ROLE OF THE HOST COMMUNITIES IN FINAL DISPOSAL OF SPENT NUCLEAR FUEL IN FINLAND AND SWEDEN

M. KARI
Tampere University, Faculty of Management and Business
Tampere, Finland

M. KOJO
Tampere University, Faculty of Management and Business
Tampere, Finland
Email : matti.kojo@tuni.fi

M. LEHTONEN
Universitat Pompeu Fabra
Barcelona, Spain

Abstract

Finland and Sweden are the countries with the most advanced plans for final disposal of spent nuclear fuel (SNF). The OECD Nuclear Energy Agency's Forum on Stakeholder Confidence (FSC) has evoked both countries as good examples in the use of a 'partnering' approach, designed to achieve both a licensable site supported by the community and a balance between fair representation and competent participation. While both countries are consensus driven high-trust societies, with similar technological concept for SNF disposal, and whose licensing processes have advanced at fairly similar pace, both also possess their own distinct characteristics. One difference concerns the role of the communities in siting and licensing of the repositories. The paper examines 1) the background for this differentiation, 2) how local final disposal organisations in the host communities Eurajoki and Östhammar took shape and evolved, and 3) how differences between the organisations illustrate the divergence between the Finnish and Swedish approaches to stakeholder engagement. While the Swedish approach can be characterised as 'involved partnership' – which shapes the operating environment for the implementer and authorities, by challenging and even modifying the policies and actions – the Finnish case could be described as a 'bystander partnership' characterised by trust in safety authorities, with community economics as the primary concern.

1. INTRODUCTION

Top-down, unconsultative siting approaches of Decide Announce and Defend (DAD), imposing radioactive waste facilities on communities, failed and were rejected by especially local publics in various countries during the 1980s and 1990s [1]. These failures led for example OECD's Nuclear Energy Agency (NEA) to conclude that, to enable decision-making regarding nuclear waste management (NWM), changes in the decision-making environment and public sensitivity required approaches entailing thorough public examination and stakeholder involvement. Moreover, practitioners clearly acknowledged that problem definitions and their own role in the process had evolved. [2] As the technocratic management was deemed counterproductive, it became replaced by more communicative and participative governance, as part of the subsequent 'participatory turn'. However, the new approach did not simply replace the old one, but instead resulted in the creation of hybrid systems, reshaped actor relationships and modified the boundaries and levels of participation. [3]

NEA [4] has advocated the partnership approach as an effective way of achieving a fair representation, competent participation, and community support to ensure a licensable site. It has argued that key elements of the partnership approach have been incorporated by most of the OECD countries and increasingly worldwide. The key components of a partnership approach are: voluntarism, formal or informal right of veto by the affected community, collaboration with local stakeholders, and the provision of community benefits packages, thus placing local community firmly in centre of the siting process [4]. Both Finland [2,4] and Sweden [4] have been considered as examples of countries where partnering has been implemented. In view of the experience in these Nordic forerunner countries, partnership arguably appears as rather successful. The Swedish National Council for Nuclear Waste [5] has also stressed the role of the municipalities as one of the three main actors in final

disposal, along with the industry and the state. The municipal right of self-determination concerning the siting of industries and land use in these countries means that the opinion of the municipalities is decisive in siting decisions. Furthermore, already in 1994, Lidskog suggested that the municipality – interconnecting the civil society, the state and the economy – can become central actor in waste management [6]. In Finland, the right of veto held by the host community has been seen as a success factor, but municipalities are not seen – neither in discourse nor in policy practice – as active players in NWM [7].

The purpose of this paper is to explore the role of the local communities as actors in SNF management via an examination of the repository projects in Eurajoki and Östhammar, the hosts for the final disposal of SNF in Finland and Sweden.

The structure of the paper is as follows: Section 2 focuses on the development of the partnership approach internationally. Section 3 describes data and research methods. Section 4 describes the siting strategies and Section 5 the institutional arrangements of partnership in Finland and Sweden, so as to provide a background for the two case studies analysed in Section 6. Section 7 concludes that the Swedish case is characterised as an 'involved partnership' whereas the Finnish case is described more as a 'bystander partnership'.

2. PRACTICES OF PARTNERSHIP

In the late 1990s it was becoming clear to the NWM community that the societal dimension related to waste management warranted increasing attention due to difficulties encountered, even though this dimension had until then not been seen as truly an element of radioactive waste management. NEA created the Forum on Stakeholder Confidence (FSC) in 2000 to address the issues in the area of public perception and stakeholder confidence. Recounting its key findings in 2004, FSC reported that stakeholder involvement had become central and that the general trend towards a more participatory democracy required more dialogue also in NWM. Local development and the needs and views of the affected communities should be taken into account to achieve a licensable site with community support. [3] Partnership approaches, especially in Belgium but also in Finland and Canada, were highlighted as good examples and partnership was evoked as an effective means of achieving a balance between fair representation and competent participation [3, 4]. Also the British Commission on Radioactive Waste Management (CoRWM) and the European Commission funded COWAM2 research project advocated in 2006 local partnership as a model for NWM [4,8]. Recently also the UK Policy Paper [9] and the Final Report of RESET [10] have emphasized the need for partnerships.

Originally, the ‘partnership approach’ for NWM was developed as a methodology that would allow the Belgian radioactive waste agency ONDRAF/NIRAS and a potential host community for low-level radioactive waste to engage in negotiations with each other. Social acceptance had become a prerequisite for the feasibility of a disposal solution, as public opposition and governmental decisions had compelled ONDRAF/NIRAS to change its NWM strategy and adopt a voluntary siting process. Behind the approach was idea of collective decision-making in democracy as negotiation – and that stakeholders should have the opportunity define their own interests, rather than having NWM experts and authorities to define them. Involving different parties in the decision-making process was considered as the best way of taking the interests of all parties into account. [11] Bergmans [12] has defined the partnership approach as a “semi-voluntary approach to identify a suitable site, based on site-specific repository design and local participation in decision-making through the joint development of an integrated repository project”, and highlighted certain key issues concerning the approach: availability of resources and time, relative independence of a local partnership, co-design and co-ownership, and stepwise decision-making.

However, FSC raised partnering to the fore as an umbrella term for certain types of engagement practices. In 2010, based on an analysis of the evolution and practices of partnering in 13 countries, NEA [4] outlined the partnership approach as a collaborative working relationship between the implementer and the affected communities, while other institutions could also play a role. Partnership was seen to support active involvement and joint problem solving, instead of passive acceptance, and redistribute power through negotiation, empowering the local community. A partnership would provide continuity and a non-adversarial manner to address arising issues, and could emit a credible judgment and deflate tensions. While NEA concluded that the composition, intensity and formality of partnerships could vary greatly, it nevertheless identified certain main components. These included voluntarism, right of veto, collaboration in facility design

and implementation, and benefit packages. Typically, partnership arrangements also included conditions for continued participation and measures for empowerment of local communities. [4] Later on, NEA further elaborated its definition of the partnership approach, describing it as "a formal or informal arrangement between the radioactive waste management implementer and representatives of the local community to work together to assess technical and socio-economic issues", and noted that the regulator can be part of the partnership or is usually at least aware of it, due to partnership related requests (e.g. for regulator's briefings for community) [13].

Initially, partnerships were envisaged as a means to promote participation and trust after an era dominated by top-down approaches. Early partnerships were essentially local information and/or monitoring committees, and local liaison committees typically with little influence on the decisions. Later on, NEA has concluded, however, that at the level of partnership, power should be reapportioned through negotiations and the parties involved should "agree to share planning and decision-making responsibilities through such structures as joint policy boards, planning committees and mechanisms for resolving impasses". [4] The shift from informing to partnering, from token involvement to influence, has been paralleled by other shifts: communities' role from passive to active, from resigned acceptance to collaboration and voluntary involvement; new appreciation of the need and legitimacy of community empowerment measures and socio-economic benefits; and, new frames for collaboration concentrating on mutual learning, added value and sustainable development. [4] NEA considers that "[c]o-framing the issues for consultation, evaluation or decision helps to achieve quality and legitimacy, especially in contentious situations" [14]. A partnership enables pertinent issues and concerns to be raised and addressed, understanding and learning, and developing added value to community [4, 13].

3. METHODS AND DATA

The analysis adopts a comparative case study approach with special interest in long-term changes. The cases of Eurajoki and Östhammar were selected for analysis as the repository host communities in Finland and Sweden, generally deemed as the forerunners in final disposal of SNF. A comparative approach is fruitful because although the social and political structures in both Sweden and Finland follows a Nordic welfare society model, there are differences in the ways in which partnerships have been nurtured in these countries. Focus on long-term changes helps to show how and in part why the municipal approaches were modified over time. Moreover, highlighting the differences helps to better understand the smooth progress of these SNF disposal projects. The aim is to contribute to research on partnerships in the field of radioactive waste management, particularly to the understanding of the evolution of the role and activities of host municipalities.

Our comparative analysis includes the use of different kinds of data such as documents published by municipal authorities, which helps us to trace the development of the municipal approach in these two cases. Also previous research regarding the topic was consulted. Moreover, our case study approach is tailored to analysing both the national context (i.e. institutional arrangements and site selection strategies) and the local level (i.e. the municipal approach itself). The thick descriptions of the cases are characterized by a holistic and process-oriented focus. As often in case studies, the boundary between the case and the context is blurred. [15]

For Eurajoki, the material consisted of municipal documentation related to the issue and the minutes of three liaison committees: (1) The liaison committee between Eurajoki municipality and the nuclear utility TVO, established already in the late 1970s. The main task of the committee was to offer an arena for discussing practical questions related to the activities of shared interest to both parties. (2) Another, more focused, joint committee between TVO and Eurajoki was established towards the end of the 1980s, when the preliminary site characterizations began. It served as an arena for discussion and information exchange on issues related to bedrock investigations. In late 1990s, issues related to Environmental Impact Assessment (EIA) were also discussed. Later, Posiva replaced TVO on this committee. (3) The Vuojoki working party, established in 1998, dedicated to discussion on further cooperation between Eurajoki and Posiva. [4, 16] From 2013 onwards the separate liaison committees between Eurajoki and TVO and Eurajoki and Posiva were merged. Unfortunately, despite many requests, we could not obtain from TVO the copies of the minutes of this new group.

In the case of Östhammar, the source material consisted of the annual activity reports of the municipality's final disposal organisation, from 1997 to 2018. We analysed the reports from (1) the Reference group (Referensgruppen) 1997–2003, (2) the Preparatory and Reference group (Beredningsgruppen, Referensgruppen) 2004–2005, (3) the municipality's work on SKB's site investigation 2006, (4) the Final disposal project (Slutförvarsprojekt) 2007–2009, (5) the Review organisation (Granskningsorganisation) 2010–

2013 and (6) the Final disposal organisation (Slutförvarsorganisation) 2014–2018. In addition, the reports of the SKB, the Swedish Government Inquiries series (Statens offentliga utredningar, SOU) reports, were consulted.

4. FLEXIBLE SITE SELECTION STRATEGIES

4.1. Sweden – voluntariness as the principle

Repository siting in Sweden started with a systematic geo-scientific research programme at the beginning of the 1980s. Escalating protests and opposition forced SKB to discontinue the test drillings in 1985 [17].

As Elam and Sundqvist [18] have documented, after discontinuation of field studies, SKB postulated in 1986 that besides geology also "other factors of importance to society can be weighed in". Later, in 1989, SKB determined that other factors could be "accorded greater importance in the siting", and finally in 1992 concluded that the selection of candidate sites should at the first stage not be based on geological considerations at all, but on pre-studies in municipalities that express "an interest" [18]. Hence, at the end of 1992, SKB was ready to turn the tables on the opposition, by sending a letter to every municipality in the country, inviting volunteers for feasibility studies [18].

SKB's decision changed municipalities' standing in the process. In this new situation both the implementer and the municipality can be seen as strategic actors negotiating their interests [19]. The municipality has an opportunity to voice its interests, give its input to the process and stands to gain prosperity, and the implementer, in turn, surrenders some control over the process but stands to gain legitimacy for its aspirations and chance to conduct investigations [cf. 18]. However, the opportunity interested only a few remote municipalities [20] and SKB had to, again, come up with a back-up plan.

At the same time, siting of the central temporary storage facility for long-lived radioactive waste (CLAB) in Oskarshamn and of the repository for short-lived radioactive waste (SFR) in Östhammar had not posed any significant problems. SKB therefore considered that "opportunities in municipalities that already have nuclear activity should also be explored [translation by an author]" [21] and that "it is of interest to conduct feasibility studies in municipalities with existing nuclear activities" [22]. The nuclear communities considered as the most promising were informed of SKB's interest, confirmed via a letter in May 1995. As a result of a series of disappointments, SKB ended up to the negotiation table with experienced community stakeholders recognising "a strategic opportunity to re-negotiate their established relationship with SKB" [18]. Thanks to the change in its siting strategy, SKB was able, in the end, to carry out feasibility studies in eight municipalities in 1992–2000. Oskarshamn and Östhammar, the hosts of CLAB and SFR, agreed to participate in site investigations, which finally started in 2002. [19]. SKB announced Östhammar as the host community of the repository in 2009.

4.2. Finland – a semi-voluntary approach

In Finland, the state-owned Imatran Voima (IVO) transported SNF to the Soviet Union and Russia until 1996. The privately owned TVO, however, found out that international reprocessing or final disposal options were not readily and cost effectively available. The working group set up by the Ministry of Trade and Industry concluded that if an international contract could not be achieved by 1983, investigations for a domestic option should be started. After having screened geology in the entire country in 1983–1985, TVO submitted to the authorities a list of 102 potential areas. While others were selected via a systematic elimination process, Olkiluoto in Eurajoki, as the host of TVO's nuclear power plant (NPP), was added to the list based on a separate review. After initial screening by the authorities, the number of areas was reduced to 85. TVO informed in writing all municipalities hosting potential areas and proposed discussions on potential bedrock investigations. [16, 23].

The initial idea was that TVO would choose 5–10 areas for preliminary site characterization by the end of 1985, but as the schedule was not met, the Ministry of Trade and Industry urged TVO to choose the investigation sites one by one. TVO announced the first site in 1986. However, because of local resistance and media attention spurred by the Chernobyl accident, the investigations stopped before they had even properly started. Formally, TVO needed the permission of the landowner only for the site investigations, but after the failure the company realized that local political support was needed. According to Nikula et al. [23], a favourable stance on the part of the municipality influenced TVO's decisions, alongside landownership and

geological conditions. TVO wanted to initiate discussions with the municipalities but did not request their formal consent before starting the investigations. Therefore, although the proposed municipality has a right of veto in the Decision-in-Principle phase the strategy can be called semi-voluntary when compared to Sweden.

In 1987, TVO named five sites for preliminary site characterization and, after two of the sites were eliminated because of geological uncertainties, detailed site characterizations were started at three sites in 1993 [23]. Additionally, after the amendment of the Finnish Nuclear Energy Act in 1994, which banned the export and import of nuclear waste and terminated IVO's SNF transports to Russia, also Loviisa, the host community of IVO's NPP, was brought in to the siting process as a special case, in a similar manner as Eurajoki earlier. The detailed site investigations started in Loviisa in 1997. [24]

In 1999 Posiva concluded that the main differences between the sites arose from the fact that, as nuclear communities, Eurajoki and Loviisa would be more willing and prepared than other two candidates to accommodate final disposal facility. Final disposal would induce less fear and anxiety, there would be less image problems and the majority of residents would be willing to accept the facility. The residents had a more positive attitude towards final disposal on the whole, and the facility would generate less commotion, as nuclear operations were already an important factor in the communities. [24]

5. INSTITUTIONAL ARRANGEMENTS OF THE PARTNERSHIP APPROACHES

5.1. Sweden – resources for municipalities' own review and informing activities

The institutional arrangements of Swedish partnership approach, influenced in many ways by activity of municipality of Oskarshamn, had five characteristics relevant for our analysis. First, the municipalities can apply for funding from nuclear waste fund to review SKB's work and inform citizens. The financing act was amended in 1995. Second, the municipality has a veto right. The Minister of the Environment has assured that the government will not consider overruling the municipal veto as an acceptable way to abolish opposition towards a final repository, and that the veto right would not be forfeited by allowing SKB's investigations. Third, the importance of environmental legislation was enhanced and status of EIA-groups was made official. Fourth, the national coordinator was appointed in order to coordinate information, contacts between the various actors, and efforts of the municipalities concerned. [18, 19] From this improved position communities were able to impose far-reaching demands on SKB [cf. 25], which leads to our fifth point: Östhammar and Oskarshamn were able to influence the allocation of compensation. The two municipalities announced that they would reject the final repository unless some form of compensation would be offered also to the municipality that would not be selected as a host for the repository. The agreement on the Added Value Programme, guaranteeing that the 'loser' in the race for the repository would receive the majority of the compensation, was concluded between SKB and the municipalities in 2009 [26].

5.2. Finland – veto right on site selection and tax revenue as an economic incentive

The institutional cornerstone of the Finnish partnership approach is the veto right that the Nuclear Energy Act offers to the proposed host municipality. The increased property tax on nuclear facilities constitutes a significant economic incentive. Unlike in Sweden, the Finnish municipalities have not been particularly eager to build their own competence concerning final disposal of SNF in general or repository safety in particular, despite the fact that safety has been the top concern of residents [27]. Knowledge management and evaluation were raised as an issue in Finland, but no initiatives were implemented to improve awareness and local decision-making in practise. However, in the late 1990s the municipality of Loviisa requested that municipalities be provided funding to enable them to review Posiva's plans. No funding was granted, but instead the representatives of the four candidate municipalities were invited to the co-operation group for the social science studies of the Public Sector's Research Programme on Nuclear Waste Management JYT2001.

Along the missing funding for the municipalities for independent reviews and assessments, three other reasons for the weak interest of the municipalities in competence-building can be identified. First, NWM has been perceived as a "purely technical" issue, leaving little room for social aspects. Second, confidence in the Finnish Radiation and Safety Authority (STUK) has been exceptionally high [27]. Third, safety issues were excluded from the EIA process, which was the main forum for public discussion and participation during the

site selection process in the late 1990s [24]. Although local opposing groups raised some concerns and introduced alternative technical concepts, the safety issue was depoliticized at the local level, and safety analysis was delegated to STUK.

6. MUNICIPALITY APPROACHES TO FINAL DISPOSAL IN EURAJOKI AND ÖSTHAMMAR

6.1. Östhammar, Sweden

6.1.1. Preliminary study and site investigation phases

In Östhammar competence building started in 1995 with modest and straightforward organisation. The Reference group, comprised of representatives of all political parties in the municipal council was created, in order to follow, review and assess SKB's preliminary study and provide information to citizens, as well as, receive information from citizens and forward it. To assist Reference group, consisting seven members and a secretary, a working group of four civil servants was also formed. Reference group participated in various study visits and seminars and enlisted regional university to review SKB's work. Moreover, the reference group also participated in county-led EIA-group, in which communities in concern, SKB, the investigative authorities and National Coordinator on Nuclear Waste were represented. Reference group's work resulted in a number of questions and proposals for additions and corrections, which were reported together with SKB's responses in the end report of Östhammar's preliminary study, in 2000. [28] After SKB had supplemented its research accordingly, the municipality agreed to the site investigations on certain conditions. In the contract with SKB municipality stipulated e.g. unlimited access to investigation results, being kept well informed about the progress of the investigation and that Reference group's ideas and views had to be given due attention. Additionally, investigations had to be summarised, and progress information submitted, in fashion that is understandable, and passable, to the local residents. [18]

The new extended final disposal organisation worked directly under the municipal board, as it was considered essential to keep it well informed at this stage. Former Reference group was renamed as Preparatory group and appended with a representative from neighbouring municipality of Tierp. The new Reference group working under Preparatory group (in advisory capacity) was comprised of representatives of all political parties in the municipal council, two representatives per municipality from neighbouring Tierp and Älvkarleby, and representatives of local NGOs. Additionally, the local EIA-group was created, particularly for following SKB's EIA work. The task of Preparatory and Reference group was to spread knowledge of possible impacts of final disposal on people and the environment, follow developments from municipality's point of view and, on the municipal board's discretion, review and assess reports submitted.

Later, in 2006, the municipality estimated that the need for information and dialogue would be increasing the closer the siting decision would get, and the organisation were refined further. Preparatory and Reference groups' main purpose was determined as ensuring that the municipality's representatives receive sufficient training and knowledge regarding the work of the SKB and the authorities. Reference group would also serve as a link to the public. The local EIA-group was renamed as Planning group to highlight the task of planning ahead, in order to have the opportunity to engage in affairs affecting the municipality at an early stage.

In addition to reviewing and commenting increasing amount of reports (e.g. using specially appointed working groups) and attending to EIA consultations, the municipality participated in various seminars, projects and other competence increasing functions. Östhammar also still counted on regional university's and experts' help to review SKB's work [29]. While municipality communicated directly with SKB and authorities [29], also EIA consultations resulted in a number of questions, which were reported together with SKB's responses [30]. Local NGOs were given some financial support, municipality discussed final disposal in its own information newspaper and produced a newsletter regarding the issue. Östhammar and Oskarshamn started regular cooperation to use resources more rationally and to deliberate common issues, in end of 2003. This led to the 2008 cooperation agreement, resulting in pact concerning the Added Value Programme.

6.1.2. The site selection and onwards

To ensure the quality information and decision-making on SKB's applications, the local final disposal organisation was once again renewed in 2009.

Under the municipal board, and the new municipal board's working group for the final disposal, the organisation was divided into three parts: two parts corresponding to two different applications under different legislations, i.e. Safety group and EIA group, with addition of Reference group and its working group. The assignment of the Safety and EIA groups' was to review SKB's research plans and reports and the work of the authorities, with a view to preparing questions, statements and proposals. The Reference group was to keep itself informed regarding final disposal, inform and maintain dialogue with the public, and, together with the other groups, to maintain dialogue with the municipal council and to ensure adequate training and knowledge for the municipal representatives

Both the Safety and EIA group had 11 members, whereas the Reference group grew up to 27 members, as further neighbouring municipalities joined, including Åland (from Finland), as did the chairmen and vice-chairmen of both Safety and EIA groups. The chairman of the Reference group chaired also the five-member working group. Later, in 2016, in anticipation of the approaching licensing decision, all members of the municipal council were incorporated into the Reference group.

Expecting that the need for information and dialogue would grow once SKB would submit its applications, the municipality significantly increased its efforts to strengthen its ability to understand, form opinions and inform the public about the applications. The organisation would review and revise SKB's RD&D reports, the preliminary EIA report, the actual applications, and their amendments. It would also follow the work and opinions of the authorities and other stakeholders e.g. by reviewing the radiation authority's (SSM) technical notes and preliminary reviews and by following the completion round initiated by the Land and Environmental Court, as well as SKB's responses in the process.

The final disposal organisation continued to attend study visits, workshops, seminars and conferences, but also organised consultations with SKB, employed its own consultants, networked with other communities (e.g. by initiating the European local Network of radioactive Waste Dialogue, ENWD), followed international research programmes and participated in international reviews and discussions. The organisation had its representatives at SKB's copper corrosion reference group and in the roundtable discussions of the National council for nuclear waste. On several occasions, the municipal board requested discussions with SKB and SSM. The organisation also arranged number of seminars and lectures both for itself and for the general public.

The several initiatives of capacity building included regular updates and thematic training days. Especially in 2011–2013, a series of intensive internal education, ranging from chemistry and thermodynamics to environmental ethics, took place. Around the same time, the municipality also conducted a so-called Dialogue tour consisting of 50 stops and resulting in about 300 comments from the public. Web-based activities were given emphasis: the earlier active blog was complemented by a digital working room, and by an internet-based portal with online seminars, meetings, and reporting from EIA hearings.

6.2. Eurajoki, Finland

6.2.1. Preliminary and detailed site characterization phases

In 1987, TVO informed Eurajoki and that the company had chosen Olkiluoto as one of the alternative investigation sites for final disposal of SNF, in addition to sites in four other municipalities. The municipal board took note of the announcement, but did neither decided on any organizational measures, nor asked the municipal board's consent. In 1980, as part of the Olkiluoto planning process, the municipality had asked for a commitment from TVO that no a repository of final disposal of high-level nuclear waste would not be located in the Kaalo area in Olkiluoto site in 1980. The municipality was opposed to the idea of siting an SNF repository in Eurajoki – a position documented in the municipality plan in 1982 and rehearsed in several documents in the 1980s and 1990s. [16] Therefore it was unsurprising that the municipality did not prepare for any kind of partnering activities. However, later in 1987 the first liaison committee between TVO and Eurajoki, focused on bedrock investigations, as the Ministry of Trade and Industry requested that information or liaison committees be established in the municipalities on TVO's list of candidates [23].

Despite this negative position, and the controversial nature of both nuclear power and nuclear waste in Eurajoki in the 1980s, the municipality was attracted by the economic benefits from an NPP. Both TVO as a company and the construction and operation of an NPP as a project were very different from the business the municipality was used to. TVO was economically independent from the municipality and did not require any economic support. On the contrary, the NPP was seen as the opportunity to boost economic development in the municipality. As described by one of the municipal directors of the time, it was important for the municipality to take things forward and decide quickly, to avoid any unnecessary delays [31].

According to Äikäs [32], a retired Executive Vice President of Posiva, the liaison committee would have "to act as a forum for discussion at the local level" and as "the main information channel to members of the community and a vehicle for TVO to gain feedback and advice". Thus, TVO primarily aimed at exchange of information and improving knowledge on final disposal in the host municipality, but not the kind of extensive competence building and independent reviewing as in Sweden. The municipal board appointed to the committee local elected politicians and civil servants. The tasks of the committee included follow-up of the investigations, use of local services and workforce, communication, and other relevant issues related to the investigations.

By the mid-1990s, Eurajoki had changed its position on final disposal. In 1995, it signed a cooperation agreement with TVO, both parties committing themselves to taking into account the interests of the other party. [16] No new liaison committee was established but the two permanent Eurajoki-TVO joint committees continued their work (see Section 3). One covered a wide range of issues such as the operation of the NPP, taxation, tourism, and NWM, while the other focused on bedrock investigations only. In 1997, the latter committee was transformed into an Eurajoki-Posiva follow-up and steering committee concerning EIA process.

The liaison committees formed the backbone of the partnership in Eurajoki. The committees established new ad hoc sub-committees as seen necessary, to complement the partnership network.

In the partnership, issues related to municipal economy were primary concerns for Eurajoki. This was partly due to the property tax as an incentive for locating a nuclear facility. In March 1999, Eurajoki drafted a 'wish list' for the government concerning the final disposal project. The municipality argued that the real estate tax rate should be considerably higher for a repository than for an NPP, and that the rate should be specified in the real estate tax legislation. [16] Only six months later, the government proposed that the higher tax rate for nuclear facilities would also apply to a repository for SNF. The government wanted to reduce ambiguity and thus support the progress of final disposal project.

The compensation negotiations with Eurajoki are an example of the leverage that the host community can exert in the Finnish context. The power of Eurajoki was based on the right of veto and its "comparative advantage" as the location of the NPP, the SNF storage, and supportive local opinion. On the other hand, Posiva wanted to keep the site selection in its own hands and, at the same time, to ensure the commitment of the host municipality by naming only one site in its application for a Decision-in-Principle (DiP). [23]

6.2.2. The site selection and onwards

Eurajoki local council accepted the location of the repository in 2000, on the condition that only SNF produced in Finland would be disposed of in the facility. The statement on Posiva's DiP application was prepared by the Vuojoki working group, which indicates close partnership between the municipality, TVO and Posiva. Since then, several decisions concerning nuclear energy and NWM at Olkiluoto has been taken. The partnership has greatly benefited the municipal economy, and has helped the companies to promote their projects. For example, in March 2008, Eurajoki announced, already before the DiP phase, the community's willingness to host at Olkiluoto both the planned new NPP unit and the SNF it would produce. It justified this message to TVO openly and purely on the grounds of municipal economy. Until now Eurajoki has accepted the extension of the repository twice, in 2008 for TVO and 2009 for Fortum Power and Heat, although the latter only after a vote. In its statement on the construction license application for the Posiva SNF facility in 2013 Eurajoki relied totally on STUK's expertise in safety assessment and did not establish any additional conditions for approval. The economic stakes are high: in 2010, TVO and Posiva provided about 90% of the municipality's real estate tax revenue, i.e. almost a third of Eurajoki's total annual tax revenue.

Partnering arrangements between Eurajoki and the nuclear industry were rearranged in 2013 as the two liaison committees (Eurajoki-TVO and Eurajoki-Posiva) were merged. NWM is therefore again only one among many nuclear-related issues on the local agenda, as it used to be when Eurajoki and TVO began partnering.

Eurajoki improved its international connections in 2013, when the municipality decided to join the European local Network of radioactive Waste Dialogue initiated by Östhammar. It considered exchange of information and experience with other nuclear communities as important, because nuclear companies were already collaborating cross the borders. Amongst themselves, the three Finnish nuclear communities (Eurajoki, Loviisa and Pyhäjoki) met only occasionally, without any permanent discussion forum until 2017, when a new liaison committee was established between the power companies (i.e. TVO, Fortum Power and Heat and Fennovoima) and the nuclear communities. The agenda and details of this committee are only slowly being made public. Up to now, the relationships between the Finnish nuclear communities have been characterised more by rivalry than collaboration, largely because of the property tax revenue that an NPP generates for its host municipality. Eurajoki also saw Loviisa as a rival for hosting the repository [16]. The latest issue concerns the site for Fennovoima's SNF repository. In 2016 Fennovoima named Eurajoki and Pyhäjoki as alternative host communities without any prior consultations.

While Eurajoki citizens strongly trust the safety authority, they see the government as far less trustworthy [27, 33]. Already in the late 1990s there were some suspicions that government could interfere with siting, and, that Eurajoki might hence lose the possibility to negotiate with the power companies [16]. Concerns were raised also in 2010 in connection with discussions regarding SNF of Fennovoima [34]. In 2010 the Eurajoki municipal board reminded that the right of the municipality and its residents to decide on whether a facility should be sited in its territory, particularly given the responsible manner that Eurajoki had applied this right in the past. The municipality further highlighted reciprocal openness, confidence and accountability as features that make the conditions for building and operating nuclear facilities in Eurajoki decisively better than in rest of EU.

7. CONCLUSIONS

This article compared the long-term evolution of host municipality approaches to final disposal of SNF in Eurajoki and Östhammar. The results indicate that the main components of partnering have been applied differently in the Nordic context. This is partly due to differences in the evolution of the site selection strategies and subsequent institutional arrangements. For instance, in Sweden the municipalities can apply for funding for review and information activities, whereas in Finland, institutional arrangements do not empower and encourage potential host communities to undertake such activities, but instead ensure that a host community has an economic incentive to host a facility. In Sweden, Östhammar has adopted an active role as an involved host community, seeking to increase its competence and posing demands on the implementer and the authorities, challenging policies and actions, and actively engaging public and local actors in project planning. In this manner, the host community has gained more independence in relation to the NWM company. The Finnish Eurajoki has taken somewhat of a role of a bystander, holding a high level of trust in the safety regulator, and tending primarily to municipal economic interests. The structure of the partnership reflects a close relationship with the implementer and the nuclear utility, and delegation of safety issues to the regulator. The cases illustrate how apparently similar Nordic high-trust contexts nevertheless produce distinct partnership approaches, following from choices made throughout the entire process.

ACKNOWLEDGEMENTS

This work was funded by the Finnish Research Programme on Nuclear Waste Management (KYT2018).

REFERENCES

[1] BLOWERS, A., SUNDQVIST, G., Radioactive Waste Management - Technocratic Dominance in an Age of Participation, J Integrative Environmental Sciences, **7** 3 (2010) 149–155.

[2] NUCLEAR ENERGY AGENCY, Learning and Adapting to Societal Requirements for Radioactive Waste Management: Key Findings and Experience of the Forum on Stakeholder Confidence, NEA, OECD, Paris (2004).

[3] BERGMANS, A., et al., Wanting the Unwanted: Effects of Public and Stakeholder Involvement in the Long-Term Management of Radioactive Waste and the Siting of Repository Facilities, CARL Report, Antwerp (2008).

[4] NUCLEAR ENERGY AGENCY, Partnering for Long-Term Management of Radioactive Waste: Evolution and Current Practice in Thirteen Countries, NEA No. 6823, Nuclear Energy Agency, OECD, Paris (2010).

[5] SWEDISH GOVERNMENT OFFICIAL REPORTS, Nuclear waste: state-of-the-art reports 2004: A National Council for Nuclear Waste (KASAM) report, SOU 2004:67 (2004).

[6] LIDSKOG, R., The Politics of Radwaste Management in Sweden: Civil Society, the Economy and the State, Acta Sociologica, **37** 1 (1994) 55–73.

[7] VARJORANTA, T., PALTEMAA, R., Construction of First Phase of Spent Fuel Repository in Finland: Lessons Learned and Success Factors, Proceedings of an International Conference on the Management of Spent Fuel from Nuclear Power Reactors, Vienna, (2010).

[8] NUCLEAR DECOMMISSIONING AUTHORITY, Managing radioactive waste safely: Literature review of international experiences of community partnerships, NDA, United Kingdom (2007).

[9] DEPARTMENT OF BUSINESS, ENERGY AND INDUSTRIAL STRATEGY, Implementing geological disposal – working with communities: long term management of higher activity radioactive waste, Policy paper, 19 December, United Kingdom (2018), available at https://www.gov.uk/government/publications/implementing-geological-disposal-working-with-communities-long-term-management-of-higher-activity-radioactive-waste (Accessed 2019).

[10] RESET OF AMERICA'S NUCLEAR WASTE MANAGEMENT, Strategy and Policy, Final Report, Standford University, Georg Washington University (2018).

[11] BERGMANS, A., VAN STEENBERGE, A., VERJANS, G., CARL Country Report – Belgium, Belgium (2006).

[12] BERGMANS, A., Stakeholder Participation and Voluntary Siting in Radioactive Waste Disposal in Belgium. NWMO SR-2008-29. Ontario: Nuclear Waste Management (2008).

[13] NUCLEAR ENERGY AGENCY, 2013. Stakeholder Confidence in Radioactive Waste Management: An Annotated Glossary of Key Terms. NEA No. 6988. Paris: Nuclear Energy Agency, Organisation for Economic Co-operation and Development

[14] NUCLEAR ENERGY AGENCY, How can stakeholder involvement be improved? December 2015. [flyer]

[15] LAINE, M., BAMBERG, J., JOKINEN, P., "Tapaustutkimuksen käytäntö ja teoria", Tapaustutkimuksen taito Gaudeamus, Helsinki University Press, Helsinki (2007).

[16] KOJO, M., "The strategy of site selection for the spent nuclear fuel repository in Finland", The Renewal of Nuclear Power in Finland, Palgrave Macmillan, New York (2009).

[17] SWEDISH GOVERNMENT OFFICIAL REPORTS, Time for final disposal of nuclear waste – society, technology and nature. An in-depth report supplementing KASAM's Nuclear Waste State-of-the-Art Report 2007. SOU 2007:38.

[18] ELAM, M., SUNDQVIST, G., Stakeholder involvement in Swedish nuclear waste management, SKI Report 2007:02, (2007).

[19] SUNDQVIST, G., The Bedrock of Opinion: Science, Technology and Society in the Siting of High-Level Nuclear Waste, Kluwer Academic Publishers, Dordrecht (2002).

[20] VEDUNG, E., OLOFSSON, P., Lokalsamhällets beslutsfattande om kärnavfallet. Tre kommuner i norr. SKI Rapport 97:38 (1997).

[21] SKB, FUD-PROGRAM 92 – Kompletterande redovisning. Kärnkraftavfallets behandling och slutförvaring. Komplettering till 1992 års program sammanställd med anledning av regeringsbeslut 1993-12-16 (1994).

[22] SKB, General Siting Study 95, Siting of a deep repository for spent nuclear fuel, SKB TR-95-34, Swedish Nuclear Fuel and Waste Management Co, Stockholm (1995).

[23] NIKULA, A. et al. Kohti turvallista loppusijoitusta - Ydinjätehuollon neljä vuosikymmentä, Posiva Oy (2012).

[24] POSIVA, The final disposal for spent nuclear fuel, Environmental impact assessment report. Posiva Oy (1999).

[25] Swedish Government Official Reports, Slutförvaring av kärnavfall - Kommunerna och platsvalsprocessen, SOU 1999:45 (1999).

[26] FROSTENSON, M., Slutförvarets industriella organisering: Fallgrop eller följdriktighet? SKB R-10-55. Swedish Nuclear Fuel and Waste Management Co, Stockholm (2010).

[27] KARI, M., KOJO, M., LITMANEN, T., Community Divided: Adaptation and Aversion Towards the Spent Nuclear Fuel Repository in Eurajoki and its Neighbouring Municipalities, University of Jyväskylä, Jyväskylä (2010), http://urn.fi/URN:ISBN:978-951-39-4149-9

[28] SKB, Förstudie Östhammar. Slutrapport, Swedish Nuclear Fuel and Waste Management Co, Stockholm (2000).

[29] NYBERG, H., Från början till slutförvar? En dokumentation av slutförvarsprocessen i Östhammars kommun, Municipality of Östhammar, Östhammar (2011).

[30] SKB, Environmental Impact Statement. March 2011, Swedish Nuclear Fuel and Waste Management Co, Stockholm (2016).

[31] VAHEKOSKI, R. Eurajoen ydinvoimalahanke jälkikäteen muisteltuna. In: Kotiseutumme Eurajoki IX. Eurajoen Kotiseutuyhdistyksen ja Eurajoen kunnan kulttuurilautakunnan yhteinen julkaisu. 69–88 (n.d.).

[32] ÄIKÄS, T. Decision Making on Siting of a Geological Disposal Facility in Finland. A Paper for RESET Project's Meeting on Consent-Based Siting, March 9 – 10 (2016).

[33] VILHUNEN, T., KOJO, M., LITMANEN, T. TAEBI, B., Perceptions of justice influencing community acceptance of spent nuclear fuel disposal, A case study in two Finnish nuclear communities. J Risk Research, (2019). DOI: 10.1080/13669877.2019.1569094

[34] KOJO, M., OKSA, A., The Second Repository for Disposal of Spent Nuclear Fuel in Finland: An analysis of the Interests, Resources and Tactics of the Key Actors, InSOTEC Working Paper, University of Tampere (2014), http://urn.fi/URN:ISBN:978-951-44-9514-4