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The Second Repository for Disposal of Spent Nuclear Fuel in Finland:

An analysis of the Interests, Resources and Tactics of the Key Actors

Authors: Matti Kojo and Anna Oksa
University of Tampere, School of Management

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Glossary

DiP	Decision-in-Principle (in accordance with the Nuclear Energy Act)
EIA	Environmental Impact Assessment
E.ON	German energy company. The company owned 34 per cent of Fennovoima, but it pulled out and sold its business in Finland.
Fennovoima	Power company established in 2007. It plans to build a new NPP unit at Pyhäjoki.
Fortum	Energy company, the State of Finland is the biggest shareholder with an over 50 per cent holding.
FPH	Fortum Power and Heat Ltd (formerly IVO), part of Fortum Consortium, operates the NPP at Loviisa. FPH owns 25,8 per cent of TVO
IVO	Imatran Voima Ltd, 100 per cent state-owned power company established in 1932. Known as Fortum Power and Heat since 1998
MEE	Ministry of Employment and the Economy (formely Ministry of Trade and Industry)
MTV3	Finnish media company
NPP	nuclear power plant
Pohjolan Voima	Energy company that owns the majority of TVO shares, the forest industry companies UPM Kymmene and Stora Enso are the biggest shareholders of Pohjolan Voima
Posiva	Nuclear waste management company owned by TVO (60 per cent) and FPH (40 per cent), established in 1995
SNF	spent nuclear fuel
STUK	Finnish Radiation and Nuclear Safety Authority
tU	tons of uranium
TVO	Teollisuuden Voima Ltd, operates the NPP at Olkiluoto site in Eurajoki
UPM Kymmene	Bio and forest industry company, the biggest shareholder of Pohjolan Voima
YLE	Finnish Public Broadcasting Company

1. INTRODUCTION

Today Finland is often regarded as one of the few success stories in implementing the final disposal of spent nuclear fuel (SNF). The decisions by the government in 2000 and by Parliament in 2001 regarding the Decision-in-Principle were a turning point. The construction of the ONKALO Underground Rock Characterization Facility at the Olkiluoto site in the municipality of Eurajoki was started in 2004. Parliament has also ratified two expansions of capacity of the repository, in 2002 and 2010. Due to this progress Finnish nuclear waste policy and SNF management have been praised using words such as “successful” (Macfarlane, 2003, 797), “democratic” (Riley, 2004, 83), “relatively smooth and steady progress” (Vandenbosch & Vandenbosch, 2007, 238) and “advanced” (Feiveson et al., 2011). According to Alley and Alley (2013, 316) “Finland also appears to be in the repository home-stretch”.

Therefore it can be argued that Finland has taken its national responsibility for the final disposal of SNF seriously. However, national responsibility is a relatively new principle in the Finnish nuclear waste policy as until December 1996 SNF from Loviisa nuclear power plant (NPP) was transported to Russia. The prohibition of export and import of nuclear waste, which is the most palpable expression of national responsibility, became effective due to the amendment to the Nuclear Energy Act of 1987.

The principle of national responsibility has two sides: Firstly, it addresses how a country utilizing nuclear power takes care of nuclear waste produced in the country and secondly it deals with the rights of a country to forbid final disposal of spent fuel produced in other countries on its territory. (Cramér et al., 2009, 17). For example, in Sweden responsibility according to Cramér et al. (2009, 17), is a combination of producer responsibility, governmental regulation and forbidding the disposal of foreign waste. The Finnish application is very similar to that in Sweden. This division of labour and liabilities is deemed pronounced and therefore seen as one factor explaining the progress (Rasilainen & Vuori, 2002, 9).

In practice national responsibility is understood to refer to one repository only per country¹. A repository is expensive and deciding on the site is more than problematic. Therefore the waste

¹ In the United States there have been plans to have more than one repository for spent fuel from commercial NPPs. In 1982 the Nuclear Waste Policy Act of the United States outlined

producers have collaborated, either under a governmental or private agency (see NWTRB, 2009), to find one site for all SNF produced in one country. For example, as of the end of 2007 spent fuel inventories in the United States covered 61,000 tons of heavy metal and in Canada 38,400 tons. In Sweden the amount was 5,400 tons. (Feiveson et al., 2011) These countries plan to have one repository for commercially produced SNF. In Finland the amount was 1,600 tons. Nevertheless the second repository was accepted as a viable option by the Finnish government in 2010.

National responsibility has therefore encountered a new socio-technical challenge. It is possible that in the future there could be two separate repositories for SNF in Finland. This would be unique by international comparison. The challenge emerged when the nuclear power company Fennovoima started planning its NPP and SNF management in 2007. Fennovoima wanted to cooperate with the nuclear waste management company Posiva in the final disposal of SNF at the planned repository at the Olkiluoto site. Fennovoima argued that the role of Posiva was to manage all spent nuclear fuel produced in Finland and that for this purpose a single site was approved. According to Fennovoima this is compatible with the national interest. Posiva has rejected this and stated that its objective is to take care of SNF produced by its owners only, i.e. the power companies Teollisuuden Voima (TVO) and Fortum Power and Heat (FPH)². Furthermore, Posiva has argued that there is not enough capacity in the bedrock at the Olkiluoto site.

The objective of this paper is to analyse the interests, resources and tactics of the key actors negotiating the development of the joint final disposal of SNF in Finland. The research question is as follows: How was the spent nuclear fuel management of Fennovoima, and especially the question of collaboration with Posiva, shaped by socio-technical arguments? The key actors are Posiva, Fennovoima and the Finnish Ministry of the Employment and Economy (MEE). Some other actors, such as the Finnish Radiation and Nuclear Safety Authority (STUK) and the municipality of Eurajoki, are also involved in the analysis, but they

that the quantity of waste to be emplaced in the first repository was limited to 70,000 metric tons of heavy metal. A future second repository was planned to be located in the eastern United States. However, in accordance to the Nuclear Waste Policy Amendments Act of 1987 the requirement to pursue a site for a second repository was suspended. (Vandenbosch & Vandenbosch, 2007, 39–42.)

² Fortum Power and Heat (FPH) is part of Fortum consortium.

are not in the main focus as they were not among the most active players of the controversy. The main controversy was between Posiva and Fennovoima at this phase of the siting, as Fennovoima attempted to gain access to Posiva's disposal project and to dispose of its SNF at Olkiluoto. The rejecting attitude of Posiva against Fennovoima may have sheltered the municipality of Eurajoki and thus perhaps made it more passive in its own activity regarding the issue. MEE due to its responsibility for overall supervision of nuclear energy policy was a kind of a mediator between the companies.

The research data consists of publicly available documents and newspaper and internet articles related to the issue. A number of different newspapers and internet sources were reviewed to avoid possible one-sidedness if only one newspaper had been used as a source. On the other hand, readers should be aware that, as the data is based on public sources, documents written for the internal use of the actors could have revealed new aspects of the case study. Interviews were not conducted as the controversy had already continued for several years before the gathering of the data for the case study data was started. Compared to interviews newspapers were regarded as a more reliable source to gather the main arguments voiced publicly by different actors. The analysis covers the time period from 2007 to 2013. In 2007 the establishment of Fennovoima opened up the controversy, which seemed to have reached a more tranquil stage in 2013 after the final report of the Working Party aimed at considering different options under the command of the Ministry of the Employment and Economy.

The paper is empirically oriented, but ideas from actor power in interactions are applied as a framework. The debate and negotiations on the development of the joint final disposal of SNF in Finland are seen as socio-technical challenge, i.e. as an issue where social and technical aspects merge. The debate on a "national solution" is a combination where conflicting interpretations regarding rock capacity assessment, policy decisions and power relations are entangled. We will analyse how the dispute between Fennovoima and Posiva evolved from an initial project, transformed and became a retransformed project. These refer to different stages of the dispute which evolved as a result of the social activity of the main actors and events beyond their control. The first stage, the initial project, refers to debate conducted between Fennovoima and Posiva in 2007 and 2008 in the Finnish media after the announcement by Fennovoima that they would collaborate with Posiva in the final disposal of SNF at Olkiluoto.

The second stage, the transformed project, refers to Fennovoima's application for a Decision-in-Principle on an NPP unit and the Decision-in-Principle issued in May 2010 by the government. Fennovoima submitted the application in 2009. It included Fennovoima's plan for spent nuclear fuel management. The government offered Fennovoima two options for its SNF management. The company was either to negotiate an agreement with the existing licensees under waste management obligation (i.e. TVO and FPH) or submit an Environmental Impact Assessment (EIA) Program in respect of a final disposal facility of its own for spent nuclear fuel. Fennovoima was obliged to take action by 30 June 2016.

The third stage, the retransformed project which reflects the continuing dynamics of the controversy, refers to the Working Party established by the Ministry of Employment and the Economy in March 2012. The objective of the Working Party was to guide the joint report of the power companies regarding the options for the final disposal of nuclear fuel (MEE, 2013, 3). The final report of the Working Party, published in January 2013, suggested that Fennovoima and Posiva should continue negotiations on a commercial basis.

The structure of the paper is as follows. In Section Two the theoretical framework of the paper is introduced. The analysis of actor power is based on ideas by Roger Few (2002). The crucial point of the framework section is to introduce how actor power can be applied in analysing socio-technical combinations. In Section Three the Finnish nuclear waste policy and responsibilities of the main actors are introduced. This is vital, as the shareholders of Posiva, i.e. TVO and FPH, are according to the Nuclear Energy Act licensees under waste management obligation whereas Posiva and Fennovoima are not. The status or non-status of a licensee under waste management obligation is one important resource in the story. In Section Four the research data is analysed in terms of these three stages. In Section Five our conclusions suggest that national responsibility for the final disposal of SNF is re-interpreted in Finland as the option of the second repository was indeed allowed. The controversy that became troublesome for the whole nuclear energy sector in Finland was solved temporarily by a classic method, i.e. driving the conflicting parties around one table and closing the doors. Due to the conflict the identity of Posiva as a private company was accentuated. Finnish nuclear waste policy continues to be based on actor-specific policies.

2. THEORETICAL FRAMEWORK

The dispute evolving due to Fennovoima's need to plan its spent nuclear fuel management is a good example of a technological project in the making. The issue of Fennovoima's nuclear fuel management is perceived in the paper as a relationship between social choices and technical options that are still open. The options are either to collaborate with Posiva on a joint repository at Olkiluoto to extend it or to build a second repository elsewhere in Finland. Fennovoima strongly prefers the former. The issue discussed, however, includes more complicated discussions than merely a choice by Fennovoima. For example, the balance of power in Finnish nuclear waste policy, the status of Posiva and the total disposal capacity (technically) available in the Olkiluoto bedrock are touched on. Therefore the issue is perceived as a socio-technical question.

Robert Few's idea of actor-power is applied as a tool to analyse the actors and their roles in the socio-technical change of the nuclear waste project. We think of actors as constantly engaging each other in a group and also withholding non-human forms. (Latour, 2005.) The actors, with a significant role in the project attempt to mobilize and stabilize what Law and Callon call the "global network". This stabilization can be done by obtaining resources with which it is possible to control and build a project. The "global network" refers to a relationship between the actor and its neighbour and further between the neighbour and the next. "This network generates in space, a period of time and set of resources in which innovation takes place." The space can be called the "negotiation space" (Law & Callon 1992, 21.) The project can therefore be conceived of as balancing acts in which elements both inside and outside of the project can be seen as parallel. (Law & Callon, 1992, 22)

We see the dispute as a project influenced by the events and strategies that shape the global network. (Law & Callon 1992, 22) Hence we want to look more closely at the negotiation space or negotiation arena and its actors. Because in their networks the actors wield power, we found it useful to use the analytical tool by Few in order to examine the different actors' influence on the project.

Actor-power rests on theories of power. Few introduces a "working model" of power which includes three key points as follows: 1) "power is dispersed throughout society, rather than concentrated solely in the hands of the "dominant", 2) "power is entangled in social relations

between agents that differs in their interests, identities, and resources”, 3) “Social power is articulated through complex mechanisms including tactics of negotiation” (Few 2002, 31).

Power can be seen to be wielded in the planning arena when an actor intervenes in a social event (Few, 2002). Action refers to putting forward an initiative or presenting an argument. According to Few, the characteristics of power are formed by motives, resources and tactics. Few argues (2002, 33, 37) that by analysing the motives, resources and tactics of different groups it is possible to gain a better understanding of the effects of social power and power relations, in this case a study on technological choices. We will be able to look at how and by whom the problem is positioned and how the project can be influenced by different events and strategies. (Law & Callon, 1992, 22) In Few’s terminology *motives* refer to the actors’ reasons for their actions. The actions may include strategic objectives and articulations of identity. However, instead of motives, we understand these as merely actors’ interests, which are articulated in public debate. Analysis of actors’ motives would have required a different research method. Power resources and tactics were used in accordance with Few’s thoughts. *Power resources* are not only personal skills and connections but also more structural features such as discourses. *Power tactics* refers to strategic social action that draws on the resources and which the actor use in power systems. Tactics may include alliance formation, enrollment, persuasion, manipulation, compromise and exclusion. (Few 2002, 33.)

3. FINNISH NUCLEAR ENERGY AND NUCLEAR WASTE POLICY

Finland experienced a strong nuclear renaissance in the 2000s (see Litmanen and Kojo, 2011; Kojo, 2009). In 2002 Parliament voted in favour of a new NPP unit. The applicant, TVO, signed a turn-key contract with Areva in 2003 for the construction of a 1600 MW European Pressurized Reactor (Olkiluoto 3 unit). Construction at the Olkiluoto site began in 2005. At the same time, in 2003–2006, a new debate on building additional nuclear power capacity was started by the spokesmen of Finnish energy-intensive industry. Some foreign power companies were also interested in investing in nuclear power production in Finland. For example, E.ON and Vattenfall announced their interest in 2006 and 2007.

TVO and Fortum, which had collaborated in lobbying for the Olkiluoto 3 NPP application, decided this time to proceed on their own. TVO submitted an application to the government in April 2008 and Fortum in February 2009. The third applicant, Fennovoima, submitted its NPP application in January 2009. Furthermore, Posiva submitted two applications: The first in April 2008 for a Decision-in-Principle on an extension to the final disposal facility of SNF for Olkiluoto 4 and then the second in March 2009 for a Decision-in-Principle on an extension to the final disposal facility of SNF for Loviisa 3.

E.ON, which had failed to acquire a property in Loviisa for a NPP unit of its own, became the second biggest shareholder in Fennovoima. E.ON was also interested in collaboration with TVO due to the NPP siting issue, but this collaboration never materialized. (Pylkkönen, Litmanen and Kojo, 2008, 13–18.) Thus the networks established around the three companies TVO, Fortum and Fennovoima and their shareholders competed for political support for their own NPP applications in 2008–2010. However, in the issue of the final disposal of SNF only two ‘global networks’ existed as Posiva is jointly owned by TVO and FPH.

The Finnish government made the decision on additional nuclear build in May 2010. All three NPP applications and two applications for the extension of the final disposal facility were addressed at the same time. The applications by TVO and Fennovoima were granted a positive Decision-in-Principle, but that by Fortum was rejected. (TEM, 2010a.) After voting Parliament ratified the governmental decisions in July 2010.

The Decision-in-Principle of Fennovoima NPP included requirements regarding SNF management. The government required that within six years Fennovoima was obliged either

to negotiate and sign an agreement with the existing licensees, i.e. TVO and FPH, under a waste management obligation, or to submit an Environmental Impact Assessment (EIA) Program concerning a final disposal repository for SNF of its own. If the company should fail to fulfill the requirement, the government would not issue the construction licence for the NPP unit (M 4/2010 vp, 16).

As Parliament ratified the DiP for Fennovoima, it also accepted a resolution by the Finance Committee regarding nuclear waste policy. According to the resolution Parliament required that the government exert pressure on Posiva, its owners and Fennovoima to initiate during 2010 clarifications and negotiations towards a national final disposal solution aiming at a joint national final disposal solution also including the final disposal of spent fuel from the Fennovoima NPP unit. (TaVM 13/2010 vp, 40; MEE, 2012a.)

The new government formed by Prime Minister Jyrki Katainen (of the National Coalition Party) in June 2011 included this resolution in the government programme. According to the programme *“the government will make decisions concerning the final disposal of spent nuclear fuel after the completion of necessary surveys by seeking a national solution in accordance with the Parliament’s decision”* (Government Programme, 2011, 71). Thus the government aimed not at a *joint* national solution as Parliament had required, but at a national solution. In the press (*Satakunnan Kansa*, 18 June 2011) the national solution was still interpreted to refer to the concentration of final disposal on one site, i.e. Olkiluoto, but Minister Jyri Häkämies (of the National Coalition Party) noted that ‘national solution’ did not mean that nuclear waste produced by Fennovoima had to fit into the final disposal site of Posiva. Nor did it mean the nationalization of Posiva or changes to the legislation. Häkämies also commented that a joint national solution had been an option in the negotiations of the government programme, but the chosen wording, i.e. national solution, *“allowed one train to travel in one direction and another in the opposite direction”*. (*Tekniikka & Talous*, 12 August 2011). Thus, the government programme was deliberately more flexible than the parliamentary resolution.

However, as the dispute between Posiva and Fennovoima could not be resolved by the actors themselves, the Governmental Committee on Economic Policy outlined in February 2012 that the Ministry of Employment and Economy could take action in determining the different licensees under a waste management obligation to conduct nuclear waste management jointly

if the conditions stipulated in the Nuclear Energy Act were indeed met (MEE, 2012a). For this purpose the Ministry established a Working Party which held its first meeting in March 2012 (MEE, 2012b). The final report including statements by STUK and the Energy Market Authority was published in January 2013. The Working Party consisted of representatives of the MEE, TVO, Fortum, Posiva and Fennovoima. The host municipalities of nuclear facilities or other stakeholders were neither represented nor given a voice in the Working Party.

A licensee under a waste management obligation is defined in the Finnish legislation. According to paragraph 9 of the Nuclear Energy Act “[a] licensee whose operations generate or have generated nuclear waste (licensee under a waste management obligation) shall be responsible for all nuclear waste management measures and their appropriate preparation, as well as for their costs (waste management obligation).”

In practice an applicant becomes a licensee when the government grants a licence to operate a nuclear facility generating nuclear waste. Before that a separate construction licence application is required. Thus an applicant granted a positive Decision-in-Principle under the terms of the Nuclear Energy Act is not yet *licensee under a waste management obligation*. For example, Fennovoima was granted the DiP for a NPP unit in 2010, but so far the company has not even applied for a construction licence. Neither is Posiva a licensee under a waste management obligation as the operations of Posiva do not generate nuclear waste.

The definition of a licensee under a waste management obligation has consequences for the story as according to paragraph 29 of the Nuclear Energy Act “[t]he Ministry of Trade and Industry may order various licensees under waste management obligation to undertake waste management measures jointly, if by doing so safety can be increased and or costs can be substantially reduced or if any other weighty reason so requires.” MEE considered applying paragraph 29 and its implications (MEE, 2009, 2; 2010b), but was reluctant to apply the paragraph.

Before the formation of the abovementioned Working Party was announced the Ministry of Justice was asked to issue a statement on paragraph 29 of the Nuclear Energy Act in relation to the Finnish Constitution. According to the statement the objective of the legislator seemed to have been, that if the requirements of the regulation are met, fairly extreme requirements regarding collaboration can be imposed. The Ministry of Justice concluded that the option of

imposing mandatory collaboration seemed not to be an issue of making a legal stipulation but rather an isolated administrative decision. (Ministry of Justice, 2012, 2.) In other words the Ministry of Justice, in contrast to the MEE, made the interpretation that collaboration can be made compulsory as long as the obligations are not completely unreasonable for the parties.

4. ANALYSIS

4.1 The initial project: A daydream of easy access to the national solution

The establishment of Fennovoima was announced in June 2007. Immediately after that the issue of nuclear waste management appeared in the headlines of the Finnish press³. The tactics of Fennovoima were focused on alliance formation as the company was interested in collaboration with Posiva. According to the spokesman of the stainless steel company Outokumpu, which was one of the main actors establishing Fennovoima, the objective of Fennovoima was to discuss with Posiva on final disposal.

However, Posiva was distant and cautious in its tactics. The then CEO of Posiva stated that the task of Posiva was to dispose of the spent fuel produced by its owners (*Talous-Sanomat*, 15 June 2007). In fact Posiva had already announced in April 2007⁴, i.e. before the establishment of Fennovoima, that Posiva had no connections with E.ON and their possible NPP project in Finland (Posiva, 2007). Thus, Posiva emphasized its identity as a private company with a specific task determined solely by the shareholders. The then CEO of TVO, as the representative of the main shareholder of Posiva, stated that they were not very enthusiastic, but that TVO was ready to discuss. (*Talous-Sanomat*, 15 June 2007.) Thus the status and identity of Posiva as part of Finnish nuclear waste policy were immediately in focus.

The media also asked the Ministry of Trade and Industry, which is in charge of Finnish nuclear waste policy, for its position. A civil servant of the Ministry stated that the main principle was that the state would not interfere in the game, but the industry had to take care of nuclear waste management. (*Taloussanomat*, 18 June 2007.) The Ministry did not want to apply paragraph 29 of the Nuclear Energy Act, which can be seen as the last resort, although, according to the Act, the Ministry can compel the licensees under waste management obligation to cooperate (See Section 3). Therefore the tactics of the Ministry were non-intervention at this point. Their interest was to urge the industrial actors to resolve the issue

³ The data of this section comprises selected newspaper articles focusing on the dispute between Fennovoima and Posiva.

⁴ TVO and Fortum announced in April 2007 that they would start EIA procedures for new NPP units.

themselves. The Ministry did not want not to interfere with or upset the balance of power stipulated in the Nuclear Energy Act.

However, the industrial actors did not concur with each other. On the contrary, the tactics of Posiva became clearly exclusive already in September 2007. At that time Posiva announced that the company would not negotiate with Fennovoima on final disposal. (*Kauppalehti*, 28 September, 2007.) The status and identity of Posiva were used as a resource. The owners of Posiva, i.e. TVO and FPH, rejected the negotiations and furthermore Posiva stated that Fennovoima had made a totally wrong interpretation regarding Posiva. The CEO of TVO stated that Posiva as a company could not be nationalized (*Kauppalehti*, 28 September, 2007). Posiva clearly wanted to be identified as a private company implementing a task for its owners and not as a common national agency with a national mission. Posiva wanted to shed the mantle of a national nuclear waste agency which Fennovoima wanted to put on Posiva.

Posiva also interpreted paragraph 29 of the Nuclear Energy Act. According to Posiva it could not be obliged to cooperate unless the Act was amended in accordance with the legislative procedure of the Finnish Constitution. (*Kauppalehti*, 28 September, 2007.) Thus the conflicting parties used the same resource, paragraph 29 of the Nuclear Energy Act, but their interpretations were opposite. Posiva was protecting its back as it referred to the company's constitutional rights in owning and controlling assets, i.e. the repository under construction.

In October 2007 Fennovoima attempted to apply a collaborative approach towards Posiva as Fennovoima proposed negotiations between the actors, but according to the press Posiva did not even reply. Fennovoima had also a new resource as it had acquired property at Olkiluoto, located in the vicinity of the Posiva repository. Fennovoima was ready to hand over this property, 24 hectares of land, for the disposal of SNF produced in Finland. The tactics based on this resource were two-dimensional, first persuasive and then oppressive. Fennovoima's willingness to donate the property was initially meant to be a goodwill gesture persuading Posiva to start the negotiations, but later the tactics became much harder.

In a memorandum⁵ submitted to the MEE Fennovoima (2010, 19–20, 25–31) outlined that if a joint repository at Olkiluoto was not available either because of Posiva's rejection or the

⁵ According to Fennovoima (2010, 3) the objective of the memorandum was to provide specified background regarding options of final disposal of SNF. The primary option was the

state's unwillingness to apply paragraph 29 of the Nuclear Energy Act Fennovoima's main alternative plan was to construct a second repository at Olkiluoto. It would be located on the abovementioned property. Furthermore, the property and the bedrock underneath, which were controlled by Fennovoima, would not be available to Posiva for free of charge. Thus the tactic was to put pressure on both Posiva and MEE.

Fennovoima emphasized that nuclear waste management is a national issue. According to Fennovoima Posiva was established to take care of the final disposal of all nuclear waste generated in Finland. The then CEO of Fennovoima revealed that their assumption was right from the beginning that Posiva would take care of their waste, too. (*Länsi-Suomi*, 2 November 2007; *Helsingin Sanomat*, 2 December 2007.)

New arguments were evinced in the escalating debate as Posiva announced that there was no room at Olkiluoto site for nuclear waste produced by Fennovoima. Posiva argued that according to the EIA Report the maximum capacity was 9000 tU. Posiva urged Fennovoima to study the bedrock at the candidate host sites of its planned NPP unit. (*Kauppalehti*, 13 November 2007.) According to Posiva each nuclear power company itself had to take care of SNF produced by the company. Furthermore, Posiva rejected Fennovoima's interpretation that Olkiluoto would be the disposal site for all nuclear waste produced in Finland. (*Länsi-Suomi*, 2 November 2007). Thus Posiva emphasized the principle of licensee-specificity as the line of Finnish nuclear waste policy.

Although the main parties had drifted into a public dispute, the representative of the Ministry of Trade and Industry still expected the industry to be able to solve disposal issue "rationally" and thus the Ministry held its tactics of non-interference. According to a civil servant the Ministry would consider the issue only when the DiP applications were submitted. However, the representative of the Ministry stated that the construction of a second repository would be "horribly expensive, which hardly would be the best option for Finland". (*Länsi-Suomi*, 2 November 2007.) Thus at least some kind of understanding for the interests of Fennovoima regarding a national solution could be seen in the thinking of the Ministry.

joint repository at Olkiluoto in collaboration with Posiva either on voluntary basis or obliged by the state. The number one alternative option was to construct an own repository at Olkiluoto, possibly at two layers due to limited area available. The last option was to look for an entirely new site. The memorandum (Fennovoima, 2010) was dated on 31 March 2010. That is two weeks before the government decided on nuclear new build.

TVO and Posiva submitted their DiP applications for an OL4 NPP unit and expansion of the final disposal repository in April 2008. At the same time TVO indicated that the company was not interested in discussing final disposal with Fennovoima. Posiva was stated to be “our solution”, reserved for their own use only as there was room for waste from possible new NPP units of TVO. (*Satakunnan Kansa*, 26 April 2008.)

According to a director of Fennovoima the above-mentioned outline of TVO was awkward. (*Satakunnan Kansa*, 26 April 2008.) He had already earlier criticized Posiva of manufacturing obstacles as it was clear that final disposal was a national, not a company-specific issue (*Helsingin Sanomat*, 13 December 2007). Fennovoima still believed that one final disposal site was enough for Finland, as also in other countries. Furthermore, according to the director the owners of Posiva would receive enormous income from Fennovoima. Compensation was part of the tactics of persuasion by Fennovoima. Holding on to the nuclear power oligopoly was however, according to the director of Fennovoima, more important for the owners of Posiva than the income from Fennovoima. The state decision-making power was seen as a resource of Fennovoima as the director was confident that the state would determine the lines of Finnish nuclear waste policy. (*Satakunnan Kansa*, 26 April 2008.)

Now the state also entered the debate. Mauri Pekkarinen (of the Centre Party of Finland), the then Minister of the Trade and Industry, stated that the statement of TVO represented only the interests of the company regarding the role of Posiva. The Minister pointed out that the state had not yet outlined the issue. Hence the Minister suggested that the state might have a different opinion on the status of Posiva⁶. Furthermore, if necessary, the Ministry was vested with the power to compel Posiva to cooperate with Fennovoima. (*Satakunnan Kansa*, 26 April 2008.) Thus, once again paragraph 29 of the Nuclear Energy Act was applied as a resource. The interpretation of Minister Pekkarinen was in line with that of Fennovoima. In another interview two weeks later, the Minister repeated that the state could intervene, but his wish was that no coercion would be needed. (*Etelä-Suomen Sanomat*, 10 May 2008.) The tactics of the Ministry were still based on keeping out of the issue although a warning of a harder policy line was now pronounced.

⁶ In March 2008 Minister Jyri Häkämies (of the National Coalition Party), who was then responsible for duties related to state ownership steering stated that the state would exert no influence over Fortum in this issue (*Seura*, 2008, 20). The Prime Minister’s Office, i.e. the State of Finland, is the biggest shareholder in Fortum (with 50.76% of the shares).

In 2008 Posiva submitted an EIA programme regarding the expansion of the final disposal repository. As Fennovoima considered that Posiva's project would influence its own NPP project, Fennovoima submitted a statement to the MEE in June 2008. The aim was pressure Posiva into considering the Fennovoima plan. In the statement the main resource of Fennovoima was the interpretation of Finnish nuclear waste policy decisions regarding the number of disposal sites. Fennovoima argued that a joint repository at Olkiluoto for all nuclear waste producers operating in Finland was the only option in line with social acceptance. According to Fennovoima *"the decisions by the Council of State and Parliament during the last 25 years have aimed at and noted that disposal of all spent nuclear fuel generated in Finland to one single disposal site is in consonant with the overall good of the society"* (Fennovoima, 2008, 1). Thus Fennovoima applied nuclear waste policy decisions as a resource as it interpreted those in accordance with its own interests. The interpretation also addressed the status of Posiva's repository as Fennovoima announced that Posiva was not unequivocal enough on the status of the repository as a joint final disposal facility. Fennovoima required Posiva to describe in the EIA programme how Eurajoki was chosen to be the final disposal site for nuclear waste from the Finnish NPP units and what the status of the repository would be regarding the final disposal of SNF of other actors' than the current owners'.

Fennovoima also appealed to the EIA Act. According to Fennovoima it was impractical and deceptive that Posiva was limiting the disposal capacity of the repository to 12000 tU. Fennovoima argued that the minimum capacity considered should be at least 18000 tU to cater for SNF generated by the NPP units that were under planning. Fennovoima also repeated that the company controlled a property called Lastenmaan tila at Olkiluoto. According to Fennovoima the expansion plan of the Posiva repository was partly located at the abovementioned property, which Fennovoima was ready to hand over for the disposal of SNF generated in Finland. (Fennovoima, 2008.)

In the statement Fennovoima described its tactics as collaboration-oriented, but as the attempts of the company to initiate negotiations with Posiva had failed, some frustration was expressed between the lines. The tone of the statement was also to some extent more peremptory and no longer merely persuasive. As described above, the parties had not converged at all in the negotiations on the joint repository. Therefore Fennovoima attempted

to appeal to the MEE as a contact authority of the EIA procedure and to gain access to Posiva's project.

However, a civil servant of MEE stated that the Ministry could not and had no grounds to compel Posiva to increase the disposal capacity to more than Posiva and those under nuclear waste obligation had suggested in the application (*Satakunnan Kansa*, 23 August 2008). The argument was given in a newspaper interview only. In its statement on Posiva's EIA programme MEE evinced no arguments for the rejection of the proposal for increased capacity of 18000 tU (MEE, 2008). Thus the increased disposal capacity required by Fennovoima was rejected in the frames of the EIA procedure as it failed to get support from the MEE.

At this point the representative of the municipality of Eurajoki, the chair of the municipal government Matti Valtonen (of the Social Democratic Party) announced that the municipality was aware of the interests of the new power company and that there had been some informal discussions but Eurajoki was not enthusiastic about concentrating final disposal in its area. As previously, the municipality wanted to retain its right of veto⁷ on the expansion of the repository. The municipality spokesman also warned that the state should not take any coercive decisions in this issue. (*Satakunnan Kansa*, 7 September 2008). Thus Eurajoki as the host municipality of the repository was also reluctant to further the interests of Fennovoima.

Summary

Fennovoima's wish for self-evident inclusion in the national solution at Olkiluoto faded away. The tactics of alliance formation and persuasion did not work as planned, but Posiva excluded Fennovoima, the competitor of its owners, from the Olkiluoto site. First Posiva referred to the status of the company but then it also started to argue that there was no room for Fennovoima's SNF in the Olkiluoto bedrock. As the network around Fennovoima did not have resources to control the issue of final disposal it failed to start the negotiations on a voluntary basis with Posiva and its owners, not to mention reaching a compromise. Therefore Fennovoima needed to invoke paragraph 29 of the Nuclear Energy Act again to keep the

⁷ The municipality has right of veto only on the expansion of the repository, not on the whole final disposal project it already approved in January 2000.

package around its NPP application project together. The MEE urged the contending parties to start negotiations on a voluntary basis but it also implied that the state could compel the parties to negotiate on collaboration. Although this did not help, no further measures were taken. Hence, the Ministry held itself aloof from the dispute.

4.2 Transformed project: Dispute concerning a single common site and national solution

As described in Section 4.1, the issue of the development of a joint national repository had been debated more than one and half years before Fennovoima submitted the DiP application⁸ to the Council of State in January 2009. During that time the “national solution” was already badly stuck.

The primary interest of Fennovoima was to ensure a positive Decision-in-Principle for its NPP application. Therefore it needed to convince the politicians that it could take care of SNF management, too. The easiest way was to refer to the final disposal plans by Posiva with collaborative tactics aiming at alliance -formation. Fennovoima outlined in the application that its objective was to *“develop and implement the final disposal of spent nuclear fuel together with other Finnish operators that are under a nuclear waste management obligation”* (Fennovoima, 2009b, 315). Fennovoima also argued that the company *“had been actively involved in the sector with the aim of establishing close relationship with other operators and key interest groups”* (Fennovoima, 2009a, 100). However, at the same time it was added that if necessary the MEE in accordance with paragraph 29 of the Nuclear Energy Act could compel the licensees to collaborate on nuclear waste management. Thus Fennovoima relied on support from the State in resolving the dispute (See also Public Broadcasting Company *YLE*, 14 January, 2009). This reminder regarding paragraph 29 was

⁸ The data in this section consists of two Supplements of the Fennovoima DiP application of 2009 and Posiva’s statement on the Fennovoima DiP application (Posiva, 2009). The former, Supplement 2B (Fennovoima, 2009a) focuses on the general significance of the nuclear power plant project and one of its chapters was specifically about nuclear waste management. The latter, Supplement 5B (Fennovoima, 2009b), is entitled “Nuclear power plant fuel and waste management”. It is a general description of Fennovoima’s plans and of the methods available for nuclear waste management. It covers the management of low and medium-level nuclear waste, of spent nuclear fuel and of nuclear waste generated during decommissioning. In this analysis the chapter on spent nuclear fuel management only is referred to.

needed as part of backdoor tactics. The tactics could not be based on one option only as Posiva had already rejected the initiatives regarding negotiations a number of times.

In general Fennovoima referred to E.ON⁹, i.e. one of the then main shareholders of the company, as a resource. According to Fennovoima (2009a, 99; also 101) “Fennovoima will draw on the extensive nuclear energy expertise of the E.ON Group in implementing the project” (NPP). E.ON was introduced as the largest private energy company in the world and the owner or co-owner of 21 NPP units in Germany and Sweden. Furthermore, the connection with E.ON was also introduced as a key to the development work of the Swedish KBS-3 model, as E.ON Nordic AB is a co-owner of SKB (2009b, 315; also Fennovoima, 2010, 39). This connection, which was introduced as a resource ensuring access to KBS-3 know-how was part of the backdoor tactics as it could be seen as an indication that Fennovoima was not totally dependent on Posiva in the development of final disposal.

Fennovoima’s backdoor tactics, 40 years’ time-out, was planned for the case of the altered status of Olkiluoto as a common national repository. The daring tactics of Fennovoima were based on the assumption that the company had introduced an orthodox interpretation of the national solution that would hold unless the state decided to change the line of nuclear waste policy. Fennovoima stated as follows:

“If political decisions are taken in the future which alter the planned Olkiluoto repository’s status as a common national final disposal repository for spent nuclear fuel, Fennovoima would still have at least 40 years to design a repository based on the KBS 3 method or other method that fulfills long-term safety requirements, to obtain the necessary permits and to build the repository before the planned final disposal commences.” (Fennovoima, 2009b, 316.)

Consequently the main body of Fennovoima’s resources consisted of interpretations of governmental decisions regarding nuclear waste management in Finland. The objective of Fennovoima was to argue that the repository at Olkiluoto site was intended to be the single facility for the disposal of spent nuclear fuel and that the repository would be a common national facility for nuclear power companies operating in Finland. One of the core

⁹ E.ON pulled out of Fennovoima in October 2012. The media speculated whether the whole of the NPP project would collapse. (YLE, 24 October 2012.)

interpretations of Fennovoima was the claim that *“in 1983 the government adopted a decision-in-principle regarding the final disposal of spent nuclear fuel at a single site”* (Fennovoima, 2009a, 99). Fennovoima also stated that *“decisions made to date by the Finnish government have set a goal of establishing a single common site and method for the management of spent nuclear fuel produced by nuclear power plants in Finland”* (Fennovoima, 2009b, 316).

Furthermore, Fennovoima presented its status regarding the organizing of nuclear waste management to be equal to that of TVO and Fortum. Fennovoima construed the role of Posiva as follows: *“Posiva is a company owned by TVO and Fortum whose purpose is to manage the spent nuclear fuel and other high-level waste from operating nuclear power plants units in Finland”* (Fennovoima, 2009a, 100). Thus, Fennovoima appealed to the national rhetoric¹⁰ which Posiva had consciously applied earlier when it had built confidence in the company’s disposal project. Fennovoima also emphasized that nuclear waste management at the Fennovoima NPP would be undertaken using the same methods as the NPPs already in operation in Finland (Fennovoima, 2009a, 99).

Spent nuclear fuel management introduced in the Fennovoima DiP application was notified by Posiva as it gave a statement on the application on June 2009 (Posiva, 2009). Posiva’s interests were related to the status of the company itself and the status and use of the final disposal repository at Olkiluoto. Firstly, Posiva was concerned that the DiP application of Fennovoima might give the impression that Posiva was obliged to take care of SNF disposal generated by Fennovoima. Secondly, Posiva noted that the impression might have been given that the repository planned at Olkiluoto by Posiva would also be available for Fennovoima. Posiva argued that Fennovoima’s NPP project and related disposal of SNF had to be addressed as a separate project without any connections to Posiva’s business or the repository at Olkiluoto. (Posiva, 2009, 1.) Therefore, Posiva continued applying the tactics of exclusion: The company had nothing to do with the Fennovoima project and Fennovoima’s interpretations regarding Finnish nuclear waste policy were biased. Hence, Posiva was neither

¹⁰ For example, at the end of the 1990s Posiva emphasized the viewpoint of national interest of taking care of final disposal of SNF generated in Finland’s NPPs as the company defined its own mission. Ownership of the NPPs located in Finland was carelessly introduced as collective and national feature. (Kojo, 2002, 41.)

willing to include Fennovoima in its network nor to develop a common national solution at Olkiluoto.

These interests were related to the main interest, which aimed at clarifying the principles of Finnish nuclear waste policy. That is, that the state regulations regarding nuclear waste management are actor-specific. In its nine-page long statement Posiva put a lot effort into arguing that a national nuclear waste management programme was never established in Finland, a national decision on concentrating final disposal of all SNF generated in Finland at a single site was never taken and that according to the state there is no national solution for the disposal of SNF in Finland. (Posiva, 2009.)

Therefore, the Olkiluoto repository, according to Posiva, was only for the use of its owners, i.e. TVO and FPH, *“for so long a time period that it is ensured a safe final disposal of spent nuclear fuel of their [owners’] NPP units which exist, is under construction and are planned”* (Posiva, 2009, 8.)

In the statement Posiva argued against the interpretations of Fennovoima regarding Finnish nuclear policy decisions. The main line of the argumentation was to indicate that decisions were actor-specific and no decision on a national solution or on a single disposal site had been taken. Posiva argued that the requirements outlined in the decision of the government in 1983 were actor-specific as were the solutions of the companies’, i.e. TVO and IVO. Furthermore, Posiva pointed out that the decision of 1983 did not obligate the companies to build a joint interim storage for SNF, but both companies built one for their own purposes. Posiva also argued that measures required by the state had been different.

In the statement the establishment of Posiva was also explained to be in line with actor-specific policy. Posiva noted briefly that the joint company had been in the interests of both companies in 1995. However, Posiva neither gave any further arguments nor did it explain how or why the situation in 1995 was different from the current situation. Posiva was in any case established for the benefit of the owners. The agreement on collaboration had needed approval by the Ministry of Trade and Industry, which was granted in 1995. Posiva argued that the application and affirmation of approval indicated that the state did not consider that there was a national solution in Finland for the final disposal of SNF. Posiva interpreted that the approval was issued specifically for inter-company collaboration based on joint demands.

Posiva also took a stand on paragraph 29 of the Nuclear Energy Act. The company argued that the aim of the paragraph was not to exempt a DiP applicant from submitting a nuclear waste management plan independent in relation to the other actors under waste management obligation. Furthermore, the aim of the paragraph was not to open the window of opportunity to demand the use of nuclear waste management solutions planned, financed and implemented by other actors. Therefore, Posiva argued that Fennovoima should introduce a plan of its own.

MEE also hesitated in applying paragraph 29. A memorandum of MEE (2009b, 2) noted that Posiva was not a licensee under waste management obligation, but only the companies operating the NPPs. Therefore the MEE could not compel Posiva in accordance with paragraph 29 of the Nuclear Energy Act, but MEE could only compel the companies under waste management obligation, i.e. TVO and FPH, to collaborate with Fennovoima in establishing a new final disposal facility.

Posiva and TVO repeated their arguments in the media in 2010 before the government granted the Decisions-in-Principle. Posiva stated that a second repository was needed for future energy production in Finland as the area at Olkiluoto was limited. Furthermore, Posiva did not want to excavate disposal tunnels underneath the NPP or the sea. However, in the same interview a geologist from Posiva noted that technically it was possible to expand underneath the sea. (*YLE*, 26 March 2010; also 21 April 2010.)

Other stakeholders also voiced their viewpoints. Eurajoki as the host municipality of the repository reacted to Fennovoima's plans. The municipal government of Eurajoki submitted a statement to Minister Pekkarinen in March 2010 as the municipality had not been consulted on the issue (Eurajoki, 2010). Eurajoki reminded the Minister that the host municipality of a nuclear facility is vested with the right of veto in accordance of the procedure of a Decision-in-Principle and that the veto is compulsory in relation to the decisions by the Council of State and Parliament. This procedure was deemed to be of great importance in building openness and trust. Eurajoki stated that the rights of the municipality and its inhabitants regarding the decision-making on siting on its territory should not be violated. Especially as previous use of that right served as a good example.

If Eurajoki was cautious regarding Fennovoima's disposal plans, the statement by the Ministry of Finance supported Fennovoima's interpretation on the disposal of spent fuel at a single site in Finland. Furthermore, the Ministry of Finance stated that as in the future nuclear electricity might also be produced by other companies than the owners of Posiva in Finland, the decisions concerning final disposal should not distort markets. Therefore the Ministry of Finance deemed it important that the cost-efficient disposal of SNF by others than Posiva's owners should not be hindered. (Ministry of Finance, 2010, 7–8.) Thus Fennovoima's view on a common site gained important political support as Jyrki Katainen, the then Minister of Finance and chair of the National Coalition Party had signed the statement.

Regardless of political support for a common site, the option of two repositories also gained indirect support. STUK had already submitted the preliminary safety analysis of the Fennovoima application to the MEE in 2009. The analysis referred briefly to the final disposal plan by Fennovoima. STUK noted that the disposal concept (KBS-3) was the same as the one under preparation in Finland and Sweden and hence it fulfilled the requirement set in the legislation. According to STUK the concept was also described enough at the DiP application stage. Furthermore, STUK noted that they had no information on the actual chances of Fennovoima disposing of SNF in Olkiluoto. STUK referred to the site selection and site investigations by TVO and Posiva and stated that the bedrock at Olkiluoto was not unique and that appropriate bedrock was available elsewhere in Finland. (STUK, 2009, 25–26.) Right after the unofficial meeting of the government (held on 21 April 2010) but before the formal decision on nuclear new build, a director of STUK noted in the media that hundreds of candidate sites had already been identified in the 1980s. These sites only needed further investigation. According to the director there was no specific reason to dispose of the waste at Olkiluoto. (*Satakunnan Kansa*, 24 April 2010; see also 23 April 2010.)

The government discussed the NPP applications unofficially on 21 April 2010 on the basis of the proposal by Minister Pekkarinen (MEE, 2010c). As a result, additional accounts concerning the final disposal of SNF were requested from Fennovoima. A director of Fennovoima commented that the shortage of capacity at Olkiluoto seemed to be based more on a tactical issue than on technical facts. She felt confident that as soon as the competition for the NPP licence calmed down there would be time for logical reasoning. She also referred to compensation for Posiva and Fennovoima's property at Olkiluoto. (*Kaleva*, 22 April 2010.)

As mentioned in Section Two, the government issued a positive DiP on Fennovoima on 6 May 2010. The decision included requirements for SNF management. The government required that within six years Fennovoima was obliged either to negotiate and sign an agreement with the existing licensees under a waste management obligation or to submit an EIA Programme concerning a final disposal repository for SNF of its own.

The CEO of Fennovoima commented on the requirements by noting that it would make sense to dispose of all nuclear waste generated in Finland at the same site. He continued that if Fennovoima was issued a licence the company would attempt to reach agreement with Posiva in a couple of years, but if that failed then the company would plan a solution of its own. (*YLE*, 27 April 2010.) Thus Fennovoima adjusted itself to the requirements of the government and started to talk about a second repository as a viable option although a joint repository with Posiva was still the main option. In the media Fennovoima also emphasized that the company was not in hurry as the final disposal of SNF would be topical only in the 2050s (*YLE*, 19 May 2010; see also *YLE*, 25 May 2011). Posiva did not change its point of view or tactics. After the announcement of the government's decisions the CEO of Posiva repeated that in the tunnels at Olkiluoto there was capacity for waste produced by TVO and Fortum only. According to Posiva¹¹ the site was limited and they did not want to expand underneath the sea. (*YLE*, 12 May 2010.)

Summary

Fennovoima still attempted to apply alliance -formation tactics but at the same time it visibly introduced the backdoor tactics which relied on paragraph 29 of the Nuclear Energy Act. To support the model of compulsory collaboration Fennovoima argued strongly in favour of a national solution for the disposal of SNF and a single common site. The company interpreted the previous decisions regarding the nuclear waste policy in Finland.

Posiva continued to apply tactics of exclusion as it replied with counterarguments. Posiva defended its status as a private company implementing tasks set by its owners only. The main

¹¹ An interesting exception was introduced in the interview of the vice CEO of Posiva. He stated that there was no obstacle to going underneath the sea as not a single regulation nor international agreement disallowed it. According to his view excavation of tunnels underneath the sea was more an issue of operation. (*Länsi-Suomi*, 19 May 2010.)

line of Posiva's argumentation was to indicate that nuclear waste decisions were actor-specific and neither a decision on a national solution nor on a single disposal site had been taken.

Furthermore, Posiva argued that the aim of paragraph 29 was not to exempt an applicant from submitting a nuclear waste management plan independent in relation to the other actors under waste management obligation. Posiva firmly rejected any plans to start negotiations with Fennovoima on developing a common national solution. MEE was reluctant to apply paragraph 29 of the Nuclear Energy Act as it was not amended according to the legislative procedure of the Finnish Constitution and it would have violated property rights of Posiva.

4.3 Retransformed project: Towards commercial collaboration and a second repository

The decisions by the government in May 2010 did not immediately bring the contending parties any closer. In September 2010 the parties met at the invitation of Minister Pekkarinen (*Kauppa-lehti*, 4 November 2010). The CEO of Pohjolan Voima Oy, the biggest shareholder of TVO, stated that neither Posiva nor its owners were going to start negotiations with Fennovoima on access to the repository. The CEO repeated that Posiva was for the use of TVO and FPH and the disposal capacity at Olkiluoto was reserved for SNF produced in their present and future NPP units. Although Posiva stuck to its main tactics, i.e. excluded Fennovoima from Olkiluoto site, there was a concession as now, according to the CEO, Posiva was ready to offer Fennovoima technological and other expert help on a commercial basis. Furthermore, Posiva was ready to start investigations with Fennovoima on a fast schedule. (Virkkunen, 2010.)¹²

Most likely the owners of Posiva were informed that some activity by the Ministry was to be expected. This did indeed occur when Minister Pekkarinen urged the parties to negotiate seriously. Furthermore the Minister referred to the possibility of investigating the application of paragraph 29 of the Nuclear Energy Act with experts specialized in the Finnish Constitution. The Minister's own interpretation of the paragraph was cautious, but the

¹² The letter-to-the-editor by the CEO Lauri Virkkunen was a replication of an article published in the newspaper *Turun Sanomat* the same day (*Turun Sanomat*, 23 September, 2010). The article stated that TVO and Fennovoima were going to start negotiations in the near future on the possible joint use of Posiva's repository.

implication for investigating compulsory collaboration indicated that the Ministry was considering a more active tactics for itself. (*YLE*, 7 October 2010a; 7 October 2010b.) According to the Minister the objective was that all SNF should be disposed of at the same site at Olkiluoto (*Satakunnan Kansa*, 8 October 2010).

However, only one month later the Minister noted that he was surprised by calculations which indicated that building a separate facility would not necessarily be more expensive than a joint facility. (*Kauppalehti*, 4 November 2010.) A month later the Minister added that the establishment of a joint repository seemed to be difficult and that it is not a bad option to build two repositories. (*Helsingin Sanomat*, 3 December 2010). Thus a policy of two repositories was not excluded by the Minister. This outline was partly influenced by the interpretation of the civil servants of the MEE who found coercion impossible (*Helsingin Sanomat*, 3 December 2010). On the other hand Minister Pekkarinen did not exclude the possibility that the state would apply greater pressure on the contending parties (*YLE*, 2 December 2010). Prime Minister Mari Kiviniemi (of the Centre Party of Finland) also commented on the dispute. She urged the power companies to agree on the site and noted that one site was enough as it surely was also the most rational solution from the point of view of economy and relevance. (*MTV3*, 5 December 2010.) Thus it seemed that the leading politicians¹³ of the Finnish Centre Party at this point still preferred the option of the joint repository although Minister Pekkarinen indicated some support for two repositories. His Ministry, however, was reluctant to apply the tactics of compulsory collaboration (MEE, 2009; 2010b).

Fennovoima disagreed with Minister Pekkarinen on having two repositories. The company referred to the decision by Parliament in July 2010 and argued that a joint repository would be beneficial for all parties. (*Kaleva*, 4 December 2010; *YLE*, 4 December 2010; *Satakunnan Kansa*, 16 December 2010.)

¹³ Antti Rantakangas, Member of Parliament and vice chair of the parliamentary group of the Finnish Centre Party, also supported the option of joint disposal at Olkiluoto. He also worked for this option in the Finance Committee of Parliament. (*YLE*, 31 May 2010.) Timo Kalli, MP and chair of the parliamentary group of the Finnish Centre Party who is known for his close connections with TVO, pointed out that the nuclear waste of Fennovoima could end up in the host municipality of the new NPP unit. However, he did not reject joint disposal at Olkiluoto. (*YLE*, 27 May 2010.)

Negotiations on a joint repository were once again badly stuck. In March 2011 a director of Fennovoima confirmed that negotiations were not on-going and the parties could not even agree on the agenda of the negotiations. The companies had communicated only by letter. Posiva had offered collaboration aiming at planning of a separate repository, a proposal which Fennovoima had rejected. (*YLE*, 21 March 2011; 25 May 2011.) The director also confirmed that Fennovoima was not planning any alternatives as the interpretation of the politicians was that one disposal site was enough. Thus Fennovoima did not introduce the options outlined in the company's memorandum (Fennovoima, 2010). TVO's interpretation was that a joint final disposal solution was required, but not a joint disposal site. (*YLE*, 21 March 2011.) Thus, TVO was ready for some kind of collaboration with Fennovoima for instance consulting but TVO was not willing to share the Olkiluoto site.

The option of two repositories was also supported indirectly by STUK as it announced that if the option of two repositories were assessed to be unsafe STUK would intervene in the planning¹⁴ (*YLE*, 21 March 2011).

In the print the CEO of Fennovoima continued building up trust that collaboration with Posiva would be achieved and repeated the argument of Fennovoima that from the beginning the national solution had been the objective, meaning that all SNF produced in Finland would be disposed of at one site as in other countries. He claimed that the political support for the joint solution was strong. (*YLE*, 11 August 2011; also *YLE*, 25 May 2011.)

The new Minister of Economic Affairs, Jyri Häkämies (of the National Coalition Party) commented on the dispute in autumn 2011. He applied to some extent different tactics from his predecessor Mauri Pekkarinen. Minister Häkämies stated that Posiva could not be compelled to dispose of Fennovoima SNF as coercion was difficult from the view point of legislation. Pekkarinen had pointed out the option of state intervention again and again although paragraph 29 of the Nuclear Energy Act was never applied and tested in practice. It seems that the Centre Party of Finland had a somewhat lower threshold for state intervention in the issue, i.e. coercion in accordance of paragraph 29, than the National Coalition Party, which is known as the most pro-nuclear party and more market-oriented in the Finnish Parliament. The Minister's opinion was that other kinds of collaboration measures than

¹⁴ In accordance of the Nuclear Energy Act STUK provides a preliminary safety assessment as part of DiP procedure. In practice STUK is vested with the right of veto.

coercion had to be looked for. If those measures were not successful then Fennovoima was responsible for introducing the solution. The option of two repositories was not excluded. Håkämies also urged the companies to negotiate and intended to start discussions in the near future. The previous discussions had ceased more than one year earlier. (*Tekniikka & Talous*, 12 August 2011; *YLE*, 6 October 2011a.)

Posiva reacted immediately to this. Posiva's main interest persisted: Onkalo at Eurajoki was not a solution for Fennovoima. According to CEO of Posiva the reasons were purely technical. The area reserved for final disposal did not have room, due to the laws of physics and chemistry. However, Posiva repeated that if necessary Fennovoima could acquire know-how for the final disposal of SNF from Posiva. (*YLE*, 6 October 2011b.) The option for consulting was a minor concession by Posiva. Otherwise there was no sign of convergence.

The municipal director of Eurajoki noted that Eurajoki had the right to veto the expansion of the repository at Olkiluoto. It was expected that the statement of Eurajoki would be asked for at a stage of the Fennovoima construction licence application. (*YLE*, 6 October 2011c.)

In February 2012 the government intervened in the debate as it was outlined by the Committee on Economic Policy that the government was ready to apply paragraph 29 of the Nuclear Energy Act. Now Minister Håkämies stated as follows:

“This is the Government’s message to the operators in the field: the technical investigations regarding final disposal should be carried out in a neutral and unbiased manner. After that, it will be time to make decisions. It should be possible to engage in cooperation if the reports show that a joint solution is feasible and the best option from the perspective of overall economy and safety.” (MEE, 2012a.)

It was also required that the parties initiate the completion of the investigations required on collective final disposal.

Minister Håkämies stated that Fennovoima was required to investigate the final disposal solution of its own and the second option was the joint one. As the voluntary approach between the companies did not work, the Minister deemed it important that the government gave a strong signal that if necessary the Ministry would insist on studying the joint option. (*YLE*, 28 February 2012.)

Posiva reacted immediately and announced that the company was not going to change its stance. According to Posiva there was no room for the nuclear waste of Fennovoima at Olkiluoto. CEO of Posiva stated that “This is not a political decision, but it is a purely technical issue.” (YLE, 29 February 2012a.) On behalf of Fennovoima the CEO noted that Fennovoima was confident that the parties would start a joint independent investigation of the situation at Olkiluoto (YLE, 29 February 2012b). In this changed situation the owners of Posiva and TVO appealed to safety and risks. First TVO stated in a press release as follows:

“The current researched repository can hold 12,000 tonnes of nuclear waste and is located at an optimum depth of 420 metres. Posiva has no need and, for safety reasons, no possibility to expand the repository.

The facility must be able to sustain earthquakes and a potential glacial period without compromising the safety of long-term disposal. These are essential criteria for determining the placement and capacity of the repository. Furthermore, for safety reasons, the companies are not willing to store nuclear waste in two layers or underneath the Olkiluoto power plant or underneath the nearby settlement. Disposal under the seabed has been ruled out for the same reasons. Horizontal or vertical positioning of the final disposal capsules makes no difference to the capacity of the repository. Based on the nuclear safety requirements of the final disposal facility and extensive deliberations, Posiva and its owners have come to the conclusion of the repository at its current size and location.” (TVO, 7 March 2012.)

This was followed by the notion of the CEO of UPM pulp and paper company, one big owner of TVO, that it was a conscious decision of risk management by the owners not to excavate underneath the sea, the NPP or residential area. An extended repository might mean risks. (MTV3, 8 March 2012.) Thus the owners defended the design of the repository even more firmly as the safety issue was taken up. In accordance with paragraph 29 of the Nuclear Energy Act the Ministry can order the licensees under waste management obligation to address their waste management measures collectively if safety can thereby be increased or expenditures substantially reduced, or other important reasons require this action. As Posiva could not appeal to reduced costs, attention was paid to the safety aspect.

In the media an estimate of expenditure was introduced by an energy technology professor of Lappeenranta University of Technology. The professor stated that an insignificant issue was exaggerated. In his view final disposal was an activity which everyone in the energy technology business should be able to manage for themselves. The professor estimated that a repository of Fennovoima's own would cost about 1.3 billion euros. A common repository would save 200 to 300 million euros. This amount, according to the professor, was a pittance in NPP investment, which once in operation would yield about 600 million euros annually. The professor was amazed by the need for governmental intervention in the issue and he advised Fennovoima to ask for Posiva's invitation to tender to build a repository for Fennovoima at an appropriate site. (*YLE*, 25 March 2012.)

Another prominent person, the retired director general of STUK, Jukka Laaksonen, also commented on the dispute and advised the politicians to suggest returning to the issue in 20 or 30 years. According to him there was no hurry thus there was no sense in discussing the issue now. (*MTV3*, 11 March 2012.) Although these were sporadic statements, they became part of the networks around the contending parties.

The Working Group¹⁵ was established in March 2012 (MEE, 2012d). According to the Working Group its objective was to collect already available data in order to enable comparison of different options as well as for further actions. The interest of the whole Working Group could be said to be to find a mode of collaboration for Posiva and Fennovoima. In an interview Minister Häkämies noted that the Working Group was investigating whether the Onkalo of Posiva could be expanded. He excluded that the option that the disposal capacity reserved for the Loviisa 3 NPP unit at Olkiluoto would be allotted to Fennovoima. Thus the interest of Fortum regarding future final disposal was ensured. (*YLE*, 29 March 2013a.) According to the minutes of the meetings, Fennovoima and Posiva were encouraged to engage in collaboration¹⁶ several times. However, Minister Häkämies told the

¹⁵ The Working Group held altogether 12 meetings between 19 March 2012 and 20 December 2012. Posiva and its owners (TVO and FPH), Fennovoima and the Ministry of Employment and the Economy were represented in the Group. The minutes of the meetings are very sparse in details concerning the different issues discussed.

¹⁶ The collaboration between the companies came up several times in the minutes. For example on 22 November, the chair asked about the collaboration. The parties recommended collaboration, but details of the collaboration needed clarifying. These details were discussed in the meeting, but the minutes did not include any details.

parties not to comment on the nuclear waste issue in the media. According to the Minister this was needed in order to put an end to the yes vs. no dispute. (*YLE*, 29 March 2013b.) The chair of the Working Group, representing of the MEE, also noted that the Group will not otherwise inform its work progress to third parties (Minutes of the Working Group, 19 March 2012).

On behalf of Fennovoima the option of the second repository was received with satisfaction, but in an interview the Fennovoima director of communications refused to comment on the municipality of Pyhäjoki as an optional site as it had not been on the agenda and indeed was not considered in the land use planning of the NPP site (*YLE*, 14 March, 2012). The concrete outcomes of the Working Groups were the interim report published on 27 June 2012 (MEE, 2012c) and the final report on 10 January 2013 (MEE, 2013).

The Working Group agreed that the existing material should be introduced in the meetings for possible comparison of the options. Posiva presented their material on Olkiluoto. Posiva was also asked to introduce information on areas where the extension of the repository might be possible. The chair of the Group stated that it was an important question whether the repository could be extended or not. Fennovoima announced that they had started the preparation of the EIA programme regarding their own repository. (Minutes of the Working Group, 4 April 2012). Interestingly this was not disclosed to the media, neither were the site selection plans introduced in the Fennovoima memorandum of 2010 (Fennovoima, 2010). Therefore it seems that Fennovoima started only an internal preparation for site selection¹⁷. The company needed to take into account the requirements set by the government, but at the same time the joint repository with Posiva was the main option. Public announcement of the preparation of a site selection process of its own might have undermined political support for the one single national disposal site.

Posiva introduced its material on Olkiluoto which included planning justifications, the planned area, and the restrictions to be taken into consideration if the area were to be extended. Restrictions on a possible extension of the area were uncertainties in the rock

¹⁷ For example, in the municipality of Sievi speculations concerning the possible site selection plans of Fennovoima raised concerns in summer 2012 (*Kaleva*, 29 July 2012). One of the five investigation sites which TVO studied in the late 1980s is located in Sievi. This site is the nearest one to Pyhäjoki, where the Fennovoima NPP is planned to be located. The issue was also discussed in Äänekoski, which was one of four candidate sites investigated by Posiva in the 1990s (*YLE*, 7 December 2010, updated 5 June 2012).

characteristics and its impact on how to place the canisters, land ownership questions, and planning. (Minutes of the Working Group, 23 April 2012). Posiva continued introducing its plan for the repository in the next meeting highlighting safety and optimizing factors. The restrictions to an extension in Olkiluoto were also discussed. Some possibilities could be found in building under the sea, but that also included certain risks. According to Posiva examination of the area and planning was complicated in sea areas. (Minutes of the Working Group, 21 May 2012.) The conclusion seemed to be that these were not very good options for a possible extension at Olkiluoto.

Fennovoima introduced their plan for the forthcoming EIA programme at the Working Group. The planned investigations were due to start the same year. The possible siting areas had not yet been chosen (Minutes of the Working Group, 6 June 2012.) According to the interim report of the Working Group published in June 2012 Pyhäjoki as the planned location of the NPP unit was one of the possible sites Fennovoima was considering when preparing the EIA programme for a SNF repository of its own. In total the EIA programme would include half a dozen candidate sites. (MEE, 2012e; see also *YLE*, 28 June 2012). In the Working Group it was noted that Fennovoima needed to make a plan in accordance of paragraph 74 of the Nuclear Energy Degree, where the whole lifespan of the project, involving time plans, safety and technological examinations, site examinations, and cost estimates would be included. Other possible sites were also discussed and it was concluded that the feasibility studies at those sites had to be done again. The sites mentioned in the minutes were located at Eurajoki, Hyrynsalmi, Kuhmo, Loviisa, Sievi and Äänekoski. The launching of possible commercial negotiations was discussed, but nothing more on the matter could be found in the minutes. The MEE introduced Swedish plans on building underneath the sea. (Minutes of the Working Group, 6 June 2012.)

The interim report of the Working Group concluded that the final quantity of spent fuel that would fit into Olkiluoto would be ascertained in the decades to come. It was not entirely certain that 12000 tons of spent fuel could be disposed of in the Olkiluoto area. Therefore the objective and interest of Posiva to exclude Fennovoima seemed assured already at this stage. MEE stated in a press release on behalf of the Working Party as follows:

“ (...) the working group states that it can neither be proven nor ruled out whether more than 12,000 tonnes of spent nuclear fuel might be placed in final disposal in the

Olkiluoto bedrock section. It will take decades before the amount of spent nuclear fuel that can be placed in final disposal in Olkiluoto can be specified, and more precise information on the quality of the bedrock will only become available in surveys during the excavation stage of the final disposal tunnels. Therefore, it is not certain whether there is room in Olkiluoto even for the planned 12,000 tonnes of spent nuclear fuel.

According to the working group, extending the Olkiluoto final disposal facility to accommodate Fennovoima's nuclear waste (some 3,000 tonnes of uranium) would require a derogation from Posiva's current research and operational principles. Possible surveys regarding an expansion to the Olkiluoto final disposal facility must not endanger the safety and operational preconditions of the current final disposal project.” (MEE, 2012e.)

According to the discussion of the group, this meant that Fennovoima needed to have a solution of its own for the SNF in the application for a construction license. It was also unsure if the SNF produced by the Loviisa 3 NPP unit would fit into Olkiluoto. (Minutes of the Working Group, 24 August 2012.) Hence the policy option of two repositories became more likely.

The Working Group discussed the criteria for a comparison of the options. It was again noted that the life span of the project was an important factor when making the comparison, for example intermediate storage was a major issue in assessing the costs. It was also noted that a comparison was hard to accomplish as the guiding principle was to apply existing publicly available information. It was proposed at the Group that the comparison would be based on qualitative information and it would report relative differences. Hence the evaluation of options as such could be a better approach than direct comparison¹⁸ between them. The chair concluded that Fennovoima needed to present a more thorough solution of their own for a final disposal repository and an estimate of safety and environmental issues. Posiva and Fennovoima were asked to collaborate in comparing the costs of the options. It was further decided that the companies should aim at collaboration. (Minutes of the Working Group, 24 August 2012.)

¹⁸ The word comparison was however applied in the minutes.

The criteria for a comparison were thoroughly discussed. Those were safety, environment, costs and the overall good of the society. At the meeting of 8 October the chair concluded the discussion on criteria by claiming that both options of the comparison were feasible. Safety was in his opinion the starting point, but safety would not determine the site selection. Environmental issues and social issues were deemed important. The chair stated that there would be impacts if there were two repositories. A possible new site would entail a lot of effort. It seemed also problematic to find a good way to compare economic factors. More detailed information was needed on these factors. The overall good of the society approach was also discussed. The chair concluded that the national approach and solution were essential, not the issue of one or more repositories. (Minutes of the Working Group, 8 October 2012.)

The last meetings of the Working Group were concerned with finalizing the final report. The group wanted to submit a report which all parties of the group supported. The final report was published in January 2013. It assessed the environmental impacts of the various options, safety, costs and a review of these with respect to the overall good of the society. An important conclusion was as follows: When implemented in an optimal and timely manner, the difference in costs between different options would be insignificant compared to the life cycle costs of nuclear power production (MEE, 2013b).

According to the final report the difference in costs between an extended repository at Olkiluoto and a separate facility of Fennovoima would be about 0.9-1.0 billion euros. However, if a separate final disposal facility were to be built in an optimal way difference in expenditure would only be about 0.2 billion euros. Compared to the life cycle expenditure of nuclear energy production the difference was deemed minor. Furthermore, the report stated that it was essential to utilize the experience and know-how of the entire field and to aim at an optimal final disposal solution. Optimization also referred to collaboration in encapsulation at Olkiluoto, to longer cooling periods of SNF and therefore cost-effective use of disposal capacity. Instead the number of repositories, one or two, was deemed unessential. The Working Group recommended that the companies continue negotiations on finding a solution for Fennovoima and noted that negotiations on a commercial basis were not within the remit of the Working Group. (MEE, 2013, 11–12,14–15.)

At the press conference the Minister of Economic Affairs Jan Vapaavuori (of the National Coalition Party) noted that all activities related to nuclear power were more or less characterized as national questions and that the nuclear waste issue was such a long-lasting solution that only the very top could wield the steering power. According to the Minister the commercial interests of private companies could cover decades at best, but solutions spanning thousands of years could not be characterized as commercial questions. The Minister also thanked the Working Party for turning the focus of the debate away from the number of final disposal sites to essential measures, i.e. planning, research and optimizing costs, in other words, the collaboration of the companies. (MEE, 2013c.)

In 2013 Fennovoima announced that the company was continuing negotiations with Rusatom Overseas¹⁹. Later, in September 2013 when Fennovoima submitted the updated EIA programme to the Ministry, the company announced that “*Fennovoima’s primary plan is to join the disposal of spent nuclear fuel from the nuclear power plants currently operating in Finland*” (Fennovoima, 2013c, 21). Furthermore, Fennovoima still stated that “*Posiva is responsible for the disposal of spent nuclear fuel in Finland*” (Fennovoima, 2013c, 21). The recommendations of the Working Party were referred to as follows “*(...) it is purposeful and cost-efficient in the disposal to aim at an optimised solution and to utilise the knowhow and experiences evolved in the industry through the Posiva project.*” (Fennovoima, 2013c, 21.) Otherwise the Olkiluoto site or the policy of a single common site, were no longer directly mentioned.

Summary

The tactics of Posiva changed as it consented to start negotiations on selling know-how concerning the final disposal of SNF to Fennovoima. However, Posiva did not give up in relation to the status of Onkalo. The repository at Olkiluoto continued to be reserved only for

¹⁹ In July 2013 Fennovoima announced that it had signed a Project Development Agreement aiming at a NPP (a VVER design) supply contract with Rusatom Overseas, a subsidiary of Rosatom. In addition, negotiations on Rusatom Overseas acquiring a 34% share in the capital of Fennovoima were carried out. Fennovoima submitted an updated EIA programme to MEE in September 2013. (Fennovoima, 2013a; 2013b.)

the owners of Posiva, meaning the exclusion of Fennovoima. Aspects of the assessment of total disposal capacity at Olkiluoto seemed to be in the hands of Posiva.

Thus Fennovoima was only partly successful. The negotiations on collaboration were finally started due to state intervention, but the company did not gain access to the repository at Olkiluoto. The Working Group recommended that the companies continue on a commercial basis. Hence MEE could withdraw from the role of mediator and further planning and implementation would be left to the companies, which concurs with actor-driven and actor-specific nuclear policy.

It is important to note the influence of the Working Party as a negotiation arena on the further development of final disposal for setting the future direction of Finnish nuclear waste policy. Although Parliament had required “*negotiations towards a national final disposal solution aiming at the joint national final disposal solution which also includes the final disposal of spent fuel from Fennovoima NPP unit*” the Working Party succeeded in outlining a policy allowing the option of two separate repositories in the frames of national solution.

At this time it is difficult to anticipate the scope of future commercial collaboration between Posiva and Fennovoima, but on the basis of the case study it would be a surprise if Fennovoima became a shareholder of Posiva in the near future. It is more likely that Posiva will sell know-how on the site selection procedure and planning of the final disposal facility. However, in the future it is feasible that the companies would share an encapsulation plant at Olkiluoto.

Fennovoima lost an important resource as E.ON pulled out of the NPP project in October 2012. At the same Fennovoima lost its connection to the KBS-3 research and development activities, which was one of the main arguments in the final disposal of SNF in the DiP application of 2009. Access to KBS-3 know-how via E.ON had also been the foundation of the backdoor tactics of Fennovoima in case of failure in the negotiations with Posiva on a joint repository.

5. CONCLUSIONS

Socio-technical challenges can be characterized as “*situations and issues where the relationship between the technical and social components is still unstable, ambiguous and controversial, and where negotiations are taking place in terms of problem definitions and preferred solutions*” (Bergmans et al. 2012, p.3). In this case study we analysed the debate and negotiations on the development of the joint final disposal of SNF in Finland. The challenge emerged as the nuclear power company Fennovoima started planning its NPP and SNF management in 2007.

The case study indicates the challenges related to a siting process in a company-driven implementation policy where one site for final disposal of SNF has already been approved, but a new power company wants to join and expand the existing disposal project. Due to the conflicting interpretations regarding the foundation of the Finnish nuclear waste policy the principle of national solution was shaken. The case study also indicates how the socio-technical challenges of the siting controversy are addressed by establishing a negotiation arena which is open for the main actors only.

The objective of the paper was to analyse the interests, resources and tactics of the key actors, i.e. Posiva, Fennovoima and the Ministry of Employment and the Economy, negotiating the development of “national solution”. From the beginning Fennovoima applied tactics of alliance formation. It attempted to start collaboration with Posiva, first on a voluntary basis, but then also by arguing that the MEE could compel the parties to collaborate. It was in the interests of Fennovoima to ensure access to the national solution on the final disposal of SNF and hence to support its owners’ NPP project. Fennovoima also attempted to persuade Posiva by referring to compensation and by appealing to the piece of land Fennovoima controlled in the vicinity of the Olkiluoto disposal site. Hence, the tactics of persuasion were applied. Later Fennovoima’s tactics became somewhat harder and even arrogant as the company became frustrated due to continuous rejections by Posiva. Fennovoima perceived that a policy decision on a national solution aiming at a common single site at Olkiluoto had been taken in Finland. Hence, paragraph 29 of the Nuclear Energy Act was an important resource for Fennovoima, especially as many politicians also seemed to support the interpretation of a single common disposal site.

Posiva applied tactics of rejection and exclusion. First Posiva defended its identity as a private company and the status of the final disposal facility at Olkiluoto as an activity of its owners only, which could not be nationalized for national interests. Posiva introduced counterarguments concerning the principles of Finnish nuclear waste policy and argued that the regulations were actor-specific. Later Posiva also appealed to the lack of space, and to safety and risks in excluding Fennovoima from Olkiluoto. Finally Posiva changed its tactics and agreed to start negotiations on collaboration, but most likely due to its expertise in assessing the information concerning the limitations of the Olkiluoto site it succeeded in defining the final disposal options in such a way that the company managed to reserve Olkiluoto only for its owners.

MEE involuntarily assumed the role of a mediator between the conflicting parties and urged the companies to start negotiations voluntarily, but these tactics of non-intervention failed. Even though the ministers implied that the state could intervene in the dispute, MEE was reluctant to resort to force in accordance with the Nuclear Energy Act. Finally the Ministry succeeded in getting the parties around the same table. It seems that the interpretation of the Ministry of Justice of paragraph 29 of the Nuclear Energy Act changed the situation. The Working Party established, however, interpreted the request of Parliament concerning the national solution in such a way that the policy option of two separate repositories became the most likely one.

Therefore the principle of national responsibility for nuclear waste management was re-interpreted. Instead of a common single site, optimization and timing were emphasized in the frames of commercial collaboration of the licensee under waste management obligation. In the future the licensees could collaborate in encapsulating SNF in one facility but finally disposing of it at two different sites in Finland.

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