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The Art of Being Ethical and Responsible: Print Media Debate on Final Disposal of Spent Nuclear Fuel in Finland and Sweden

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Abstract

After decades of preparation, the final disposal of spent nuclear fuel has reached the construction stage in Finland, and the neighboring Sweden is likely to soon follow in the footsteps. These Nordic countries rely on a similar technical concept based on passive safety, advocated as a means of minimizing the burden to future generations. The scholarly literature on the ethics of nuclear waste management has thus far paid little attention to the views of the broader publics on the associated ethical challenges. This article helps to fill the gap through a longitudinal and comparative analysis of ethical discussion of the final disposal of SNF in news articles and letters to the editor in four leading Finnish and Swedish daily newspapers in 2008–2015. The study period included major milestones in the licensing processes of the respective two repository projects. The article examines the attention paid to intra- and intergenerational distributive and procedural justice, the changes in the ethical agenda over time, and the societal actor groups that receive attention in the media. The analysis reveals two distinct ethical media agendas: (1) the news article agenda that is dominated by framings of the main players (industry, politicians, authorities, and experts) and largely excludes future generations from the scope of justice, and (2) the agenda represented by the letters to the editor, which focuses on intergenerational justice concerns. Particularly, in the Finnish letters to the editor the value of the lives of distant future generations was discounted implicitly.

Keywords Intergenerational justice · Nuclear waste · Passive safety · Scope of justice · Media attention · Finland · Sweden

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Introduction

The final disposal of spent nuclear fuel (SNF) is a socio-technical project unprecedented in the history of humankind. Due to the long-term risks involved, such projects require open deliberation that allows scientific, social, and ethical arguments to be publicly discussed and tested, to enable the society to give an informed consent for a high-risk techno-scientific project, and respect the principles of environmental justice (Cotton, 2018; Shrader-Frechette, 2002). The present generation needs not only to develop a technically feasible solution, but also to interrogate its ethical grounding and robustness, in an intergenerational perspective (Shrader-Frechette, 2000; Wilding, 2012, 306). Two Nordic countries, Finland and Sweden, which are at the forefront in developing final disposal, have incorporated into their nuclear waste policies the idea of passive safety. The respective nuclear waste management (NWM) companies, Posiva in Finland and SKB in Sweden, have done so by developing the so-called KBS-3 final disposal concept (Posiva, 1999a, 21–25; NEA, 1995; Sundqvist, 2002). Ethical arguments are used to justify passive safety, given its key objective of sparing future generations from the need for managing the waste or for long-term post-closure monitoring of the repository. As such, the principle follows the stipulations of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, signed by both the Finnish and Swedish governments (see e.g. Posiva, 1999b, Appendix 3, 2–3; SKB, 2000).

In recent years, scholars have paid increasing attention to the ethical principles related to SNF disposal (e.g. Bråkenhielm, 2015; Krütli et al., 2015; SOU, 2016; Taebi, 2017). Empirical studies have typically addressed the ethics of NWM through the notions of justice, fairness and responsibility, mostly in relation to future generations. While this research has studied documents such as industry license applications (e.g. Bråkenhielm, 2015; Wilding, 2012), there is a dearth of information concerning the views of the broader publics on ethical questions. For instance, Lavelle et al. (2013) have addressed the long-term ethical considerations associated with RWM, related notably to the rights and duties of the current and future generations, long term responsibility, democracy, and justice. In practical policymaking and societal debate on NWM, ethics tend to be discussed within narrow circles of authorities and decision-makers, without input from the affected publics (Taebi, 2017). However, ethical considerations should not be a matter solely for experts (e.g. US Nuclear Waste Technical Review Board, 2015, 8), who typically address these issues from their own disciplinary perspective. Broader publics need to be engaged, to ensure a more polyphonic and comprehensive ethical debate on NWM, and to influence agenda-setting, i.e. the choice of the issues for public deliberation (Bergmans et al., 2015, 350). For an informed societal debate on the ethics of SNF disposal, it is vital to ensure that a diverse range of actors, themes and perspectives have access to the media agenda (Raitila, 2002).

This article addresses the ethical issues through the concept of justice, comparing the media debates on the final disposal of SNF in two forerunner countries

that rely on a practically identical final disposal concept, with passive safety as a key principle designed to ensure intergenerational justice. The fact that these countries are set to become, in the 2020–2030s, the first in the world to operate SNF repositories, provides a unique opportunity for comparison. As forerunners, these countries are likely to set a precedent also for the treatment of ethics in NWM. By ethical issues, we mean moral justifications, claims and opinions related to NWM debates raised by stakeholders and the broader publics in media. Our conceptual framework draws on literature on (1) media agenda-setting, and (2) environmental and energy justice, especially in NWM context (Cotton, 2018; Krütli et al., 2012, 2015; Shrader-Frechette, 2000). The study can inform policymaking in other countries that currently consider or pursue final disposal and debate on ethically legitimate solutions.

Building on earlier literature, we start from three key assumptions. Firstly, the ethical agenda is not immutable, but instead dynamic and prone to variation over time, according to the institutional context (e.g., Cotton, 2018, 2021). The ethical principles currently applied to SNF disposal have evolved as an outcome of socio-historical developments and agenda-setting, which entail confrontation of competing discourses promoted by diverse actors (Kojo et al., 2020; Litmanen et al., 2017). Secondly, the print media constitutes a societal arena that allows a relatively comprehensive expression of such contrasting discourses and perspectives, including the perceptions of justice concerning NWM (Krütli et al., 2010). Thirdly, country-specific socio-political, legal-administrative and economic-technical features contribute to the framing of ethics in debates on NWM (Chilvers & Burgess, 2008; Lehtonen et al., 2021). Key among these features is the national nuclear waste ‘regime,’ with its own rules, norms, main actor groups, power relations, and discourses (see Litmanen et al., 2017). The regime conditions the media agenda-setting processes whereby diverse societal actor groups compete for limited media attention, particularly from the most powerful media houses. National specificities in ethical discussion on NWM hence reflect the degree of polyphony of the given NWM regime, its willingness to engage in a wider societal debate on the options of final disposal of SNF and their potential consequences, and to include different actor groups in this debate.

This article adopts a media agenda-setting approach to studying a single issue from a comparative two-country perspective. Following Dearing and Rogers’ (1996, 3) definition of an issue as “a social problem, often conflictual, that has received mass media coverage,” we examine the treatment of environmental and energy justice—in their intergenerational distributive and procedural dimensions and from the perspective of intergenerational justice—relating to the final disposal of SNF in the Finnish and Swedish print media. The analysis focuses both on the ways in which justice is addressed and on the degree of attention that different actor groups receive in the media. The analysis is placed within the context of the Finnish and Swedish nuclear waste regimes and repository licensing processes. We are particularly interested in ethical agenda-setting, that is, the ways in which different groups present in media debates either challenge or defend the core ethical arguments put forward by the actors in the nuclear waste regime.

The empirical analysis focuses on the ethics-related media coverage prompted by SKB's and Posiva's license applications. By operationalizing the questions of ethics via the three-dimensional conceptualization of justice, with particular attention to intergenerational justice, we pose three questions: (1) How do the Finnish and Swedish print media compare with each other in terms of the attention that they pay to distributive, procedural, intragenerational, and intergenerational justice in relation to the final disposal of SNF? (2) How has this ethical agenda in the media changed over time? (3) Which societal actor groups receive attention in the media, and which justice issues are on their agendas? Our findings reveal the dominant position that incumbent actors hold in framing the media agenda concerning SNF disposal in both countries. Intergenerational issues have a minor role on the print media agenda, and the dominant framings portray passive safety as the key means of addressing intergenerational justice.

The structure of the article is as follows. Section "[Theoretical Framework: Media Agenda-Setting](#)" introduces the media agenda-setting theory. Section "[Ethical Issues in Nuclear Waste Management](#)" presents the literature on ethics and justice associated with NWM relevant for the analysis. The Finnish and Swedish nuclear waste regimes are briefly presented in Section "[The Final Disposal Concept and Licensing of the Repository in Finland and Sweden](#)." Section "[Data, Methods, and the Field of Research](#)" describes the data and methods, while Section "[Results](#)" presents the results of the comparison between the Finnish and Swedish discussions. Sections "[Discussion](#)" and "[Conclusions](#)."

Theoretical Framework: Media Agenda-Setting

In general, an agenda refers to a body of issues considered as important enough to deserve time and attention. Agenda-setting is crucial because "the agenda of any institution is too limited to afford considerable attention to every issue" (Vliegenthart et al., 2013, 391). The agenda-setting process involves three interrelated agendas, each with its own research traditions: the media agenda, the public agenda, and the policy agenda. To understand how and why policy decisions are initiated, prepared, and eventually taken, it is crucial to analyze the interaction between these agendas (Green-Pedersen & Walgrave, 2014, 4). While research has traditionally sought to mainly understand the influence of the media agenda on the public agenda (McCombs et al., 2014, 787–788) and to a certain extent also on the policy agenda (see van Aelst, 2014, 232), the impact of the public and policy agendas (McCombs et al., 2014, 790; Teräsväinen, 2012) on the media agenda has received less attention. In the media agenda-setting process, diverse players compete for attention from the media, the public, and the policymakers, seeking to highlight their own priority issues (Dearing & Rogers, 1996, 5). The media have a central role in distributing and shaping the scarce attention. Competitors in the agenda-setting process seek to maximize the positive and neutral attention while trying to avoid negative attention and criticism.

According to media agenda theorists, two key factors determine the public agenda, which in turn shapes the policy agenda (e.g. Weaver, 2007, 142). First, the

relative salience of an issue, that is, “the degree to which an issue on the agenda is perceived as relatively important” (Dearing & Rogers, 1996, 8), and second, the attributes of the issue on the media agenda (e.g. Scheufele & Tewksbury, 2007). In practice, the former relates to the number of times that an issue is mentioned, whereas the latter concerns the ways in which it is defined and constructed.

In a similar vein, two explanations have been proposed to explain the influence of media agenda-setting on individuals, namely accessibility and applicability. The former denotes the relative importance of an issue in the media, which is assumed to influence the standards that people apply when forming their attitudes. The agenda-setting effect then follows from “the fact that the issue has received a certain amount of processing time and attention” (Scheufele & Tewksbury, 2007, 14). Applicability refers to how framing, or characterization of an issue in the media shapes the way in which the various audiences understand the issue (Scheufele & Tewksbury, 2007, 11; see also McCombs, 2005, 551–552). Van Aelst (2014, 232; also Green-Pedersen and Wilkerson, 2006) has indeed argued that agenda-setting research has amply explored the ways in which media coverage influences the issue priorities of political actors, but has focused too much on the relative salience of issues, while overlooking framing, frame-building, and the media in the later phases of the policy process.

In this paper, we explore both accessibility and applicability in relation to the ethical agenda in print media. Press reporting in the two countries is compared by examining (1) the number of news articles and letters to the editor that address the issue from an ethical perspective, and (2) the attributes of the issue, i.e., how ethical issues are defined in news articles and letters to the editor related to final disposal of SNF.

Ethical Issues in Nuclear Waste Management

Ethical issues related to NWM have been examined in social sciences since the 1970s (Hietala & Geysmans, 2020; Solomon et al., 2010). This has included research on ethical considerations in the perceptions of community residents, leaders, and the general public (Krütli et al., 2015; Stefanelli et al., 2017; Vilhunen et al., 2019). Sjöberg and Drottz-Sjöberg (2001) found that issues such as fairness, alongside with the “naturalness” of the risk, were the major determinants of risk perceptions and attitudes towards nuclear waste in Swedish repository siting. In their analysis of the proposed Swiss host communities, Krütli et al. (2010, 2015) identified procedural and distributive notions of justice as vital for acceptance, with transparency and meaningful information as key notions. Similarly, Huang et al. (2013) stressed the procedural, distributive and intergenerational justice concerns that had arisen in nuclear waste repository siting processes in Taiwanese nuclear communities. Ocelík et al. (2017) found that in the Czech Republic community mayors defended deep geological disposal as a responsible solution, especially in view of future generations. Stefanelli et al. (2017) identified safety, justice, and responsibility as the most prominent categories in public discussion on nuclear waste repository siting in Switzerland. Alongside safety and technology, also the “process issues”

of trust, communication, and democracy have been found to figure prominently in media debates related to NWM (Huang et al., 2013; Krütli et al., 2012, 2015; Krütli et al., 2010). Among our two case study countries, ethical issues of final disposal have been researched clearly more extensively in Sweden (e.g. Bråkenhielm, 2015; Löfqvist, 2008; Sjöberg & Drottz-Sjöberg, 2001) than in Finland (e.g. Vilhunen et al., 2019).

The final disposal of radioactive waste poses a fundamental problem of inter-generational injustice: while the present generation reaps the benefits of nuclear power, future generations will have to bear the long-term risks involved in NWM (e.g. Shrader-Frechette, 1993, 2000, 2002). Shrader-Frechette (1993, 94, 212) has questioned the acceptability of deep geological disposal on the grounds that it would not adequately acknowledge the rights of future generations: the present generation takes decisions that have far-reaching implications for future and distant generations, which cannot express their consent. Future generations may, therefore, be simply excluded from the scope of justice considerations that focus on distributive and procedural questions concerning the present generation (Opotow, 1996, 2016). When future generations are included in these considerations, their needs and interests can be misrepresented. Indeed, while the present generation may give “second-party consent” on behalf of future generations, it is questionable whether one can genuinely consent to something so technically and politically uncertain, with potential harm to both the present and future generations (Andrén, 2012; Shrader-Frechette, 1993, 2002; Shrader-Frechette & Persson, 2001; Solomon et al., 2010; Taebi, 2012, 2017; Taebi & Kloosterman, 2008; Wilding, 2012). Hannis & Rawles (2013, 350) thus stress the often overlooked distinction between public and ethical acceptability—a distinction similar to the one made between *de facto* acceptance and principled acceptability (Cowell et al., 2011). In other words, a group or an individual may consent to a project, for a variety of reasons (including pragmatism, disinterest, opportunism, or lack of viable short-term alternatives), but nevertheless consider the project ethically unacceptable. Furthermore, the existing research has failed to clearly distinguish between the considerations concerning present, future, and distant generations, although such distinctions are crucial for choices between alternative NWM solutions (Kermisch, 2016; Taebi, 2017).

Recent research has elaborated on the notion of energy justice, drawing on the well-established concepts of environmental justice, applying this framework to the study of the distributive, procedural, and recognition justice in decision-making on NWM (Bell, 2021; Cotton, 2018, 2021; Jenkins et al., 2016; Schlosberg, 2013; Sovacool et al., 2017; Williams & Doyon, 2019). Distributive justice focuses on outcomes (Cotton, 2021), requiring fair and equal distribution of the risks, costs, and benefits of a project between the involved groups and individuals. Procedural justice concerns topics such as equal access to vote, information, participation, decision-makers, and courts. Recognition justice relates to the capacity of individuals and communities “to have voice, and to have their cultural, social, and moral values respected throughout processes of environmental decision-making” (Cotton, 2021, 205). We draw on these concepts, but depart from this classical distinction for two key reasons. First, while recognition justice is implicitly included in our analysis, for example in the degree to which future generations’ needs are included within the

scope of justice (Opotow, 2016), we do not name recognition justice as one of the main themes, because our material does not allow full-fledged analysis of this type of justice. Second, we highlight the fundamental importance of intergenerational justice in NWM by singling out this as a category of its own. Obviously, justice has its distributive, procedural, and recognition dimensions also in an intergenerational perspective, yet intergenerational considerations emerged from our empirical material as a relatively homogeneous and independent set of issues. Moreover, the very rationale for passive safety (i.e., no need for post-closure monitoring or measures to facilitate the retrieval of waste), which underpins the Finnish and Swedish repository projects, foregrounds intergenerational justice. Treating intergenerational justice as a separate category highlights the importance of the “scope of justice”: to which extent are future generations included in present-day justice considerations, as opposed to being discounted, misrecognized, discriminated against, or simply excluded (Opotow, 2016)?

The Final Disposal Concept and Licensing of the Repository in Finland and Sweden

The Finnish and Swedish nuclear waste regimes (see Table 1) differ in the ways in which they have addressed ethics in national debates and policymaking. In Sweden, the National Council for Nuclear Waste (Kärnavfallsrådet) considered the ethical dimensions of SNF disposal already in the mid-1980s (Andrén, 2012, 34–45). Various reports (e.g. Swedish National Council for Nuclear Waste (KASAM), 2004) have also addressed ethical questions, notably justice and responsibility towards future generations.¹ An informal national Environmental Impact Assessment (EIA) forum called for more detailed analysis of ethical issues in 1997 and appointed a committee to pursue the matter (Nilsson, 2001, 7). Ethical questions were also included in the SKB social science research programme 2004–2010 (Berner et al., 2011). In Finland, intergenerational justice was mentioned briefly in the early 1980s, when final disposal was introduced as an option (Teollisuuden Voima, 1982). Later, Posiva’s EIA report (1999a, 21–25) considered the ethical principles of final disposal options. In the Finnish research programme on nuclear waste management, ethical issues were first included in 2010 (Ministry of Employment & the Economy, 2010, 27).

Both countries rely on the so-called KBS-3 concept, originally developed in Sweden (Sundqvist, 2002; Vira, 2017). Safety in the KBS-3 concept relies on the principle of multiple natural and engineered barriers, whereby the characteristics of the fuel, copper canisters, bentonite clay, and bedrock are designed to jointly isolate SNF from the living environment. A system of tunnels and deposition holes will be constructed in crystalline bedrock at a depth of about 500 m, in the Forsmark site in the municipality of Östhammar (Sweden) and the Olkiluoto site in the municipality

¹ For example, in the licensing process, MMD (2018) demanded greater clarity on who would be responsible for the repository in the long term.

Table 1 Comparison of the Finnish and Swedish nuclear waste policy contexts and regimes

	Finland	Sweden
Polymaking culture	The “pre-legislative consultation” habitually less open and comprehensive than in Sweden	A highly deliberative policy preparation process, rationalism, openness, and consensus
Role of nuclear power in the electricity mix	Four NPP units cover 34% of the electricity production. Parliament approval of nuclear new-build projects in 2002 and 2010	Six NPP units cover nearly 30% of the electricity production. In 2010 Parliament passed legislation allowing existing NPP units to be replaced with new ones. Government policy of 2016 aims at 100% renewable energy by 2040 but does not rule out nuclear new-build
Producer responsibility for nuclear waste management	Nuclear power companies are responsible for the costs and implementation of NWM	Nuclear power companies are responsible for the costs and implementation of NWM
Nuclear waste management company	Posiva (owned by nuclear power companies Teollisuuden Voima and Fortum Power and Heat)	SKB (owned by nuclear power companies Vattenfall, Forsmarks Kraftgrupp, OKG Aktiebolag, and Sydkraft Nuclear Power)
Final disposal concept	The KBS-3 concept relying on the principles of multiple natural and engineered barriers and passive safety. Both the encapsulation plant and the underground repository are to be located in Eurajoki municipality	The KBS-3 concept relying on the principles of multiple natural and engineered barriers and passive safety. The encapsulation plant to be located in Oskarshamn and the underground repository in Östhammar
Repository licensing procedure	Licensing is guided by the Nuclear Energy Act and governed by Ministry of Economic Affairs and Employment (MEAE). The procedure includes an Environmental Impact Assessment and a government Decision-in-Principle (DiP)	Licensing follows two parallel procedures, under (1) the Nuclear Activities Act, supervised by the Swedish Radiation Safety Authority (SSM), and (2) the Environmental Code, supervised by the Land and Environment Court (MMD)
Site selection process	Started on semi-voluntary basis in the 1980s. The candidate host municipality has a right of veto. A benefit package agreement between the Eurajoki municipality and the nuclear industry. Eurajoki approved the siting in 2000. A new power company Fennovoima launched a site selection process for a possible second repository in 2016	Restarted on a voluntary basis in 1994, after failed site search in the 1980s. The candidate host municipality has a right of veto. An added-value programme between the Oskarshamn and Östhammar municipalities and the nuclear industry was signed in 2009. The municipalities approved the siting in 2020
Decision-making on the final disposal of SNF	Government Decision-in-Principle in 2000, ratified by Parliament in 2001. Construction license approved in 2015. Expected start of operations in 2024	Government approval for the construction of the repository in 2022. Expected start of operations in the 2030s

of Eurajoki (Finland). Therefore, the technical challenges of final disposal are similar in both countries, although in Sweden the encapsulation plant and the underground repository are to be located in two different municipalities.

The concept builds on the principle of passive safety, i.e., isolation that relies on the passive operation of natural environmental and man-made barriers, does not permit easy human access to the waste after final emplacement, and does not require continued human control and maintenance (Blue Ribbon Commission, 2012, xi). This type of facility is designed so that it can safely be forgotten (Vira, 2006, 76) and would therefore minimize the burden to future generations (NEA, 2008, 10), as the repository would be inherently safe, without a need for human intervention and surveillance (Schröder et al., 2016). From this perspective, active measures—such as those foreseeing retrievability of waste and reversibility of decisions—can be viewed as counterproductive (Lagerlöf et al., 2018, 48). The possibility to retrieve the waste has, in principle, been integrated into the repository concept in both countries, yet unlike especially in France, the notions of reversibility and retrievability have not played a significant role in public debate and policymaking (Lehtonen, 2010, 153–155; SOU, 2010, 35–39; SOU, 2013, 82). While possible, retrieval of waste is in Finland and Sweden seen as economically costly and technically complicated, and as such, a possible “constraint on the freedom of choice of future generations” (SOU, 2013, 83).

The regulatory and institutional settings, licensing procedures, and site selection processes in the two countries follow internationally accepted radiation protection and safety principles (Posiva-SKB, 2017, 10). In both countries, the search for a site and associated decision-making have been internationally praised for their democratic and participatory qualities, the volunteering host communities have long experience of nuclear industry, with benefit packages incentivizing and facilitating the engagement of the communities in the siting process (Kojo & Richardson, 2012; Lehtonen & Kojo, 2019; Litmanen et al., 2017). However, the two licensing processes differ from each other in many respects (Kari et al., 2021; Litmanen et al., 2017). In Finland, the government issues a license for a nuclear facility, via a procedure guided by the Nuclear Energy Act and governed by the Ministry of Economic Affairs and Employment (MEAE). Five key steps in the procedure can be identified: an Environmental Impact Assessment (EIA); a government Decision-in-Principle, DiP (preceded by municipality approval and followed by parliamentary ratification), designed to ensure that the project is in line with the overall good of society; a preliminary licensing review; a construction license; and an operation license. The EIA process in 1997–1999 compared four siting options, and Parliament ratified the DiP in 2001 after the approval of the proposed host municipality, Eurajoki. The key actors of the nuclear waste regime later stressed that the subsequent steps in the licensing process would be mainly of technical or industrial nature (e.g., Vira, 2017). The preliminary licensing review was conducted in 2009–2010 (Vira, 2017), with the Radiation and Nuclear Safety Authority (STUK) playing a central role. The Government issued the construction license for the repository in 2015. Posiva applied for the operating license in 2021. Moreover, a new nuclear power company, Fennovoima, launched in 2016 a site selection process for a possible second repository.

In Sweden, licensing follows two parallel procedures, under distinct legislative acts. In 2011, SKB submitted license applications for review by the Swedish Radiation Safety Authority (SSM) under the Nuclear Activities Act for the repository and the encapsulation plant, and a separate application to the Environmental Court (MMD) for the entire repository system, according to the Environmental Code (Bjällås & Persson, 2013). SKB, hence, faces a more complex licensing process than its Finnish counterpart. Furthermore, the Swedish government can authorize the construction of a repository only if the municipal councils give their approval. SSM and MMD submitted their statements to the government in 2018. In 2019, SKB submitted additional documentation to the government following the requirements by MMD and SSM. The proposed host municipality, Östhammar, agreed to hosting the repository in 2020, before the government even asked for a statement. The government approved the repository and the encapsulation plant in January 2022.

Data, Methods, and the Field of Research

Media Landscape in Finland and Sweden

Historically, the Finnish and Swedish media landscapes have been characterised by the Northern European democratic corporatist model, with high newspaper circulation, pluralism, and strong protection of press freedom (Hallin & Mancini, 2004, 66). In recent decades, this landscape has taken a more liberal tone (Wadbring & Ohlsson, 2018). Media self-regulation is the norm, and the state intervenes only if a law is breached. The total circulation of print newspapers has declined dramatically since the 1980s, but print media readership remains high (Jyrkiäinen, 2018; Wadbring & Ohlsson, 2018).

In both countries, toughening competition has pushed the media towards greater market- and entertainment-orientation. Moreover, the mediatization of society has undermined the ability of the media to produce independent and critical journalism. (Noppari & Niemi, 2017, 247.) Teräväinen (2012) pointed to the relatively high dependence of Finnish journalists on government and industry experts as sources of information on energy policy issues. This would suggest that the policy agenda exerts a significant impact on the media agenda in Finland. On the other hand, the Finnish media have gained greater independence from the political system and the political elite since the 1980s, partly thanks to professionalization (Noppari & Niemi, 2017, 250–252; Väliavironen, 2018, 53–55). In Sweden, this transformation of the political communication system began earlier (Strömbäck & Nord, 2008).

Data

The study covers the period from January 1, 2008 to December 31, 2015. This period included the SKB announcement of the site selection in Sweden (March 2009), the submission of the pre-licensing material in October 2009 in Finland, the license applications (Sweden in March 2011 and in Finland in December 2012), and the

construction license granted to the Finnish Posiva in November 2015. The data consist of news articles and opinion letters published in four leading newspapers in Sweden and Finland: *Dagens Nyheter* (DN), *Svenska Dagbladet* (SvD), *Helsingin Sanomat* (HS), and *Aamulehti* (AL).² All four have sufficient resources for their own news production. The data were collected from the newspapers' online archive, except in the case of *Aamulehti*, for which the data were collected through the publisher's media archive. Identical search terms were used (in the respective languages): nuclear waste, final disposal, Posiva, and Svensk Kärnbränslehantering. For *Dagens Nyheter*, the search was slightly different because the newspaper's search engine did not allow the use of Boolean operators or breakdown signals (Kojo et al., 2020). The search with the above-mentioned terms gave a total of 962 items of various types, including news articles, editorials, columns, and letters to the editor.

First, exclusion criteria were applied to narrow down the material to only those that are the research topic. We discarded items that were clearly off the topic, and those that concerned low- and intermediate-level waste, military waste, or reprocessing, unless a connection to the Finnish or Swedish final disposal plans and projects could be identified. Second, we excluded other items than those news articles and letters to the editor that addressed the repository licensing in Finland and Sweden ($N=342$). This allowed the exclusion of other types of items (e.g., editorials, columns, and mentions in TV guides) (Kojo et al., 2020). We focused on news articles and letters to the editor because these categories illustrate both the ways in which the journalists present final disposal in the news articles and how the broader publics address the topic.

Analysis

This article adopts a longitudinal, comparative approach (Hansen, 2015), analyzing changes in the media agenda over time. Quantitative methods were applied in the content analysis, to quantify both the manifest and latent meanings in documents (Dearing & Rogers, 1996, 35). In addition to quantification, we also qualitatively analyzed the ethical issues present in the data.

The analysis entailed categorization of those items that included ethical speech, according to the theory-based classification system created by the authors. This reading adopted a broad perspective, drawing on previous and ongoing discussion of NWM ethics in scholarly literature and in the political sphere. Through multiple iterations, the number of justice-related categories of issues was progressively narrowed down to three. Only those items that evoked aspects of distributive, procedural, or intergenerational justice in relation to final disposal of SNF in Finland or Sweden were included. These accounted for 48% of the Finnish and 65% of the

² The Swedish opinion letters and news articles were longer than the Finnish ones, allowing deeper discussions and exposure of a more diverse range of perspectives. The Finnish news articles mostly consisted of articles in which the authorities, industry, and politicians gave short comments and rarely evoked issues of justice.

Table 2 The main themes and subcategories of the content analysis*(A) Distributive justice:*

A1 Safety and risks associated with the final disposal of nuclear waste, especially for nature and the present generation

A2 Economic costs, benefits of the final disposal of nuclear waste.

(B) Procedural justice

B1 General discussion on the fairness of decision-making and participation in the final disposal of nuclear waste

B2 The type, reliability and certainty of knowledge used to support decision-making on the final disposal

B3 Trust in the core actors of the nuclear regime: decision-makers, researchers, and nuclear waste management companies

B4 The responsibility of nuclear waste producers for managing nuclear waste (in Finland, notably in relation to the dispute between Posiva and Fennovoima)

(C) Intergenerational justice

C1 Long-term risks of final disposal and the safety of future generations

C2 Weighing the pros and cons of final disposal of nuclear waste between the present and future generations

C3 Possibility of future generations to participate in decision-making and the nuclear waste management

Swedish news articles and letters to the editor. The data (Fin $N=109$, Swe $N=76$) were coded with the help of Atlas.ti and Excel softwares.

The content analysis was performed using a custom-made theory-oriented classification system, covering the procedural, distributive, and intergenerational dimensions of justice (see Table 2). Each news article and letter to the editor could be classified under several themes in the coding scheme. In the resulting analytical framework, based on environmental and energy justice literature, a total of nine subcategories were specified under three main themes: (A) *Distributive justice* consists of two subcategories: (A1) ‘safety and risks especially for nature and the present generation’ and (A2) ‘economic costs and benefits.’ Safety and risk are considered here as the core topics in the discussion on distributive justice. This study, therefore, follows energy and environmental justice literatures, as well as Taebi and Kloosterman (2008), who consider safety as a moral value in NWM (see also Kristiansen, 2017). Distribution of benefits in NWM concerns the form and amount of compensation. (B) *Procedural justice* was operationalized by identifying statements belonging to four subcategories: (B1) ‘general discussion on the fairness of decision-making and participation,’ (B2) ‘the type, reliability and certainty of knowledge,’ (B3) ‘trust in the core actors of the nuclear regime,’ and (B4) ‘producer responsibility’ (the responsibility of nuclear producers for managing their waste). *Decision-making* covers issues concerning the advancement of the licensing process, including political participation (e.g., who should participate in licensing decisions). The three other subcategories address more specific issues, such as the reliability and accuracy of the information provided by different parties about safety and risks. (C) *Intergenerational justice* covers three subcategories: (C1) ‘long-term risks of final disposal and the safety of future generations,’ (C2) ‘weighing the pros and cons of final disposal of nuclear waste between the present and future generations,’ and (C3)

Table 3 Societal actor groups and the main organizations constituting these groups

Actor group	Individual actors included in the groups
Industry	Posiva, TVO, Fortum, Fennovoima, SKB, E.ON, OKG, Vattenfall, Forsmarks Kraftgrupp and their representatives
Authorities	EU, STUK, SSM, SKI, Miljödomstolen, ministries, and their representatives
Experts	NEA, VTT, Kärnavfallsrådet, KTH, universities, researchers, consultants, and their representatives
NGOs	Greenpeace, MKG, environmental organizations and activists and their representatives
Politicians	The President, ministers, members of national or EU parliaments, political parties and their representatives
Province, county, city or community representatives	Eurajoki, Östhammar, Oskarshamn, Åland, etc., and their representatives
Members of the public	Individuals not affiliated to an organization
Others	Journalists, artists

‘possibility of future generations to participate in decision-making and the nuclear waste management.’ Intergenerational justice is here treated as a separate category, covering both distributive and procedural justice, to examine the distribution of benefits and burdens, as well as the degree and ways in which future generations are taken into account in decision-making (Shrader-Frechette, 2000).

We define a nuclear waste regime via its constituent societal actor groups. In our earlier research, we identified the actor groups of the Finnish and Swedish nuclear waste regimes as they appeared in press articles (Kojo et al., 2020). The same classification of actor groups is used in this article. Industry, authorities, and experts form the core actor groups. Politicians and municipal and provincial representatives are situated at the outer rim of the regime. NGOs can be regarded as a counterforce to the core actors, yet of course not even the core actor groups are homogeneous, as individual members of those groups can hold and publicly defend diverging views. The general public is situated furthest from the core of the regime. The following main societal actor groups were identified: Industry, Authorities, Experts, Politicians, Public, NGOs, and Community representatives. Other actors were combined into a single class, ‘Others’ (see Table 3).

Results

Media Agenda of Distributive, Procedural, and Intergenerational Justice From a Longitudinal Perspective

Questions related to the three domains of justice—distributive, procedural and intergenerational—were all identified on the Finnish and Swedish media agendas (Fig. 1). In both countries, distributive (FI 42%, SWE 41%) and procedural justice

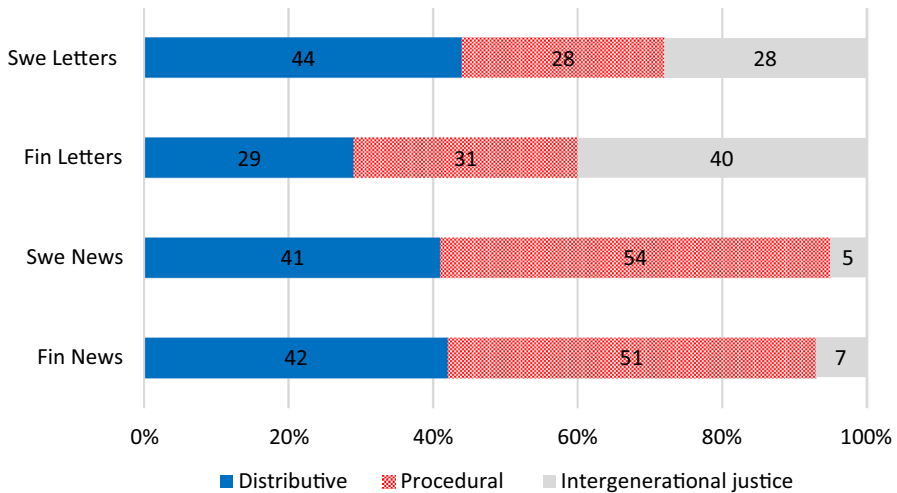


Fig. 1 Share (%) of main ethical categories concerning the final disposal of SNF in Finnish and Swedish news items and letters to the editor

(FI 51%, SWE 54%) far outweighed intergenerational justice (FI 7%, SWE 5%) as the most frequent ethics-related themes in the news articles. However, intergenerational justice outweighed procedural and distributive justice as a topic in the letters to the editor in Finland, but not in Sweden.

While the discussions on ethical questions addressed similar main themes in both countries, clear differences emerged concerning the subcategories. First, the ethical agendas in the news articles and the letters to the editor differed considerably from each other, notably on the question of which actor groups are given a voice (Figs. 2 and 3). Secondly, and more importantly from the perspective of this study, the ways in which procedural and distributive justice were discussed clearly differed between the two countries. Some subcategories, such as costs and benefits, appeared hardly at all in the Finnish data, whereas the Swedish discussion scarcely addressed topics such as producer responsibility or the sharing of risks and benefits between the present and future generations. Also the prevalence of discussion on trust differed by country (FI News 5%, SWE News 13%, FI Letters 11%, SWE Letters 5%). This can be partly explained by the country-specificities concerning the main topics related to NWM, such as the dispute between Posiva and Fennovoima concerning access of Fennovoima to Posiva's final disposal project.

The findings show differences between news and letters in terms of the actor groups that appeared as speakers. They also reveal how the actors interpreted the situation in Finland and Sweden and sought to construct their ethical agendas.

Producer responsibility was in Finland debated mostly in the news (in 8% of the articles). The topic emerged in reporting on the public dispute between Posiva, its owners, and Fennovoima on possible joint final disposal at the Olkiluoto site. The dispute spurred both industry and government representatives to explore the question of producer responsibility, given that the repository at Olkiluoto was once

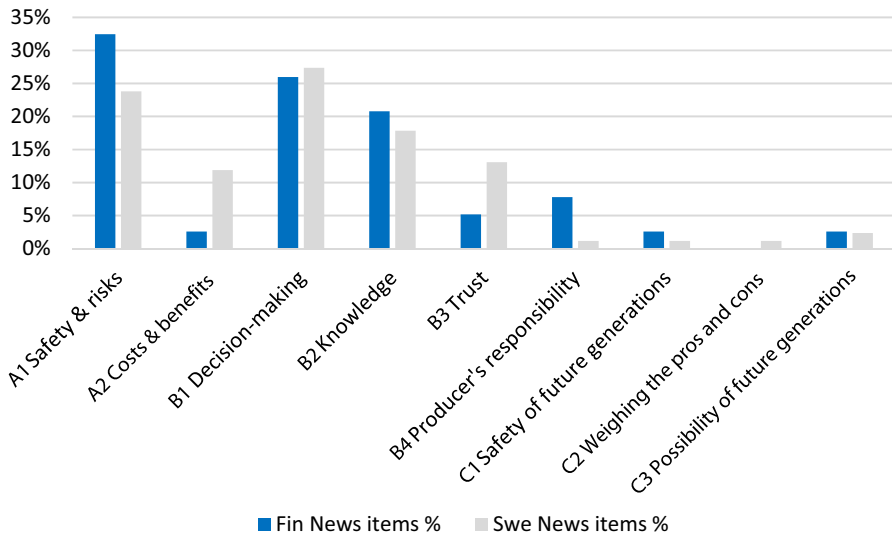


Fig. 2 News items by subcategory in the Finnish and Swedish newspapers (%)

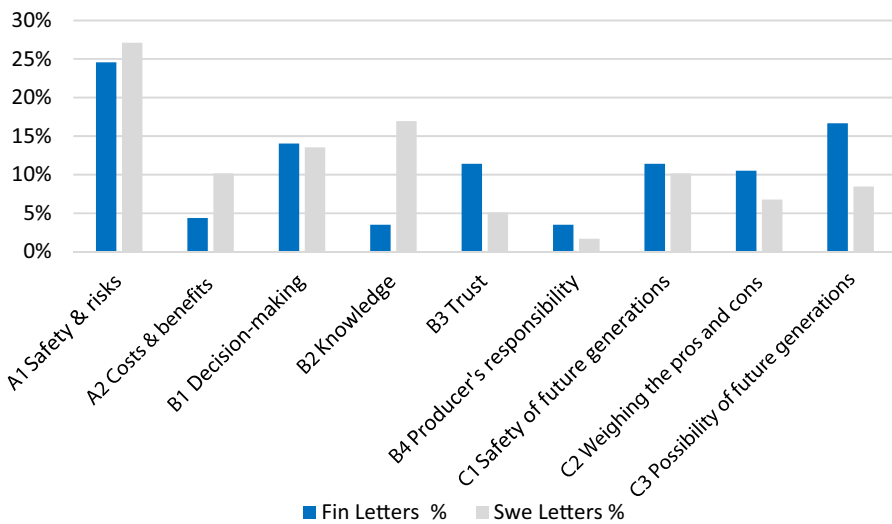


Fig. 3 Letters to the editor by subcategory in the Finnish and Swedish newspapers (%)

envisaged as a ‘national solution’—the destination for all Finnish SNF. For instance, an MEAE official reminded Fennovoima of its responsibilities:

“Fennovoima seems to have forgotten its responsibility.” According to Avolahti [from MEAE], Posiva is not even the right instance, with whom Fennovoima

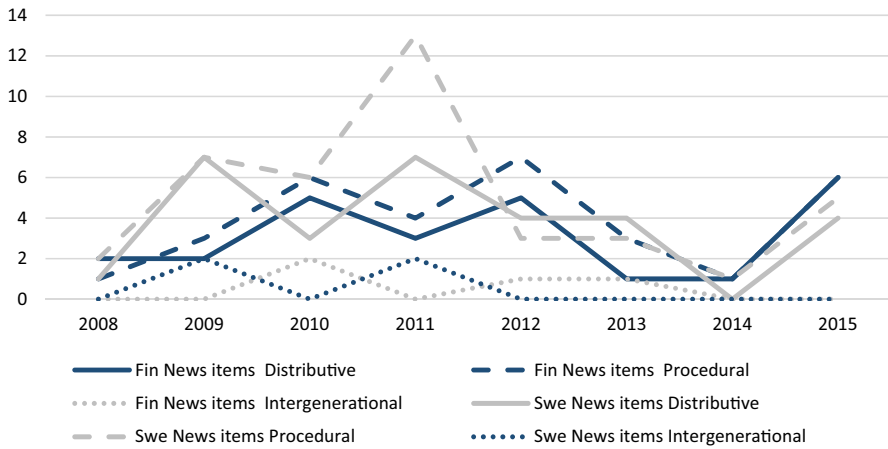


Fig. 4 News items discussing the justice of NWM per year in Finnish and Swedish newspapers 2008–2015 (*n*)

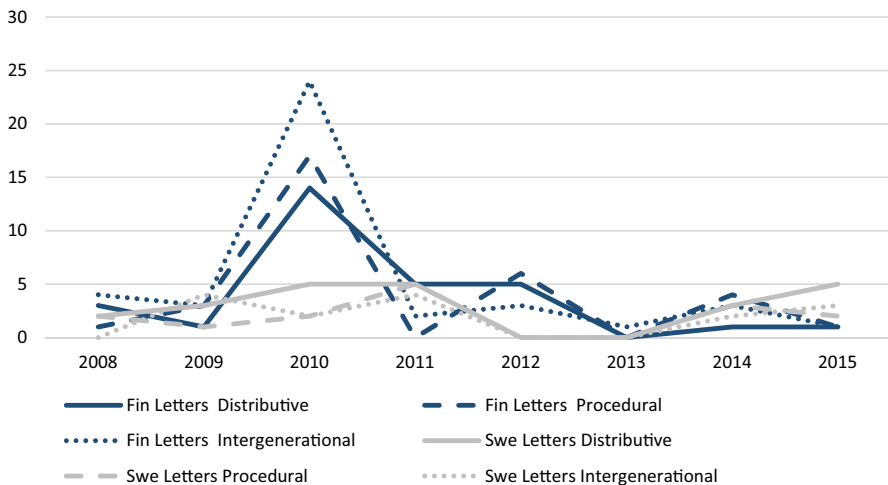


Fig. 5 Letters to the editor by ethical themes per year in Finnish and Swedish newspapers 2008–2015 (*n*)

voima could agree on its nuclear waste problem.³ (HS 8 October 2011–news article)

The dispute also influenced the treatment of other categories of justice, such as (A1) ‘safety and risks’ and (C3) ‘possibility of future generations.’ In Sweden, the respective responsibilities of SKB and the government did not stand out as a topic,

³ All translations of the citations are by the authors.

as compared with other procedural justice questions such as decision-making in general.

The subcategories (B2) ‘knowledge’ and (B3) ‘trust’ were at the core of debates on procedural justice. These concerned in particular the reliability of information brought onto the agenda by various actor groups, and the legitimate role of that information in decision-making. In addition, articles reflected upon the trustworthiness of the actors as sources of information on safety and risks. In both countries, reliability of information, that is, its truthfulness and accuracy, was portrayed as one of the main requirements for ethically legitimate decision-making. An MEAE official underlined the importance of independent appraisal of Fennovoima’s SNF disposal options:

The state will commission an independent assessment to determine which option is viable-without compromising safety. (HS 9 March 2012–letter to the editor)

Three peak years in the number of items addressing justice and NWM were identified in both countries. These were 2010, 2012, and 2015 in Finland, and 2009, 2011, and 2015 in Sweden (Figs. 4 and 5).⁴ For the letters to the editor, the peaks were lower in Sweden than in Finland, with the highest peak in 2010, thanks to the high prevalence of items addressing intergenerational justice ($N=24$) (Fig. 5).

Our findings suggest that the salience of final disposal on the media agenda spurred discussion on justice: both in the news articles and letters to the editor, the media addressed ethical questions related to SNF disposal in reaction to triggering events in the licensing procedure. These peaks reflect events in the licensing procedures, but also more general dynamics of nuclear energy policy. However, differences in the advancement of the respective national repository projects shaped the intensity of the debate. For instance, while in Finland the site selection and the local benefit package had been debated and decided already in 1999–2001 (Häkli, 2002), they were on the policy agenda in Sweden during the investigation period (2008–2015) (see also Kari et al., 2021).

In Sweden, SKB’s site selection announcement in 2009 generated media discussion about procedural, distributive, and intergenerational justice. The letters to the editor addressed the issue from the perspective of distributive justice, notably relating to safety, but also to compensation and distribution of harmful impacts. Intergenerational justice was evoked hardly at all in the news articles, despite its centrality in scholarly debate on the ethics of NWM (Shrader-Frechette, 1993; Taebi, 2017). However, long-term risks were discussed, on a relatively abstract level, and without reference to future generations or the possible impacts on their environment and living conditions. In Finland, by contrast, intergenerational justice was the dominant topic in the letters to the editor in 2010, when Parliament was debating on three applications for new NPP units. In this political debate in Finland, the potential downsides of nuclear power for future generations were evoked, including the

⁴ However, even in the peak years, the absolute numbers of items were relatively low, i.e., 2–26 items.

possibly weak legitimacy of SNF disposal from the perspective of intergenerational justice:

Nor can anyone guarantee that our society will be so stable in 50–100 years that all nuclear waste could be buried in the bedrock even in a seemingly safe manner. Nuclear power therefore involves externalizing the greatest risks to future generations. (HS 11 March 2010–letter to the editor)

Indirectly, the debate also evoked the question of discounting over long time periods. A member of the public argued that if indeed there were to be future generations, they would certainly face more serious problems than the risks from SNF disposal:

The Planet will face many catastrophes before the nuclear waste problems will appear. These include super volcanoes and giant asteroids, even nuclear war. (AL 28 March 2010–letter to the editor)

Most letters in Finland were written by the general public (see Fig. 9, next section). Some letters reflected the belief that Posiva's repository would not be a final but instead a temporary storage facility. This spurred debate about the freedom of future generations to decide. No such interpretation appeared in Sweden. However, the discussion in the Finnish letters was framed in terms of justice towards future generations, whereas in the news the debate concentrated on procedural and distributive aspects, especially in relation to nuclear new-build. The highest number of SNF-related articles in Sweden was published in 2011 (when SKB submitted its license applications), with procedural justice as a major topic.

In Finland, the Fennovoima power company negotiated in 2012 with possible suppliers for its planned NPP. The dispute between Fennovoima and Posiva over joint final disposal was present in the media debate, which covered some questions of distributive, procedural and intergenerational justice. The government approval for Posiva's construction license application in 2015 did not provoke justice-related discussion. In the same year, the Swedish SSM published the preliminary results of its safety review.

The Actors of the Nuclear Waste Regime as Speakers on Ethical Questions

Analysis of the positions of various actor groups on the media agenda provides further insights into the differences between the two countries and can help explain some of the findings presented in the previous section. It also helps to understand the ways in which the various actor groups framed and construed the ethical agenda (Figs. 6 and 7).

The proportions of different actor groups as contributors varied greatly between the two countries. In the news articles, the greatest differences concerned the presence of the groups 'NGOs' (FI 10%, SWE 22%) and 'Experts' (FI 9%, SWE 19%). In Finland, 'Politicians' (22%) and 'Authorities' (17%) were much more often represented than in Sweden (Politicians 5% and Authorities 8%). In the letters to the editor, 'Public' was the most represented in both Finland (75%) and Sweden (31%). In

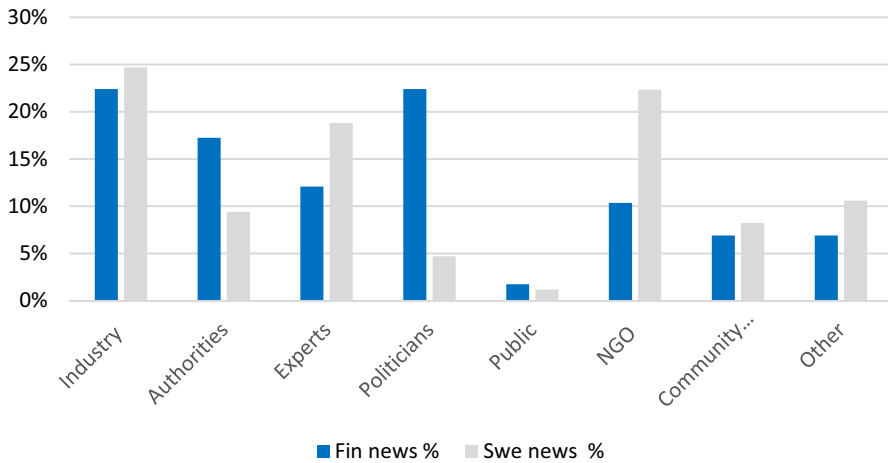


Fig. 6 Actor groups in Finnish and Swedish news items

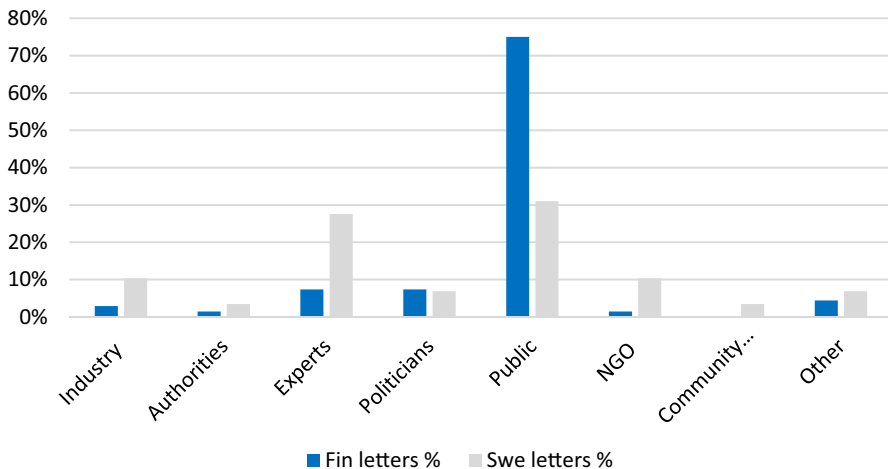


Fig. 7 Actor groups in Finnish and Swedish letters to the editor

Finland, this may be explained by the anti-nuclear movement campaigning against the NPP projects in 2010. Unlike in Finland, in Sweden also other groups were relatively well represented in the letters to the editor (Experts 28%; NGOs 10%, Industry 10%). It should be noted, however, that the number of items per actor group was low.

The representation of actor groups in the various subcategories of justice was also examined (Figs. 8 and 9).

In both countries, the results indicate that industry was the major agenda-setter on ethical issues. Industry framed justice relating to final disposal of SNF in the news

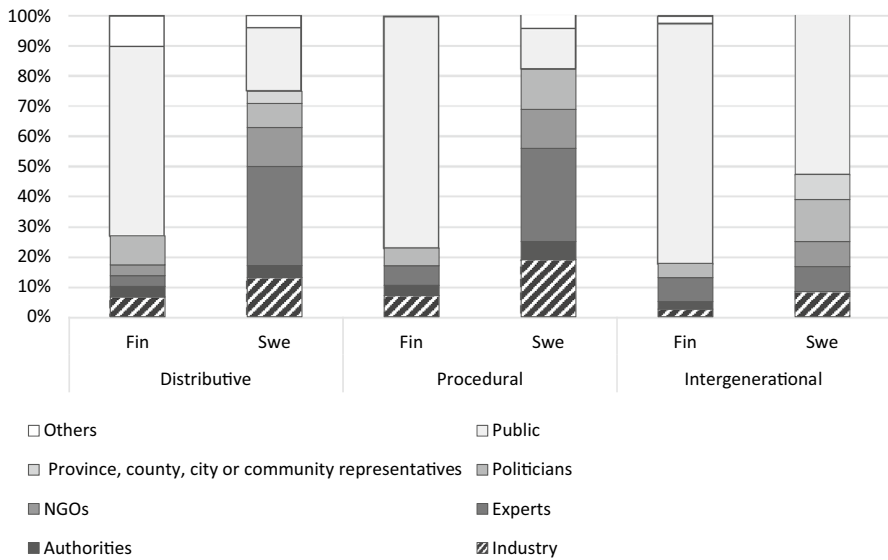


Fig. 8 Actor groups (%) on distributive, procedural and intergenerational justice in Finnish and Swedish letters to the editor

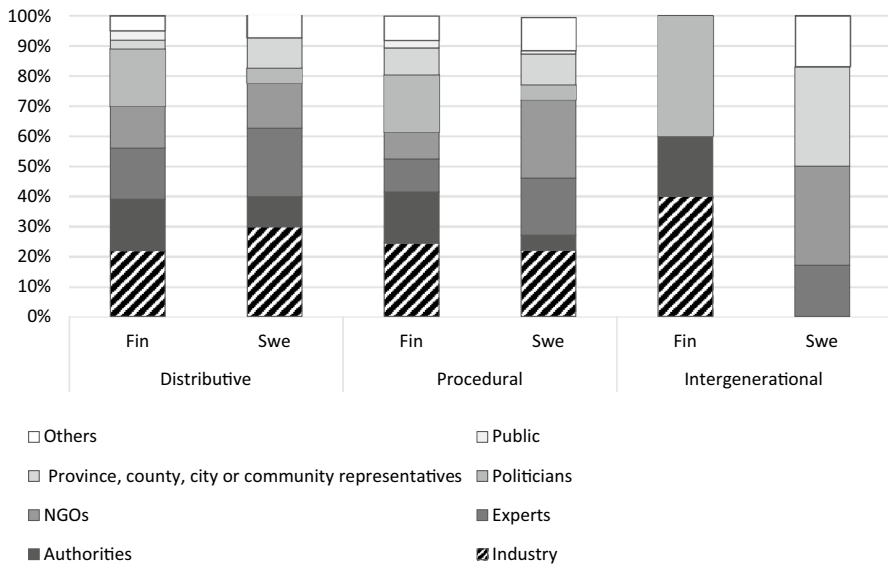


Fig. 9 Actor groups (%) on distributive, procedural, and intergenerational justice in Finnish and Swedish news items

articles mostly in distributive (FI=22%, SWE=30%) and procedural (FI=24%, SWE=22%) terms (Fig. 9), addressing primarily questions of passive safety. Industry portrayed itself as an actor doing its utmost to deliver the best possible solution of SNF disposal, and stressed, as did the authorities, the ‘safety first’ principle:

Claes Thegerström, CEO of Svensk Kärnbänslehantering AB, SKB, noted that there was only one valid argument behind the decision: safety.-The Forsmark alternative is better for long-term safe disposal. We have examined 600 scientific reports per site and have unequivocally reached this conclusion. The rock has spoken. (DN 3 June 2009–news article)

Industry also underlined the role of the safety regulator in decision-making. Furthermore, it evoked procedural justice, mainly on questions related to knowledge, and the advancement of decision-making procedures. In Sweden, industry showed willingness to discuss the new findings about safety and to debate with experts:

We [SKB] welcome all critical views and address them in our work, but we react to statements in public debate that distort facts and draw unfounded conclusions. (DN 2 August 2010–letter to the editor)

In Sweden, Public, NGOs and Experts framed the final disposal of SNF as an issue of distributive, procedural and intergenerational justice, challenging the ethical agenda set by the industry. In Finland, NGOs framed the issue as a question of procedural and distributive justice, whereas experts used multiple frames. The letters to the editor addressed procedural questions such as knowledge more often in Sweden than in Finland. Experts mostly evoked risks and raised concerns about safety-related distributive justice and more broadly about procedural aspects related to knowledge. For instance, an adjunct professor from Stockholm University argued:

Wikberg [the research director of SKB] talks about how the method has been developed via the integration of new findings. Over the years I have been rather struck by the opposite, that is, how one has one-sidedly adhered to outdated reviews and categorically refused to even consider new facts that contradict one’s own model. (SD 8 September 2008–letter to the editors)

The concept of passive safety was challenged somewhat differently in the two countries. In Finland, criticism appeared primarily in letters to the editor, most often those in which the public stressed the right of future generations to decide on what to do with nuclear waste, as well as the uncertainty and unfairness that final disposal imposes on future generations. Experts and politicians participated in this debate mainly by addressing distributive justice. Industry and authorities seldom explained how passive safety would enhance intergenerational justice. As noted in the previous section, some members of the Finnish public considered that the SNF repository constitutes an interim storage facility, or that at least its operation should be monitored until a safe and ethically sound solution would be found. For instance, one letter to the editor argued:

At this stage, it is still pointless to talk about “final disposal” of nuclear waste, because the cave in Eurajoki will be sealed first in the 21st century. Hence, there is still more than a hundred years to consider what is the safe way to manage nuclear waste. Meanwhile, nuclear waste can be deposited in the cave, but also retrieved. Therefore, talking about “final disposal” is incorrect, because we do not know whether the waste will remain in the cave or whether better ways of using it will be found. (HS 13 May 2010—letter to the editor)

This kind of interpretations were absent from the Swedish articles. However, especially Public and Experts addressed the issue of passive safety in multiple ways, as a question of distributive, procedural and intergenerational justice. For instance, a member of public argued:

But an ethical point of view would obviously require that it be possible to retrieve the high-level waste if something unforeseen happens over the next hundred thousand years or more. For this to happen, we would need a different storage method than the one that SKB now recommends. (SD 22 February 2009—letter to the editor)

Summing up, in Sweden, Industry, NGOs and Experts constituted the most prominent actor categories in the news debates, while in Finland, Industry, Authorities and Politicians dominated. The main difference was the greater prominence of NGOs in Sweden, especially on procedural justice (FI 10%, SWE 28%).

All the core actors of the respective national nuclear waste regimes (see Section “[The Final Disposal Concept and Licensing of the Repository in Finland and Sweden](#)”) participated in the discussion on ethics. As one would expect, industry stressed safety and risks as the core ethical issues. Furthermore, the Swedish anti-nuclear movement has chosen to challenge industry on safety-related issues—something that the Finnish NGOs have been unable to do, for lack of resources needed to produce counterarguments for discussion (Anshelm & Galis, 2011; Lammi, 2009; Raittila, 2002). In Finland, authorities were less active in discussing safety concerns than in Sweden, and very straightforwardly focused their statements on issues of decision-making. The Swedish nuclear regime appeared as more open in that it commented, for instance, discussion on alternatives to the KBS-3 disposal concept.

Discussion

The Nordic nuclear waste management companies, SKB and Posiva, have postulated the rights of future generations as among the main principles and justifications for final geological disposal. The analysis of print media attention to ethical issues related to the Swedish and Finnish licensing procedures showed that various involved actors raised concerns about final disposal, but the legitimacy of the repository projects was not widely challenged. This was particularly true for the news articles, whereas the letters to the editor revealed a more critical ethical agenda. Further research could seek to explain the reasons for the existence of two divergent ethical

discussion arenas in the media: in the news articles, the core actors of the nuclear waste regime dominate the debate on ethics, whereas the letters to the editor emanate from a broader range of actors.

Ethical debates on NWM in the two countries displayed both similarities and noteworthy differences. In both countries, the media agenda was primarily driven by industry, which stressed safety, knowledge, and procedural issues relating to formal decision-making. The general public was in both countries the main actor bringing intergenerational justice issues onto the ethical agenda. Alongside industry, also politicians and authorities figured prominently as speakers in the news articles in Finland. In both countries, the NGOs focused their ethical argumentation on risks and safety, and questioned the accuracy and trustworthiness of associated knowledge claims (see also Anshelm & Galis, 2011).

In both countries, the news agenda, established by the dominant actors, focused on intragenerational distributive and procedural justice, to the detriment of intergenerational justice issues, which remained practically absent. These debates on distributive and procedural justice emerged in both countries in reaction to similar events that were related to disposal but external to the formal licensing process. However, beyond the similarities in the broad topics, clear differences could be observed in how different subcategories were addressed. In Sweden, topics virtually absent from the media agenda included the responsibility of the nuclear industry for the waste problem, as well as the sharing of risks and benefits between the present and future generations. The Finnish debate, in turn, hardly addressed the ethics of costs and benefits. Although smaller in number than in Finland, ethics-related news articles in Sweden had on average more actor groups represented. This suggests differences in editorial norms guiding the discussion on nuclear waste ethics. The finding resonates with Raittila's (2002) observations of a lack of dialogue between actors in the Finnish media debate on nuclear waste in 1999–2001 and of the unwillingness of Finnish journalists to challenge government policies.

A major difference appeared in the letters to the editor. Intergenerational justice outweighed procedural and distributive justice as the main topic in Finland, but remained a minor topic in Sweden, where distributive justice questions dominated. This discussion revealed several agendas in the Finnish media concerning the safety of future generations: some stressed the long-term risks while others downplayed the importance of long-term safety and thereby discounted the lives of future generations. Some members of the public seemed to widely believe that final disposal would not be permanent and that future generations could still retrieve and reuse the SNF, for example as reactor fuel. While clearly richer than in Sweden, the debate on intergenerational justice in Finland addressed the issue in terms of “unavoidability,” where final disposal was not necessarily presented as a fair solution, but instead as the only rational and perhaps an unavoidable option, for both present and future generations.

Kermisch (2016) points out that the nuclear community rarely defines what is meant by the potentially affected future generations that should be considered in NWM decisions. She therefore suggests distinguishing between close and remote future generations. Her observation resonates with our findings in that the core actors of the nuclear regime specified neither future generations nor the potential

risk to distant future generations. However, we found that the public most often defined future generations as people living in a very distant future. It may be that the KBS-3 concept implicitly invites this kind of reasoning, given its underlying requirement that the spent fuel be isolated from living organisms for 100 000 years. The core actors chose not to challenge or address the broader public's definition of future generations, and therefore, no open deliberation about intergenerational justice took place in the media.

Crucially, while the general public was the dominant actor in the Finnish letters to the editor, in Sweden, the letters represented a wider range of actors. More often than in Finland, the letters also addressed procedural questions such as knowledge. This is understandable in view of the greater willingness of the Swedish industry to discuss new findings and debate with a diverse range of experts, compared with their Finnish counterparts. Open deliberation about the reliability of knowledge and the associated uncertainties would nevertheless be essential for the decisions and decision-making processes to be ethically acceptable.

Similarities between the media agendas in the two countries can be understood against the fact that both are forerunners in SNF disposal and rely on a similar final disposal concept. The countries also share a rather media-driven political communication culture, characterized by professionalism, independence from governmental influence, and the use of diverse journalistic sources (Pfetsch, 2014; Kojo et al., 2020). The considerably greater prevalence of intergenerational justice in the Finnish letters to the editor, in turn, might be explained by differences in the countries' respective licensing procedures, and hence varying degrees of attention given to certain discussion topics, such as compensations to host communities.⁵ Furthermore, the failure of the Finnish authorities and industry to adequately address ethical aspects of final disposal at earlier policy stages may have spurred the public to raise these issues via letters to the editor. Sweden has a longer and stronger tradition of ethical discussion on NWM—discussion partly organized and supported by the industry and authorities (KASAM, 1988). Since the political decision on final disposal of SNF was in Finland made early, at the Decision-in-Principle phase (Raattila & Suominen, 2002), some vital justice issues have been overshadowed by technical and social questions, and neither the authorities nor the NWM company have felt much need to address justice issues anymore.

Conclusions

While both Finland and Sweden are at the forefront in advancing towards final disposal of SNF, some members of the public in both countries questioned the dominant interpretation of responsibility, which strongly relies on the principle of passive safety of the KBS-3 concept. Thus, the media analysis presented in this article helps to better understand the relationships between the on-going ethical debate in society

⁵ The Finnish and Swedish site selection strategies and compensation arrangements are discussed in Kari et al. (2021). For Sweden, see also Sundqvist (2002).

and the ethical principles underpinning NWM. Concern for future generations did not figure prominently either on the Finnish or the Swedish press media agenda. This was illustrated by the scarce attention to preservation of records, knowledge, and memory (RKM) as means of building confidence in and ownership for the disposal project (e.g. NEA, 2015).⁶ Instead, the dominant actors underlined the notion of ‘passive safety’ as the key means for enhancing confidence in the project—a notion that enables a more calculable and predictable treatment of safety than ‘active safety’ (Schröder et al., 2016). Furthermore, the plentiful discussion on justice concerning safety and risks largely overlooked intergenerational justice and the fate of future generations. Instead, a line of argumentation in the Finnish media—mostly in the letters to the editor—implicitly discounted the value of the lives of distant future generations. Critique against this kind of discourse has a decades-long history amongst ethicists skeptical towards final disposal (e.g. Shrader-Frechette, 1993). Further research could usefully examine the extent to which the adoption of passive safety as a key principle might weaken the attention to intergenerational ethics in NWM policy, exclude future generations from the scope of justice, and as such accentuate the cleavage between (intragenerational) public acceptance and (intergenerational) ethical acceptability.

Major modifications to the technical disposal concept seem unlikely at present, as also the Swedish government has approved the final disposal, but—if criticism continues and intensifies—the authorities and waste management companies may in the future give greater attention to retrievability of the waste and reversibility of decisions. In the absence of certainty about the long-term safety of final disposal of nuclear waste, the condition of ‘informed consent’ (e.g. Wilding, 2012) cannot be met, and the radioactive burden is, *de facto*, imposed upon future generations who cannot give their consent. Reversibility and retrievability could constitute a means for addressing this conundrum, yet neither in Finland nor in Sweden have these options been subject to extensive debate, unlike especially in France, where reversibility constitutes a cornerstone of NWM (Lehtonen, 2010; Lehtonen et al., 2021; SOU, 2010; Vuori, 2014, 64–65). It remains to be seen whether the KBS-3 concept can survive societal pressures if it is exported to countries with weaker public trust in authorities and experts and with greater societal demand for reversibility of decisions and retrievability of the waste.

The fact that intergenerational justice was not a significant topic on the news agenda in either of the two countries, but was highly prevalent in the Finnish letters to the editor, suggests that actors emphasizing intergenerational justice in Finland lack access to the news agenda and therefore express their opinions in the letters to the editor instead. If an intergenerational justice issue that the public considers as important fails to emerge on the agenda, the present generation may consent to final

⁶ However, in 2021, an SKB-funded project was launched, to elaborate a document (“Key Information File”) that would transfer to future generations information about the Swedish nuclear waste repositories (Linköping University, anon). In Finland, the topic of RKM and the closure related issues have been recently examined in the Finnish Research Programme on Nuclear Waste Management (KYT2022) (see Schatz & Naumer, 2022; Paju, 2021), but we are not aware of the elaboration of a similar document as in Sweden.

disposal on behalf of future generations without adequate debate on the topic. This leaves to the general public the vital task of broadening the range of perspectives present in the discussion, including notably the long-term ethics.

It is an open question why the Finnish authorities did not intervene in the media discussion on intergenerational justice, when some members of the public suggested that the KBS-3 concept entailed interim storage rather than final disposal. Further, why did the authorities and industry not openly address the possibility that the solution based on passive safety might implicitly discount the interests and wellbeing of future generations? The answer seems to lie in two premises of the debate in Finland: (1) passive safety is assumed to effectively exclude the need for any human action, and (2) the general societal issues are deemed to have been resolved in the earlier political stage. Further discussion on ethical acceptability would therefore no longer be needed, at least from the perspective of distant future generations.

Efforts should be taken to bring onto the media agenda questions of intergenerational justice, given that the core actors of the nuclear regime, as representatives of today's generations, seem to debate distributive and procedural justice almost exclusively from an intragenerational perspective. While central actors of the nuclear waste regimes of both Finland and Sweden advocate for the passive safety that underpins the KBS-3 final disposal concept, and claim that justice is served because the concept saves future generations from the burden of managing the waste, the evidence from media debates indicates that the broader public in these forerunner countries is not convinced.

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