to trust both the process and the science behind it, as well as having confidence in their elected representatives' abilities to protect their interests.

The media in general are relatively quiet as regards waste management. It will become busier when potential repository sites are being examined. Most of the stories that appear in the press don't concern waste management, more operations and past practices at Sellafield. We expect considerable interest from the local community in west Cumbria, although there are differing views about what constitutes a 'community'; we tend to regard it as the Sellafield 'travel to work area'. This extends quite widely, and Cumbria County Council has responsibility for planning decisions. Transport issues surrounding waste management could prove to be significant in the repository siting process.

It is important to communicate successes to the public. We have carried out safe storage and disposal for many years and must demonstrate we can handle legacy wastes as well. If this was done well, it could help develop increased trust in the nuclear industry and perhaps help gain public support for new build.

BNG attempts to put stories that appear in the local and national media into context. Whereas in the past we used to try and win over hearts and minds for the nuclear industry, now we are much more low-key, although we show local and national opinion formers around the site, run school trips and provide speakers when asked. There are fewer general visitors now, especially because of the increased security.

BNG does feel it has a mandate to communicate with people about its activities, but not necessarily in terms of risk. We run consultations on things like BPEO's, as we are legally bound to do, report to the Site Stakeholder Group, and report regularly to council groups (Copeland and Cumbria). Staff are given training in general communication skills, but not specifically as regards risk. Communications staff will often coach experts on how to get complex issues over to the public, and we organise consultations to seek public views on our proposed actions.

We feel we are generally trusted as regards the information we provide. In some cases it may be that there is too much consultation. It is unclear at the moment whether the local councils in west Cumbria are capable of taking on the role of scrutineer, with assistance from regulators, like happens in Sweden.

Interview held 3rd July 2007

4.7.2 Nuclear Directorate of the Health and Safety Executive

[Based on material taken from HSE website 03 09 07]

Under UK law (the Health and Safety at Work etc. Act 1974) employers are responsible for ensuring the safety of their workers and the public, and this is reinforced for nuclear installations by the Nuclear Installations Act 1965 (NIA), as amended. Under the relevant statutory provisions of the NIA, a site cannot have nuclear plant on it unless the user has been granted a site licence by the Health and Safety Executive (HSE). Acting for the HSE, the Directorate sets out in conditions attached to a site licence the general safety requirements to deal with the risks on a nuclear site. Licensees comply with these in different ways; such as, with a safety case to meet a stage in the plant's life, or with arrangements and procedures to meet a licence condition. Guidance is also set out in the safety assessment principles, which the Directorate has developed for its own use, and made available to the public.

The Directorate seeks to keep up and improve safety standards for work with ionising radiations at licensed nuclear installations. It does so through its licensing powers by assessing safety cases and inspecting sites for licence compliance. It sets national regulatory standards and helps to develop international nuclear safety standards. There are some 250 staff in total.

4.7.2.1 The Nuclear Directorate of the Health and Safety Executive (Interview conducted on 4th July 2007)

Probably the most significant date was the publication of Command 2919 in 1995, followed by other subsequent reviews. A number of consultations are currently in progress, on new build and on finding an equitable, trans-generational solution to radwaste management.

In general, public opinion around nuclear facilities tends to be more tolerant and understanding, in particular around Sellafield, although views of those living within the National Park are somewhat different. There are problems communicating issues related to health and safety, especially in the light of terrorism concerns. On a national scale, public opinion tends to be fluid, and is affected more by historical issues and the associated costs, although perceptions are changing in the light of the energy and climate change debates. There is more understanding now. Not sure about the media coverage. Not all coverage is balanced, as the need to attract the audience often outweighs balanced reporting, although most try to provide a balanced perspective. There could be more done by HSE and others to involve scientific staff in communication through the media, especially TV.

Both EA and HSE regulate safe practices on nuclear sites; liabilities are now owned by the NDA. DEFRA leads on policy development and is now a co-sponsor of NDA with DBERR. There is however no clear exposition at present of where the various responsibilities lie. The public doesn't really care though; they are just concerned that those who are responsible do the correct things. HSE are just viewed as 'government servants' rather than independent. We should be more proactive with regard to communicating new changes in responsibility, and make it much clearer and easier to understand.

The most significant decisions in the future revolve around long-term management issues, with the present consultation the most important. High-active wastes are of most concern, as opposed to LLW. There will of course be an influence on new build plans. The issues surrounding the energy review and associated decisions are of great significance, and will

impact on the waste debate. If there were to be no new build that would actually be a comfort to existing waste communities, and possibly even the waste industry.

Within HSE, a hazard is defined as something with the property/ability to do harm. Risk is regarded as hazard x probability to do harm. It's maybe more difficult when trying to provide a similar definition for safety. We tend to actively avoid the term whenever possible, but in general, as long as a management option is regarded as acceptable and meets the limits in the legislation, we regard it as safe. The question can arise though as to whether we are discussing a single, transient event, or asking whether a situation is safe to work in. HSE policy has developed with regard to what we refer to as 'tolerability of risk'.

Uncertainties exist with regard to the waste management policy itself at the present time.

Risk equity and environmental justice issues are addressed, but it is difficult to equate ethical issues in a similar way to risk equivalence, one risk with another. The main point here is that people tend to be prepared to tolerate high-risk situations if they feel they have some degree of control.

There are no standards in the UK as regards quality of radwaste-related information. HSE and the other regulators produce some joint guidance on what information should be made available by a developer or operator, and this is likely to increase in the future. There could be better access to the process for members of the public. NII produces e-bulletins etc. to communicate consultation outcomes etc. but could probably produce more as regards the way it reviews safety cases and materials management, and about the use of SAP's Safety Assessment Principles). We also present papers to conferences and publish in journals. We are improving the website at the present time with the intention of making information more accessible. In general, HSE is probably more trusted now by the public than in the past.

In general, HSE focuses its attention on the relevant opinion formers in any situation, and no real survey of public attitudes to our work has been carried out. There are no absolute legal requirements concerning communication, although we must report to government about incidents etc. We do get involved with local SSG's, but this is not a requirement. We are only charged to provide advice, when requested.

At the present time there is no clear overview of responsibilities for waste management that is readily available to members of the public. There is also a generational issue to be addressed as to how people access information (young people use the internet etc, whilst older people tend to use TV and the written media).

There is a need for improved education in the risk area, to enable people to better understand the interrelationship between their actions and the scientific principles underlying them. This would help them to understand relative risks and their importance and consequences.

There should be better communication of how we are actually successfully managing radioactive waste at the moment, and of how we make assumptions about future techniques. We should be open and honest about what we can and can't do, and especially about how we take people's comments into account during our assessments.

4.7.3 Nuclear Waste Assessment Team of the Environment Agency

[Based on material taken from EA website 03 09 07]

The Environment Agency is responsible, in England and Wales, for authorisation of radioactive waste disposal under the Radioactive Substances Act 1993 (RSA93). It was established in 1995.

The Agency oversees how the 33 nuclear licensed sites in England and Wales dispose of their radioactive waste by granting site disposal authorisations to the operators who run them. These authorisations set out limits and conditions on the amount and way they dispose of their waste and cover all radioactive waste disposals including discharges to air and water, and transfers of wastes for incineration or disposal to land. The Agency also checks up on these sites to ensure they do not exceeding their limits. In addition to the nuclear industry, the Agency also oversees other organisations that use radioactive substances including universities, hospitals and factories.

The Radioactive Substances Regulation consists of a number of different groups including:

- 7 combined industry regulation/RSR teams who regulate the non-nuclear sites. These teams include some national specialists on medical practices, radiation incidents, NORM and radioactively contaminated land
- 2 nuclear regulatory groups, north and south, who regulate the nuclear licensed sites in England and Wales
- A central policy section, responsible for leading the function and for setting policy and standards across the RSR team
- A process section who manage the implementation of policies and functions across the group and provide technical guidance
- The Nuclear Waste Assessment Team (NWAT), responsible for providing assessment of disposal facilities and waste packaging proposals (see below)
- Radiological monitoring and assessment (RMA), responsible for providing delivery of the RSR team's environmental and waste monitoring and radiological assessment service
- A science manager providing RSR input to and from the wider Environment Agency science programme
- A team at the National Customer Communications Centre, providing focal point of contact for customers on RSR issues.

The Nuclear Waste Assessment Team (NWAT) provides specialist technical support within the Environment Agency on the management and disposal of radioactive waste in England and Wales. Their main aim is to ensure that radioactive wastes will be disposed of in the most appropriate manner in order to protect the public, the wider environment and to contribute to the UK's aim of sustainable development. The team interacts closely with nuclear licensees, government departments and the Nuclear Decommissioning Authority (NDA). Much of their work is carried out in partnership with colleagues in the Health and Safety Executive (HSE) and the Scottish Environment Protection Agency (SEPA).

4.7.3.1 Environment Agency (Interview held in Penrith on 4th July 2007)

The most significant dates in the UK were 1997, when Nirex was refused planning permission, and 2004, when the Agency published its review of the Drigg Repository Safety

Case; this was the first full such assessment carried out in the UK and it will act as a benchmark for all future examples, including a deep repository.

In the UK, the national LLW repository near Drigg is operational, and the MRWS Consultation is ongoing until November 07. All policies are currently up for discussion, with the EA involved over a wide range of activities; this means sometimes it may not be clear exactly who we regulate and who we don't. In the UK, sites and waste are now in public ownership through the NDA, whereas contractors have day to day operational responsibility.

CoRWM did a good job of developing public confidence in the MRWS process, and building bridges to different groups and stakeholders. However, the public don't seem to find the idea of a repository as a major issue at the moment, it's more the idea of new build and nuclear weapons that concern them. Interest will grow when specific sites are identified. There's really only a relatively few people engaged at the moment.

There has been little press coverage of the MRWS process, or the launch of the Consultation, except in Scotland. Where stories have appeared they tend to be negative, using words like 'bribery'.

Within the UK, the application of the Radioactive Substances Act (RSA) is mature and well understood by those it affects. EA regulates discharges, waste disposal and accumulations, and also spent sources. We have close relationships with the HSE, under the terms of a Memorandum of Understanding. We are in the process of producing joint guidance on treatment and storage of ILW. The HPA deal with health-related issues associated with radwaste, whilst the EA concentrates on doses to people. We consider operational doses when a facility is open, but apply a risk target after closure.

The important decisions to be taken in the future concern Stage 4 (implementation) of the MRWS process, as well as the appointment of a new operator for the national LLW repository. In addition, the probable need for on-site disposal of large volumes of low activity wastes from decommissioning of reactors will trigger local inquiries, where we will be called on. Finally, there will be further decisions affecting waste management when the current Energy Review is completed.

The EA considers operational risks in terms of dose limits. This extends throughout the period of institutional control. Beyond this, in the post-closure period, we impose a risk target of $1x10^{-6}$, and expect an operator to use multiple lines of reasoning to justify the predictions in an assessment. We regard risk as equal to hazard x probability, from which one can derive a measure of the tolerability of a risk. We acknowledge that the relationship between safety and risk can be open to debate. Safety is a complex attribute, and it can be hard to decide how safe is safe enough. In essence, risk is a mathematical value based on probability, whereas safety involves personal perception.

The EA does not have a consistency of knowledge about risk communication amongst its staff. Within the radwaste division, efforts have been made to explain to the public etc. what exactly constitutes a potential risk. We have worked with local communities to explain how we assess risks from operations (see our paper at VALDOR 2001), and we recognise that local issues and politics can also influence what is perceived locally as a risk.

The EA is developing training in risk for its staff, which emphasises the meaning of uncertainty in terms of radwaste management. It is crucial to address the various levels of uncertainty that exist within safety assessment, and whether these can be reduced or managed.

The public finds it hard to trust assessment decisions when authorities blithely state that there are no uncertainties, when clearly there are.

The Agency does not proactively issue information on risk assessment, although it is moving towards explanatory documents on how it plans and undertakes assessments. This is in addition to the results of assessments etc. which are published as a matter of course. We now attend all SSG meetings around facilities, and will talk to interested parties if requested. We sometimes run local surgeries, and issue posters and booklets. An internal project called 'Building Trust with Communities' provides assistance via short communication 'toolkits'. This is EA-wide, not targeted specifically at radwaste.

There is no real lack of information about radwaste in the public domain, although of course some is subject to confidentiality and security limitations.

The EA conducts periodic surveys to gauge how well it is perceived and trusted by the public and stakeholders. As no new sites have been developed in the last 20-30 years, it's a little unclear as to how the public would view our activities in relation to a new repository, although we feel the level of trust and confidence is steadily improving overall. Often, we find that individual staff members are trusted but the Agency as a body is not. We are not sure how we rate relative to other organisations in the nuclear field.

There should be more collaborative working, rather than just consultation, involving operators and the public. We should also be more transparent in terms of how we take account of comments that are received during a consultation. We support the implementation proposals from CoRWM, which seek to involve local people more through partnership panels. We would take part as advisors, not full members, in order to maintain our independence. It should be possible to run staged regulation in parallel to staged decision-making, with the Agency commenting whenever an application to move forward is made. This would allow the developing safety case to become more comprehensive as we move through the various stages of the siting process. Other organisations, such as the NDA, should also be involved in risk assessment activities as the work progresses, but the Agencies should retain final control.

4.7.4 Radiation Protection Division of the Health Protection Agency

[Based on material taken from HPA website 03 09 07]

The Health Protection Agency (HPA) is an independent body that protects the health and well-being of the UK population. The Agency plays a critical role in protecting people from infectious diseases and in preventing harm when hazards involving chemicals, poisons or radiation occur.

The Radiation Protection Division (formerly the National Radiological Protection Board) is part of the Centre for Radiation, Chemical and Environmental Hazards, and carries out the Health Protection Agency's work on ionising and non-ionising radiations. It undertakes research to advance knowledge about protection from the risks of these radiations; provides laboratory and technical services; runs training courses; provides expert information and has a significant advisory role in the UK factories.

4.7.4.1 HPA (Interview held on 2nd July 2007)

The Radiation Protection Division of HPA only deals with issues concerned with ionising radiation. It is constituted as a non-departmental public body.

Important past dates in the UK include: 1980's Nirex 4-site saga; 1997 Inquiry; 2002 MRWS; 2006 CoRWM report; 2007 Consultation Document.

Important future events will cover repository site selection, and possibly new build decisions. It is vital to provide clarity as to how a repository system could and should be implemented and to address the issues associated with LLW from decommissioning. Many people will not understand how this is separate from a repository programme, and that disposal facilities may be needed at existing sites. It is important to overcome the bad press from things like the Dounreay Shaft situation and the need to stabilise legacy wastes at Sellafield, where some stores will also need refurbishment. It may be that local politics could result in a failure to find any volunteers to host a repository.

Public opinion in the UK is currently mixed, with differences between England and Scotland. There's quite a lot of media coverage at present, generally written media only, rarely TV.

The NDA is now responsible for repository development, scrutinised by new CoRWM. HPA advises on policy development, based on ICRP recommendations, which now include chemical effects, but only on humans, not animals. It is not as easy to follow lines of responsibility now as it was in the past. The NDA structure can be difficult to penetrate.

Major concerns at present concern the long-lived nature of the wastes and the inability to provide firm guarantees of performance. Does this actually mean there is no solution?

Risk is defined in the HPA as the risk of a health effect, and the probability of a radiation dose and the subsequent health effect. The main measure is Tolerability of Risk, with $1x10^{-6}$ generally regarded as 'acceptable'. We look at the most exposed group, in keeping with developing ICRP thinking to examine individual doses. Risks in the UK are regulated in terms of 'risk targets', but regulators also want to see other factors of a robust safety case. The presentation and interpretation of data can be complex, but this is crucial to understanding.

Current radwaste management plans are generally sensible, but it's unclear as to what type of site is actually being sought, and whether the volunteer process can find a suitable one. Also, what about packaging for disposal?

CoRWM examined alternative options that could be implemented if more than one site was needed, but in the end concluded that a single site was best. This raises the question of where will the major impacts actually be? There could be impacts over large areas if long transport distances are required.

A number of organisations issue information regarding radwaste, from the NDA and government through to the Environment Agency, NGO's and umbrella organisations like NuLeAF. Government especially stresses application of the waste hierarchy. There are no strict legal requirements to communicate on risk but the HPA remit encourages dissemination of useful information whenever possible and does so in general terms to help the public understand issues surrounding risks from everyday activities. Generally this is done through the website or occasional press releases, as in the case of the Po-210 scare. HPA also provides speakers for meetings if required. Although there is no formal training in risk communication, we do encourage development of presentational skills. In reality this tends to apply only to certain staff who get invited to meetings etc.

HPA is generally trusted in regard to its information, although there is a difference of interpretation between us and some other advisory groups such as CERRIE on issues such as health risk/unit dose of radiation.

HPA has no formal budget for risk communication specifically in relation to radwaste, only that existing in the general Communications Division, which covers all aspects of the HPA activities. Division staff are kept up to date with relevant issues and act as the 'public face' of the Agency.

The UK media only tends to cover radwaste when there is an event, although we always send press releases out with new reports etc. They are not often used. We do supply background information to reporters etc. if they request it. Generally however, there is a lack of good, general information available to them and the general public, who only ever seem to see bad news, rather than details of successes.

It is important to communicate the degree of radwaste management and control that actually exists on a day to day basis, and that the risks involved are in reality very small. Also, there is a poor general understanding of the time periods involved. The use of the various strategies overseas should also be better demonstrated.

Unable to recommend a magic solution on risk communication; basically, the message is keep talking!

4.7.5 Environment and Planning Section of Cumbria County Council

[Based on material taken from Cumbria CC website 03 09 07]

Cumbria County Council is the local authority for an area of northwest England stretching from Barrow in the south west to Carlisle in the north. It is the most north-western county in England. Cumbria has an area of 676,780 hectares, and is the second largest in area in England. The population in 2006 was 496,000.

West Cumbria is at the heart of the UK's nuclear industry, with currently over 12,000 direct jobs making a major contribution to the Copeland and west Cumbrian economy. However, most of these facilities will be closed and decommissioned over the next 10-15 years. The County Council has signed a **Memorandum of Agreement** with the NDA, Copeland and Allerdale Borough Councils, the North West Regional Development Agency and Government (through the Government Office in the North West) to work together to manage the changes in the interests of west Cumbria. At the heart of the Agreement, is the **West Cumbria Strategic Forum**, created by national government to *'ensure the region's long-term socio-economic welfare in the light of the new decommissioning focus at Sellafield*'.

The Council has also set up a Nuclear Issues Working Group (NIWG) to monitor all aspects of the nuclear issues agenda. The NIWG is a special cross-party sub-group of Councillors, which considers issues across the nuclear agenda and makes informed recommendations to Cabinet and Council. All the organisations involved in Cumbria work together on these issues and a West Cumbria Officers Nuclear Issues Overview Network (WC ONION) has been formed to ensure effective communication and efficient information sharing.

The County Council has long been an active member of the Sellafield Local Liaison Committee, which is now reformed as a Site Stakeholder Group (West Cumbria Sites Stakeholder Group) with separate sub Committees for each nuclear licensed site plus Emergency Planning and Environmental Health factories.

4.7.5.1 Cumbria County Council (Interview held on 4th July 2007)

The most significant dates for CCC, and probably the country, were in the 1990's, especially 1997 when the RCF application was refused. Subsequently, 2001 onwards and the MRWS process have been very important. The LLW policy review, reporting in 2006, has also had great significance.

Whilst responsible for issues associated with radwaste and nuclear issues, we also deal with all environmental issues, including domestic waste, where we encourage recycling wherever possible.

The increased decommissioning activities at Sellafield in particular have demonstrated the large volumes of LLW (and ILW) that still require a management plan. It is clear that the National Repository at Drigg does not have sufficient capacity, and CCC has sought to highlight this issue and get government action to address it. This has lead to the new LLW Policy, published earlier this year, but there is still the issue of what to do before any new on-site facilities come on stream. Should Drigg be extended? We are unsure about the long-term safety of Vault 9, in the light of probable sea-level rise. There is also the issue of PCM in earlier trenches; should this be removed, so as to increase the radiological capacity at Drigg? At the moment, CCC will only accept a plan involving storage, not disposal. Finally, we are considering whether Drigg should be limited to only locally-produced wastes, so as to extend its availability, so we are pressing for development of at least storage on other nuclear sites around the country.

CCC was a founding member of NuLeAF, and takes an active part in its bipartisan meetings with government.

Support for nuclear issues and waste management plans decreases generally with distance from Sellafield, where it is high, not least due to the dependence on jobs etc in the local community. CCC currently has no policy on new build [*support was agreed in early September*]. As regards waste management, we have been closely involved in helping develop the proposals through CoRWM and NuLeAF, and therefore support the main ideas, although we want to see retrievability as part of the design, and do not agree with immediate repository closure.

A new spatial plan (the so-called 'Energy Coast' plan) is under development, with support for a national nuclear laboratory, courses at local universities etc. CCC and Allerdale DC will monitor the MRWS process, but Copeland BC wants early direct discussions. CCC has developed a Cumbrian Citizens' Panel, but it has not yet discussed radwaste issues, although they are discussed in the Cumbrian Strategic Forum. CCC is in favour of an extensive public information programme to introduce nuclear issues into the general life of the region.

As regards the media, coverage of nuclear issues is high, more so even in the west, with new build and the spatial master plan receiving particular coverage. The local MP keeps the issue in the public limelight. CCC lobbied hard for the Energy Act (2005) to include the provision of socio-economic benefits around decommissioning sites.

At the moment there is a lack of clarity as to how benefits will be built into plans for the future of host communities. Allied to this is the need for an intensive information campaign. This is really important and should be both national and local in scale. Most people still have little knowledge or conception of waste management proposals.

CCC does not carry out risk communication as such. We do some on a case by case basis but to date have not been that successful, mainly because of a lack of information from the regulators, which has limited our capabilities. There is an emergency response team, but we tend to rely on HSE and EA in such circumstances. The recent application by Studsvik to develop a waste cleanup facility in Lilleyhall has demonstrated a lack of clear information in the application, which we have not been able to clarify with the regulators.

The onus for communication of risk-related issues should lie with the body proposing the particular project, and should be open and transparent. All key stakeholders should be fully involved from the very start. In the case of radwaste, where no site has yet been chosen, such early involvement would allow discussion of the principles of siting and screening criteria without having to concentrate on a specific location.

4.7.6 Nuclear and Sustainability Department of Copeland Borough Council

[Based on material taken from Copeland Borough Council website 03 09 07]

Copeland Borough Council was formed in 1974 and is one of six district authorities in Cumbria. The Borough covers an area of 284 square miles, two thirds of which is in the Lake District National Park. The population of Copeland in 2006 was 70,300.

The Sellafield site is situated entirely within Copeland and the Council is taking a central and leading role to manage the impact of the nuclear industry both now and in the future as facilities are closed and decommissioned. A new department has been created to develop policies and initiatives, which, with appropriate community engagement, aims to achieve the Council's objectives in relation to economic, environmental and social sustainability factories.

4.7.6.1 Copeland Borough Council

The developments of Windscale for Pu production in 1947, and of the Calder Hall reactor in 1957 were significant moments for the Copeland area. Even more so was the Windscale fire in 1957. However, local concern has generally gone, and the fire is just looked upon as an event in the past. The community is generally not pro-or anti new nuclear build, but does recognise the need for a mixed energy portfolio. Dependence on Sellafield is a fact of life. In the past it was shipping and mining.

Copeland is home to all types of radwaste, as well as the national LLW repository near Drigg and stored spent fuel at the Sellafield reprocessing facility.

Local people are not necessarily pro-nuclear; rather there is a sense of acceptance of what is. It's still unclear though as to what local public opinion is as regards the possibility of a deep repository in the area. It is council policy to support and take part in the CoRWM process, but we prefer phased disposal, not immediate closure, as proposed by government. We regard it as an ethical issue, where we must take responsibility in this generation but retain control for future ones.

Media coverage in the area is generally evenly balanced, although coverage of some issues, such as the recent 'body parts' scandal, was almost wholly negative. Occasionally there are stories about whistleblowers from Sellafield, but these don't receive huge coverage, nor did ones about the 'beach incident'. Some positive stories are also written! In general, the national press tends to be more active as regards 'bad' issues.

Main concerns regarding nuclear issues at the moment relate to the future closure plans for Sellafield and the knock-on socioeconomic impacts this will have. As regards safety concerns, there aren't really major ones expressed, though whether this is a case of complacency and fatalism as opposed to confidence in the safety culture is not clear.

The Council has confidence in the regulation of risk from nuclear activities as carried out at present by the established agencies. Not so clear about the regulation of any new build that might take place. There is also some concern at the moment about the long-term responsibilities associated with a potential deep repository. In particular, who has the long-term duty of care, after the facility is closed and who retains ownership of the wastes?

The Council do feel rather that local people and local government were not given any opportunity to comment on the development and subsequent expansion of the repository at Drigg into a national facility. It was initially only for wastes from Sellafield. The way that Nirex appeared to focus on the area in the 1990's has also been a matter of local concern, such that there is some uncertainty about what might happen in the new volunteer process.

The Council does not proactively communicate with the public on safety issues regarding radwaste, leaving this to other agencies, although they do hold public meetings if specific issues arise, and invite experts from the Environment Agency, Health and Safety Executive and other bodies to attend. For example, officers met with the EA to discuss ways to communicate the Agency's findings regarding the safety assessment of the Drigg repository to the general public.

Officers and some members do however take part in other public meetings and option studies, workshops and other activities etc., especially those concerned with planning the end-state for the Sellafield site. Officers maintain good relationship with BNG and attempt to act as experts for local people who may express concerns or ask for information. Regular meetings are held with senior BNG staff, to which the public are invited, as are interested NGO's. They also hold regular briefings for councillors. The Council is an active member of the Site Stakeholder Group.

4.7.7 British Nuclear Fuels Ltd (BNFL)

[Based on information supplied by Eileen Turner, Sellafield Ltd]

BNFL is the current holding company for Sellafield Ltd, which currently manages the Sellafield and Capenhurst nuclear sites on behalf of the Nuclear Decommissioning Authority (NDA). The NDA competition for the Sellafield management contract is expected to be completed in summer 2008 when they will announce a new holding company, although Sellafield Ltd will continue as the name of the Site Licence Company. Sellafield Ltd also owns 51% of International Nuclear Services which manages UK and overseas reprocessing contracts and associated logistics.

Activities at Sellafield are centred around clean-up and decommissioning of the historic waste legacy. The site also houses the Magnox and Thorp reprocessing plants, the Mixed Oxide fuel manufacturing plant and a wide range of waste management and effluent facilities. The focus at Capenhurst is decommissioning of redundant uranium enrichment facilities.

4.7.8 Summarised initial reactions following ARGONA UK Interviews

- The NDA focus now appears to be on communicating safety, as opposed to communicating risk
- Some interviewees identified several types of risk associated with nuclear waste management, such as health, financial and programmatic. Similar distinctions were not made by all
- Socio-economic risks were identified by one interviewee as more significant than health-related ones, given the well-developed safety culture at existing facilities
- No interviewee expressed complete confidence in the likelihood of progress in UK nuclear waste management in the future or was able to suggest a likely rate for any that might take place
- Many interviewees expressed uncertainty as regards identified responsibilities for the various future steps in the MRWS process
- No organisation appears to produce guidance as to what should be communicated to stakeholders or the public, beyond statutory requirements
- There is no apparent clear national guidance about what should be communicated regarding nuclear waste management in general, or how it should be done or by whom
- The issue of legacy waste management does not appear to be separated in the main from the issue of new nuclear build
- Few organisations in the UK appear to have a specific mandate to communicate risk-related issues, and even where one is thought to exist, it tends to be reactively carried out, rather than proactively. Most recognise a need to communicate about their activities but not specifically about risk
- No organisation currently provides specific training on how to communicate risk although at least one regards it as an implicit job requirement and one organisation is developing an internal guide for staff
- LA's tend to regard risk communication as the responsibility of the regulator and operator
- There are varying views amongst those interviewed about the level of risk associated with nuclear waste management
- Some interviewees regard retrievability as an important requirement, whereas others agree with the proposals in the Consultation Document which dismisses it
- All interviewees recognised a need to provide more information on nuclear waste management to the general public, subject to issues of confidentiality
- At least one interviewee identified poor scientific education as a barrier to the understanding of risk
- There are interesting differences as regards the importance of past events; whilst most considered the Nirex failure at Sellafield as very significant, some also felt that regulatory reviews were as important, while others cited distant events such as the Windscale Fire in 1957 as setting the tone in the public mind, certainly nationally, although it appears to be less important now locally
- Some interviewees expressed difficulty with terms such as 'risk equity' and 'environmental justice', suggesting these are only used by social scientists, although the same individuals did express a recognition that local politics are an important guide to perceived risks and threats as identified by communities
- At least one interviewee considered transport to be a major potential issue when a site is eventually chosen for a repository
- There is a need to increase transparency in responses to consultations and public inquiries

- There is still apparent uncertainty as to the role of regulators in a staged-decision making process
- One interviewee considered that the organisation of RWM was actually easier to understand in the past, before establishment of the NDA
- Most agreed that in the public mind at least, there is little distinction made between different categories of nuclear waste
- Most recognised that there are a number of alternative views on the magnitude of the risks associated with nuclear waste management, and that this makes public discussion difficult
- One interviewee considered that not enough was known by the general public about overseas activities and the relatively low risks associated with nuclear waste in general
- Most organisations appear to have good communications budgets, but few involve technical experts on a day to day basis; such people are usually only drafted in as and when required for a specific event or response
- Ownership of the waste was raised as an issue, and the effect this has on responsibilities in both the short and long term
- There is a general perception that the national press appears to be generally negative with regard to nuclear issues, although the local press around facilities is more balanced
- Most press stories at the moment are concerned with new build, although many link this to the ongoing uncertainties about waste management
- Management of LLW is perceived by some to be as likely a cause of public concern in the future as that for higher-active wastes, given the increasing need for new facilities as highlighted by the recent LLW policy statement

5. REPORT ON THE SLOVAK REPUBLIC

5.1 HISTORIC AND NATIONAL SETTINGS

5.1.1 History overview of nuclear facilities in the country

5.1.1.1 Nuclear Power Plants

There are 5 nuclear units in operation in the Slovak Republic at present; all of them are of the Russian VVER-440 design. Three operating units are installed at the Jaslovské Bohunice NPP, one of these (V-1 NPP, unit 2) will be shut down early in 2008, the other two (NPP V-2, units 3 and 4) have been upgraded recently and keep operating. The other two operating reactors are located at Mochovce NPP (EMO, units 1 and 2). Construction of further two units at Mochovce NPP has been suspended for financial reasons, nowadays new owner ENEL decided to finalize them until 2013. In addition to the three reactors in operation at Jaslovské Bohunice site, there are another two reactors on this site. NPP V-1 (I. unit) was phased out in December 2006. At the moment this unit is under the preparation of decommissioning. Next one is a pilot reactor called A-1 which is under the first stage of decommissioning. It was in operation from 1972 to 1977 and was permanently shut down in 1977 after two accidents.

5.1.1.2 RAW Management

Radioactive waste, RAW, is conditioned at the Bohunice RAW treatment centre. Final waste package is a fibre-reinforced concrete container. In addition, a bituminisation facility for fixing concentrates was commissioned in 1995; and a vitrification facility for treatment of a special type of RAW from NPP A-1 operation. After conditioning ILW and LLW are disposed of at the Mochovce national RAW repository which has been in operation since 2000. RAW not acceptable for near-surface disposal shall be stored at the NPPs. A modern interim storage facility shall be installed at Bohunice NPP site to allow storage of this kind of waste. The RAW which does not meet the criteria for disposal in near surface repository shall be disposed of in a deep geological repository. Such a repository is intended to be built within the territory of Slovak Republic.

5.1.1.3 SNF Management

SNF STORAGE

For the first period (short-term storage of 3 to 7 years) spent nuclear fuel, SNF, is stored in the pools located next to the reactors at each reactor unit. Then the SNF is moved to the Interim Spent Fuel Storage Facility (ISFS) located in a separate building at the plant site. The ISFS is a wet storage facility with a capacity large enough to house the SNF of all four reactors until the end of their designed lifetimes. Interim Spent Fuel Storage Facility in Jaslovské Bohunice is in operation since 1987. A major reconstruction, seismic reinforcement and storage density compaction during 1997-2000 resulted in a capacity increase from 5 000 up to 14 000 fuel assemblies (or 1 680 tU). This capacity is sufficient for the fuel storage needs of all Bohunice units till its expected shut down and also of Mochovce (units 1,2) till 2015. By that time, it will be necessary to build a new storage facility at the Mochovce site.

Storage of SNF from Mochovce NPP is assured for a short-term period of 3 to 7 years in the pools located at the reactors installed at each reactor unit. According to current intentions, the intermediate storage of SNF (40 to 50 years after removal from the reactor) will be provided

in a separate dry storage facility at Mochovce. EIA process for this facility has been successfully finalized, and a project for the construction of the facility is currently in its first stage of investment implementation. Nowadays, for this purpose is used also free storage capacity of ISFS J. Bohunice (SNF from EMO 1,2 is being transported to Bohunice site to storage).

SNF SHIPMENT ABROAD

The spent fuel from the A-1 nuclear power plant at Jaslovské Bohunice was removed back to the USSR in the 1970's on the basis of a bilateral agreement. Some damaged spent fuel which could not be removed easily from the storage canisters was removed to Russia in late 1990s on a commercial basis. The last spent fuel element left the A-1 nuclear power plant in July 1999.

According to initial considerations, the spent fuel from VVER reactors should have also been transported to USSR. Indeed, before 1987 a small number of spent fuel assemblies from VVER-440 reactors (697 fuel assemblies from NPP V-1) were also transported to Russia. However, these transports ceased because of the political changes.

SNF DISPOSAL PLANS

The basic concept of the Slovakian management of the fuel cycle back end is at present the establishment of a permanent deep geological repository within Slovak territory. This facility will be intended for high-level and long-lived RAW and SNF disposal (open fuel cycle without reprocessed is considered). Slovakia therefore started to develop a national deep geological disposal programme in 1996. However, the programme was frozen in 2001, mainly due to financial reasons. Next of the reasons was that Slovenské Elektrárne (SE) considered the option of transporting RAW to the Russian Federation for final disposal or reprocessing without return of HLW products. Later on these negotiations failed (due to legislative and financial reasons) and thus the geological disposal programme should be restarted soon. SE in addition expressed support to the option of an international or regional deep geological disposal by its official support letter to the SAPIERR project. SE also observes the new technologies in the area of RAW and SNF management, like transmutation and partitioning.

5.1.1.4 Principle milestones

NPP A-1 BOHUNICE

- 1956 Intergovernmental agreement between the former USSR and CSSR on the construction of an industrial-research nuclear power plant on the territory of CSSR.
- 1957 Establishment of an investment enterprise Nuclear Power Plant A-1 by the decision of the Governmental Committee for Nuclear Energy and of the Authority for Nuclear Power Management.
- 1958 Beginning of A-1 construction.
- 1972 The research and development reactor KS 150 at A-1 reached criticality. Gradual increase of the electric output up to the maximum value of 127 MW. Connection of
- A-1 to the electric grid.
- 1976 First serious incident at the KS-150 reactor.
- 1977 The decisive severe accident during reactor refuelling.
- 1978 Decision of CSSR government to decommission A-1.
- 1992 Slovak government accepted the global concepts of A-1 decommissioning.

- 1998 Project of decommissioning started to bring A-1 into safe radiation conditions (The first phase ending in 2007).
- 2007 Completion of the first phase of A-1 decommissioning.

NPP V-1 BOHUNICE

- 1969 Decision of the State Planning Commission of CSSR based on an agreement with USSR to start the construction of nuclear power plants with pressurized water reactors of VVER 440 type.
- 1970 Decision of CSSR and USSR governments to supply two nuclear power plants each with two VVER reactors 440 MW.
- 1971 Establishment of affiliated organization in Jaslovské Bohunice.
- 1973 Laying of foundation stone for the construction of main production building.
- 1978 V-1 Unit 1 reactor made critical.
- 1979 Commissioning of V-1 Unit 1 into trial operation.
- 1980 Commissioning of V-1 Unit 1 into commercial operation. V-1 Unit 2 reactor made critical. Commissioning of V-1 Unit 2 into trial operation.
- 1981 Commissioning of V-1 Unit 2 into commercial operation.
- 1984 Re-evaluation of V-1 safety.
- 1986 Other safety measures to enhance nuclear safety.
- 1990 Execution of reviews to evaluate V-1 conditions.
- 1991 CSKAE Decision about V-1 operation based on implementation of additional safety measures.
- 1991-1995 Implementation of Phase 1 measures to upgrade safety by backfitting V-1 units.
- 1995-2000 Implementation of Phase 2 measures with the objective to achieve European standards and maintain V-1 in operation.
- 2006 Phase out of the Unit 1.

NPP V-2 BOHUNICE

- 1976 Agreement signed with USSR on the construction of V-2 in Jaslovské Bohunice. Beginning of V-2 construction.
- 1984 V-2 Unit 1 reactor made critical. Commissioning of V-2 Unit 1 into trial operation.
- 1985 Commissioning of V-2 Unit 1 into commercial operation. V-2 Unit 2 reactor made critical. Commissioning of V-2 Unit 2 into trial operation. Commissioning of V-2 Unit 2 into commercial operation.
- 2000 Concept of modernization with safety upgrading.
- 2006 Acquisition of 66% of SE (including NPP V-2) by ENEL SpA

NPP MOCHOVCE

- 1974 Preparatory studies, survey works, sociology survey.
- 1978 Federal Ministry of Fuel and Power approved an investment intention to construct two twin-reactor units with the capacity of 440 MW each.
- 1981 Physical start of Mochovce construction.
- 1983 Establishment of a concern enterprise Atomic Power Plants Mochovce with its headquarters in Mochovce.
- 1989 The original deadline for Mochovce Unit 1 commissioning failed to be met due to necessary replacement of inadequate instrumentation and control system.

- 1995 The way of funding the construction of Mochovce Units 1 and 2 was still open, construction and installation works continued in a minimum extent only.
- 1998 Unit 1 reactor reached criticality. Commissioning of Unit 1 into trial operation.
- 1999 Unit 2 reactor reached criticality.
- 2000 Commissioning of Unit 2 into trial operation.
- 2006 Acquisition of 66% of SE (including NPP EMO1,2 and EMO 3,4) by ENEL SpA
- 2007 Completion of units 3 and 4 decided, operation expected in 2013.

5.1.2 Organisations involved in the NWM and their responsibilities

5.1.2.1 Government departments responsible for relevant policy and regulatory bodies

Nuclear Regulatory Authority of the Slovak republic (UJD SR) is a central state administration authority taking care of regulatory activities generally in the field of nuclear safety of nuclear installations, performs regulation of the radioactive waste management, spent fuel and other parts of the fuel cycle, as well as of nuclear materials, including their control and accounting. The responsibilities and competences of the UJD SR may be summarised as supervision of nuclear safety including all aspects of RAW management. Nuclear Regulatory Authority of Slovak Republic was established on January 1, 1993. It is an independent state body and reports directly to the government and is authorised to issue generally binding legal norms (decrees) and permits, licences, approvals and consents.

Ministry of Health of the Slovak Republic is a central state administration authority for health care, health protection and other activities in the public health sector including radiation protection. Its supervising activities are performed by Public Health Authority of the Slovak Republic (PHA SR), which is a non-profit state organization with activity in the territory of the Slovak Republic. PHA SR is linked financially to the budget of Ministry of Health of the Slovak Republic. It is lead by a director, who is responsible for its activities. The scope of the Ministry's activities includes, a. o. establishing radiation limits and of conditions for disposal and deposition of radioactive wastes from the aspect of their potential health-related effects; the Ministry methodologically guides health protection against effects of ionizing radiation, and grants permits for activities resulting in irradiation.

Ministry of Environment of the Slovak Republic is a central state administration authority for the environmental creation and protection. Its supervising activities are performed by the Slovak Environment Inspectorate. The following bodies report to the Ministry of Environment:

- Slovak Environmental Inspectorate
- Slovak Institute of Hydrometeorology.

Ministry of Interior of the Slovak Republic is a central state administration authority responsible inter alia for the conceptual management and control of fire protection, integrated rescue system, including the civil protection of population and property, public order and safety of persons. The Ministry is also responsible for the organization of aid to population (Act No. 42/1994 Coll. on Civil Protection as amended by later regulations) in case of nuclear and radiation accident.

Ministry of Economy of the Slovak Republic is a central state administration authority responsible for inter alia nuclear energy, including the management of nuclear fuel and

storage and disposal of radioactive waste, authorisation of import and export of special materials and equipment.

Ministry of Labour, Social Affairs and Family of the Slovak Republic is a central state administration authority responsible inter alia for the safety and health at work and labour inspection. State administration in the area of inspection is executed by the MoL, National Labour Inspectorate and Labour Inspectorates. National Labour Inspectorate reports to the Ministry of Labour and executes inter alia the labour inspection in the field of nuclear energy and regulation pursuant to separate regulations. Labour Inspection consists mainly of regulation relating to the compliance with legal norms and other regulations concerning the safety and health at work and safety of technical equipment. Technical Inspection reports to the Ministry of Labour and verifies the compliance with the requirements relating to safety of technical equipment.

With respect to the labour inspection the National Labour Inspectorate:

- issues permits to the legal entities granting them the right to issue certificates on the safety of technical devices and disqualifies these licences,
- proposes what technical equipment shall be considered the reserved technical equipment,
- proposes the conditions and method of evidence and registration of injuries at work, operational accidents (incidents) and failures of technical equipment including the direct investigation of these events,
- applies the labour protection requirements on granting of building permit and commissioning decision,
- decides on imposing the penalty provided that the execution of labour inspection in the nuclear energy sector is concerned,
- issues permits and certificates to legal entities and persons authorizing to execute the activities on nuclear facilities and examines the compliance with the scope of permits and certificates and with other conditions of their issuance, and disqualifies these permits and certificates from legal entities and persons.

5.1.2.2 Operators

ENEL – SLOVENSKÉ ELEKTRÁRNE, A.S.

Slovenské elektrárne (SE), a joint-stock company, is a business production company with a dominant position on the electricity market in the SR, providing generation, supplies and sales of electricity and heat, including provision of support services for the power system of the SR, management of the spent nuclear fuel and radioactive wastes. The Company's mission is to trade and generate electricity and heat in a safe, reliable, effective and competitive way, to handle radioactive wastes and spent nuclear fuel in a safe way, while continuously reducing adverse environmental impacts of the generation process.

The ownership structure of SE, a.s. after privatisation is the following: the National Property Fund owns 34 % and the company ENEL SpA owns 66 % of SE shares. The joint-stock company SE is the operator of two nuclear power plants (NPP V-2, EMO 1,2), two thermal power plants (Nováky and Vojany) and 34 hydroelectric power plants.

JAVYS, A.S.

With the aim to make more transparent the utilization of finances from the State Nuclear Fund it was proposed in mid 90's to establish a new subsidiary plant at the SE utility. Thus, the

Decommissioning of Nuclear Power Installations and Management of Radioactive Waste and Spent Fuel (SE-VYZ) commenced activities on 1 January 1996. The plant is located on the site of the Bohunice nuclear power plants. It was responsible for the treatment and disposal of all kinds of radioactive waste and spent fuel that have been and will be produced in the Slovak Republic, from the operation and decommissioning of nuclear power plants, as well as for early and complete preparation of designs and facilities for the execution of the above mentioned activities. Besides this, this plant provided the management of institutional radioactive waste from other organisations.

Due to privatisation, in 2006, this subsidiary of SE was transferred into the newly established state owned company GOVCO, joint stock company together with NPP V-1. The main activities were similar to the VYZ, which means to ensure and perform operation/decommissioning of the nuclear facilities and provides RAW/SNF management. Later on the name of this company has been changed to JAVYS, which stands for ”Nuclear and Decommissioning Company”.

The following technologies for radioactive waste treatment and conditioning in frame of the JAVYS company are currently available and certified for permanent operation:

- Bohunice Radwaste Treatment Centre
- Interim Spent Fuel Storage Facility (ISFS)
- Mochovce national RAW repository
- Bituminising plants
- Active waters purification plant
- Vitrification plant
- Facility for fragmentation of metal waste

5.1.2.3 The research and development organizations and institutes

The research and development activities in Slovakia are based on national long-term strategic plans transferred into medium-term projects, which reflect country specific conditions and needs of the utilization of nuclear energy in Slovakia. The strategic plans and projects are bound to international research and development activities, particularly those conducted within EU countries or OECD/NEA. The research and development in Slovakia is financed from the state budget completed by funds, from private sector and/or support from EU. The research activities are focused on effective and efficient use of nuclear fuel, efficient conversion of nuclear energy into heat and electricity, treatment and disposal of radioactive materials and spent fuel, improvement and validation of analytical computer codes, emergency preparedness and panning, and in support of safety enhancement of nuclear facilities. Significant results were achieved in the field of decommissioning assessment calculations. The organizations, which conduct the research and development in Slovakia, are:

- VUJE, Trnava
- VUEZ, Levice
- DECOM Trnava
- AllDeco, Jaslovské Bohunice
- EKOSUR, Jaslovské Bohunice
- Slovak Technical University, Bratislava, and others.

5.1.2.4 Responsibilities

Under Act No. 541/2004 Coll. on peaceful uses of nuclear energy (Atomic Act), the supervision of peaceful use of nuclear energy is performed by government authorities within their competencies laid down in the relevant acts as shown in the following scheme.

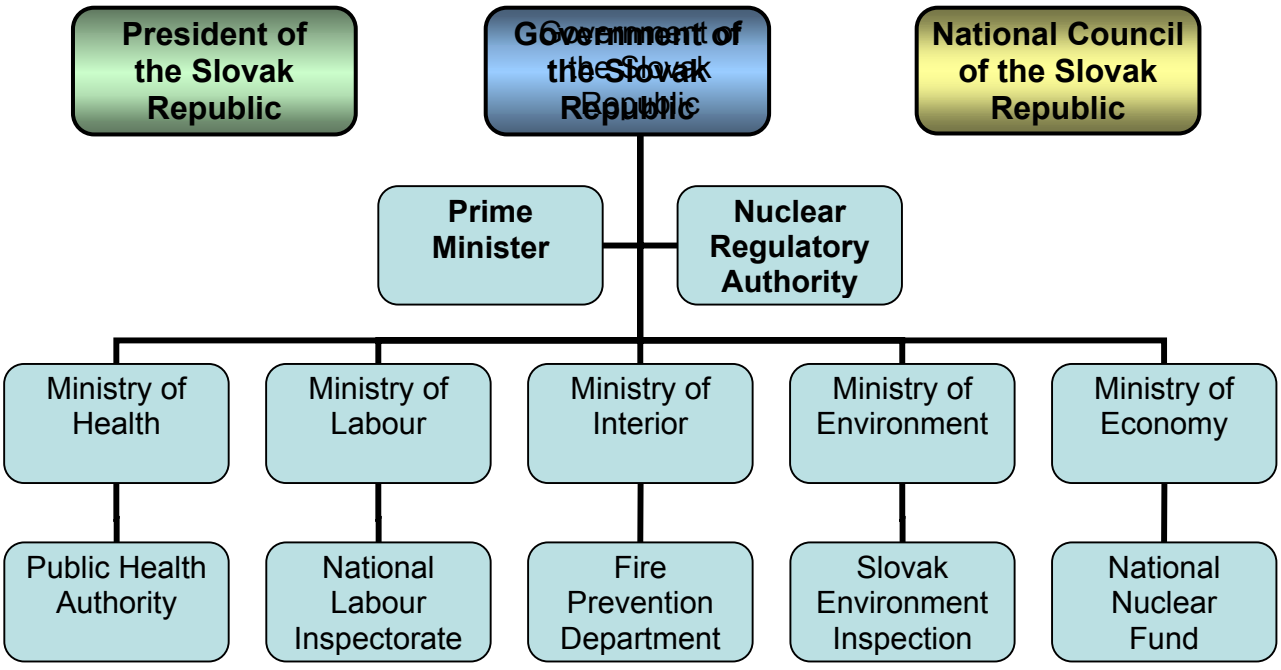


Fig. 1. Slovak state bodies involved in the nuclear sector.

NUCLEAR INSTALLATION LICENSING PROCEDURE

Responsibilities and competences of involved institutions are given by the licencing process defined by the Act 541/2004 Coll. on Peaceful Use of Nuclear Energy (Atomic Act). The licensing procedure of nuclear installation consists of the following major stages:

- siting,
- construction,
- commencement and permanent operation,
- decommissioning/closure.

Before granting a licence for permanent operation, the regulatory authority carries out control under the approved programs for hot and cold testing and grants approval for fuel loading, physical start up, energy start up and trial operation.

The basic condition essential to licensing in terms of nuclear safety is to prepare and submit a Safety Analysis Report and other prescribed safety documentation and to meet the conditions of the regulatory authority's licensing procedures and decisions.

Nuclear Regulatory Authority issues decisions on sitting, construction, operation and decommissioning of nuclear installations following permission the Public Health Office of the Slovak Republic, labour inspection authorities and other state administration authorities and organisations (see the figure below). A licence holder is the responsible body for the safety of a nuclear installation.

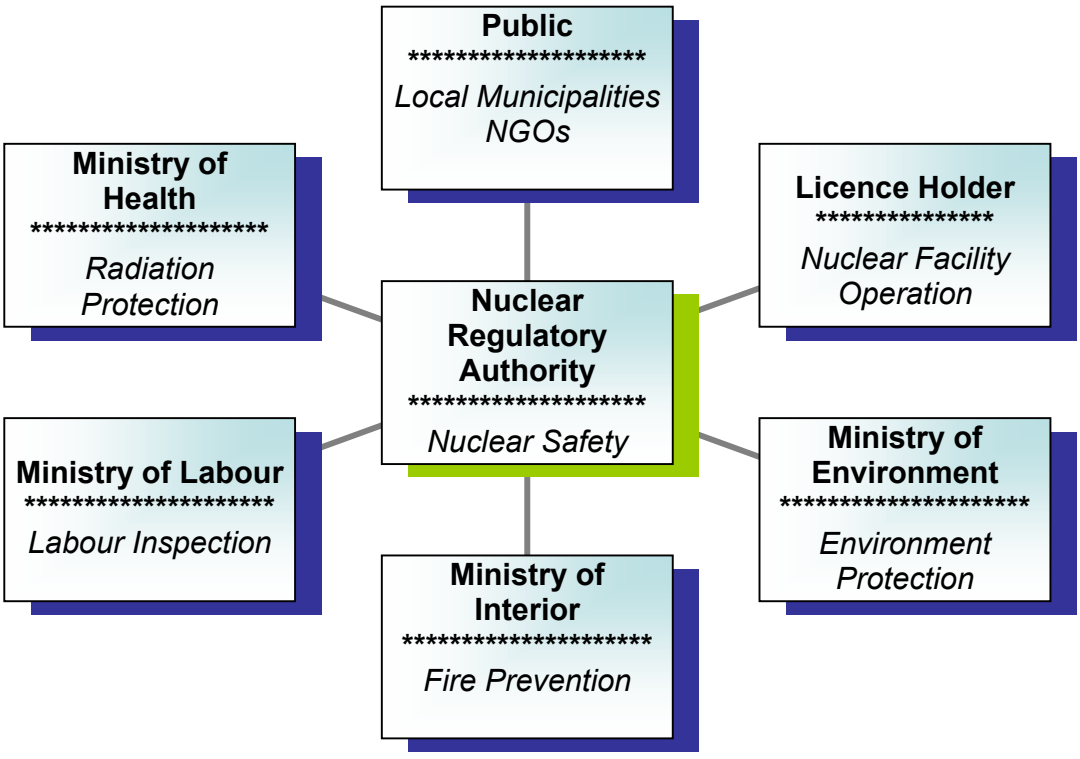


Fig. 2. Stakeholders involved in the licensing process

ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURE

The Atomic Act requires from the operator to perform an EIA process for any new nuclear facility or activity. The Slovak EIA legislation is based on the act No 24/2006 Coll. on environmental impact assessment. This act establishes the responsibility of the Ministry of Environment to evaluate the proposals, which can influence the environment. The scope of the evaluation includes all new nuclear facilities and also the changes of existing facilities exceeding 50 % of former extend of activity. This act also establishes the responsibility of the Ministry of Environment to give the statement to the proposals for proposed options. Direct and indirect impacts resulting from new activities related to urban structure, health, living conditions and public acceptance are assessed in detail.

The environmental impact assessment process includes hearings of citizens in local and neighbouring municipalities, local initiatives and actions taken by public institutes. Local authorities, individual citizens, and public institutions may express their comments and opinions in public hearings as written statements. A positive statement from the safety authorities (Nuclear regulatory and Radiation protection authorities, Ministry of the Environment) is a binding prerequisite for the acceptance of a decision by the government. The licensing authority has to take into account the result of the EIA process. The Regulatory body in this process issues the statement to EIA documents before the siting of any nuclear installation (including radioactive waste management facilities). The statement is based on the assessment of documents issued in accordance with the EIA Act.

THE PUBLIC RIGHTS IN THE EIA PROCESS

Civil associations and citizens of affected municipalities are entitled to participate in the assessment process from the very beginning. Delivered comments and standpoints of public individuals/groups, NGOs and affected municipalities have to be considered during the assessment and decision making process.

The role of the public in the phase of the Intention

After submitting the Intention, the public has the first opportunity to participate. It is a duty of the local municipality to inform the public about the intended activity and to announce when and where the Intention will be available for the public (for the period of 5 weeks). The public has the right to submit standpoints or comments to the Ministry of Environment. The Ministry has to take these standpoints into account and to deal with them in the future steps of the process. The public can also establish a civic association in this phase, which can also submit its standpoints.

The role of the public in the screening process

Public standpoints to the Intention have a great significance in the screening process. The public is entitled to establish a civil initiative or association in this phase. The detailed assessment is obligatory for any nuclear facility.

The public's role in scoping and determination of a timetable

Scoping is a highly significant part of the EIA process which the public can either influence or utilize for further steps. The Ministry takes into account the standpoints to the Intention also for the purpose of scoping.

The public's role in the hearing process

As mentioned above, the most important public participation tools are as follows:

- Check-up of report completeness with the possibility to suggest return it to the proponent
- Active participation at the public hearings
- Possibility to establish a civic association
- Possibility to submit standpoints to the report.

5.2 GENERAL BACKGROUND INFORMATION OF THE COUNTRY

5.2.1 NGOs

The political changes in late 90th made new resources and possibilities available in a number of Eastern Europe countries. That is why western NGOs sought to increase their influence in the transition countries including former Czechoslovakia. This was done especially through contributing to the re-emergence of a vibrant civil society in which environmental NGOs were the prime representative due to their historical role in the process of democratisation. The most obvious organisational effects were the foundation of new groups modelled on Greenpeace and Friends of the Earth. Greenpeace Czechoslovakia, Hnutí Duha (Rainbow Movement) and Děti Země (Children of the Earth). These organizations were established on western NGOs' know-how and resources and became leading groups in both succession states: Czech Republic and Slovak Republic. Main environmental NGOs active in Slovakia are presented below.

GREENPEACE

Greenpeace is present in 40 countries across Europe, the Americas, Asia and the Pacific, including Slovak Republic. Greenpeace is one of the most active anti-nuclear NGO in Slovakia and organizes various protest campaigns against nuclear activities. Greenpeace representatives have announced that they intend to continue criticizing "the extreme risks of nuclear power and presenting acceptable, much safer nuclear-free options despite the aggressiveness and violence of the State power."

Greenpeace is an independent global campaigning organisation that acts to change attitudes and behaviour, to protect and conserve the environment and to promote peace by:

- Catalysing an energy revolution to address the number one threat facing our planet: climate change.
- Defending our oceans by challenging wasteful and destructive fishing, and creating a global network of marine reserves.
- Protecting the world's ancient forests and the animals, plants and people that depend on them.
- Working for disarmament and peace by tackling the causes of conflict and calling for the elimination of all nuclear weapons.
- Creating a toxic free future with safer alternatives to hazardous chemicals in today's products and manufacturing.
- Campaigning for sustainable agriculture by rejecting genetically engineered organisms, protecting biodiversity and encouraging socially responsible farming.

ZA MATKU ZEM (THE FOR MOTHER EARTH SLOVAKIA)

The "For Mother Earth Slovakia" is a worldwide grassroots environmental network campaigning for an ecologically sustainable, just and peaceful world. This organisation is an independent Slovak branch of this international NGO. It coordinates its activities also with Hnutí Duha from Czech Republic and Global 2000 from Austria. The for Mother Earth Slovakia movement started its activities at the beginning of December 1994 in Bratislava, Slovakia. It is a free, independent civic group devoted to the protection of the natural environment, human rights and disarmament.

Antinuclear campaign is the basic part of its activities. The for Mother Earth Slovakia leads an opposition against nuclear power in Slovakia and supports similar efforts worldwide. Its activities are primarily devoted to reach the phase out of Bohunice NPP and to stop the competition of the Mochovce NPP. FME was actively taking part in the public participation process organized by the European Bank for Reconstruction and Development. This NGO has organized several discussion meetings with the Mochovce region residents, several protest meetings and demonstrations, and walks. As a part of this anti-nuclear campaign it supports "the cheaper, safer, and environmentally healthier projects such as the cogeneration, efficiency, hydro power in the small units, renewable energy sources etc".

FRIENDS OF THE EARTH SLOVAKIA

Friends of the Earth Slovakia became a member of the Earth International in 1997. Since then, they have been actively participating in activities coordinated by Friends of the Earth International and its regional association, Friends of the Earth Europe.

Friends of the Earth Slovakia consist of three organisations at present:

- Friends of the Earth-CEPA,
- Friends of the Earth-SPZ and
- WOLF Forest Protection Movement.

Friends of the Earth-CEPA performs activities focused on the operation of corporations, international financial institutions policies, EU funds usage, regional development, sustainable alternatives in agriculture, transport, energy and water management sectors and on the effects of social security privatisation.

Friends of the Earth-SPZ leads campaigns in the area of waste management and works in areas relating to waste, such as natural resources consumption, toxic substances use and disposal, effects of incinerators and packaging issues.

WOLF Forest Protection Movement campaigns for forest protection - strives for their legislative protection and establishes a network of natural forest ecosystems with protected evolutionary processes.

5.3 THE CURRENT NATIONAL DEBATE

5.3.1 New nuclear power plant in Jaslovské Bohunice

EDF is interested in building a nuclear plant at the Jaslovske Bohunice site in the west of the country, where one Soviet-designed reactor was shut down at the end of 2006 at the insistence of the EU and another one is due to close by the end of 2008. Each Bohunice reactor accounts for around 9.0 percent of Slovakia's electricity needs. German power giant EON is also in the running to buy a new nuclear plant in the booming Central European country, according to Slovak media reports. Earlier this year Italian-based ENEL said it would complete two nuclear reactors in the country by 2013. Work on the two reactors at Mochovce was frozen 15 years ago, shortly after the collapse of the former communist regime and ahead of Slovakia's independence in 1993 following the split of Czechoslovakia. ENEL owns a 66 percent stake in Slovakia's biggest electricity producer, Slovenske Elektrarne, with the remaining 34 percent held by the state.

5.3.2 Shut down of NPP V-1 in Jaslovské Bohunice

As earlier mentioned, and as a condition of joining the EU, Slovakia shut down one unit of its Bohunice V1 nuclear power plant at the end of December 2006. It was an older Soviet era VVER-440/230 type. Closure of the 28 year old unit eliminated 408 MWe net, supplying about 9% of Slovakia's electricity. The twin second unit of the V1 plant is to be closed at the end of 2008. Both units have had major upgrades, and international expert reviews have confirmed their safety. The Prime Minister said that he respected the decision to shut down the plant, but considered it as "energy treason" by the previous government, with Slovakia now becoming an electricity importer.

BACKGROUND

During accession negotiations, Slovakia committed itself to the closure of Unit 1 of the Bohunice nuclear power plant by 31 December 2006 and of Unit 2 by 31 December 2008 at the latest. The European Union has already established a specific assistance programme. In the framework of the PHARE programme, a contribution of €150 million had been earmarked for Slovakia up to 2003. For the period 2004-2006, under Protocol No 9 to the Act of Accession, €90 million had been earmarked to support decommissioning and the consequences for Bohunice.

The purpose of the Commissions proposal is to establish the legal framework to enable Community support to be provided from 1 January 2007 to 31 December 2013. In the case of Slovakia, Protocol No 9 to the Act of Accession refers only to the PHARE programme, which is due to expire and therefore cannot cover the period after 2006. The Protocol mentions the need to continue financing beyond 2006 but does not provide a specific legal basis.

5.3.3 Italy's ENEL to complete two units at Slovakia's Mochovce NPP by 2013

On 23 February 2007, Slovakia's Prime Minister, Robert Fico and Enel's general director Fulvio Conti announced that Italy's Enel, majority owner of Slovakia's dominant power producer, Slovenske Elektrarne, will complete the third and fourth units of the nuclear power plant at Mochovce, southern Slovakia by 2013. The Mochovce NPP has two VVER 440 type V-213 reactors in operation and two yet-to-be-completed reactors. The completion of the two unfinished reactors is expected to close the forthcoming energy gap.

Indeed Slovakia is likely to face energy supply problems by 2008. The Slovak government is due to decommission the Jaslovske Bohunice nuclear power plant (NPP)'s two oldest reactors as part of the energy chapter of Slovakia's accession treaty with the EU. Bohunice's unit 1 was shut down on 31 December 2006, and the second reactor will be closed in 2008. For environmental reasons, Slovakia may have to shut down parts of two thermal power plants at Novaky and Vojany, and reduce production at the hydroelectric power plant at Gabcikovo - a controversial dam on the Danube. Meanwhile, electricity consumption is rising by 3% a year, which could result in power shortages in the country. The EU will provide funds to help support projects linked to the closure of the Bohunice V-1 nuclear power reactors.

Preliminary estimates for the cost of completion are about 63 billion Slovak crowns (SKK) (about 1.8 billion euros, 2.4 billion US dollars). Mr Fico said Enel would finance the project and that it was ready to invest SKK 110 billion in the country up to 2013. That figure is about SKK 40 billion more than Enel promised when it bought its majority 66 percent stake in SE.
The Slovakian government, which owns about one-third of SE, will also be involved in the project and has committed to help Enel obtain all necessary approvals for completion of construction. Construction permits already exist for Mochovce-3 and -4 and are valid until 2012 – by which time Enel expects to have the units completed. However, SE has not yet received approval from EU authorities to complete construction.

5.3.4 New energy security strategy

Nuclear power stations, multi-billion crown construction investments and more renewable energy resources could be part of Slovakia's new energy security strategy by 2030. The document, which Economy Minister Ľubomír Jahnátek presented to the press in late September, sets guidelines for Slovakia for over the next 23 years to establish a stable supply of energy.

Major energy players say they are fine with the government's plans until it respects the EU liberalisation policies and guarantees stability on the market, while environmentalists are quick to stress that the strategy has a few bugs that must be worked out.

Slovakia would have to reach deep in its coffers, as the new energy security strategy calls for approximately SKK 460 billion (€13.6 billion) to build power production facilities. Almost half of the money would flow into renewable energy resources, which are set to make up a quarter of the total electricity production, and the rest into thermal, water and nuclear power plants. The Economy Ministry, which coordinated energy experts and others work on the document, assumes that both private money and state funds will have to be channelled to the sector. However, the final funding arrangements will also depend on political decisions, Jahnátek said.

The strategy banks on the completion of the third and fourth units of the Mochovce nuclear plant by 2013, and the construction of two units at the V3 nuclear power plant in Jaslovské Bohunice. The country switched off the first V1 unit in Jaslovské Bohunice in late 2006 to comply with European Union regulations on de-commissioning outdated Soviet-type nuclear plants. The second unit will be unplugged by the end of next year (in December 2008).

5.3.5 Ukrainian electricity will be imported to Slovakia from 2009

Slovakia should start importing electric energy from Ukraine on January 1, 2009. The Slovak Cabinet approved an intergovernmental agreement between Slovakia and Ukraine on mutual cooperation in securing electricity supplies. According to this, Slovakia is to import 2-4 terawatt hours of electricity annually for a period of at least ten years. The Slovak government justifies the need to import electricity from Ukraine with the shutdown of the V1 nuclear power plant in Jaslovske Bohunice, whose first reactor was shut down at the end of last year, while the same fate is destined for its second reactor by the end of next year. The Economy Ministry, which submitted the draft agreement to the Cabinet, explained that until Slovakia builds new energy sources, in particular the third and fourth blocks of the nuclear power plant in Mochovce, it will be dependent on imported electricity. In the agreement the Slovak side is committed to build a unidirectional connection. The national electricity transmission network operator Slovenska Elektrizacna a Prenosova Sustava, a.s. (SEPS) should be responsible for this task. The nuclear decommissioning company Jadrova Vyradovacia Spolocnost (JAVYS) should bear responsibility for the commercial aspect and will guarantee to increase the security of electricity supplies. According to the agreement, the aforementioned companies will establish a consortium to create space to plug private capital into the project. So far, as yet unidentified Ukrainian companies are to secure the energy route and the technical aspects of the project. They may also set up a consortium for entry of private capital to the project. The agreement should be valid for at least ten years. If neither side withdraws from the agreement six months prior to its expiration, it will automatically be prolonged by one year.

6. REPORT ON SWEDEN

6.1 BACKGROUND AND CURRENT SITUATION

Electricity from nuclear power has been produced in Sweden for more than 30 years. The first Swedish reactor (i.e. atomkraftvärmeverk) was placed in Ågesta by the lake Magelungen in 1963, by AB Atomenergi, Vattenfall and Stockholms elverk. However, the first reactors built for commercial production were started early in the 1970's, in Oskarshamn, Barsebäck and Ringhals. The Swedish programme planned up to 24 reactors, but political changes resulted in 12 reactors at four sites. (For an overview see the table below). Today, after the dismantling of two reactors at the Barsebäck plant, there are 10 reactors at work. Two regulatory authorities supervise the nuclear facilities, i.e. the Swedish Nuclear Power Inspectorate (SKI) and the Swedish Radiation Protection Authority (SSI). Both report to the Ministry of the Environment. SKI is responsible for system safety of nuclear power plants and nuclear waste facilities. The authority is also responsible for reviewing the planned waste programme. SSI has the responsibility to prepare directions regarding radiation safety and to supervise compliance to the rules at the nuclear facilities. Radiation protection involves the areas of personnel safety, releases to the environment and control of radioactive waste. The authorities are a part in the Swedish emergency preparedness organisation.

Nuclear power and the management of spent nuclear fuel are legally regulated by the Nuclear Activities Act (1984:3) concerning nuclear activities, the Radiation Protection Act (1988:220) and the Swedish Environmental Code (1998:808). The responsibility of legal authorization of nuclear activity in Sweden and licencing of nuclear power plants lie with SKI and the Government as regulated in the Nuclear Activities Act. The Financing Act (1992:1537 and the decree of 1981:671) regulates e.g. the financing of future costs for spent nuclear fuel and radioactive waste, dismantling of facilities, and research and development related to such tasks. The fees to the Nuclear Waste Fund are decided by the Government on the basis of SKI's estimates and expert opinion and paid by the reactor owners. The cost differs across the facilities but the mean fee was 1.3 Swedish öre/kWh. At the time of the year 2006/2007 the Fund had a market value of 38 billion Swedish crones.

A final repository for radioactive operational waste (SFR) exists, placed close to the Forsmark plant north of Stockholm. It is the final storage of all Swedish low and medium level radioactive waste. This type of materials shall be kept isolated at least 500 years. The situation regarding spent nuclear fuel that must be isolated for up to 100,000 years, is interim-stored in water pools at the Central interim storage facility for spent nuclear fuel (Clab) close to Oskarshamn on the south east cost of Sweden. The major issue with respect to nuclear waste management currently in Sweden concerns the planning and building of a final repository for spent nuclear fuel. Future plans also involve an extension of SFR, a future repository for long-lived low and medium waste (SFL) and other developments within the Loma-programme. See e.g. the 2007 RD & D program of SKB (Fud-program, 2007).

The 12 § of the Nuclear Activities Act from 1984 holds that the reactor owners shall create or be instrumental to the creation of a program of comprehensive research, development and demonstration (the RD&D program is abbreviated Fud in Swedish), involving the measures that are needed for a safe handling and storage of waste resulting from the production. They are also under the obligation of a safe facing out and dismantling of nuclear facilities that are no longer needed (SOU, 2002:63). The Nuclear Activities Act makes a distinction between *nuclear material* (kärnämne) and *nuclear waste* (kärnavfall). Low and medium radioactive rest-products are classified as nuclear waste, but for the high level waste there is a distinction

between "used nuclear fuel that is not placed in a final repository" which is classified as nuclear material, and used nuclear fuel that is placed in a final repository" which is classified as nuclear waste (Cramér, Stendahl & Erhag, 2007). Note the use of *final* repository in the classification which indicates e.g. that not any type of deep geological repository would qualify for storage of the waste. There is no final repository constructed at this point in time and therefore spent nuclear fuel is strictly speaking classified as nuclear material, although in the debate and on the basis of the current strategy and advanced plans of a final repository it is ordinarily described as nuclear waste.

The table below provides an overview of selected events and decisions of importance in the Swedish history of nuclear waste management, starting from the early days in the 1950's when the development of nuclear power took place in Sweden and it gives some information of the historic developments that shaped the Swedish programme. Note, however, that the table does not in any way provide a full account of important events or decisions.

6.2 HISTORIC OVERVIEW

Table 3. Overview of events and developments influencing, or occurring in, the Swedish plans for the management of nuclear waste.

Time	Description
1955	1st UN Atom conference in Genève
1956	Three investigations were published; Atomenergiutredningen (SOU 1956:11), Strålskyddskommitténs betänkande (SOU1956:38), Bränsleutredningen (SOU 1956:46).
1958	2nd UN Atom conference in Genève; sea dumping of radioactive waste no longer an alternative.
1959	Lokal protests in Ågesta; concerns about radioactive spill water to a lake.
1960	AB Atomenergi investigates a possible localisation for a Swedish plutonium plant. Sannäs in the north of Bohuslän is pointed out as the best localisation for processing and storage. Local protests followed. Considering international developments the Department of Energy concluded in 1971 in a report that such a localisation would not be of interest until the 1990's, and that nuclear production, processing and storage were foreseen to have different locations.
1963	Start of the Ågesta reactor.
1969	Nuclear fuel factory in Västerås in operation.
1970	Media article by Gösta Walin (DN, april) criticizing plans for reprocessing, transports and storage, closely followed by an article by Björn Gillberg warning for a "radiant future"
1970	The Nobel prize laureate in physics Hannes Alfvén writes an open letter to the Government asking for reconsiderations of the nuclear programme.
1972	The first UN conference on the global environment was held in Stockholm on the initiative of the Swedish Government. An alternative conference, Folkets forum, was organized in parallel.
1972	Commercial operation of the Oskarshamn 1 reactor.
1972	The initiation of the first official state investigation on nuclear waste storage (SOU 1976:30-31).
1972	The politician Birgitta Hambraeus (c) put a question to the Swedish Parliament, pleading for precaution regarding nuclear power and underlining the moral problem of leaving radioactive wastes to future generations.
1973	Intensified medial debate on nuclear power. The political consensus in the Parliament broken.
1973-75	More than 150 articles in Dagens Nyheter, criticizing energy policy, nuclear power and economic goals.
1973	May; a Parliamentary group (näringsutskottet) decides to go against the Government's nuclear programme, recommending licensing only the 8 reactors already started until the safe storage of radioactive wastes.
1975	Commercial operation of the Oskarshamn 2, Barsebäck 1, and Ringhals 2 reactors.
1975	Parliamentary decision on energy issues.
1975	702 nuclear power technicians wrote a proclamation (upprop) to the Government declaring e.g. nuclear power energy superior to fossil fuels.
1976	Commercial operation of the Ringhals 1 reactor.

1976	Final report from the AKA-investigation; suggested two reprocessing plants for spent nuclear fuel in Sweden and geological final storages for high level waste.
1976-	Intense critique of the AKA-report in media, and open debate among various experts.
1976	Thorbjörn Fälldin placed the nuclear issue as a major issue in the Parliamentary election campaign, especially on the basis of the management of nuclear waste. This election focuses on energy issues and has been called "the nuclear power election"; a core consideration was staying with five power plants in operation or continue the investments in nuclear power. Fälldin promised that the Center pary would dismantel nuclear power until 1985 if in power, and stated that he would not be part of a Government that licenced more nuclear power plats.
1976	September: the Parliamentary election breaks the 44 years Government rule of the Social Democrates, and Fälldin as the leader of the largest conservative part becomes Prime Minister. The reactor Barsebäck 2 was ready for licensing, the energy issue and especially the nuclear waste management issues were central.
1976	October: the Government allows the starting up of Barsebäck 2, but the Governmental declaration was imbedded in a number of requirements related to reprocessing and safe deposition of high level waste (i.e. Villkorslagen, presented in December, decided by the Parliament in April 1977). Two alternatives were available for managing the nuclear fuel: reprocessing and then storage of high level waste, or direct, final storage without previous reprocessing.
1976	October: Curt Nicolin, CEO of ASEA and the directors of Swedish energy power companies meet to outline a large research project on Nuclear fuel safety, aimed at showing that the principle strategies for the management of nuclear waste management and storage were feasible. The energy minister Olof Johansson wanted to keep state authorities out of the project and put the task of proving the safe storage of nuclear wastes to the power companies. The company Svensk kärnbränsleförsörjning AB, (SKBF) that worked with import of nuclear fuel and bying reprocessing services was given the task. In 1984 the company changed its name to Swedish Nuclear Fuel and Waste Management Co (Svensk kärnbränslehantering AB, SKB)
1977	Commercial operation of the Barsebäck 2 reactor.
1977	The American President Jimmy Carter stopped all transport to third countries of reprocessed uranium from the USA.
1977	December: SKBF presents the first investigation of nuclear waste management, KBS-1, where the focus is on reprocessing and then storage of high level waste.
1978	SKBF presents KBS-2 focusing on direct deposition of spent nuclear fuel.
1978	Extensive criticism and debate of KBS-1 and KBS-2 by experts and journalists.
1978	The Government considers the application of licencing Ringhals 3 and Forsmark 2, but requests results from drillings at one or several locations in Sweden that show that the geology is at hand for guaranteeing a safe storage. The new complemented licensing application is to be reviewed by SKI. Different interpretations emerge and especially the ani-nuclear movement deems the development as a betrayal relative earlier promises and agreements. The media discusses a national referendum. The prime minister Fälldin resigns in October. A minority Government takes over, lead by Ola Ullsten.
1979	Complementory drillings in geological formation takes place in Finnsjö in the north of Uppland, and at Sternö close to Karlshamn. An expert group of geologists, consultants for SKI, reports that the number of boreholes are too few to conclude on the matter. A debate among geologists developed, and the Minister of Energy Carl Tham underlined the responsibilities of politicians.
1979	March 27: The board of SKI approved of the licencing. An intense media debate followed the SKI approval and the Governmental decision.
1979	March 28:The Three Mile Island nuclear accident in Pennsylvania. The media debate from this time mainly concerned focued on energy issues, not nuclear waste management.
1979	SKI decides that Ringhals 2 and 3 must be rebuit for safety reasons.
1979	The Social Democrat party joins in with the requirement of the Center party (c) and the left party (vpk) to arrange a national referendum.
1980	March 23: national referendum on nuclear power. Three alternatives were given, the second gained most votes on the policy to start and use totally 12 reactors but dismantle the nuclear program within 25 years.
1980	Commercial operation of the Forsmark 1 reactor.
1980	Based on the acceptance of the KBS-method, new drilling were planned in April (by PRAV). The entrepreneur met compact resistance at Kynnefjäll, in the nort-east of Bohuslän. The action group "Save Kynnefjäll" was initiated. It continued its activities until 2000 (noted in Guinness Book of Records). In December the drilling in Voxnadalen, in the south of

	Helsingland, started without prior notice to the local population. The "Save Voxnadalen" action group was started. They blocked the entrance to the site in 1981 and three persons were prosecuted and convicted.
1980	Building of Clab starts outside Oskarshamn.
1981	SKBF takes over responsibility for the trial drillings (from PRAV). Resistance is met at every new trial drilling site (e.g. Tölö, Tränningen, Klipperås, Almunge). The resistance groups starts collaboration and forms eventually The Waste Network (Avfallskedjan). From this time the rhetoric involving words such as humiliation and abuse of the local population comes into the debate.
1981	Commercial operation of the Forsmark 2 and Ringhals 3 reactors.
1982	The specially built transport ship, Sigyn, starts to transport spent nuclear fuel back and forth to France, the United Kingdom, and between the nuclear power plants and Clab.
1983	Commercial operation of the Ringhals 4 reactor.
1984	The new Nuclear Act replaces Villkorslagen.
1984	The Government considers licensing (laddningstillstånd) of Forsmark 3 and Oskarshamn 3 on the basis of KBS-3.
1985	The Swedish National Council for Nuclear Waste, KASAM, is established. It has the mandate to study issues related to nuclear waste and the decommissioning of nuclear installations and to advise the Government and certain authorities on these matters.
1985	Commercial operation of the Forsmark 3 and Oskarshamn 3 reactors.
1985	Energy minister Birgitta Dahl asks SKB not to use police force to move demonstrators from the drilling site.
1985	Clab in operation.
1986	SKB starts drilling ät Äspö, close to Oskarshamn, without protests.
1986	Construction of the underground laboratory at 500 meters depth at Äspö is started.
1986	April 26: The Chernobyl accident.
1988	March: SKB gets approval to start depositing waste at SFR (Final repository for radioactive waste) from SKI and SSI. SFR holds all Swedish low and medium level waste.
1989	RD&D-programme 89 from SKB to SKI (here FoU-programme, i.e. research and development, and from 1992 *FUD*-programmes, the abbreviation of research, development, demonstration).
1992	RD&D programme 92 from SKB to SKI.
1992	October: SKB send a letter to all Swedish municipalities informing about its work and inviting to participate in overview studies (förstudier)
1993	Sweden in negotiations to become EU-member country.
1993	Eight municipalities responds positively to SKB; förstudier are initiated in Storuman 1993 (finished 1994) and Malå 1994 (finished 1996).
1994	Euroatom states that the management of nuclear waste is a national issue.
1995	Local referendum in Storuman resulting in a massive no response to continuing site investigation.
1995-2000	Carrying out of overview studies in Oskarshamn, Östhammar, Nyköping, Tierp, Hultsfred and Älvkarleby.
1997	Local referendum in Malå resulting in a small majority saying no to site investigation.
1999	The Barsebäck 1 reactor is closed down.
2001	Nyköping municipality decides not to participate in site investigations.
2001	RD&D-programme from SKB to SKI.
2002	Tierp decides not to continue with site investigation.
2002	SKB initiates site investigations for siting of a final repository at two sites, the Simpevarp area close to Oskarshamn and the Forsmark area in Östhammar municipality.
2002	Consultations, related to the environmental impact assessment, EIA, begin.
2004	SKB extends the site investigation area in Oskarshamn municipality with the Laxemar area.
2004	RD&D-programme from SKB to SKI.
2005	The Barsebäck 2 reactor is closed down.
2005	The two research reactors at Studsvik R2 and R2-0 are closed.
2006	The most recent safety assessment from SKB, SR-Can. (The next will be SR-Site 2009).
2006	SKB submits an environmental impact assessment, EIS, for the encapsulation plant. (The EIS for the final repository system is planned to be submitted 2009).
2007	RD&D-programme from SKB to SKI.
2007	The Swedish National Council for Nuclear Waste, KASAM, changes name to Kärnavfallsrådet.

Sources: *Anshelm, J. (2006)B Från energiresurs till kvittblivningsproblem. Frågan om kärnavfallets hantering i det offentliga samtalet i Sverige, 1950-2002. SKB Rapport R-06-113. Stockholm: SKB. Internet: www.ski.se, www.ssi.se, www.skb.se, www.sou.gov.se/kasam.*

The current situation, with respect to nuclear waste management, involves facilities, site investigations, consultations, involved organisations, and future plans and decisions.

Facilities: A system of facilities exists for the management and disposal of radioactive waste. It involves Clab, SFR, m/s Sigyn, the canister laboratory and the Äspö HRL (Hard Rock Laboratory). *Clab* is the central interim storage for spent nuclear fuel, at the Simpevarp Peninsula close to Oskarshamn. The spent nuclear fuel is stored in water pool basins in the rock. *SFR* is the final repository for radioactive operational waste situated in the vicinity of the Forsmark nuclear power plant. *m/s Sigyn* is the ship especially constructed to transport nuclear waste. *The canister laboratory*, situated in Oskarshamn, develops the encapsulation technology using copper canisters and dummy fuel. The Äspö laboratory is situated deep in the rock and works with processes relevant to the final repository.

Site investigations: Two site investigations have been carried out since 2002 in the municipalities of Östhammar and Oskarshamn. The main parts of the site investigations are done, and the investigations in Laxemar will be ended in the first quarter of 2008. SKB has divided this task into two stages: the initial and the complete site investigation. Recent work from the initial site investigations has been published in the Annual Reports 2005, presented in May 2006 (ISBN 91-976141-0-6 and 91-975606-9-3). The initial stage also involves the identification of the most suitable areas for the final repository. The purpose of the complete site investigation, writes SKB on their web site, is to gather the detailed data that are needed to choose one of these sites and apply for a permit for siting of the final repository.

Consultations. In a report from 2005 SKB describes the consultation process in the following way: "The consultation procedure, for applications under both the Environmental Code and the Nuclear Activities Act, is regulated by Chapter 6 of the Environmental Code. In the case of an activity that requires a permit pursuant to the Environmental code, consultations shall be held with the County Administrative Board, the supervisory authority and any individuals who are likely to be affected. In the case of certain types of activities, for example nuclear activities, consultations shall also be held with other national authorities, local authorities, private citizens and organizations that are likely to be affected. According to the Environmental Code, the consultations shall cover the siting, scope, design and environmental impact of the planned activity, as well as the form and content of the EIS. If an activity is likely to have a significant environmental impact in another country, the Swedish Environmental Protection Agency shall, according to the Espoo Convention "*inform the competent authority in that country about the planned activity or measure and give the country concerned and the citizens who are affected the opportunity to take part in a consultation procedure concerning the application and the environmental impact assessment*". The Swedish Environmental Protection Agency has sent out an inquiry to all countries around the Baltic Sea and is waiting for replies during the spring of 2006 as to whether they are interested in participating". (SKB, 2005, Consultations according to the Environmental Code, p.10).

Centrally involved organisations: The authorities SKI and SSI as described above, the implementer SKB, the County Government Boards, the Local Governments, local citizen groups, and environmental organisations. In addition are *all private citizens and organizations that are likely to be affected* to be counted among those involved.

6.3 CITIZEN GROUPS AND ENVIRONMENTAL ORGANISATIONS

The municipalities involved in the siting process have organized specific working groups for the overseeing of the nuclear waste issue, especially concerning the planning related to the final repository. Thus there are working groups related to the respective Local Government Boards. Östhammar municipality has a reference group focused on the final repository for spent nuclear fuel (see www.osthammar.se/slutforvar/referensgr/index.asp) and their current mandate of four years ends after 2010. On their web page they present links to authorities, KASAM, environmental organisations, municipal bodies and SKB. The Oskarshamn municipality has developed a LKO group, i.e. Local Competence Building, with a project on nuclear waste within the municipality structure, but financed by the Swedish Nuclear Waste Fund. The work of the LKO is mainly developed within the process of consultations related to the Environmental Code.

There are several environmental organisations, and people organized in groups related to protest activities since 1970's, who collaborate in the umbrella organisations of MKG, MILKAS, and the Waste Network. The MKG, the Swedish office for nuclear waste review, NGO group was established in 2004 by the Swedish environmental movement. They have four member groups: Youth and Nature Sweden, Oss, a local opinion group for safe final storage of radioactive waste in Östhammar community), the Swedish Society for Nature Conservation (SNF), with the local chapter of SNF in Uppsala county and the local chapter of SNF in Kalmar county administrative province. MKG states as its goal "to assure that the method and location for the disposal of Swedish nuclear waste meets the highest long-term standards for health and environment" (see: www.mkg.se). MKG participates in the consultation process, and they receive funding from the Board of the Swedish Nuclear Waste Fund.

MILKAS is the abbreviation of The Swedish Environmental Movement's Nuclear Waste Secretariat or the Swedish NGO Nuclear Waste Secretariat. It was founded in 2004 by two groups: The Folk campaign against nuclear power-nuclear weapons (i.e. the organisation Swedish Anti-nuclear movement), and the environmental organisation Friends of the Earth. MILKAS cooperates with the organisation "Green women" (see: www.milkas.se/). They have a national and international network and produce own reports and makes available reports relevant to e.g. the nuclear waste management issue. They currently have an advertisement for the European Nuclear Critical Conference in Helsinki, November 9-11, 2007. The organisations involved in MILKAS have, in addition, their own networks.

The Waste Network "co-ordinates groups of citizens at places which have been considered as sites for nuclear waste management". It was created in 1981 due to test drillings. Their aim is foremost to "promote exchange of knowledge and experience between local groups". (See: www.avfallskedjan.se/public/english/). There are 19 local groups listed at specific locations on their website. Maybe the most famous among those is the "Save Kynnefjäll-group" (Rädda Kynnefjäll) based in the north of Bohuslän and adjacent parts of Dalsland (Tanum, Munkedal, Dals Ed) which actually got their protest into the Guinness Book of Records in 2003 for their "longest uninterrupted guarding" of the road

6.4 FUTURE PLANS AND DECISIONS

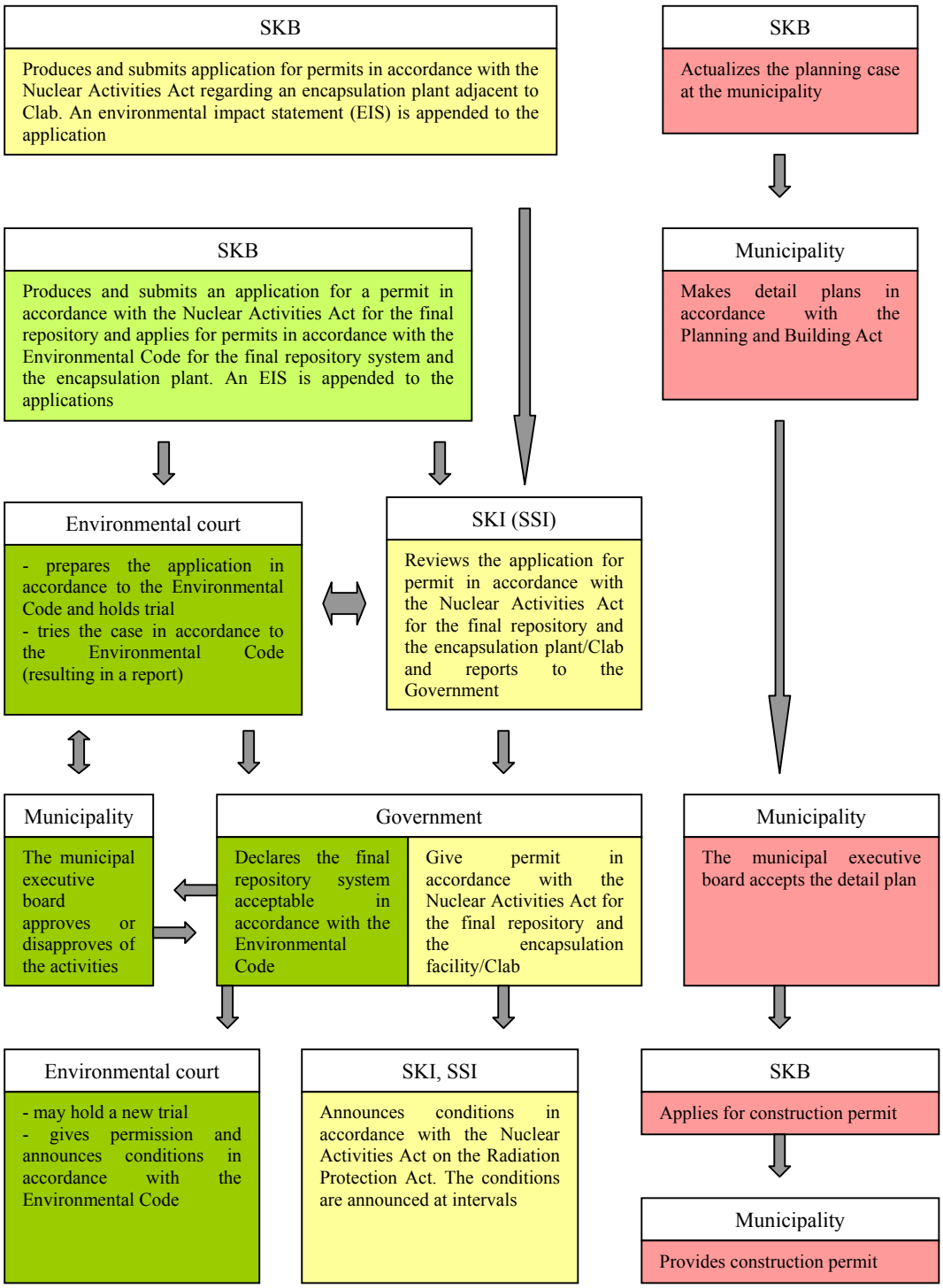
The next steps involve decisions regarding the permit to build an encapsulation plant (application submitted 2006), the permit to enlarge Clab, and the final repository under the Nuclear Activities Act and the Environmental Code. The activities must also accord with the municipalities' detailed building and planning strategies, and receive land use and building permits. The recently presented RD&D programme deals mainly with the time period 2008-2010, and the proposed method is KBS-3. SKB has suggested Oskarshamn as their main alternative for the encapsulation plant, but also says that this plant can be built at the final repository. The decision steps involve:

- SKB submits the applications to SKI and the Environmental Court
- SKI reviews the applications for nuclear waste depository and the encapsulation plant in accordance to the Nuclear Activities Act and submits a statement to the Government.
- The Environmental Court reviews the application according to the Environmental Code and submits a statement to the Government
- The Government makes a decision on the application according to the Nuclear Activities and Act and the Environmental Code whether the application shall be approved or rejected.
- Decision by the Local Government Board to accept the activities
- The Government decides in relation to the Nuclear Activities Act and the Environmental Code
- When the Government has received the statement from the Environmental Court, the application is sent to the Local Government Board for decision
- The Local Government Board decides on the municipality detail/building plan
- The Environmental Court gives permit and provides conditions related to the Environmental Code
- If the Government approves the application, SKI/the new authority[4] prescribes conditions related to the Nuclear Activities Act.
- If the Government approves the application, SSI/the new authority prescribes conditions related to the Radiation Protection Act
- SKB makes an application for the building permit
- The municipality decides on building permit

Table 4 below presents an overview of the decision structure as described in several sources.

[4] Strålsäkerhetsmyndigheten

Table 4. An overview of the decision structure is provided below freely reproduced based on SOU 2007:38, page 82 (that refers to SKB Report R-06-50 page 20 and KASAM rapport 2007:1, page 17).



REFERENCES

[3-1] Deegan-Krause, Kevin (2006) Elected Affinities. *Democracy and Party Competition in Slovak Republic and Czech Republic*. Stanford University Press

[3-2] Giddens, Anthony (2000) The Third Way and its Critics. Blacwell: Oxford

[3-3] International Energy Agency: Energy Policies of IEA countries: Czech Republic

[3-4] International Energy Agency: Energy Policies of IEA countries: Slovak Republic

[3-5] International Energy Agency: Energy Policies of IEA countries: Sweden

[3-6] International Energy Agency: Energy Policies of IEA countries: United Kingdom

[3-7] Pollit, Christoffer & Bouckaert, Geert (2004) Public Management Reform. A Comparative Analysis. Oxford University Press

[3-8] Sweden's Fourth National Report under the Convention on Safety 2007. Ministry of Environment, Sweden

[4-1] Nirex, 'The 2004 UK Radioactive Waste Inventory, N/090, DEFRA/RAS/05.002, 2005'

[4-2] Nirex/Defra, Radioactive Wastes in the UK: A Summary of the 2004 Inventory', DEFRA/RAS/05.001, Nirex Report N/089, October 2005.

[4-3] Nuclear Decommissioning Authority, 'Final Strategy Document', April 2006

[4-4] Department for Environment, Food and Rural Affairs and the Devolved Administrations, Policy for the Long Term Management of Solid Low Level Radioactive Waste in the United Kingdom, 26th March 2007

[4-5] Committee on Radioactive Waste Management, CoRWM's Radioactive Waste and Materials Inventory. CoRWM Document 1279, 2005

[6-1] Anshelm, J. (2006). B Från energiresurs till kvittblivningsproblem. Frågan om kärnavfallets hantering i det offentliga samtalet i Sverige, 1950-2002. SKB Rapport R-06-113. Stockholm: Swedish Nucear Fuel and Waste Management Co (SKB).

[6-2] Cramér, P., Stendahl, S., & Erhag, T. (2007). Nationellt ansvar för använt kärnbränsle i en utvidgad europeisk union? SKB Rapport R-07-11. ISSN 1402-3091. Stockholm: Swedish Nucear Fuel and Waste Management Co (SKB).

[6-3] Fud-program (2007). Program för forskning, utveckling och demonstration av metoder för hantering och slutförvaring av kärnavfall. September 2007. Stockholm: Swedish Nucear Fuel and Waste Management Co (SKB).

[6-4] SKB (2004). Activities 2004 - Svensk kärnbränslehantering AB. Stockholm: Swedish Nucear Fuel and Waste Management Co (SKB).

[6-5] SOU (2002:63). Kärnavfall – forskning och teknikutveckling. KASAM:s yttrande över SKB:s FUD-progarm 2001. Stockholm: KASAM, Statens råd för kärnavfallsfrågor. National Council for Nuclear Waste.

[6-6] SOU (2007:38). Kunskapsläget på kärnavfallsområdet 2007 – nu levandes ansvar, framtida generationers frihet. Stockholm: KASAM, Statens råd för kärnavfallsfrågor. National Council for Nuclear Waste.