

**WANTING THE UNWANTED: EFFECTS OF PUBLIC AND STAKEHOLDER
INVOLVEMENT IN THE LONG-TERM MANAGEMENT OF RADIOACTIVE WASTE
AND THE SITING OF REPOSITORY FACILITIES**

FINAL REPORT CARL PROJECT

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Executive Summary

This report summarizes the key findings of six thematic research lines conducted within the CARL project in the period 2006-2007.

The report frames the problem of long term radioactive waste management (RWM) as a particular type of ‘wicked’ or ‘messy’ problem (problems that are complex, unstructured and difficult to define; and that depend on political judgement to come to some kind of closure). The particularity of RWM stems in the first place from its inevitable link with nuclear power production and, where the reprocessing of spent fuel is concerned, from its potential reuse in nuclear weapons programmes. Second, RWM brings about a very significant risk dimension that operates over uniquely long timescales. Third, the problem is faced with inherent cognitive (in addition to strategic and institutional) uncertainties that are a consequence of system complexity and simply cannot be eliminated. Fourth, the stakes involved, both in political and economic terms and in environmental and human terms, are very high.

In such complex circumstances, with high stakes involved, conventional problem solving strategies are often inadequate and different, and more participatory approaches are recommended to evaluate relevant knowledge and formulate and implement policy. Such strategies do not in every case entail close engagement with the lay public, but where a problem elicits strong, conflicting public reactions and where its solution entails the consent of ordinary citizens, as in the case of radioactive waste, this becomes essential.

This report looks at how changes in framing and governing RWM issues have come about and manifested themselves. The change in framing of the radioactive waste problem has led to a change in practice, a change in policy arrangements for regulating, planning and implementing RWM policy. Particularly with regard to siting repository facilities, we have witnessed across the European Union (EU) a shift from a purely technical approach to an approach that integrates the technical with the social and the economic, and aims to include stakeholders and the public in the decision-making process. In Sweden, Belgium and Slovenia this participatory turn is most explicit on the local level, and focuses on the local acceptability of more or less pre-defined waste facilities. The United Kingdom, on the other hand, has begun again with an options appraisal process and can be seen as setting a European precedent for national-level stakeholder involvement in RWM. Attention is therefore paid in the report to different types of stakeholder

identity, underlying respectively local and national stakeholder involvement in RWM. These local and national stakeholder identities are consequently related to six domains of combined technical and political decision where scope exists for the variable expansion of public and stakeholder involvement. An analysis is furthermore made of how the social aspects of RWM have been incorporated in the national waste programmes of the CARL countries, and of what socio-technical combinations are strived for and achieved. Although almost universally recognised as important, there is as yet no well-institutionalised culture of addressing the social aspects of radioactive waste management as there is for technical aspects. Consequently, the social aspects remain continuously under threat of being downplayed in favour of the technical aspects. Finally, the report discusses a variety of the potential challenges and limitations faced by citizen and stakeholder involvement initiatives: participant expectations; resource issues of various kinds (including financial resources, available time and personal or organisational competences and capacities, together with the associated problem of stakeholder fatigue); transparency and stakeholder feedback; representativeness of participants; and finally issues of politics and power.

From the CARL research project, at least three general conclusions may be drawn:

- 1) The public debate on the future of nuclear energy and the solution to the waste problem tends to be dominated by principled and sometimes antagonistic exchanges between believers and non-believers in the manageability of radioactive waste. This we have seen reflected on the local level in almost every non-nuclear community that at some point or other has been considered to host a repository facility. However, in many existing nuclear communities the dominant response to the prospect of hosting a repository facility tends to be one of 'pragmatic acceptance' (cf. Giddens, 1990). Both social-psychological factors (e.g. normalisation, trust in what you know or the propensity to take calculated chances) and structural factors (e.g. the waste already being there and nobody else wanting it) contribute to this general attitude. But this pragmatic acceptance can never be taken for granted. It is constantly evolving, susceptible to changes over time and always conditional (e.g. on the existence of beneficial trade-offs or on feelings of personal empowerment or choice).
- 2) Participation is a sign of the times but, nevertheless, what has been achieved in the field of RWM often goes further than what is embedded in, for example, EU law. In many respects these efforts can be considered innovative and productive, if not completely unique. Nevertheless, this has not as yet led to a redistribution of power to the extent that one could talk of a move to full power sharing or co-governance. Stakeholder participation as we have witnessed in RWM in the CARL countries can be broadly situated as ranging from giving

policy advice towards emerging forms of co-decision making, though focussed at the operational level. In most instances, however, key decisions have not been opened up to co-decision-making. It is possible to discern a variety of factors that contribute to this. On the one hand, different structural and contextual elements can have a constraining effect on the creation of opportunities for power sharing and co-governance. Governments, for example, remain rather selective in their support for public and stakeholder involvement; allowing strategic use of such arrangements for specific ends, while keeping to less open approaches in other policy areas. On the other hand, NGOs may be ambivalent in their response to participatory, community-based processes that remove the issue from the national political arena and from which they as national interest groups may be excluded. Therefore, affected communities play a crucial role in ensuring that participation remains a required part of every aspect of the complex long-term process of siting and managing the waste, not merely a short-term tactical response to increasing scepticism and previous policy failure.

- 3) Recognition of the importance of social aspects of radioactive waste management is practically universal today. But this recognition has thus far not led to a thorough integration of the social and the technical aspects in the decision-making. Participation is often focussed strongly on the social aspects, while decisions about the technical aspects remain to a large extent the prerogative of the techno-scientific community. That is not to say that technical issues are not being brought into the public arena, but that this is still mostly done only after the technical experts have come to the conclusion that this should be the solution to the problem. The technical-social divide, however, is largely an artificial one: from the very beginning, the definition of what will be regarded as waste and what as a resource is not just a technical, but also a political choice. We therefore think that the biggest challenge for the future lies in working towards a closer integration of the technical and social aspects and in finding ways of meaningfully opening up the technical 'black box' to the mutual benefit of both experts and society. This will undoubtedly require continued experimentation with methods of and structures for engagement between those concerned, in order to explore the potential of and limits to participatory arrangements. The conclusion that there is a need for a stronger integration between the technical and the social should not be understood as reproaching the experts for continued secrecy or unwillingness to enter into dialogue; it is merely an observation that we are witnessing a process that may still not have reached its full maturity.

1 Introduction

This report concludes the CARL project as it was conceived in 2004. The report summarizes the key findings of the six thematic research lines that were conducted in the period 2006-2007. Full thematic reports, addressing each research line in more detail are also available.¹

The CARL research looked at the effects of stakeholder involvement on decision-making in radioactive waste management (RWM) in Sweden, Belgium, Slovenia and the UK. The research focused primarily on three elements: (1) the relationship between the principles and practices that have characterized stakeholder involvement in RWM and their outcome; (2) the integration of such initiatives with technical programmes in RWM; and (3) the influence of contextual (historical, social, political) factors on particular participatory initiatives and their outcome.

The contextual elements were researched at the beginning of the project, leading to four substantial country reports² (as well as a report on Finland³ and a draft report on Canada⁴) and a first comparative report⁵, raising a number of additional research questions that were then addressed in the thematic research. The thematic reports deal, each in their own way, with the relationship between participatory principles and practices, and with the integration of the social and technical aspects of the radioactive waste (radwaste) problem.

Internationally, all four countries in this project are today recognised for giving particular attention to the social aspects of radioactive waste management. Sweden is often considered a forerunner in managing spent nuclear fuel, while Belgium's programme in low- and intermediate level waste management is assessed as a role model. After its RWM policy crisis, the UK Government set up a new programme in 2001 and subsequently established a new committee to advise on RWM policy. Its decision to start with 'a blank sheet of paper' is seen as an important effort to include the social aspects of radioactive waste management in the decision making process. The process in Slovenia, finally, is often mentioned as one of the few examples of responsible waste management in Eastern Europe (e.g. NDA, 2007).

¹ www.carl-research.org

² Bergmans, et al., 2006b; Elam & Sundqvist, 2006; Polic, et al., 2006; Simmons, et al., 2006

³ Kojo, 2006

⁴ Facella, 2006

⁵ Bergmans, et al., 2006a

1.1 Radioactive Waste as a Wicked Problem

Dealing with radioactive waste could be described as a ‘wicked problem’. The term wicked problem was first introduced in 1973 by Horst Rittel and Melvin Webber, professors in design and city planning at Berkley University. Planning problems, including most public policy issues, they argued, are inherently wicked, for such problems are ill-defined, can never be fully solved, and are therefore dependent on elusive political judgement for some form of closure (Rittel & Webber, 1973: 160). Wicked problems, often also referred to as ‘messy problems’ (Korsten, 2000), cannot (easily) be defined and isolated in order to search for a solution. Defining and locating the problem in these cases is not straightforward. Consequently, it is just as troublesome to identify the actions needed to change the situation for the better (Rittel & Webber, 1973: 159). Furthermore, these types of problems have in common that both the definition of the problem and the identification of possible solutions can differ depending on the position from which they are looked at. What one considers a solution, might well be considered by others to add to the problem (Rittel & Webber, 1973: 169).

Many have since built on this notion of wicked problems, particularly as regards complex and contested technical problems in the fields of environment, and health and safety. For Hisschemöller (1993), for example, wicked problems are first and foremost “unstructured problems”; problems that are characterised by a dissensus on both facts and values; where there is a lack of knowledge about what really constitutes the problem and disagreement about what measures should be taken to resolve it (Hisschemöller, 1993). Van Heffen (1994) conceptualises the notion of wicked problems as problems that are both complex and uncertain (Van Heffen, 1994). This uncertainty, van Bueren et al. (2003) point out, relates mainly to the risks involved for man and his environment, and can be cognitive, strategic, as well as institutional in nature (van Bueren, et al., 2003: 193). Where cognitive uncertainty stems from a lack of (scientific) knowledge on what constitutes the problem and its solutions; strategic uncertainty results from the involvement of a diverse range of actors, all addressing the problem from their own perspective. Institutional uncertainty then results from the existence of various places and policy arenas in which decisions relating to the problem are or can be taken (van Bueren, et al., 2003: 193-194).

Wicked or messy problems, as the terms themselves suggest, are difficult to deal with. They are complex in many respects: not necessarily in terms of the level of technology or scientific uncertainty involved, but also because of aspects such as the variety of interested and affected parties and their mutual dependency, the time-scales involved, the financial implications, and the

socio-political environment in which they have to be dealt with. Because of their complexity, wicked problems cannot be solved by a single organisation, governmental or otherwise. In order to make any progress (in defining the problem and possible solutions, as well as in implementing the chosen solution), contribution is needed from a multitude of actors, with diverse interests and resources, such as knowledge, experience, money, etc. (Driessen, et al., 1997; Pröpper & Steenbeek, 1998; Rijnveld & Koppenjan, 1997; Rittel & Webber, 1973; Theys, 2002; van Bueren, et al., 2003; Van Meegeren, 1997). For this, wicked problems cannot be treated solely from a techno-scientific rationale.

Dealing with radioactive waste is a wicked problem, for it is complex and technology-driven, facing both socio-political (strategic and institutional), as well as scientific or factual (cognitive) uncertainties. Furthermore, radioactive waste is not a problem that stands on its own. It is the unwanted by-product of a socially contested activity, namely the production of electricity through the generation of nuclear power.

1.1.1 “Unwanted!”: Radioactive waste

Radioactive waste is burdened with a double stigma. It is waste and it is radioactive. **Waste** is generally considered an unwanted by-product of industrial production and modern consumerism. To characterise an object as waste is the result of a social activity, of defining that object as a “*cultural misfit*”, something that society needs to get rid of (Sundqvist, 2002: 7). Such definitions are not stable: they are culturally determined and can shift over time. But what remains as waste, is automatically given a negative image, and associated with “*the wrong, the bad and the ugly*” (Sundqvist, 2002: 7).

During the first era of civil nuclear technology development, **radioactive waste** was not considered a major problem, compared to the much more complicated problem of domesticating nuclear fission for safe operation in nuclear power plants. In the 1950s and early 1960s it was not even called waste, just fission by-products and considered a resource (Sundqvist, 2002). However, the waste as a problem, in all of its aspects, became manifest when plans for building repositories for final disposal were set up. In many countries this happened during the 1980s, when plans met strong local resistance and the pejorative label of NIMBY (not in my backyard) was applied to negative local responses.

Its inevitable link with nuclear power, the ultimate symbol of high-technological risk production (see for example: Beck, 1987), places radioactive waste on top of the ‘unwanted’ list, regardless of whether one is talking of low- or high-level, or short- or long-lived waste⁶. In previous CARL reports reference was made to the existence of quite striking differences in the qualification of waste, the management structures and solutions between Sweden, Finland, Belgium, Slovenia, Canada and the UK (see: Bergmans, et al., 2006a: 19-21). In some countries, spent nuclear fuel is waste (Sweden, Finland, Canada, and Slovenia); in others (the United Kingdom, but also for example France) the remains after reprocessing of the used fuel are waste. In Belgium, the residue of reprocessed spent fuel is for the moment the only (high-level) waste (a moratorium on reprocessing was issued in 1993); spent fuel remains for the time being only ‘potential waste’. While some countries divide their waste mainly in terms of the half life of the radionuclides (long-lived versus short-lived), others give more weight to the difference in activity level (high-level versus low-level). It appears that no universal and stable definition of what radioactive waste is exists. At least Sweden, Finland and France seem to have reached today a reasonably stable techno-political fix as regards what is considered waste - albeit a different fix in the smaller Nordic countries, than in Europe’s champion of nuclear power and consequently waste. In many other countries this fix has varied more over time and even today is still not very stable. Much may in the future depend on any decisions regarding the building of new nuclear power stations, even though for the time being that decision in Finland does not seem to have had any influence on the waste programme.

This situation seems in line with Kemp’s observation in 1992 that for radioactive waste there does not exist a universal and generally accepted technical standard solution: *“the problem of radioactive waste disposal is one for which there is no straightforward technical fix”* (Kemp, 1992: 2). This led him to the conclusion that any solution in essence would have to be *“politically and environmentally, as well as technologically acceptable”* (Kemp, 1992: 2). So not only local inhabitants raised issues against the waste managers’ plans, also some scientists and national environmental groups were

⁶ The distinction between high, low and intermediate level waste relates to the level of radiation and is of particular importance for the short-term management and day-to-day handling of the waste. The distinction between short- and long-lived waste refers to the half-life of the radio nuclides and indicates the time span in which the waste remains a danger to its environment. This distinction is most relevant for the long-term management (including disposal) of the waste. Although not all low-level waste is also short-lived and not all high-level waste is automatically long-lived, these terms are often used as interchangeable. Since the terms high, low and intermediate level waste (HLW, LLW, ILW) are most common, they tend to be used in this report also to differentiate with regard to final disposal options, even if this may not be entirely correct from a scientific point of view.

critical, most of all to the attitudes held by nuclear agencies responsible for taking care of the waste, downplaying involved risks and defining the issue as of a solely technical kind.

In the 1980s and 1990s many European countries chose to gradually discontinue their nuclear energy production. This has led to a separation of the waste issue from the debate on nuclear power generation. Siting a final repository became an exercise in finding a resting place for waste that already exists (or soon will, within a timeframe relatively easy to demarcate). However, controversy on climate change and global warming has reopened the nuclear energy debate worldwide. With the option of 'new build' back on the political agenda, the problem of the long term management of the waste becomes again more entangled with the issue of nuclear power generation and radioactive waste production. Siting a repository can thus no longer be understood as locating the landmark of the end of the nuclear era. On the contrary, it can now be seen as the symbol of the solvability of the waste problem, turning nuclear power generation in that respect into an industrial activity like any other. This evolution could affect the 'wantedness' or 'unwantedness' of the waste once again.

1.1.2 Radioactive waste: an exceptionally wicked problem?

A question that is often raised in debates on the vices and virtues of public and stakeholder involvement in radioactive waste management is why radioactive waste siting processes always demand something extra as compared to siting for example an incinerator or landfill. What makes radioactive waste disposal such a difficult problem and one that is quite different to many other difficult policy issues?

At least three characteristics are important here. First of all there is a very significant risk dimension to the problem that operates over uniquely long timescales. Second, in addition to the recognisable strategic and institutional uncertainties associated with this problem, there are inherent cognitive uncertainties that are a consequence of system complexity and simply cannot be eliminated. Third, the stakes involved, both in political and economic terms, and in environmental and human terms, are very high.

For these reasons, some frame radioactive waste as universal (neither limited in space, nor time) and 'unmanageable ecological risk' (e.g. Beck, 1992, 1995). In fact, the non-manageability of the generated (high-level) waste and the uncertainties involved with the safeguarding of this waste for

thousands of years at the back-end of this technology are some of the main arguments of the opponents of nuclear power. It is at this point that the great divide between proponents and opponents can be situated, leaving the more neutral parties in the debate and those potentially affected with a difficult choice between these two ‘beliefs’; for both positions are based on hypothesis and neither can be demonstrated in anything else but a real-life setting.

But regardless of the discussion on manageability, the almost unimaginable timescales involved (particularly for high-level waste) make it very difficult not to see a final repository as a real-life test laboratory in itself (cf. Krohn & Weingart, 1987). The ambition to guarantee long-term safety calls for the implementation of monitoring and controlling procedures, for the development of safety technologies and “*ancillary technologies*” to keep the technology up and running, even at times when the technology fails (Luhmann, 1993)⁷. Where high-level waste is concerned, there are almost no existing examples one could draw from. In the case of low and intermediate-level waste, operational repositories have been established all over the world, but practices and techniques tend to vary significantly, making it difficult to extrapolate to other situations. Moreover, experience, in particular in the US, has not always been that positive (Kemp, 1992: 1, 132). Perhaps a lack of ‘negative experience’ can conversely explain to some extent the relatively positive attitude of the Finns towards nuclear new-build (with recent polling showing a more positive attitude among the Swedes as well), or of the Nordic nuclear communities towards hosting a high-level waste repository as yet another nuclear facility?

In any case, in such complex circumstances with high stakes involved, conventional problem solving strategies are often inadequate and a different approach is needed. Although a variety of labels have been proffered for such an alternative approach, the prescriptions all call for opening up to wider participation the process by which relevant knowledge is evaluated and policy formulated and implemented (e.g. Funtowicz & Ravetz, 1990, 1993; Gibbons, et al., 1994; Irwin, 1995; Irwin & Wynne, 1996; Nowotny, et al., 2001; Ravetz, 1986). This is not merely a matter of prescription, however, as there is evidence from other policy areas, for example climate change, of alternative problem solving strategies being developed (Saloranta, 2001). Such strategies do not in every case entail close engagement with the lay public, but where a problem elicits strong,

⁷ For each new technology, Luhmann argues, a casing of ancillary technologies is required to monitor and guard the process; to secure continuous operation and back up in case of unforeseen incidents. But inevitably there are limits to the protection these ancillary technologies can offer, for they themselves are not infallible. This process Luhmann considers important in the definition of high technological risks (Luhmann, 1993: 91-92).

conflicting public reactions and where its solution entails the consent of ordinary citizens, as in the case of radioactive waste, this becomes essential.

1.2 Dealing with the Wicked Waste Problem

The fact that wicked problems cannot be treated solely from a techno-scientific rationale, has become clear in radioactive waste management in the last decades of the 20th century, when nearly all radioactive waste management agencies in the European Union (EU), Canada, the US, and Japan, experienced some form of crisis in their efforts to site repositories.

More than fifty years after the first commercial reactor at Calder Hall in Cumbria (UK) started to produce electricity on the national grid in 1956 the waste problem is still not solved in any nuclear nation in the world. After strong conflicts in the 1980s, leading to a crisis in waste management, a widely held view emerged that the crises were caused by responsible agencies' neglect of the 'social aspects' of the waste problem. Insufficient attention, it was stressed, was paid to communicate the risks in a proper and understandable way to engaged citizens and responsible politicians on the national as well as on the local level. Furthermore, the reasons behind the NIMBY-effect were not well understood: the problem is not that people fear what they know nothing about, but that they have good reasons for being negative about living in the vicinity of a waste repository (Lidskog & Elander, 1992). These crises and consequent conclusions have led radioactive waste management agencies to embrace a broader perspective, paying attention to social as well as technical aspects of radioactive waste management, and engaging stakeholders in decision-making processes, particularly as regards siting.

1.2.1 Changes in framing the radioactive waste issue

In many countries we have seen an evolution in the framing of radioactive waste as a policy issue. In all countries participating in the CARL programme, this evolution seems to have led to a shift in framing from radioactive waste management as a technical problem, to radioactive waste management as a socio-technical problem (Bergmans, et al., 2006a: 25-29). But does this conclusion hold true after closer examination?

Section 2 of this report looks at the framing of radioactive waste risk, and how this has evolved over time. Public and scientific knowledge, and consequently their attitudes, have changed over

time concerning radioactive substances and the hazards they could cause. Before the hazards of high-energy radiation were fully recognized, radioactive substances were advertised as positive and even healthy: *e.g.* “rejuvenating” water containing traces of uranium, or X-ray machines in shoe stores, for customers to check the adequacy of the shoe size (Goldstein & Goldstein, 2002). What was earlier perceived as an advancement of technology heralding a ‘radiant’ future, later became a dreaded threat. Up to the 1970s the civil use of nuclear energy presented a sign of prosperity and development. But that popularity later decreased rapidly; not least because of a number of disasters such as Three Mile Island and Chernobyl. Problems such as energy production or the construction of a radioactive waste repository, earlier perceived only or mainly as a technical matter, became increasingly social in nature, due to increased public concern and the rise of environmental movements. The history of radioactive waste management is presented here as a typical example of a change in framing from promising new technology to technological risk; from enthusiasm through ambivalence or scepticism to rejection. In the early days of the civil application of nuclear technology, people were fascinated by this promising powerful technology. Consequently there was widespread support of technocratic framings and approaches. Later, the fascination was replaced by growing scepticism and even rejection. In this context established technocratic approaches to the management of radioactive waste became counter productive and were replaced by more participatory approaches.

1.2.2 Changes in governing the radioactive waste issue

Reactions to risky technologies and connected issues are increasingly influenced by distrust in the institutions responsible for providing relevant information (Cvetkovich & Löfstedt, 1999). A necessity to open the decision-making process to public and stakeholder participation, rather than to “educate people”, has become increasingly evident (Morgan, et al., 2002; Slovic, 1993). This perceived decline in trust in traditional authorities (both in the public and private sphere) has been a driving factor for the inclusion of previously excluded stakeholders in policy formation and implementation processes. The aim here being to broaden the knowledge base of decision-makers in order to arrive, it is hoped, at better and more legitimate decisions (Pellizzoni, 2001). Public and stakeholder involvement in addressing risks associated with hazardous technologies can thus be seen as an attempt to reach a socially negotiated resolution to public controversies and to avoid future risk management failures. Stakeholder involvement in decision-making through more inclusive, deliberative and learning-oriented approaches is understood as

increasingly necessary in order to rebuild trust in state institutions, and to obviate problems caused by uncertainty and different value perspectives in risk assessments.

The change in framing of the radioactive waste problem has led to just such a change in practice, a change in policy arrangements for regulating, planning and implementing radioactive waste management policy. Particularly with regard to siting repository facilities, we have witnessed across the European Union (EU) a shift from a purely technical approach to one that integrates the technical with the social and the economic, and aims to include stakeholders and the public in the decision-making process.

Section 3 addresses this so called shift from ‘government’ to ‘governance’, from ‘old’ to ‘new’ forms of governing, as exemplifying a wider trend in the management of technological risk. Where ‘government’ of risk involves formal types of consultation that primarily involve policy insiders and are generally opaque; ‘governance’ of risk encompasses greater participation in aspects of the decision-making process, with the aim of generating mutual trust and legitimacy (Pellizzoni, 2004; Pierre, 2002; Pierre & Peters, 2000; Rhodes, 1997). The participatory turn has led to the creation of new processes and institutions designed to facilitate open and non-confrontational discussion of problems and potential solutions, as is the case in the vast majority of the public and stakeholder involvement processes in the field of radioactive waste management that are discussed in this section. These kinds of dialogue, it is hoped, can lead to more consensual points of view between previously antagonistic groups in society. In this section the cases of Sweden, Belgium, Slovenia and the United Kingdom are examined and an assessment is made of the extent to which they represent a shift towards a governance approach to the long-term management of radioactive wastes, as well the implications and possibilities for the future use of such participatory approaches.

Section 4 of this report builds on the notion of governance and the fact that the differences in political and organisational culture among the four countries examined, have led to differences in the way the concept of governance has been shaped. It looks at the emergence of (policy) networks in relation to public and stakeholder involvement in radioactive waste management. Particular attention will be afforded to the place of citizen stakeholders (particularly local stakeholders from nuclear communities) in policy networks. To what extent have they been able to penetrate existing networks? Did they have to create opportunities for themselves, or were opportunities offered to them by others? Did they develop parallel networks of a different kind?

Could something be identified as a radioactive waste network, or a series of networks addressing different or overlapping aspects relating to radioactive waste policy? And, assuming that there are diverse networks, how do they relate to each other?

1.2.3 The interrelations of local and national issues in RWM

In Sweden, Belgium and Slovenia the participatory turn is most explicit at the local level, and has focused on establishing the conditions for local acceptance of already determined waste facilities. The United Kingdom, on the other hand, can be seen as setting a precedent for national-level stakeholder involvement in the issue after failed attempts to site a rock characterisation facility in Cumbria in 1997 led to a ‘return to first principles’. As a result a variety of so-called upstream issues in radioactive waste management (i.e. technological option appraisal issues arising *prior* to the issue of the local acceptability of a given facility) have been opened up to broader public and stakeholder involvement.

Section 5, looks at the process of solving the waste issue as a process of collection and isolation (*e.g.* in the case of high-level waste through geological disposal). Such a process cannot be physically materialised without identifying a ‘suitable’ site, or bringing the waste ‘home’ to somewhere. The technical task of collecting and isolating radioactive waste from the biosphere is also, therefore, an inherently political task. Today the inseparability of technology and politics in radioactive waste management appears to be widely recognised and well-established with regard to the siting of waste facilities. The case of Yucca Mountain notwithstanding, local acceptability appears to have received near universal recognition as a legitimate factor for contemporary siting decisions. But the ‘where question’ is not the only domain where inseparable technical and political decisions have to be made. Differences of opinion over the relative importance of the nuclear security concerns (i.e. measures to prevent people of malicious intent from gaining access to materials that would enable them to illicitly produce nuclear weapons) have led to the emergence of important differences in radioactive waste management practice between countries impacting on the very definition of radioactive waste itself. Such framing issues as the question of what is radioactive waste and what is not remain beyond the remit of established patterns of local stakeholder involvement while suggesting a justifiable need for broader nationwide stakeholder involvement. This section looks at the different types of stakeholder identity, underlying respectively local and national stakeholder involvement in radioactive waste management. These local and national stakeholder identities are then related to a total of six domains of combined

technical and political decision where scope exists for the variable expansion of public and stakeholder involvement.

1.2.4 Reconciling the technical and the social: finally making the unwanted wanted?

As already indicated, since the 1990s, the waste programmes in many nuclear nations have been relaunched, adopting a more communicative approach that incorporates consideration of social aspects of the problem. However, the progress in terms of policy output after 10 years does not seem very impressive. The European Commission Green Paper on secure energy supply, published in 2002, stated that the nuclear industry in the EU has still not found trustworthy solutions to its waste problems, and that the future of the nuclear industry “*depends on finding a clear and unequivocal answer to the question of the processing and transportation of radioactive waste*” (EC, 2002: 7).

In **Section 6**, an analysis is made of how the social aspects of radioactive waste management, have been incorporated in the national waste programmes in Belgium, Slovenia, Sweden, and United Kingdom. So what are these social aspects actually about: “How are social aspects understood, and what role should they have in relation to technical aspects?” In short: “What socio-technical combinations are strived for and achieved in the four countries?” Before turning to the four countries, the section presents a theoretical framework on how to analyse the programmes and activities in a two-step process. In the first step, the interdependence between different spheres, such as the social and the technical, is considered, and concepts are introduced to distinguish between different types of socio-technical combinations. In the second step, two main types of possible combinations (“*separation*” and “*integration*”) are described to integrate technical and social aspects. These are then used to examine the socio-technical combinations found in the four countries and to ask in each case: “Are separation or integration what is being strived for?” Although almost universally recognised as important, this section concludes that there is no well-institutionalised approach for addressing the social aspects of radioactive waste management as there is for technical aspects. Consequently, the social aspects remain continuously under threat of being downplayed in favour of the technical aspects.

1.2.5 “How far can the stretching be stretched?” Limits to public and stakeholder involvement in RWM.

Regardless of the indication in section 6 that the technical discourse continues to dominate the discussions on social aspects, there is increasing consensus among policymakers, stakeholders and academics that public and stakeholder involvement in decision processes can, if designed properly, help overcome the apparent lack of trust in radioactive waste management organisations, and enhance legitimacy of decision making in relation to radioactive waste. This belief is supported by the empirical studies of the four countries participating in the CARL project, as well as by documented experience in several other countries.

In the Swedish context, activating stakeholders in the decision-making process is sometimes referred to as a process of “*stretching the implementer*” to test its legitimacy, authenticity and trustworthiness (Andersson, 2006; Andersson, et al., 1998). But it also involves ‘stretching’ the other participants in a variety of ways, posing the question: how far can such stretching go? Is it feasible and meaningful for stakeholders to engage in processes that in length and intensity appear to mirror the half-lives and radiation levels of the waste concerned. What are the limits to public and stakeholder involvement in the long-term management of radioactive waste?

Section 7 of this report underlines the essentially experimental nature and diversity of the initiatives for public and stakeholder involvement taken in the four countries participating in the CARL project. It considers the limitations of participatory processes not only in terms of internal characteristics but also in terms of external constraints on the practice of stakeholder and public involvement in radioactive waste management. Drawing on the CARL case studies, this section discusses a variety of potential challenges and limitations faced by citizen and stakeholder involvement initiatives: participant expectations; resource issues of various kinds (including financial resources, available time and personal or organisational competences and capacities, along with the associated problem of stakeholder fatigue); transparency and stakeholder feedback; representativeness of participants; and finally issues of politics and power. While some of these issues are of a practical nature, they also raise more fundamental questions about the democratic nature of such participatory processes. Given the different interests and expectations with which participants approach these processes, it goes almost without saying that there is no guarantee that participatory processes will deliver. One of the challenges faced by those undertaking any programme of public and stakeholder involvement is therefore that expectations

may be raised that are difficult, if not impossible, to fulfil. However, if the outcome falls far short of expectations, the process can easily engender cynicism rather than trust or legitimacy.

To conclude this report, the final section presents some key lessons learned and general insights.

2 The Framing of Radioactive Waste Risk: a Comparative Analysis⁸

Siting of risky or unpleasant facilities is becoming increasingly difficult in any modern society. The reasons range from general legitimization problems to the technocratic arrogance of the main proponents of such projects. In this respect the siting problems associated with nuclear technology, in particular radioactive waste facilities are a paradigmatic case. Social acceptability of such facilities remains beyond the control of social, political or expert institutions. These efforts to find legitimate solutions in Belgium, Slovenia, Sweden, and the UK are discussed in comparative perspective.

Public understanding of an issue depends on its framing. The concept stems from Erving Goffman (1974) who defined frames as “*schemata of interpretation*” which enables its users (individuals or groups) “*to locate, perceive, identify, and label*” events and occurrences, thus rendering meaning, organizing experience, and guiding actions (Goffman, 1974: 21). Framing is part of broader processes of selecting and structuring of social problems. Actually framings are changeable results of perplexed and continuing ‘social construction’ of the social reality – in this case of radioactive waste management. The one who structures and selects a frame is the one who has the power to determine what is more and what is less important, safe, dangerous, etc. In this respect the framing process is an attempt to “*invoke a particular image of an idea*” about un/safety of radioactive waste disposal for instance.

The main focus here is on the social context of the siting process with special attention to the different modes of public participation. This section highlights the importance in all four countries of the transition from a technical (technocratic) approach to a participatory approach which includes all actors in decision making processes. Developments of the siting process are presented and critical changes explained in relation to the dynamics of these framing processes and to the specific social, economic and political environment in each country.

In a social context the power of nuclear technology generates simultaneous reactions ranging from enthusiastic fascination to strong scepticism and criticism, and even fearful absolute denial. On the basis of these observations it seems reasonable to suppose that the fascination (Fa) – fear

⁸ A full thematic report by [Drago Kos and Marko Polič](#) on this topic is available on the CARL website.

(Fe) syndrome forms the initial and basic framing pattern of the nuclear discourse. It is possible to imagine four different ideal types of relations between enthusiastic supporters and sceptical critics of nuclear technology:

1. High fascination (FA) – low fear (fe): technology worshipper;
2. Low fascination (fa) – high fear (FE): critical anti-technologist;
3. High fascination (FA) – high fear (FE): interested hesitant;
4. Low fascination (fa) – low fear (fe): disinterested public.

These four types are of course rough theoretical generalizations or ‘ideal types’. In reality there may exist many intermediate categories. It is important to stress however the surprising or at least unusual counter evolutionary development of the nuclear technology acceptability. At the beginning the technology worshippers prevailed, but with the passing of time, the second and third type received more support. To understand these changes the general chronology of nuclear technology development should be considered in detail. It seems sound to differentiate five chronological phases of nuclear technology perception, from its (1) prehistory, through (2) military demonstration, (3) peaceful use, (4) global nuclear accidents, to current (5) end of the cold war, terrorism and global warming.

The general framing of nuclear technology and of radioactive waste in particular is developing from a technocratic to a participatory frame. Behind this shift is a general change of the ‘fascination – fear syndrome’. At the beginning fascination prevailed, scepticism or even fear was hidden or at least overlaid by faith in unlimited technological competence. This could be labelled as “FAfe” framing. But along with somehow surprising and unexpected changes in legitimization processes on the local, national and global level the unsolved nuclear technology problems started to play a more and more crucial role. In this respect radioactive waste became a paradigmatic problem which contributed to a substantial shift in frames of reference from an enthusiastic to a much more sceptical approach. This could be labelled as a faFE framing. According to this disposition of the basic framing dimensions it is possible to construct a general two dimensional system in which the framing process is developing over the course of time, and where the two dimensions are not orthogonal. With the first dimension we evaluate the changing general public attitudes, opinions about nuclear technology and particularly about the radioactive waste problem. As already mentioned, the extreme values of this dimension are fascination and fear. The other dimension evaluates style of decision making in the field. The extreme values here are authoritative, elitist technocracy and democratic, participatory decision making. It makes

sense to suppose that the fascination attitudes support technocratic style management and that those with fear, concerns, and worries support participatory management. The interesting point to investigate is how in the course of the development of modern 'nuclear societies' the framing has evolved. The basic assumption is that the changes correlate closely with the general development of crises of legitimacy in the development of nuclear technology and in particular of the radioactive waste problem.

This simple, two dimensional model helps us to identify different but coexisting framing patterns and their evolution over the course of time. A comparative analysis of radioactive waste framings in countries with different political, social, economic and cultural backgrounds surprisingly reveals that many of the waste images (i.e. framings) are quite similar despite rather substantial cultural, economic, political and other differences. Analyzing the history of nuclear issue framing in Belgium, Slovenia, Sweden and the UK, it seems that the framing of nuclear technology and in particular of radioactive waste are constructed along universal patterns.

The first step in analyzing the similarities and differences was to construct four general clusters of framing types which somehow correspond to the above presented model. From the history of nuclear technology and RWM development presented in the four Country Reports it is possible to identify four basic groups of framings. These general groups could of course be further divided into specific subtypes. It is important to note that these types are not discriminative, which means that they may sometimes overlap. This could be explained by the fact that fear and fascination often occur together and that the common sense perception of nuclear technology is often complicated because of the inhuman dimensions of nuclear technology effects. These four general framing types and their basic attitudes are as follows:

- A) Optimistic technological framings: fascination, attraction, trust
- B) Pessimistic technological framings: terrific power, fear, concern
- C) Technocratic framings characteristics: instrumental, authoritative PR approaches
- D) Participation framing characteristics: governance, local involvement

The analysis of the radioactive waste framing in Belgium, Slovenia, Sweden and the UK reveals that the general developmental pattern is common to all: the move from secretive elite management of nuclear technology (and radioactive waste) at the time when the civil application of nuclear technology started to develop out of military nuclear programs and was replaced at different rates in each country by more or less participative governance. The process of

'civilizing' the technology involved generating framings ranging from fascination to fear. At the beginning promising powerful technology fascinated people and this certainly supported technocratic approaches and framings. Later on the fascination was replaced by growing scepticism. In such a context technocratic management became counter productive and was replaced by much more communicative, participative governance. It looks like fascination sometimes turned into opposition. People who lost their utopian hopes became harsh opponents of the nuclear technology especially at the local level. Such development was a part of the general legitimacy crisis in modern societies. This explains why the timing of these changes is important. The early participation was effective (Sweden) but this can not be said for later attempts (Belgium, Slovenia, UK). On the basis of our analysis it seems plausible to explain the limited success of the participative decision making model by its instrumental (read PR) nature. Instead of introducing the genuine participation in decision making the prevailing framings of the radioactive waste reveals that under the surface of formally accepted participative approaches the technocratic paternalism often remains strong. There are even indications that it is growing again.

3 From Government to Governance? The Turn to Participation in RWM Policy Development and Implementation⁹

We begin by making a distinction between ‘government’ and ‘governance’ of technologies. In the ‘government’ of technological risk there is a desire to control the management of events and reinforce predictable frameworks of risk assessment and risk management. Consultation is formal, involving mainly an elite of policy insider groups. In the ‘governance’ of risk, there is greater public/stakeholder participation in aspects of the decision making process, with the aim of generating mutual trust and legitimacy. Governance involves the active participation and co-operation of a wider range of actors than one finds in government style arrangements. Although not necessarily found in a ‘pure’ form these two ‘ideal types’ capture important characteristics of political and policy arrangements that are relevant to the issue of radioactive waste management.

For those advocating a governance approach there are three main benefits that exist for promoting increased participation: firstly, that it will increase the legitimacy of decision outcomes; secondly, that it will lead to better decisions as a result of enhancing the knowledge base, and thirdly, that it will help to develop better citizens. In the case of repository siting the main rationale that has informed the activities of national RWM organisations is that of legitimacy, although there has also been some recognition of the knowledge gains that it can provide. However, the turn to governance is not just a response of technical or political elites to a crisis of legitimacy, as noted earlier in the report. Pressures by social movements for more democratic governance have also played their part in promoting change. This is not however to suggest that widening participation is seen universally as a good thing. Some within government and the business sector express concern that more participatory forms of governance may lead to policy being driven by an activist minority who have become astute players of the participation game.

This section of the report questions the extent to which there has indeed been a move from government to governance in the field of radioactive waste management. In what follows we outline the key variables in explaining the changes we have seen across the four countries, in particular the greater use of public and stakeholder involvement.

⁹ A full thematic report by [John Walls](#) on this topic is available on the CARL website.

3.1 Crisis and Change in the Management of Radioactive Waste

In all of the CARL countries we have witnessed an increase in the discourse and practise of public and stakeholder involvement in relation to issues surrounding the disposal of nuclear waste. A key factor in explaining this is the response to the multiple failures to site a repository during the 1980's and 1990's. A common factor which explains these failures is the absence or lack of any communication and/or dialogue between the proposed local communities and the national radioactive waste management organisation tasked with trying to find a site for a repository. This left communities feeling as though they had been unfairly singled out. Although initial lists of potential sites included locations with no existing nuclear facilities, given the stigma attached to nuclear technology community rejection of such the proposals was almost assured from the outset. The failure of this technically driven approach, where geological criteria dominated the site selection process, necessitated a fundamental rethinking of strategy.

In Slovenia, the changes have been primarily concerned with improving communication between the national RWM organisation and local communities, although there have also been limited forms of dialogue. In Belgium and Sweden radioactive waste management (RWM) organisations have entered into close dialogue and working partnerships with local communities; while in the UK the process has returned to first principles and involved stakeholders in a national process assessing a range of waste management options. All of these developments have been facilitated by changes in organisational culture within the main national RWM organisations.

3.2 Institutional Learning and Culture Change

RWM organisations and, to a lesser extent, some decision making bodies have been implementing changes in their operating culture – that is in the ways of thinking and, importantly, of doing things – since the mid 1990s in response to crises arising from the attempt to find sites for repositories. However, instituting cultural change is not a simple task, not least because of the difficulties associated with integrating new participatory mechanisms with existing organisational structures and management processes and with adapting to new expectations and practices. The process has unsurprisingly been uneven but nevertheless can be effective. This was the case of UK Nirex, where initial resistance to change existed but where, as a result of the lead taken by senior managers, reorganisation and change was effected over a four year period and was generally seen by stakeholders as being successful.

To ensure success, learning must become a key organisational virtue and some of the RWMOs have become increasingly reflective about the limitations of a technically focused approach. However, the nature and extent of change is variable across the four organisations and, to varying degrees, at different operational levels within each. There have consequently been occasions when old ways of doing things have reappeared and it has been clear that the new culture of transparency and openness requires continuing effort and commitment at the most senior levels if it is to be maintained. Failures to carry through consistently those commitments, perhaps as a result of uncoordinated management actions, can have a negative impact both on stakeholder confidence and on staff morale. It is therefore vital that work on changing organisational subcultures focuses not only on the engineering culture of RWMOs, often cited as a source of organisational blindness in the past, but also on the culture of management, ensuring that all members of the organisation act in accordance with its new values and commitments.

3.3 Openness, Transparency & Trust Building

One result of these efforts at culture change has been a formal commitment to openness and transparency by RWMOs in their efforts at building trust. Even where such commitment is made, stakeholders may harbour the suspicion that not all relevant information is being made publicly available. Researchers have often noted that trust takes a very long time to achieve but can very quickly, perhaps irredeemably, be lost. It may take only one act to undermine years of hard work, as when a confidential note from the Director General of NIRAS to the minister of Energy, in which the Dessel site was suggested as being marginally better, was made public along with the governmental decision to site the repository in Dessel.

It is not only stakeholders in Belgium, however, who maintain a sceptical outlook; for stakeholders more generally, it is rational to maintain a degree of scepticism towards RWMOs, nuclear industry and government organisations given that the efforts at establishing trust are motivated by clearly stated instrumental goals. These efforts are clearly having the desired effect. In Slovenia, for example, trust in radioactive waste management organisations has increased so that it is now higher (currently 37%) than Belgium and the UK (33% and 20% respectively). This can in part be accounted for by Slovenian success in agreeing a site for a repository and by the changes made in the communication strategies of ARAO. However, scepticism still exists among stakeholders and in local communities, which is unsurprising given the historically low levels of credibility, and in none of these countries are RWMOs trusted by a majority of the population. It

is apparent however that trust is often built between individuals from the national RWMO and other stakeholders, rather than stakeholders expressing a generalised trust in the RWMO itself. People may thus express trust in the individual but at the same time express doubts about the overall organisation, which highlights the importance of face-to-face relationships in generating trust and confidence.

Looking beyond the RWMOs, in the UK, for example, the Government's advisory Committee on Radioactive Waste Management (CoRWM) went to great lengths to achieve openness and transparency both in its operation and decision making, to the extent that a wide range of commentators and stakeholders have held up its programme of public and stakeholder involvement as a benchmark for future efforts. In contrast, it may be significant, given its role in the radioactive waste issue, that the nuclear industry itself is not generally seen to have made the same improvements in this area as the national RWMOs. In Belgium for example a recent (albeit minor) accident at a nuclear plant was not reported to the public until some days afterwards, which for some illustrates how difficult the nuclear industry is finding it to change its culture of secrecy.

There is also evidence of improved relationships among stakeholders who have taken part in Public Stakeholder Involvement (PSI) processes in all of the CARL countries. This is not to suggest the absence of disagreement between stakeholders but there appears to be a greater willingness to engage in non-confrontational discussions. In the UK, for example, many NGO's suggest that when an issue arises they are now less likely to immediately contact the press and more likely to contact the other organisation to arrange a meeting to first discuss their concerns. In Belgium, Slovenia and the UK, new forums have been created to facilitate dialogue between stakeholders and RWMOs or other bodies, whereas in Sweden discussions have taken place under the aegis of the local municipality.

3.4 Impact on Sponsors and Government

The Belgium local partnerships and the Swedish local municipality have proved effective at transmitting public and stakeholder views into the decision making structure. The Slovenian local partnership has so far proved less successful at this. In the UK, where the process is still operating at the level of national policy formation, CoRWM's final report traced in detail the way

in which inputs that it had received from the four rounds of PSI events had been considered and had influenced its thinking and recommendations.

In Belgium and Sweden public opinion polling has been used to canvass local views around proposed repository sites and has been acted upon by the relevant local decision making body. Whilst stakeholders expressed general support for the way that national processes (such as CoRWM), local partnerships (Belgium and Slovenia) and local municipalities in Sweden have used inputs from their respective PSI programmes, many did not think that government departments or nuclear energy companies had adequately demonstrated how public views have impacted upon their decision making.

3.5 Conclusions

It would be too simplistic to argue that a new participative style of governance, based on stakeholder networks, has supplanted the established top down government approach. Rather, there seems to be a hybrid governance system emerging in the RWM policy sector, which uses both traditional and innovative practices and rationales in order to try to find a solution to the problem of legacy wastes. This can nevertheless create tensions because of the very different institutional orientations that underpin the two styles: the traditional top-down or centralist culture by which government departments try to formulate and control policy does not, even though it may involve some form of neo-corporatist negotiations with powerful national actors, readily accommodate itself to a more open, participative and inclusive approach. Nevertheless, whatever its actual intentions, government has increasingly to couch its rationale for action in terms of current principles of democratic governance and if it falls short, it lays itself open to attack by non-state actors, the consequences of which are exacerbated by a critical news media keen to expose perceived inconsistencies in its approach.

Moves towards a 'governance' model have thus entailed a reworking of the relationship between actors within the state, civil society and the business sector, but one in which the state remains the central actor with ultimate legal responsibility for decision making. These changes have enabled some previously excluded groups to have a voice in the formulation of inputs to national and local decision making. In Sweden it has enabled local communities to exercise influence in developing plans for a repository, as well as empowering them to take greater control of their economic futures. The Swedish case suggests that countries with high levels of social trust may find it easier to address the problem without recourse to new institutional developments, drawing

instead upon supplementary resources within civil society. In such circumstances it only requires small changes in public policy to encourage local people to enter into dialogue with RWM organisations and to begin finding solutions to the problem. Nevertheless, it is important to acknowledge that the self-confidence of the Swedish municipalities is also founded on their statutory right to veto developments of which they do not approve. A confident, well-functioning democracy requires strong countervailing power in the central state, so that civic participation does not take place under the shadow of state domination, conditions which further alienate people from the political process. This historically has been a problem in Slovenia, still a polity in transition with a highly centralised state and a weak civil society. Even here, however, there are signs that a basis for dialogue can be found through improved communications and genuine dialogue with local communities.

There is one final and increasingly topical observation to be made about the political tensions around the governance of radioactive waste and wider developments in the energy sector. The progress made in many countries towards addressing the radioactive waste issue has been premised on a clear separation between the problem of existing wastes and the politically contentious question of new nuclear build. Nevertheless the resolution of the radioactive waste problem has been seen by many, for several decades now, as a prerequisite for the continuation and even expansion of the nuclear power industry. Although the prospects for resolving the waste problem appear currently more positive than they ever have, the problem is still far from 'solved'. In the meantime, however, changed political circumstances, including global recognition of the need to combat climate change, rapidly escalating oil prices and increasing national concerns about energy security, have led to a growing political and popular acceptance of the necessity (still a controversial claim) of new nuclear power stations. The issue on the negotiating table is no longer, therefore, simply that of legacy wastes but of a new generation of waste producing, albeit less waste producing nuclear power stations. For many existing nuclear communities this may not be an issue; for some the prospect of a repository that will continue to take nuclear wastes long after the clean up of legacy wastes is completed may be less acceptable for their communities; for resolute opponents of nuclear power this may make the permanent resolution of the waste problem politically unacceptable. Approval of a new nuclear build program in some of these countries will undoubtedly change the playing field and may therefore exacerbate the tensions that exist between the centralised technocratic style of government familiar from nuclear programmes in the past and the new, participatory governance style that has been evolving in the radioactive waste management sector.

4 Stakeholders in RWM and their Networks¹⁰

For this analysis we looked at networks as ‘interconnected groups of people or collectivities’; as ‘clusters of different kinds of actors’. More particularly we focussed on policy networks, as “clusters of actors with an interest in or relevant knowledge on a particular policy sector or domain, that each have the capacity to contribute to the success or failure of policy” (Peterson, 2003: 1).

Concerning the management of radioactive waste, two distinct types of policy networks were identified:

1. networks on general management issues, overall strategy and policy programmes;
2. networks focussing on the siting of repository facilities.

If we take a stakeholder to be “any person or organisation with an interest – or ‘stake’ – in a given activity” (in this case the management of radioactive waste) (Bergmans, et al., 2006a), then it is clear that not all stakeholders necessarily are activated in a (policy) network. To become an actor in a (policy) network, one needs to become an active stakeholder.

4.1 Three types of actors/active stakeholders in policy networks

To be able to position the active stakeholders in the identified networks, we distinguished between three types of actors:

1. **Policy Makers:** people and organisations in the core of the network, with a high capacity to determine policy. These are the actors taking the formal decisions, as well as those preparing them (*e.g.* RWM agencies, regulators, the nuclear industry, relevant governmental bodies).
2. **Policy Advisors:** people and organisations providing input and information that helps to shape policy. Contacts between these actors and the policy makers is mainly issue oriented and less directly focused on producing policy (*e.g.* public research institutions or universities, private consulting companies, waste treatment facilities, transport companies, legal advisors).
3. **Peripheral Actors:** people and organisations that do not form an integral part of the network and that have infrequent, often indirect and less stable contacts with the core of policy makers (*e.g.* the general public and the press).

However, as regards to particular issues some of these more peripheral actors are drawn into taking up a temporary role as policy advisors, thus becoming a more hybrid type of actor in the network (*e.g.* particular interest groups (local stakeholder groups, NGO’s), local politicians).

¹⁰ A full thematic report by [Anne Bergmans](#) on this topic is available on the CARL website.

4.2 The emergence of new patterns in policy networks

In all CARL countries we see new patterns of policy networks emerging: particularly on siting (Sweden, Belgium, and Slovenia), but also to some extent on general policy (UK, *Canada*¹¹).

4.2.1 Changing networks on general policy

The work of CoRWM in the UK and the NWMOs consultation on the long term management of spent fuel in Canada, may not have led to full public empowerment, genuine upstream framing of issues or co-determination of decisions. They did however raise opportunities for peripheral actors to have some form of input in the decision-making process. Not everybody was overjoyed with the outcome of the CoRWM process, but most people did seem very appreciative of the way the process was run. Also the existence of a wide variety of Public and Stakeholder involvement (PSI) initiatives on topics related to RWM in the UK, has created a more indirect opportunity for some stakeholders to take a up a role of policy advisor. This indirect way of giving input on general policy, we also see emerging through the siting networks in those countries where they are in place (*e.g.* the municipality of Oskarshamn convincing the Swedish government to amend the siting process). When looking at particular interest groups, it seems that the local authorities from nuclear communities are the one's who have established, relatively speaking, the strongest link with the national policy network (if only because of their statutory role in licensing procedures). Particularly in Sweden, both Oskarshamn and Östhammar seem to have taken up a central and almost irreplaceable position in the policy network.

4.2.2 Changing networks on siting

In the case of siting a repository facility, the emergence of new patterns in policy networks is even clearer. Not so much for the fact that in the cases of Belgium and Slovenia specific platforms were created for this process. But more because in both these countries, as well as in Sweden and in Canada (we think here of the examples of Port Hope and Kincardine), the local networks (whether in traditional 'government'¹² or a more 'governance'¹³ structure) have been able to move part of the decision-making to the local level.

¹¹ Canada has not been a core country in the CARL consortium, but we did look at developments there, particularly at the consultation process set up by the NWMO on the long term management of spent fuel.

¹² The term 'government' refers to a decision-making model where the state (or a subsidiary authority) controls the decision-making process and where consultation is generally relatively formal and elitist.

In most siting cases we can actually see a two-tier policy network: with one layer on the national level (with government, its administrations, the RWM agency, the regulator(s) and the nuclear industry as the core policy makers), and one on the local level (involving in one way or another local authorities, citizens and local interest groups). These local networks in most cases are only linked to the policy network on the national level through the RWM agency as a go between. The strengthening of the links between the local actors and the RWM agency therefore appears to be the decisive factor in opening up the core group of (national) policy makers to local stakeholders on the siting issue. In Belgium, Slovenia and Canada, the waste managers are governmental or semi-governmental institutions, while in Sweden the RWM agency is part of the nuclear sector. For that reason the local communities in Sweden have been pulling the regulators to the local level, so as to build a second and more 'neutral' bridge to the national policy network. The municipality of Oskarshamn even went as far as to actively develop direct and strong links with other actors, like the national government. In Belgium, local actors indicated to preference for an indirect link to the national policy makers through the RWM agency. For them this forms the basis of their independence vis-à-vis the nuclear industry and the waste producers.

For Belgium and Slovenia it seems that the broadening of its network to the local level has strengthened the position of the RWM agency in the network on the national level, particularly in respect to the government and the nuclear sector. Forming an allegiance with the radioactive waste manager has on the other hand given the local communities already hosting the waste a leverage to get recognition for their role as keeper of the nation's radioactive waste and to turn the situation of being stuck with the waste into an advantage, rather than a disadvantage.

The impact local actors have on siting policy and the pressure they can exert on the waste manager depends largely on the strength of their local network. This in turn seems to a great extent determined by three elements:

1. the political support for the PSI process on the local level: willingness of the local authorities and politicians to engage in and to share responsibilities with other local stakeholders;
2. the inclusiveness of the PSI process: the extent to which it can incorporate the prevailing interests and views within the community ;
3. the ability of the participants to 'touch base' with the rest of the community.

¹³ The term 'governance' refers to a model of decision-making that is characterised by a more explicitly shared responsibility between the state, business, and civil society.

Both in Sweden and Belgium, the local networks seem to be relatively strong. For Slovenia it is still a bit too soon to tell, but some criticism on the dominance of political actors can clearly be heard at the local level. In Sweden, the style appears somewhat more ‘government’ oriented, drawing on the traditional municipal network, in a more ‘traditional’ setting, at least where the relationship of citizens-politicians is concerned. This does not mean however, that the Swedish process does not allow for PSI. The LKO (Local Competence Building) project in Oskarshamn and the Östhammar reference group in that respect clearly do incorporate a number of ‘governance’ elements into the process. In Belgium, the partnerships also heavily draw on the existing municipal network, but within a relatively autonomous and more ‘governance’ type structure, engaging local authorities, local businesses and local civil society in an entity where they jointly shape local policy and, through their supra local partner (the RWM agency), indirectly also help to shape national policy on certain issues. On the other hand, one could also argue that the Swedish model, with the industry explicitly given the responsibility to take care of and dispose of the waste, reflects a more governance oriented approach, than does the Belgian, Slovenian and UK model, where it is actually the state that takes the responsibility for managing the nation’s radioactive waste.

4.3 Ever changing role patterns in the siting, development and implementation of a repository project

But this networking and forming of new alliances, brings about changes in role patterns. Particularly in the situation of Belgium and Slovenia, where new platforms were set up and where one cannot draw on predetermined structures and role sets. On top of that, the siting of a radioactive waste repository in the 21st century is no longer just about siting a repository, but about creating an environment in which the waste and the local residents can reside comfortably and harmoniously. This is made most explicit in the ‘integrated repository project’ the Belgian radioactive waste manager has set out to develop in partnership with the local community. To actually realise such a project is an endeavour that resembles the giant’s labour that is for instance preparing a city for hosting the Olympics. Trying to realise this through a more governance oriented participatory approach will not make the workload any lighter. The process of siting and consequently realising a repository facility in a ‘modern’ way, respecting and integrating the needs and preferences of the host communities is a long process, with many different phases: from finding volunteer communities, over site investigations and the choosing of one site, to the development and the implementation of the project. Each phase has its own characteristics and

requirements concerning role patterns. In Belgium this became clearly visible after the partnerships' 'social feasibility studies' ended and the site had been chosen: Mol was then no longer a candidate host community, and fell back into the role of concerned neighbour with a particular interest in the project; Dessel will become the host community, but is struggling for the ownership of the project with NIRAS/ONDRAF and Mol, that still wants to see most of its conditions fulfilled. Once again the concerned parties became engaged in a reciprocal 'sounding out' and marking of boundaries and roles, which was also clearly present in the very early days of the partnerships. But as the players in themselves have stayed the same, the need for this was not anticipated and the idea of having to renegotiate positions that were assumed to be clear and settled once and for all took some time to filter through to those involved.

If the local networks in Belgium, Slovenia and Sweden want to stand the test of time and keep playing their role of watchdog, they should be robust in their representation, as well as flexible and adaptive to social change, not only in terms of their own organisation, but also with respect to their own role and relationship vis-à-vis other actors. This demands a continued ability to develop a reflexive structure and culture. Respondents suggested investigating options for providing local networks with methodological support to cope with this 'struggle for life' and it could also be worth looking into possible roles for oversight bodies and 'guardians'. However, to achieve reflexiveness in structure and culture, one must in the end always rely on the inventiveness and open mindedness of the people (and their organisations) involved and on their willingness to learn. Experience has proven that this is not a utopian striving, but it nevertheless remains one that is beyond the control of any legal, organisational or procedural arrangement that can be put in place.

5 Six Domains of Decision for Stakeholder Involvement in RWM¹⁴

5.1 Radioactive Waste Management as a Process of Technical and Political Collection and Isolation

In this section radioactive waste management (RWM) is evaluated as a process of technical and political collection and isolation. Such a process, dedicated to first gathering together what is categorized as waste, and then, setting it apart from the biosphere, is both a technical and political process as it addresses radioactive waste simultaneously as a physical hazard and a major issue of public concern. The level of technical and political calculation underlying RWM policies has steadily grown from the 1970s onwards encompassing the growing prominence of the nuclear safeguards issue taking into account, for example, the prospect of terrorist groups targeting waste transports and waste facilities. Due to differing national calculations concerning, for example, the risks nuclear reprocessing poses for weapons proliferation, we find different definitions of radioactive waste in the different CARL countries giving rise to alternative policy frameworks within which somewhat contrasting patterns of public and stakeholder involvement are lately gaining in importance.

Viewing RWM as a field where technical options and political choices cannot be ultimately pried apart, **six domains of combined techno-political decision-making** can be identified for the variable and negotiable growth of public and stakeholder involvement (PSI). These are:

The 'What' Question – What is radioactive waste and what is not?
The 'Why' Question – Why is collection and isolation being pursued?
The 'Who' Question – Who shall be responsible for planning and co-ordinating collection and isolation?
The 'When' Question – What is the time frame for disposal?
The 'How' Question – How should collection and isolation be achieved?
The 'Where' Question – Where should collection and isolation take place?

These domains can be seen as describing an upstream-downstream continuum moving from general framing issues (e.g. do we favour an open or a closed nuclear fuel cycle?) to the

¹⁴ A full thematic report by [Mark Elam](#) on this topic is available on the CARL website.

identification of specific collection and isolation methods (e.g. retrievable versus non-retrievable waste packages) and points/sites (e.g. geology-led versus volunteer-led siting processes). There will also be multiple waste streams in any national (or international) waste management programme with the collection and isolation of some categories of waste (low-level waste versus high-level waste versus spent fuel and so on) most likely proceeding more smoothly than that of others.

5.2 Local versus National Stakeholder Involvement

Hitherto, public and stakeholder involvement (PSI) in RWM has tended to be firstly downstream 'local' PSI connected with site selection processes for largely given waste facilities focussing on a limited number of candidate communities. This tends to reflect the central paradox of RWM as a process of technical and political collection and isolation: rendering radioactive waste and radioactive waste politics peripheral to more or less everywhere always implies bringing them home to somewhere. While Belgium and Sweden (as well as Finland) can be said to have pioneered just local PSI, the 'participatory turn' in UK RWM after 1997 has set a precedent for more national upstream PSI. In its ambition to 'go back to first principles', UK RWM has, temporarily at least, opened up a greater variety of domains of decision to broader PSI compared to the other CARL countries.

The thematic report this section is based on, touches upon the different identities underlying local and national PSI in RWM. Local PSI arises firstly in connection with voluntary or involuntary acts of inclusion in the siting processes for more or less well-defined waste facilities. National PSI as it has emerged in the UK, on the other hand, tends to proceed on the assumption that everyone living in a nuclear state has, in principle at least, a stake (both ethical and financial) in the decisions guiding RWM. The report also briefly discusses additional bases of identification of potential relevance in defining publics and stakeholders in radioactive waste management which are neither strictly 'local' nor 'national' in character. For example, what has been portrayed as a distinctive nuclear 'development block' in the Swedish economy has encompassed several energy-intensive industries, nuclear fuel fabrication plants as well as a domestic electrical equipment industry which through the Swedish nuclear power programme developed into an internationally-competitive producer of nuclear reactors. This national 'development block' translates into a network of communities throughout Sweden materially implicated in the generation of radioactive waste, who could also be seen as bearing some

measure of responsibility for the safe disposal of the unwanted fruits of their ingenuity. Following similar reasoning, reference is also made in the report to recent discussions in Australia concerning whether their mining of uranium for export implicates them in the radioactive waste problems of their trading partners which include Belgium, Sweden and the UK.

5.3 Engagement Dedicated to Securing Disengagement

The report also discusses PSI in RWM as being distinct from PSI in many other fields due to its ultimate goal of advancing public and stakeholder *disengagement* as the physical collection and sequestration of wastes *outside* of society is progressively secured. Thus, although technocratic decision-making may lead to problems during the course of the collection and isolation of wastes, technocratic control must still be seen as legitimately approximating the final goal of the waste management process as all human contact with the waste is, in a step by step fashion, reduced to an absolute minimum. Therefore, as well as an ‘upstream-downstream’ continuum, the six domains of decision outlined in the report also suggest a process of phased public and stakeholder disengagement with radioactive waste as collection and isolation proceeds and human involvement with the waste progressively declines. Given this situation, problems and crises in RWM can be envisaged as arising either in relation to a relative *dearth* or a relative *excess* of PSI. A relative dearth of PSI can be equated, for example, with widespread public non-cooperation, disengagement and premature withdrawal from waste management programmes and site selection processes leaving all the key decisions in too few hands and concentrated on too few communities for legitimacy to be guaranteed. An excess of PSI, on the other hand, can be equated with the unnecessary return of widespread debate and discussion (new voices) after sound and legitimate technical and political decisions have already been taken, for example, a particular method of waste management, or a particular siting focus.

5.4 The ‘What’ and ‘Why’ Questions as Domains of Combined Technical and Political Decision

A significant feature of radioactive waste management in the different CARL countries is variation in the definition of radioactive waste itself. This variation reflects firstly how involved or uninvolved the country is, and has been, with nuclear reprocessing. In the late 1970s, Sweden experienced an early change of nuclear heart as all meaningful connection with reprocessing was curtailed. Instead of innovations in nuclear fuel supply, innovations in nuclear fuel safety and the

direct geological disposal of spent nuclear fuel were prioritized. Mirroring this change of nuclear heart, the Swedish company once known as SKBF became the one we know today as SKB¹⁵. The UK powerfully contrasts with Sweden in this respect as early commitments to reprocessing have proved irreversible. Belgium, on the other hand, takes up a middle position moving away from reprocessing for the last 10 years or so, and yet still remaining entangled with it. The question of *what* radioactive waste is in the different CARL countries is intimately connected to reasoning concerning *why* the disposal of different radioactive materials is, or is not, being pursued in each national case. While it is often argued that the 'waste question' should be kept separate from the 'industry question' if RWM is to proceed, this cannot negate the fact that the very definition of radioactive waste in any country will clearly reflect industry imperatives and developmental strategies. A robust RWM programme is one that can publicly discuss, debate and defend its chosen approach to defining radioactive waste allowing it to meaningfully engage with notable new initiatives like, for example, President Bush's Global Nuclear Energy Partnership (GNEP) from 2006 or the European Commission's new vision of a Sustainable Nuclear Energy Technology Platform from 2007.

The categorization of spent fuel as radioactive waste in countries like Sweden since the 1970s has been directly connected with concerns over nuclear proliferation. However, growing worries over climate change and sustainability as well as security of energy supply encourage a return to the categorization of spent fuel as a resource. In the Swedish case, the multi-recycling of spent fuel and the exploitation of domestic uranium reserves are literally waiting to be persuasively presented as part of the most effective solution for cutting national carbon emissions and strengthening security of energy supply. Although the nation may be well-prepared technically and scientifically to exploit spent fuel as a resource, it remains less clear whether it is sufficiently prepared politically to debate such a new move.

5.5 The 'Who' and 'When' Questions as Domains of Combined Technical and Political Decision

Like the definitions of radioactive waste held, the radioactive waste management agencies in the different CARL countries do not properly compare. Instead of viewing Nirex, before their

¹⁵ SKB started out as SKBF (the Swedish Nuclear Fuel Supply Company), responsible for investigating and planning the possibilities for reprocessing Swedish spent nuclear fuel and building Sweden's own reprocessing plant. After the Swedish nuclear industry abandoned all plans to engage in reprocessing (beginning 1980's), SKBF was transformed into SKB (the Swedish Nuclear Fuel and Waste Management Company).

integration with the NDA, as a sister organization to SKB, the latter are perhaps best characterised as the company British Nuclear Fuels Limited (BNFL) never became after the 1970s, as Sweden abandoned plans to reprocess nuclear fuel, and the UK reaffirmed its commitments to reprocessing. NIRAS/ONDRAF are again a very different organization to SKB, perhaps more closely resembling the quasi-state authority that PRAV in Sweden never gained the opportunity to develop into during the 1980s.

Looking at the ‘who’ question in connection with the ‘when’ question in the CARL countries, the key issue that appears to be shaping progress in radioactive waste management is the extent to which the nuclear industry views the task of RWM as endogenous or exogenous to its own development. In Sweden, thanks originally to the Nuclear Stipulation Act, the geological disposal of spent nuclear fuel has developed into a core concern for the nuclear industry since 1977. Gradually this has turned into a field of international business development, as through collaboration with Posiva, the KBS concept has matured into a technology platform on the Baltic rim with buoyant global prospects. No comparable development has taken place in the other CARL countries, suggesting that regardless of whether a waste management agency is public or private, it will not be successful until the nuclear industry has been persuaded to prioritize disposal plans and accept them as of immediate, rather than eventual, relevance for the future of the industry as a whole. Therefore, it can be argued that, if for no other reason, expanded PSI in relation to the ‘who’ and ‘when’ questions is justified if it can help ensure that waste management programmes remain publicly visible and high on the list of nuclear industry priorities. The challenge for PSI after such prioritising has been achieved then becomes to hold the nuclear industry accountable for different innovative programmes of waste management which they have been encouraged to view as approximating their own.

5.6 The ‘How’ and ‘Where’ Questions as Domains of Combined Technical and Political Decision

In proposals for the geological disposal of nuclear waste the ‘how’ question is always going to coincide to a certain extent with the ‘where’ question. How important a part of the ‘how’ question the ‘where’ question is has tended, however, to change over time in the CARL countries. It has tended to change firstly through efforts to render repository concepts more flexible on the basis of multiple barriers securing long-term radiation protection in ‘suitable’, as opposed to ‘most ideal’, bedrock conditions. Such relative liberation of the ‘how’ question from

the ‘where’ question is always going to be more controversial for high-level wastes and spent fuel compared to low-level, and relatively short-lived radioactive wastes. Liberation of the ‘how’ question from the ‘where’ question can also be seen as promoting the commercialisation of repository concepts in step with the growth of locational degrees of freedom and movement. Overstating it, Yucca Mountain will never be a great commercial success because it remains first and foremost a mountain in Nevada. KBS 3, on the other hand, might more easily translate into a ‘global brand’ in nuclear fuel safety technology as an engineering design which has won degrees of geological freedom. The legitimacy and viability of voluntarism as a principle guiding site selection processes presupposes the relative liberation of the ‘how’ question from the ‘where’ question. In Sweden, the flexibility of the KBS 3 concept was successfully established *before* a turn to voluntarism allowing for multiple sites to join a ‘best fit’ competition to be settled through SKB’s site investigations. In Belgium, on the other hand, flexible repository design has been more closely integrated into a voluntary siting process for a low- and intermediate-level waste repository. In this way, the flexibility of repository design is something that has been delivered further into the hands of volunteer communities in Belgium than in the KBS 3 case where repository design remains beyond the scope of local stakeholder involvement. In the UK the ‘how’ question has also been drawn apart from the ‘where’ question, but not in order to reform a specific on-going repository project, but rather, to allow for a new upstream evaluation of basic waste management options, and build a new radioactive waste policy upon more consultative foundations.

5.7 The Interrelations of National and Local PSI and the Rebirth of ‘Nuclear Parks’

If the UK is set upon rebuilding RWM policy upon consultative foundations, Sweden remains committed to basing such policy on the principle of ‘demonstrated safety’. This is something that was established through the Nuclear Stipulation Act in 1977 and normalized through the Act on Nuclear Activities from 1984. RWM has been governmentalized as a ‘public theatre of proof’ in Sweden where the ability of SKB to deliver nuclear fuel safety (KBS) remains continuously on trial with SKI and SSI installed as the two leading public prosecutors. These arrangements have worked well for settling the ‘what’, ‘why’, ‘who’, ‘how’ and perhaps even the ‘when’ questions of Swedish waste management policy. They have even succeeded in settling the ‘where’ of both SFR and CLAB. They have proved inadequate, however, for addressing the ‘where’ of a KBS 3 repository – the final jewel in the Swedish RWM crown. The settling of the ‘where’ of KBS 3 has

called for a new and novel commitment to local PSI focussing in particular on the two established nuclear communities of Oskarshamn and Östhammar who first joined a voluntary siting process somewhat belatedly several years after it had been initiated. As in other CARL countries, voluntarism in Sweden did not ultimately encourage communities nationwide to freely participate in the site selection process for KBS 3 so much as it hailed communities already hosting nuclear activities to recognize themselves as the only places for the siting process to go.

Because CARL country experiences indicate that voluntarism is responsible for pre-programming site selection processes to end up focussing on communities already hosting nuclear facilities it appears possible to connect this principle of siting practice with a resurgent vision of ‘nuclear parks’ today. The American atomic scientist and policy advisor, Alvin Weinberg first spoke of such parks as regional development blocks resembling small nuclear city-states in the early 1970s. As Weinberg originally envisaged them, these parks would typically host several reactors as well as reprocessing facilities attracting energy-intensive industrial processes into their immediate surroundings. Local PSI in communities like Oskarshamn, Östhammar, Mol, Dessel and Eurajoki appears to offer new sustenance to visions of future nuclear parks where reprocessing facilities have been largely lifted out of the picture and the development of major waste facilities have been parachuted in. Voluntary siting processes going hand in hand with flexible repository concepts may well translate radioactive waste disposal technology and services into the type of field for international business development that reprocessing succeeded in becoming during the 1970s and 80s. However, stimulating the growth of new look nuclear parks addressing waste problems largely *in situ* tends to suggest an important future role for national PSI as well as local PSI. Just because voluntarism tends to productively advance the final disposal of radioactive waste in the nuclear industry’s ‘own backyard’, this should not be allowed to let RWM fall out of more general public view, too far in advance of a genuinely happy technocratic ending.

6 Fission of Fusion? Reconciling Technical and Social Aspects of Radioactive Waste Management¹⁶

6.1 Technocratic failure, social aspects, and socio-technical combinations

After the technocratic failure in radioactive waste management, which happened at different times in all four CARL countries and is associated with locations such as Kynnefjäll and Mullwharchar Hill, a consensus emerged around the shortcomings of a technically driven siting process. Both implementers and opinion groups agreed that responsible agencies were not paying enough attention to social aspects, while focusing only on technical issues. Therefore, the solution should be to restart the programmes on a new basis, where technical criteria are adapted to social factors. Today all the CARL countries are recognised for giving attention to the social aspects. But how are these social aspects incorporated in the national waste programmes in Belgium, Slovenia, Sweden and the United Kingdom?

This questions is usually addressed by looking at what the social aspects are about, how they are understood, and what role they should have in relation to technical aspects. In this paper, however, the division between technical and social aspects is questioned. At the heart of the CARL project we find the assumption that social and technical factors are always inseparable. To manage radioactive waste is a technical task but also a political task. We never find ‘pure’ technical or ‘pure’ social factors. Of course it is possible to find people called technical experts, as well as politicians and citizens. But this does not mean that the former know nothing about social aspects or that the two latter groups do not possess vital knowledge. Instead of asking about the social factors we should ask about ‘socio-technical combinations’. A lot of different factors make up radioactive waste management. This ‘mess’ (or overflow of factors) is handled by different groups, working from various perspectives and having different responsibilities in relation to legislation. And we can be sure that they do not restrict themselves to single factors. However, sometimes, not to say quite often, activities are presented as being of a pure kind, for instance when implementers present studies of bedrock conditions as if these are just about geology and not at all about a waste repository. But this is not how actors work in practice. Therefore, the objective should be to study how the mix between technical and social factors is made up in practice as well as presented in public. In short, the report this section is based on deals with the

¹⁶ A full thematic report by [Göran Sundqvist](#) on this topic is available on the CARL website.

socio-technical combinations, which are strived for and achieved in the four CARL countries, never forgetting that the social and the technical are intertwined.

6.2 Integration and separation

When studying socio-technical combinations it is useful to distinguish between different types. In the following two main types of combinations are discerned: separation and integration. The first one is about *denying integration* between social and technical aspects, acting as if there is a clear *separation* between social and technical factors. This type is common among technical experts and is often used strategically as a way to protect their projects from involvement from outside groups. The kind of involvement accepted is of an instrumental kind, and about increasing legitimacy and creating trust. This type shows a situation where ready-made technology is to be implemented. Conflicts and negative attitudes around waste projects are understood as part of a context and not part of the technical project as such. This does not mean that so-called social aspects are considered less important. In the CARL countries we know that they have been of crucial importance when blocking technical work for decades.

From the assumption presented above, separation is an illusion, while social and technical factors are always inseparable. The separation type, therefore, is clearly a simplification and a purified picture of a complex and intertwined reality. It is however of great importance to understand this concept better, for it is widely used for presenting the interplay between the technical and the social in public.

The second kind of interplay is about *accepting integration* between technical and social aspects. The *integration* type means that social and technical aspects are co-produced, i.e. that technical and social aspects are shaping each other through an interdependent process. Such co-production means that social aspects influence technical projects, while a technical project simultaneously supports and justifies the corresponding social project. People accept a technical project because it supports their social strategies. Developing a technical project also means shaping society.

Even if separation could imply that different groups – as part of a division of labour – work together on a common project, integration means something more: that technical and social factors are understood as interrelated, and not consisting of two distinct spheres. The boundary between them is blurred: who is a technical expert or a lay person is not that clear to involved

parties; no one is a pure expert and no one is a pure lay person. Technical experts are part of a social project, that influences their work, and political representatives, environmental organisations and individual citizens make claims that are not only emotional, but based on technical details as well as opinions on what the technical project is all about.

According to the integrative type of combination, lay people's knowledge is not of secondary interest and it stands not apart from technical knowledge production. On the contrary, and if taken seriously, it implies that 'context becomes content'. Lay people's contribution is not only about enriching expert knowledge, but also about the framing of the issue as such.

Based on the CARL assumption mentioned above, integration should be the preferred choice. However, integration could be misused, not least by powerful actors, when used as a label to disguise a project driven by technical experts. On the other hand, separation could be a fair choice, if actors agree to a division of labour between different groups and at the same time acknowledge that it is impossible to achieve separation in its pure form. Technical work always includes social aspects. But in a situation where, for instance, the proposition of methods and sites (often misunderstood as 'purely' technical issues), are delegated to experts and all actors are aware that experts also carry out social activities within technical activities, separation as a type of division of labour could be a preferred alternative. In a later section we come back to the complexity of the two types, but first existing socio-technical combinations in the CARL countries are presented.

6.3 Variations of socio-technical combinations in the CARL countries

Sweden

Based on the key word of voluntarism, SKB's new mechanism for integrating social and technical issues launched in 1992 soon turned into a success. This was called feasibility studies and by a stepwise process municipalities on a voluntary basis were invited to define themselves as possible stakeholders in the process of siting spent nuclear fuel. The SKB strategy made clear that social factors were of interest to the municipalities and that they had to decide about these by themselves, independently of SKB and the technical knowledge of the company. The municipality should decide on their own whether to take part in a study, and after the completion of the study once again decide whether to continue or not. This meant a clear division of labour between SKB and the municipality, and also a separation between technical and social issues.

While municipalities discuss social factors, SKB evaluates technical facts and the geological potential of the municipality. It is often asked in a rhetorical way, by both SKB and municipalities, how it could be if local politicians or ordinary citizens should guarantee safety.

Slovenia

A new start of the siting process in Slovenia began in 1996 when a so-called 'mixed mode' site selection process was set up by ARAO. In the mixed mode approach a rough technical screening, carried out by ARAO, is part of the first contact and negotiating between the agency and the municipality. This could be viewed as a harmonious division of labour between technical and social aspects, where both are considered of crucial importance but of a different kind. The approach is giving local municipalities a clear and crucial role in the siting process. If they are not willing to participate in the process they could not be forced to become involved. On the other hand, participation is not about being involved in technical work, but just about being informed about these activities and to react to what is presented by experts. In fact, this approach is a clear example of a separation of technical and social issues, where local participation is only about accepting or rejecting ready-made technology.

Belgium

In December 1998 NIRAS/ONDRAF announced a new strategy based on the local partnership approach and voluntary participation. For a municipality, this meant entering into a joint effort with the agency in order to study and design a repository project, as well as develop an integrated project proposal that should be acceptable for all involved parties. This implies that technical and social aspects are considered inseparable and should be assessed by the partnership. This is an explicit ambition to jointly work from a socio-technical combination of integration. The partnership is the carrier of all kinds of investigations and proposals, developing as well as assessing results. It is the sole forum for negotiations and decision-making, bearing in mind that the municipal council and the government at a later stage are to decide on the issue. However, within this strong focus on integration we also find examples of separation. This has been present in the role of NIRAS/ONDRAF. The agency was given a veto on technical feasibility, had its own budget and was responsible for carrying out all necessary research and development on technical and safety aspects in relation to a repository. This gives the agency a strong position as the architect of the technical design.

United Kingdom

In 2001 the UK Government launched a consultation programme, Managing Radioactive Waste Management Safely, with the aim to develop a waste programme with public support. The key focus was to involve as many stakeholders as possible at an early stage. A new advisory body was established, the Committee on Radioactive Waste Management – CoRWM. The objective of the Committee was to give recommendations to Government on the best option, or combination of best options, for the long-term management of radioactive waste. Foremost this was about reviewing available waste management options. The CoRWM process shows an engagement process without a strong boundary between social and technical aspects. This was formulated as starting from a blank sheet of paper: all kinds of technical options and ethical considerations were discussed by everyone that wanted to take part. However, this lack of boundaries has also been criticised as trying to reinvent the wheel and take up, once again, options that earlier had been ruled out by a number of authoritative bodies. The new consultation programme could be assessed as an integrative type of socio-technical combination.

6.4 Four remaining critical issues

Thus far we have found that separation is common practice in Slovenia and Sweden, while in Belgium and the United Kingdom many examples of integration could be found. But before making this the true and final result we have to elaborate a bit further on activities in the four countries that will give us a more complex picture. Four critical issues are described and at the end of every section one problem and one solution is formulated.

6.4.1 Concealment of social aspects.

Separation often implies that technical agencies make social choices within technical choices in a non-transparent way. In Slovenia and Sweden municipalities are given the right to accept or reject being part of the process of finding a solution to the waste problem. However, it is wrong to argue that SKB in Sweden is only focusing on technical issues. SKB has strategically reassessed its view on safety issues and bedrock conditions, i.e. from the best site to suitable sites. This means that the company has tried to adapt technical aspects to social ones. This adaptation (some would call it a downplaying) of bedrock to what is socially achievable is not a pure scientific result. This strategic choice was made by SKB made on their own. In Slovenia the choice of the mixed mode approach, including a first rough technical screening, also means assessing and deciding on social

issues, where a broad discussion, including municipalities and citizens, is lacking. Why choose such a strategy? What is the motivation behind it? How to develop a method for ranking areas? These questions are not purely scientific, but also very much about what is achievable in a society where radioactive waste is considered an unwanted product not to be engaged with. Where separation is the existing mode of operation, these questions tend to be considered technical and be decided by technical experts alone.

When these kinds of issues arise within an integrative socio-technical combination they could more easily be dealt with as socio-technical choices and discussed more broadly among equal parties representing different interests and knowledge competences. But is this what is happening in Belgium and the UK? Examples show that a partnership is no guarantee for avoiding a situation where technical experts take care of socio-technical issues of crucial importance. The tendency for technical experts to decide on important issues alone, including socio-technical choices disguised as pure technical issues, could all the time be the case, but is most common within a separated socio-technical combination.

Problem: technical experts make social choices within technical choices, leading to the concealment of social aspects

Solution: identify the social in the technical and do not be afraid to discuss technical issues as social choices, or even better as socio-technical choices. What is there to be afraid of? That so-called lay people can add something of value and learn something?

6.4.2 Social aspects of second priority.

What seems to be hard to avoid in all socio-technical combinations, but also this time foremost in the separation mode, is that the social aspects, when discussed and focused upon in purity, are made second priority. This means that social aspects are considered something to add, at a later stage, to already developed and defined technical projects. This has been called downstream involvement, i.e. adding social flavour to existing and stable technological programmes. One reason for this to happen is that the technology is mature; technological waste programmes were founded already back in the 1950s, and at that time the problem, as a socio-technical project, was delegated to technical experts. Responsible politicians expected experts to make also social choices and formulate strategies. And of course they did. When much later public consultations were created, giving the impression that all options remained open for discussion, it was

forgotten that many actors long ago made up their minds on important and strategic issues such as technical options and the best possible sites. It is easy to notice that basic assumptions and strategic choices have remained unchanged over time. So what about all these consultations? What are they about? Clearly they are not very often about taking new decisions on strategic socio-technical issues.

Problem: social aspects – are often considered of second priority – added later on as a tool for achieving acceptance to ready-made technology

Solution: discuss what could be changed and what could not be changed, and *why*?

6.4.3 Fragmented and incremental process (isolated integration).

Integrative initiatives are taking place as part of a long-standing process where important things also happen beside these initiatives. How can the risk of becoming an isolated island be avoided? And how could the results from integrative processes be taken care of when once completed? This is not an easy task to deal with and unfortunately history can be frightening. This has to do with general questions of taking care of the results of integrative activities, and getting a possibility of grasping the whole picture. What is needed is a *guardian of the process* keeping an eye on the whole picture and keeping memory alive.

Integrative initiatives are often set up as a response to crises and when these are overcome things tend to go back to business as usual, i.e. technical experts advising government decisions. In both Belgium and Slovenia partnerships are established, but only in relation to short-lived waste. Spent nuclear fuel and high-level waste has not been part of any kind of integrative initiatives. In Slovenia the focus is on siting, while technological options are not really discussed with involved municipalities. Another example is the possibility for a strong decision maker to independently decide in a way that does not rely on what has been achieved by earlier integrative initiatives. The decision taken by the Belgian Government in June 2006, about choosing surface disposal in Dessel as best option, illustrates this quite well. In Sweden, the whole consultation process in relation to the site investigations in the two municipalities Oskarshamn and Östhammar, which could be described as possible examples of integration, are taking place in a larger process mainly based on separation. The municipalities are not involved in the development of the SKB R&D programme. It is too early to evaluate the UK situation, but it would be interesting to see to what degree the process set up by CoRWM is an isolated crisis response within a larger frame of strong

technically driven parties wanting to realise geological disposal, as soon as possible and preferably close to existing facilities.

Problem: integrative initiatives tend to be isolated islands put in place to overcome a crisis on a specific topic

Solution: a guardian of the process is needed to keep memory alive and ensure integration over the long term.

6.4.4 Integration disguising separation.

Invitation to integration activities, such as partnerships, is often based on the aim of restoring public credibility for scientific and technological projects. The focus on restoration means that old boundaries between technical and social aspects are protected, while rhetorically promising collaboration among equals. In the United Kingdom, participants in stakeholder involvement activities felt there was “real danger of disappointed expectations... feelings that processes are little more than tokenistic and manipulative exercises to legitimate pre-defined policy or decision-making positions”. This example gives a picture of a technical programme run by technical experts using other stakeholders and the public for getting support, as its only contribution to the programme. In fact, a strong separation between technical actors and all the rest is maintained, however disguised by talk and activities presented as integration and stakeholder involvement. In the Belgium partnerships everyone knows that the position of NIRAS/ONDRAF is of a special kind, and not only one partner among other partners in a common partnership. The agency is viewed as the architect and the one that has answers to technical questions due to its strong technical competence. In Slovenia ARAO is the manager, and by the help of the decree of compensation it could be more attractive for municipalities to join what is described as a common partnership. There is always a risk that partnerships become a new label for an old division of labour, where technical agencies are not only strong in relation to their technical competence but also protect fundamental strategic socio-technical choices as their own business.

Problem: not only isolation: strong experts also make socio-technical choices inside integrative initiatives, disguising themselves as equal partners

Solution: be aware of differences in power (resources) and competence

6.5 Conclusions

So what is needed for making authentic integration real? Critical issues to be aware of when understanding integration and separation of technical and social aspects of radioactive waste management have been discussed. An increased understanding of the complex relationship between social and technical aspects is a good starting point for making integration real. Below the four critical issues and their connected problems and solutions are summarised once more and formulated as recommendations:

- No concealment of social aspects: technical choices are also social choices
- Social aspects are not of second priority: social aspects are much more diverse than acceptance of ready-made technology (pure social factors do not exist)
- No islands of integration: focus on the whole picture and keep memory alive
- No dishonest integration: be aware of differences in power and resources

7 Limits to Stakeholder Involvement in RWM¹⁷

While much has been said about the virtues of this turn to stakeholder involvement in radwaste policy, in particular its potential contribution to enhanced trust and legitimacy, the diversity of approaches and mechanisms used highlights the experimental nature of the stakeholder involvement processes that have been developed. It is therefore important to consider the potential limits to these participatory approaches, whether ‘internal’ limitations associated with the design and operation of a process or limits placed upon it by external conditions or authorities. In this section of the report we outline some of these potential limiting factors and their implications in relation to: capacity and resource issues; communication and relations between stakeholders and sponsors; representativeness; and issues of politics and power. Although some of these might be seen as raising issues of a practical nature, all are essentially political in their implications.

7.1 Capacity Issues

Whilst the active involvement of stakeholders in waste management processes is seen as the key to achieving successful siting processes, capacity issues can limit the involvement of a range of stakeholders, particularly those with limited resources, although this appears to have been less an issue in Belgium and Sweden than in Slovenia and the UK. Lack of financial resources imposes a very real limit on stakeholder capacity to engage effectively with the decision making process. In the UK, where the process had not yet reached the implementation stage, the resources available to CoRWM supported a wide ranging national engagement process, although even there questions were raised about the adequacy of its budget. For local government bodies, however, involvement in extensive consultation processes, even as a participant rather than a sponsor, can be a significant drain on limited resources. In the UK this has been more acute because some communities hosting existing nuclear sites have been involved in several consultation or engagement processes in addition to the Government’s Managing Radioactive Waste Safely process. The problem of financial constraints on stakeholder involvement was addressed in Belgium and Sweden by making funds available to support community engagement. Nevertheless, there are still questions about the extent to which potential stakeholders have access to these resources. NGOs in Sweden, for example, have received support from a central

¹⁷ A full thematic report by [Peter Simmons](#) on this topic is available on the CARL website.

fund to enable them to conduct research but in other countries such resources are not available; even if they were, it is clear that some NGOs would be uncomfortable accepting money directly from government or industry because it might be seen to compromise their independence.

The research also found that time constraints can constitute another significant limit on the capacity of stakeholders to engage with RWM processes. This can work in two ways. First, stakeholders may feel that they do not have enough time to really get to grips with the issues. This was particularly the case where a timetable had been set by an external body, typically as the result of other political agendas, such as the nuclear decommissioning timetable in the UK or the nuclear new build agenda in Slovenia. Two possible responses to this problem were suggested: (a) to consider carefully when in the process stakeholder involvement is necessary and how it is to be used; (b) to empower stakeholders to extend the initial timetable to allow the amount of time deemed necessary to address the issues. The second circumstance in which time constraints may affect stakeholder involvement, in contrast to this last point, is when the process itself is extended. This can make it difficult for individuals, with all their other responsibilities and commitments both professional and personal, to maintain the necessary level of involvement. The withdrawal of individuals may result in a loss of valuable skills, knowledge and experience; importantly it may also mean the loss of interpersonal working relationships that have taken time to build and which represent a form of ‘capital’ within the process. These adverse effects have largely been avoided in Belgium, although communities have been involved over several years. In the longer running Swedish process, the replacement of members has been carefully managed to try and minimise any adverse effects by actively supporting new participants during the initial intensive period of learning; nevertheless some key individuals have had to disengage to varying degrees from the process.

One other effect of involvement in extended or intensive engagement processes is what has been referred to as ‘stakeholder fatigue’. Lack of resources and excessive demands on individuals have resulted for some in stress and exhaustion. This is a personal impact with wider implications as it can undermine effectiveness and even lead to withdrawal, both of which have consequences for the legitimacy and success of the process. This has been particularly acute in the UK, where there have been multiple national and local engagement processes in recent years, but Slovenia is also facing this problem as a result of its extended siting process. Local processes in Belgium and Sweden have largely avoided overloading individual participants, showing how careful management of the process can minimise the problem.

One other factor that can contribute to stakeholder fatigue, loss of trust and even cynicism towards the process is that of expectations. During CARL workshop discussions several participants emphasised the problems that could arise if stakeholder expectations were not met, even if those expectations were unrealistic. However, talk of government or RWM organisations ‘managing expectations’ can come very close to presetting the terms of the process and allowing little scope for stakeholders to exercise influence. Much therefore depends upon establishing agreement about the goals and the limits to the engagement process. This becomes much more difficult where the views and objectives of stakeholders and sponsors are very different.

7.2 Stakeholder Competence

Another potential limit to effective stakeholder involvement is the extent of stakeholder competence. Stakeholder competence may be differentiated along a number of dimensions: level of relevant technical knowledge; level of communication skills; level of organisation of specific groups; and, associated with these, the level of motivation to engage with complex siting procedures. Building the knowledge and competence of local stakeholders has been essential to the effectiveness of the Belgian and Swedish processes. This is needed not only by local citizens but also by their elected representatives. Even in communities which already host nuclear facilities, the level of understanding of the issues among members of local decision making bodies may be quite variable; enhancing their capacity to make informed decisions would seem therefore to be a priority.

7.3 Process Design and Facilitation

Many lessons about the design of stakeholder involvement processes have already been drawn by Slovenia and the UK from experience in Sweden and Belgium. In the UK, CoRWM’s national public and stakeholder involvement process has demonstrated the importance of careful procedural design, including the specific methodologies employed to guide decision making, if the process is to be seen as legitimate and to retain the support of diverse stakeholder groups. However, as we discuss below, nationally specific contextual variables can be a significant influence on the operation of stakeholder processes: in Slovenia, for example, some concerns have been expressed that the design of the current process has not been subject to sufficient dialogue with stakeholders in order to adapt ‘imported’ models to meet local circumstances.

7.4 Feedback to Stakeholders

The need for transparency in their dealings with stakeholders and their decision making procedures has been recognised by the RWMOs in all of these countries. In Belgium and Sweden this has worked relatively well in RWMO dealings with local communities. In Slovenia there have also been efforts to give local stakeholders adequate responses to their questions, although there is also more public scepticism about the institutions that provide it. In the UK, Nirex was able to develop considerably improved relations with both national and community stakeholders. However, even where relations with RWMOs may have improved, in some countries, notably Slovenia and the UK, there was concern about a lack of transparency and adequate feedback to stakeholders on the part of central government, which made the basis for some key decisions opaque. This highlights a political dimension to the process to which we return below.

7.5 Representativeness

Adequate representation of affected groups is one of the key criteria used in evaluating the success of public and stakeholder involvement processes, although agreeing what is 'representative' may be difficult. Concerns about representativeness have arisen in three of the four countries, Sweden being the exception. This may relate to the constitution of a partnership or process; in Belgium, for example, concerns were raised about the lack of women in one partnership. The same may apply to affected minorities, particularly those that are disaffected with the relevant decision making institutions. This may in part be addressed by ensuring that all potential stakeholders have access to the resources needed to participate, including necessary financial resources; it also however raises the question of whether the way in which the process is designed or run may be seen by non-participating sections of the relevant population as excluding them, something that requires careful attention by those who are already engaged.

There is also the concern that those actively involved in local partnerships might become a community of experts and therefore out of touch with the views of the affected population. In Belgium the MONA partnership addressed this by sponsoring opinion polls to check that it was in accord with the views of local people, something that is now seen by other countries as 'best practice'. In countries where there is a weak civic culture, it may be desirable to foster representative civil society groups to act as proxies for organised local communities. However, some groups that claim to represent local interests, as with the Slovenian civil initiatives, may have no mandate from or accountability to the local community. Determining the status of

organisations or groups without closing the process to wider participation is therefore a political challenge. Furthermore, experience in both Slovenia and the UK has shown that attempts to involve critics can be difficult and that the process runs much more smoothly when they leave. This result may seem desirable but in any specific case there is a need to consider whether the loss of critical voices, whether for political or capacity reasons, could in any way undermine the longer term effectiveness or legitimacy of the process. Taking an inclusive approach to participatory processes therefore presents both sponsors and affected communities with dilemmas to which there is necessarily no simple resolution.

7.6 Politics and Power

These last two points have both pointed to questions of politics and power. These may in various ways create limits to the potential effectiveness and influence of stakeholder involvement in RWM. We have already noted comments from Slovenia and the UK about the lack of transparency of some key decisions made by central government. Although the move during the site investigation phase to a local arena may create a space for negotiation and mutual learning between RWMOs and local communities, the final decision lies with national government and at that stage the matter is taken out of the hands of the local partners. It may therefore be stating the obvious, but nonetheless necessary, to note that one limit upon these stakeholder involvement processes is that ultimately they do not have that power; although in some cases communities may have a power of veto, central government generally retains the right to overrule local decisions. While a learning-based approach is to be applauded (cf. Collins & Ison, 2006), it would seem naïve to assume that this nullifies interest-based politics and the operation of power.

A second rather obvious point to note is that despite past attempts to involve a wide range of communities in the search for potential repository sites, evidence to date in the CARL partner countries is that siting efforts have been most effective when they focus on communities hosting existing nuclear facilities. There may be less distrust and anxiety associated with nuclear issues in such communities, as well as less overt concern about stigma effects; they may also possess relevant knowledge and competence through involvement with the industry. Another side of this situation, however, is that those communities already marked out by and to a greater or lesser extent dependent upon the nuclear industry may be the most susceptible to pressures to host a repository. This is particularly the case if they already have on their sites much of the waste, as the failure to find a solution would leave them with the waste in any case. The positive view of

this is that their relatively unique situation can put them in a strong position to negotiate favourable terms for accepting a repository and to place requirements on its operation; against this, however, is the sense that for a variety of socio-economic reasons these communities may have little choice and that, despite the community benefits on offer, there is an implicit and complex equity issue here that merits further examination.

There are several other ways in which politics and power may constrain the potential of stakeholder involvement processes. At the broadest level, a range of nationally specific factors may bear on the approach to and operation of such processes. These include: prevailing political cultures, for example, the extent to which they are antagonistic/consensual, or the extent to which relations between institutions and citizens are participatory, delegated or disengaged (see, for example, Eatwell, 1997), levels of social trust among stakeholders and between citizens and political institutions (see, for example, Kaase, 1999; Norris, 1999: pp. 169-178), and the distribution of political power among stakeholders, which may be asymmetric or symmetric, concentrated or distributed). This has significant implications for notions of cross-national 'learning', suggesting that there is a need for sponsors to take into account these key contextual variables when considering the transfer of models and procedures for stakeholder involvement from one country to another. It has been suggested in relation to natural resource management problems that if such contextual constraints are to be overcome and the solutions arrived at are to be generalizable to other contexts, it is necessary to develop innovative forms of information and communication and novel arrangements to enhance trust (Ostrom, et al., 1999). Certainly the initiatives that we have studied in the radioactive waste management field represent attempts at just such innovations. Nevertheless the design and functioning of such new institutional mechanisms to support stakeholder involvement might also be enhanced if participants maintain an awareness of the sources of power and the means by which these can be exercised within participatory processes: for example, through control of resources; control of knowledge (or control of what constitutes legitimate knowledge); or control of the definition of the situation, that is the way in which the problem is commonly understood, to the extent that some factors or circumstances may go unquestioned. These final considerations, although summarised in quite general terms, can be traced in more concrete form in the analysis of different aspects of the different national processes described earlier in this report.

8 Conclusions: Living with the Unwanted

It is never easy to make generalized statements after comparing a very diverse set of practices in even more varied contexts. Nevertheless, at least three general conclusions may be drawn from the CARL research project.

8.1 Multiple perspectives on the radioactive waste problem

As with any complex policy problem, the radioactive waste problem is viewed, or ‘framed’, from distinctively different perspectives. Particularly in the public debate, in the discussions on the future of nuclear energy and the question of the ‘solvability’ of the waste problem (more or less the ‘what’ and ‘why’ questions referred to in section 5) the most extreme perspectives appear to have been the more dominant. This tendency to turn debate into a principled discussion between ‘pros’ and ‘antis’, ‘believers’ and ‘non-believers’ in the manageability of radioactive waste, also appears to have been the case for most non-nuclear communities that have at some point in the past been considered to host a repository facility (e.g. the situation in Belgium after the NIROND 94-04 report identifying 98 potential sites for a LILW surface repository; or the local ‘war’ fought between the ‘yes’ and ‘no’ camp in the run up to - and aftermath of - the municipal referendum on whether or not to let SKB continue site investigations in the community of Storuman in Sweden¹⁸). These kinds of events and principled discussions in the public debate give the impression that the radioactive waste problem is predominantly framed by the wider society in terms of an unmanageable risk, forcing experts in radioactive waste management onto the defensive in order to prove the non-believers wrong. This ‘culture of confrontation’ has been an important factor in the crises that have been encountered in most siting processes in the last decades of the 20th century.

The question about the manageability of the waste, however, can only be well and truly answered by real life experience. The claim that nuclear risks are unmanageable and ‘uncontainable’ seems just as much an overstatement and non-demonstrable hypothesis as it is to promise absolute safety. The guarantees for ‘absolute safety’ demanded in the 1977 Swedish Stipulation Act were therefore rightfully criticised and consequently dismissed as unreasonable, unscientific and purely politically motivated. Whether a risk is considered tolerable or not, will never be something that

¹⁸ For an interesting account of these events, see: Drottz Sjöberg, 1996.

can be determined by science. It will always entail a mixture of facts and values and will remain a matter of judgement and of (personal and collective) choice (Fischhoff, et al., 1981).

Radioactive waste managers across Europe have turned to more participatory and voluntary approaches, with a focus (in some cases deliberate from the outset, in others more inadvertently) on existing nuclear communities. It is significant that, to date, in none of the CARL countries has the introduction of a voluntary siting process encouraged non-nuclear communities to participate fully in an incentivised site selection process for a radioactive waste repository. In Sweden and Finland (for HLW) and Belgium, Slovenia and Canada (for LILW), waste managers ended up looking for suitable sites in existing nuclear communities, with the few non-nuclear communities (like Storuman and Måla in Sweden) that did initially consider participating in the site selection process, withdrawing at a relatively early stage in the process.

In these volunteering nuclear communities, which in almost all cases are communities already hosting either interim storage or other types of radioactive waste facilities, the radioactive waste problem tends to be framed in a more nuanced and pragmatic way. The reactions from participants in various stages of the continuing processes we have analysed, and the statements taken from in-depth interviews in the course of the CARL project, show many commonalities with what Giddens (1990) has described as adaptive responses to living with risk. The responses in those communities to living with the waste (and often also other nuclear activity) are far from homogenous and in many ways display the whole range of adaptive responses that Giddens identifies, namely pragmatic acceptance, sustained optimism, cynical pessimism and radical (political) engagement (Giddens, 1990; cf. Simmons & Walker, 1999). However, even though perspectives on the radioactive waste problem within these communities vary considerably between individuals, it seems appropriate to say that broadly speaking, these communities tend to develop various forms of 'pragmatic acceptance' of their fate, rather than embracing enthusiastically the prospect of hosting the nation's radioactive waste for eternity.

It certainly appears to be the case that some established nuclear communities already hosting reactors or other nuclear facilities are more prepared than communities without a nuclear history to place their faith in the safety cases of additional facilities, provided no major local incident has encouraged them to think differently.¹⁹ A somewhat higher trust in experts can be assumed here,

¹⁹ That is not to say, of course, that this would be a matter of course for all nuclear communities.

primarily based on personal experience that nothing major has gone wrong so far or a direct or indirect involvement with the experts. It could indeed be argued that these communities have already been taking calculated chances (consciously or unconsciously) with nuclear activities for years and are relatively accustomed to what outsiders would regard as 'living dangerously'. Other communities may not be so easily persuaded to put their faith in expert calculations and see no immediate reason why they should even try to do so when this has not been required of them in the past.

Next to these social psychological factors, such as fear or trust, structural factors also contribute to this pragmatic acceptance. Many communities already hosting nuclear activities - and in particular those hosting interim storage facilities - recognise themselves as the only places for the siting process to go. Thinking about the waste in terms of an unmanageable risk, is not apt to enable those communities to face the challenge of 'living with the unwanted'. Building a sustainable and acceptable relationship with the waste being 'collected, contained and isolated' in their community is as good as impossible if starting out from a relationship of fear. However unpopular or mistrusted a waste management agency may be in these nuclear communities, to save their own lives and sanity the people living there need to live with the hope that there may still be a way to 'manage the unmanageable'. But that does not mean that these people do not avail themselves of other perspectives and take up positions that are more in line with Giddens' cynical pessimism or radical engagement, for example. Incidents abroad, stories of historical mismanagement at home, all play a part in these local people's framing of the radioactive waste they have to live with every day (cf. MacGill, 1987; Zonabend, 1993).

It is therefore necessary not to take for granted the apparent acceptance in the communities concerned and to acknowledge it as evolving and susceptible to changes over time in, for example, the perception of and trust in the RWMO and its experts. Just because there exist structural factors that to some extent predestine certain communities their acceptance cannot be taken as a given; nor can it be assumed that the local people are willing to settle for just about anything, as Nirex found in West Cumbria in the 1990s. Local acceptance is a vulnerable thing and differentiated in nature, for it is always conditional based on elements such as the amount of trust and confidence people have in the management of the risk, the existence of trade-offs, or the feeling of personal engagement and choice people may or may not experience. In this respect the concept of 'tolerability' has for some time been suggested as an alternative to the notion of 'acceptability' in both risk policy practice and social scientific literature, for it puts the emphasis

more on the 'putting up with' a particular risk, rather than willingly accepting it (see for example: HSE, 1988; Simmons & Walker, 1999). Continuation of a stable, open and honest relationship between the responsible agencies and communities is therefore needed, paying due attention to the broad range of contextual elements that constitute this fragile local acceptance or tolerance.

8.2 On Governance and participation

As the thematic section on governance suggested, there appears to be a hybrid governance system emerging, using both traditional and innovative practices and rationales in order to try and find a solution to the radioactive waste problem. This to a large degree reflects the political *zeitgeist*: today participation is recognised as a necessary condition for legitimate and sustainable democratic decision-making. It is, even if not in the most radical of terms, quite firmly embedded in EU law, exerting a certain level of top down pressure, while in the meantime growing citizen expectations create pressure from the bottom up. But what has been achieved in the field of radioactive waste management seems to go further than in most other sectors and can in many respects be considered unique and innovative.

Social scientific literature on participation, participatory processes and the evaluation of such processes has paid substantial attention to the influence participation has on decision-making processes and the extent to which participation can empower those affected by the decision. Such concepts of influence and empowerment are difficult to measure. For example, across the CARL countries there has been a distinctive increase in the range of actors that have provided inputs to the development and implementation of radioactive waste management policy and, in some cases, the sharing of responsibility between certain actors in the search for a safe and legitimate solution to the problem of legacy wastes. Nevertheless this does not as yet seem to have gone as far as a full power sharing or 'co-governance' in decision making. The question is whether this degree of empowerment is needed in order to come to shared solutions that are acceptable to all, or at least most, of the parties involved.

Public and stakeholder participation can have many different purposes and come in many different forms. Each kind of participatory approach is not necessarily well fitted to every kind of decision or engagement issue, and different levels of engagement may be required for different (policy) questions. Different schematic presentations have in this respect been developed to categorise different levels of participation and their suitability for addressing particular questions.

One example is that of Fishhoff's seven developmental stages in risk management, moving from "getting the numbers right", to "explaining the numbers" to those concerned, to "making them partners" (Fishhoff, 1995); another is the five stage "ladder of participation", ranging from (1) being informed, over (2) being consulted or (3) giving advice, to (4) co-producing policy and (5) even co-deciding on policy (see for example: Pröpper & Steenbeek, 1999: pp. 28-46). Stakeholder participation as we have witnessed in RWM in the CARL countries can be broadly situated in the area between giving policy advice and co-producing policy. In most instances, the (final) decisions as such have not been opened up to forms of co-decision-making. The reason for this is maybe not even in the first place to be sought with the responsible RWM agencies; other structural and contextual elements also play a part in creating opportunities for power sharing and co-governance. Governments everywhere remain rather selective in their support for public and stakeholder involvement; allowing strategic use of such arrangements for specific ends, while keeping to less open approaches in other policy areas. Governments and the political elites, particularly on the national level, should not therefore be expected to become the major advocates for participation. Even NGOs are sometimes ambivalent in their response to participatory, community-based processes that remove the issue from the national political arena and from which they as national interest groups may be excluded. Therefore, affected communities will themselves have to keep playing a crucial role in ensuring that participation remains a required part of every aspect of the complex long-term process of siting and managing the waste, not merely a short-term tactical response to increasing scepticism and previous policy failure.

In this respect it will be of interest to see how the Belgian process develops further, now it has moved from a siting to an implementing stage. With the introduction of a steering group between both the local partnerships and NIRAS/ONDRAF to take operational decisions on the design and development of the repository project and with the practical engagement of local actors in, for example, the drafting of the calls and evaluation of tenders for study and design work commissioned by NIRAS/ONDRAF, there seems some tendency toward forms of co-decision, even though mainly focussed at the operational level. In Sweden, the decision on a site and consequent entering into a licensing application stage, will in the near future also have an impact on the power balance between the concerned players, but in the meantime creates new opportunities for re-shaping stakeholder involvement. If one acknowledges the need for stakeholder empowerment, then seeking active alliance with others in the same situation will help

better equip actors for this inevitable task, by establishing mechanisms both for experience sharing and learning, and for jointly raising a louder voice.

As we saw in section 4, engagement processes to accompany siting processes at the local level have led to the generation of two-tier policy networks, with few connections between the national and local layers. As a result, affected communities can often only exercise an influence on siting policy through the waste management agency, which forms their main link to the national policy network. As long as there is no need for national intervention (*e.g.* a decision to confirm a site, a licensing application, an agreement on costs and financing), the waste manager, in most countries, has more or less a free hand in organising its work and accomplishing its mission. With regard to siting, all four RWMOs have committed themselves to engage with local actors in preparing their positions and their strategies vis-à-vis the other policy makers on the national level. So, as long as the RWM agency and local actors can see eye to eye and the agency perceives its relationship with the affected communities as key in gaining acceptance and legitimacy for its mission, a good part (if not the main part) of the decision-making can be conducted at the local level. The question remains what would happen if they no longer see eye to eye and if this were to be the case in all existing nuclear communities in a given country.

8.3 The entanglement of the socio-political and techno-scientific aspects of radioactive waste and its management

Recognition of the importance of social aspects of radioactive waste management is practically universal today. But this recognition has thus far not led to a thorough integration of the social and the technical aspects in the decision-making. Participation is often focussed strongly on the social aspects, while the technical aspects remain to a large extent ‘contained’ in the techno-scientific community. That is not to say that technical issues are not being brought into the public arena, but that this is still mostly done only after the technical experts have come to the conclusion that this should be the solution to the problem. Although the crisis in the UK has forced a return to first principles to examine the technical options.

Moreover, the social in practice is often reduced to the socio-economic; to debates on the desirability, ethics and suitable content (or acceptable amount) of so called ‘community benefit packages’. The social, however, is far more than that. It is about securing a sustainable (long lasting and stable) relationship with the waste and the waste management system. It is about people feeling safe and fairly confident that reliable management structures - including the

necessary financial provisions - have been put in place, not just for the day to day management, but also in the case of an emergency situation. It is about allowing affected communities to say “no” to technical options they do not trust or cannot relate to. Furthermore, it is about what constitutes legitimate knowledge; about technical choices and decisions never being truly separable from the social, economic, political and regulatory context in which they are taken. It is about how to bring together different knowledge systems and integrating their respective cognitive perspectives into a sustainable solution. It is, finally, about finding creative solutions to a problem that is not only technically, but also socially, politically and economically complex.

As we said in the introduction, radioactive waste management, and in particular the siting of repository facilities is very much a ‘wicked’ or ‘messy’ problem. It is most notably so, because it is in the end dependent on political judgement to solve, or bring temporary closure to, the problem. No matter how technically dominated an issue such as deep geological disposal of HLW may be, politics will inevitably be a decisive factor in acknowledging deep disposal is indeed the way to proceed and in deciding where such a disposal facility should be located. The Dutch decision to opt for prolonged interim storage for 100 years before reopening the problem and reconsidering the options demonstrate that such political closure does not necessarily have to coincide with the prevalent opinion in the techno-scientific community.

The technical-social divide is therefore largely an artificial one. As argued in the introduction, from the very beginning, the definition of what will be regarded as waste and what as a resource is not just a technical, but also a political statement and choice. The same could be argued for example for the issue of safety. “Safety first!” has become the mantra both of the experts and of affected communities, but do they all really refer to the same thing? Relatively intense public and stakeholder involvement has up to now been focussed on finding a site, the one site everybody has been waiting to be found for decades. But the Belgian case has recently shown that the process does not stop with the selection of a site. It is likely that in the phases following this site selection (i.e. the further development, licensing and implementation of the repository project), the issue of safety and safety demonstration will move again to the forefront. Regarding the demonstration of safety and the building of safety cases as a purely technical exercise, of which only the end results need to be communicated to the public and those affected, would seem not only rather a blinkered view in light of previous conflicts over precisely such issues, but also a missed opportunity for a more integrative approach towards the technical and the social. Such integrative efforts, designed to ensure convergence between technical and political/security

requirements and neighbours expectations and needs, could also be made in relation to the design, accessibility, monitoring and so forth of the repository site.

To conclude, we think that the biggest challenge for the future lies in a working towards a closer integration of the technical and social aspects and in finding ways of meaningfully opening up the technical 'black box' to the mutual benefit of both experts and society. This will undoubtedly require continued experimentation with methods of and structures for engagement between those concerned, in order to explore the potential of and limits to participatory arrangements. The conclusion that there is need for a stronger integration between the technical and the social should not be understood as reproaching the experts for continued secrecy or unwillingness to enter into dialogue; it is merely an observation that we are witnessing a process that may still not have reached its full maturity. This is not to presume that a process of socio-technical dialogue will 'solve' the problem in a straightforward sense: the CoRWM process in the UK for example opened up both technical and social aspects of the problem and came up with recommendations that received a positive response from the UK Government and were widely supported by many stakeholders. However, a change of government in Edinburgh from Labour to Scottish National Party led to the rejection of geological disposal in Scotland, even though the Scottish Executive had been a co-sponsor of the CoRWM process. Hence even if the technical is opened up, the 'revenge' of the political is always a possibility.

Recognising the existence and importance of social aspects in radioactive waste management and acting upon it by taking a 'participatory turn' has been a first step which has already led to impressive results in countries like Sweden and Belgium. But in spite of emerging good practices and well-meant initiatives from both sides, we nonetheless detect the need to safeguard what has been gained thus far, not by securing the trenches, but by looking for ways to deepen even further the interaction between experts and (affected) citizens. This is not about the latter having to become experts in themselves and making scientific judgements. It is rather about the scientific and expert community becoming more reflexive about the social assumptions implicit in the technical work, as well as continuing the efforts to make the technical debate accessible to lay-arguments and more responsive to social needs. This will not be an easy task and is certainly not one that can be accomplished by instantaneous policy prescriptions. But the lengths that citizens and experts in for example Sweden and Belgium have gone through over the last few years, demand that we should not aim for a standstill, but for a second phase in the process of developing a sustainable relationship between the waste and its host environment (whether it be geological, ecological, social or political).

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