

The critical Swedes and the consensual Finns: Leading newspapers as watchdogs or lapdogs of nuclear waste repository licensing?

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1. Introduction

The final disposal of spent nuclear fuel (SNF) has for decades been a subject of intense societal debate and controversy in most countries utilizing nuclear energy for electricity production. Nuclear waste management has a multitude of societal implications, and the various ways in which the problem is being contextualised affects the attitudes of the general public and shapes policymaking. The media attention paid to the issue constitutes an integral part of societal deliberation on this topic. To understand these processes of societal debate, it is vital to study the media coverage of the issue, including the long-term agenda-setting by the media, and the competition for media attention by different actor groups. Public perception that the nuclear waste issue is unmanageable and unfair can at least partly be attributed to the news media's tendency to highlight controversy rather than the more consensual aspects [1, p. 71], [2].

However, earlier studies have shown how nuclear waste discourses in the media have varied over time [3], [4] and how the issue has been marginalised [5, p. 87]. It is therefore highly relevant to examine the media coverage in the two countries, Finland and Sweden, that are on the verge of making the unmanageable at least socially manageable. As Bergmans et al. [6] argue, while the nuclear waste issue has been predominantly framed in terms of an unmanageable risk, the question of manageability can truly be answered only through experience.

This paper examines the attention that leading subscription-based newspapers in Finland and Sweden have paid to the licensing of the final disposal of SNF. The

comparison is interesting because these countries: 1) are frontrunners in the development of final disposal of SNF; 2) have chosen similar technological disposal solutions; 3) have seen their licensing procedures advance through similar phases; 4) exhibit high levels of media freedom [7]; and 5) are moving in different directions in their nuclear energy policies, with Sweden expected to phase out and Finland planning to build new nuclear. Moreover, scholars have researched media attention to SNF disposal in both countries, but not from a comparative point of view.

Many countries have had to re-schedule, postpone or abandon their nuclear waste management projects and programmes, whereas the projects of the two Nordic countries have advanced relatively smoothly. Sweden was seen as the frontrunner of nuclear waste management as early as the 1980s and 1990s [e.g. 8, p. 306], [9, p. 120, 127–128] [10]. Relatively rapid progress in implementing the SNF disposal project turned Finland into another forerunner, especially with the political decisions taken in 2001 and 2015 [11, p. 237–238], [12, p. 16–26], [13], [14, p. 229–233]. Both countries have adopted the KBS-3 final disposal concept, initially developed in Sweden, then transferred to Finland and subsequently further developed in collaboration between the two countries [15], [16]. However, the two disposal projects are not implemented in an identical manner, given the differences in institutional and regulatory contexts. Nevertheless, these two countries share a similar, rather media-driven, political communication culture, which is characterised by a commitment to professionalism and independence from governmental influence and the use of diverse journalistic sources – due to a corporatist tradition of decision-making – which is thought to diminish the risk of political control over the public agenda [17].

Waste producers in both countries, i.e. the nuclear power companies as opposed to a government agency, are responsible for SNF disposal, under the control of the

safety regulatory agency. The main differences between the respective institutional frameworks are the absence of technical/programme oversight by an entity independent of the implementer and regulator in Finland, the absence of a research programme independent of the implementer in Sweden, and funding provided to the possible host municipalities and NGOs for their review and communication activities in Sweden [18]. These attributes can foster and diversify the public debate concerning the project and its licensing which have until recently advanced side by side. The Swedish Nuclear Fuel and Management Company (SKB) submitted the licensing applications for SNF facilities in March 2011 and its Finnish counterpart Posiva in December 2012. The Finnish government granted the licence in November 2015 [19], [20], while the Swedish government decision is still pending.

Media coverage of SNF disposal has been studied in both countries [e.g. 21], [22], [23], [24], [5], [25], [4],, but not from a comparative perspective. Country comparisons of longitudinal media attention to energy technologies can help identify and highlight country-specific features and possible similarities [e.g. 26], [27], [28], [29], yet the diversity of theories and methods applied reduces the comparability between various studies [30]. However, as shown by the above-mentioned scholars, media representations of energy technologies are shaped by national characteristics relating notably to political, economic and cultural features, as well as to key events affecting the debate.

In this article, we compare the similarities and differences in national level print media attention through an analysis of articles published in two leading newspapers in each country between 2008–2015. The focus is on the main differences between the national nuclear waste regimes, in which industry, authorities and experts constitute the core actor groups and politicians and representatives of municipalities and provinces are

situated on the outer rim. We consider the NGOs as a counterforce to the core actors, whereas the general public is situated furthest from the core. The comparative perspective on media coverage serves to elucidate how media attention in leading national newspapers is divided between different actor groups and thematic categories within a regime. Responsible for implementation, industry is the dominant voice in the news items within our data. Moreover, our analysis suggests that certain attributes of the institutional framework can support the emergence of a more diverse public debate on a risky technology.

Our analysis focuses on five key elements of media attention: 1) the thematic categories concerning SNF disposal; 2) the predominant tone of the news items and letters to the editor; 3) agenda-setting power and visibility of different actor groups; 4) frequency of positive and negative views among the “speakers” that are given voice in the articles; and 5) the predominant tone of safety-related news items. The next section presents the theoretical framework and earlier media studies on the final disposal of SNF in the two countries. Section three describes the main milestones of the licensing processes, and identifies the main differences between the Swedish and Finnish institutional settings and licensing processes. Data and methods are presented in section four, and the results in section five. Section six discusses the findings, while the concluding section highlights the key features of media attention given to the Finnish and Swedish nuclear waste regimes.

2. Risk management regimes and the media

Earlier research on the interplay between risk management regimes, actors, and the media has highlighted the major role of mass media and information and communication technology in the formation of risk sensibilities and risk perceptions, but also in the formation of political agendas, decision-making contexts, and public

understanding of science [31], [32], [33], [34], [35], [36], [2]. The processes of news selection, framing, and agenda-setting have attracted scholarly interest [36], [37], [38], [39], [40].

The media can be seen as an arena where actors compete over the power to establish meanings and definitions for the rest of society. Research has shown that journalists rely heavily on a limited number of sources of information and actors, while considering other actors less reliable [41], [42, p. 96]. Kitzinger [43, p. 65] concluded that the media tends to favour 'official sources', whereas Takahashi [44] showed that the media relied mostly on governmental sources in its climate change reporting. Juntunen [45] showed that different actors of public administration were most often the source behind news influenced by public relation activities. Kitzinger [46, p. 13] pointed out that the choice by the media to focus on policy action or on procedures influences not only the types of risk that attract attention, but also the ways in which problems and solutions are framed. In particular, the focus on bureaucratic procedures may favour some questions over others. The media's dependence on certain sources can, in turn, significantly influence the choice of reported issues, as well as the evolution and framing of the news stories. The media routinely privileges official sources, while corporate sources have – thanks to their larger communication and PR budgets – easier access to the news agenda. Moreover, Väliverronen [47, p. 74] has noted that, while major media houses have cut resources appointed to science journalism, PR communication has increased, which may threaten independent and critical journalism, while at the same time the rise of new online publications and social media has accelerated the economic crisis of commercial news media [see also 48, p. 72–73].

Freudenburg et al. [49, p.32–34] distinguish four primary views in the literature on the reporting of risk and technology issues and hazardous events in the media. Two

are relatively extreme, while the other two represent intermediate positions. (1) The “sensationalistic and/or anti-technological” category entails the belief that the majority of news employ a negative framing, because crises, accidents, and catastrophes attract a disproportionate amount of media attention. (2) The “pro-technology” category perceives the media as a tool in the hands of the technological establishment. While views differ on how ‘pro-technology’ media actually is and on the mechanisms underlying this tendency, a number of researchers point out that technology-related actors are highly capable of shaping the media attention directed to them. Scholars in this category also warn about the tendency by the media to relay information originating from the richest and most powerful institutions, and hence disseminate establishment propaganda. (3) The “subtly anti-technological” category represents a more moderate view, which considers that the media behaves in a more neutral or unbiased way. For instance, following the journalistic norm of consulting and providing fairly equal amounts of publicity for opposing views in a debate. (4) The “susceptible to framing and spin control” category is more difficult to trace from the news flows. Journalists work under tight deadlines, and therefore tend to rely on official and institutionally embedded sources. For example, in the hectic everyday reporting, government agencies, corporations, and business associations are deemed more trustworthy and readily accessible than opposition groups or alternative news sources [41], [45, p. 28–30]. Therefore, the media frames tend to be adopted from the organizations considered to enjoy a high institutional status. These dominant parties hence gain a political advantage in relation to their political opponents. This type of strategy is called “diversionary reframing” [50, p. 138–141], whereby attention is directed at the legitimacy of the concerns and the actors behind them, rather than at the concerns themselves.

Media coverage of the nuclear waste issue has previously been studied both in Finland and Sweden. Scholars have shown that the media has a pivotal role in framing and reframing images of nuclear waste. [See 21], [22], [24], [25], [4], [5]. Raittila and Vehmas [51, p. 10] state that although decisions on the disposal of nuclear waste are made on various policy levels, political actors crucially depend on the media for information. Hedberg [25, p. 59] and Sjölander [52, p. 20], [see also 53] also emphasise the importance of the mass media as a source of information for the formation of public opinion.¹ Raittila and Vehmas [51, p. 24] found that, in Finland, Posiva and the local movements opposed to the disposal project were influential interest groups in publicity management, whereas the safety regulator (the Radiation and Nuclear Safety Authority, STUK) had a less visible role. However, since then STUK has, for instance, organised training events specifically aimed for journalists [54], [55] and re-examined its own role, especially in local communication [56]. STUK's new approach can be seen as a response to demands for new forms of risk governance [57, p. 17], [58]. Likewise, in Sweden, SKB, NGOs, and local groups have been active in their attempts at managing publicity [59], [52]. That said, nuclear waste in both countries has mostly been debated at the local level and has in recent decades attracted only modest national-level media attention. However, nuclear waste management in Sweden was a high-level political issue in the 1970s [see, 60, p. 153–154], [24, p. 39], [5], [61].

3. Institutional setting and licensing processes in Finland and Sweden

Despite a similar technical repository concept, differences between the institutional and regulatory frameworks of the two countries [18], [16, p. 10–11], [62, p. 9], [63, p. 27] also translate into differences in licensing. Differences in nuclear power

¹ However, Hedberg's [25, p. 60] conclusion was that the chances of the general public obtaining enough information on this technically complex issue, at least regarding the Swedish final disposal concept, were limited.

policies also play a role. The Finnish policy can be characterised as pro-nuclear whereas Sweden has seen major policy reversals [64], [65], [66], [67]. In Finland, no phase-out decision has been ever made, as the country has remained committed to nuclear power. However, the unresolved waste issue was a major argument leading the Finnish parliament to reject industry application for a new nuclear power plant (NPP) in 1993 [68, p. 74–76]. Currently two new NPP projects are underway in Finland, but none in Sweden. Several scholars have analysed the controversies over nuclear power in Sweden [e.g. 69], [70], [64]. The national referendum on nuclear power in 1980 resulted in a decision to phase out existing nuclear reactors by 2010 [61], but in June 2010, Parliament decided to allow the replacement of old NPPs on existing sites [70, p. 168], [71], [72]. However, no replacement projects have actually been launched. In 2015, the government decided on the closure of four NPP units by 2020. In both countries, producers of nuclear waste, i.e. licence holders to nuclear installations, are responsible for the implementation and expenses of nuclear waste management [62, p. 9], [63, p. 27]. This task is carried out by SKB in Sweden and by Posiva – private nuclear waste management companies established and owned by the nuclear power utilities – in Finland. There are, however, also differences between the Swedish and Finnish corporate-driven nuclear waste management. In Finland, Posiva and its owners have recently strongly emphasized the licensee-specific nature of responsibility, whereas in Sweden all utilities collaborate via SKB. Ever since its establishment in 2007, the nuclear power utility Fennovoima has tried to gain access to Posiva’s SNF project, but Posiva and its owners have repeatedly rejected Fennovoima’s proposals. [73.] Posiva’s subsidiary, Posiva Solutions, nevertheless provides Fennovoima with expert services related to the final disposal of SNF.

The Finnish licensing procedure entails four main steps: Decision-in-Principle (DiP), Construction Licence, Operating Licence, and Decommissioning Licence. The procedure is defined in the Nuclear Energy Act and Decree. DiP is a political decision whereby the government determines if the project is in line with the overall good of society. [74.] The DiP can only be issued if the host municipality has given its approval. The DiP also needs to be ratified by Parliament. The DiP for the final disposal facility was issued in December 2000 and ratified by Parliament in May 2001. In 2002 and 2008, DiPs were issued for Posiva's applications to extend the capacity of the facility to accommodate the waste from the planned new NPP units.

In December 2012, Posiva submitted the construction licence application (CLA) and supporting documentation to the authorities. STUK delivered to the Ministry of Employment and the Economy (MEE) its statement regarding the safety of the facility in February 2015 [19], [75], and the government granted the licence in November 2015 [13], [20]. The entire CLA process took only 35 months. One explanation for the speedy processing of the application is the pre-licensing stage, which took place in 2009–2010 and functioned as a dress rehearsal both for the implementer and the regulator [74], [76, p. 5], [77].. However, Vira² [78, p. 655–656] states that time and resources could have been used more efficiently. Licencing was made easier also by the fact that the political decision had already been made in 2001. The licensing procedure gave the public and stakeholders an opportunity to express their views on the CLA and supporting documents³ but participation of civil society organisations was almost non-existent. MEE also organised one public event on the final disposal project in Helsinki in

² The Research Director of Posiva at the time of the pre-licencing process.

³ The consultation period ran from 15 February until 30 September 2013.

September 2013, but this was announced with very short notice [79], [20]. No public event was arranged in the host municipality of Eurajoki.

In the Swedish regulatory system, the general principles governing safety and radiation protection are defined in the Act on Nuclear Activities, Radiation Protection Act, and Environmental Code [63], while an administrative authority, the Swedish Radiation Safety Authority (Strålsäkerhetsmyndigheten, SSM), is responsible for nuclear safety [63, p. 37]. SKB selected the Forsmark site for the repository in June 2009 after a decades-long site selection process [80]. Prior to the licence applications in 2011, SKB conducted formal consultations with stakeholders, as required by the Environmental Code. A series of consultations also took place between SSM and SKB on the format and content of the pending application [81]. The Swedish Government commissioned an international peer review,⁴ conducted between May 2011 and June 2012, to inform its decision-making. The review was not a formal part of the licensing but was organised by the OECD Nuclear Energy Agency [82], [83].

Licensing advances in a stepwise manner also in Sweden, yet the process is much longer and more complex than in Finland. The Swedish process proceeds simultaneously on two tracks, in pursuance of the Environmental Code and the Act on Nuclear Activities and Radiation Protection. By contrast, the Finnish process is based solely on the Nuclear Energy Act. SKB submitted three licence applications: separate applications for the repository and the encapsulating plant according to the Act on Nuclear Activities and Radiation Protection to SSM, and a third application submitted according to the Environmental Code to the Land and Environmental Court (Mark- och miljödomstolen, MMD) for the whole repository system [18].

⁴ In Finland, an international peer review was conducted as part of the DiP stage.

The government received statements from SSM and MMD in January 2018 [84], [85] and in April 2019 SKB then submitted additional documentation to the government, as required by MMD and SSM. This documentation will be subject to a public hearing. The government then decides on the permissibility, on the basis of the Environmental Code and make decisions on the basis of the Act on Nuclear Activities. The permissibility assessment includes consideration of important societal interests, human health hazards and major environmental impacts. As a political decision, it is equivalent to the Finnish DiP, yet it occurs later in the overall process. Importantly, before the government can issue a permit, the host municipalities, Oskarshamn and Östhammar, must have approved the operations.⁵ [88, p. 7, 29–32.] The municipalities hence retain their veto right over the project until the very end, unlike in Finland, where municipality's approval is no longer needed once Parliament has ratified the DiP.

As part of the Swedish process under the Nuclear Activities Act, the SSM review included two remiss rounds to collect feedback from the affected parties before decision-making. This openness contrasts with the procedure in Finland, where STUK alone analysed the sufficiency and suitability of the application. In Sweden, once the applications had gone through a first round of technical scrutiny in January 2016, the public was given the opportunity to participate in the second round of analysis, which concentrated on issues such as the disposal method and safety. [89.] This round lasted from January to April 2016, and corresponded to the Finnish hearing process conducted in 2013. SSM submitted its consultation response to MMD in June 2016 and the final assessment to the government in January 2018. [89], [90], [91], [84.]

⁵ While the Swedish law grants the local municipalities the right of veto, in certain cases the national government can override this right in the name of national interest. However, it is considered highly unlikely that the government would resort to this option [see e.g. 86], [87].

The main hearings in the Environmental Court were held in the autumn of 2017. In January 2018, the court submitted its statement to the government [92], [85]. The planned repository host, Östhammar, cancelled the planned municipal referendum on the project once MMD had issued its statement requiring amendments to the application [93], [94].

4. Data and methods

Newspapers have always played an important role in Finland and Sweden where newspaper circulation per capita is among the highest in the world. Our data consists of articles published between 1 January 2008 and 31 December 2015 in two Finnish and Swedish major national subscription-based morning newspapers: *Helsingin Sanomat* (HS), *Aamulehti* (AL), *Dagens Nyheter* (DN) and *Svenska Dagbladet* (SvD)⁶. The observation period covers the key official steps in the licencing processes: SKB's and Posiva's licence applications (March 2011 and December 2012, respectively) and the granting of the construction licence for Posiva (November 2015). Starting in 2008, the observation period also included possible media attention during the pre-licencing in Finland and the months preceding SKB's site selection announcement (2009).

Our choice to focus on only four leading national newspapers obviously has the disadvantage of omitting local and regional press, which may affect national-level media debates. Another limitation is the exclusion of a number of widely read evening newspapers (*Aftonbladet*, *Expressen*, *Ilta Sanomat*, *Iltalehti*), magazines, and weeklies

⁶ *Helsingin Sanomat* (HS) is the largest nationwide morning/daily newspaper in Finland, having a circulation of 324,451 and had approximately 1,9 million readers in 2015. *Aamulehti* (AL) is the second largest morning/daily newspaper in Finland with a circulation of 103,180 and a readership of about 500,000 in 2015. The population of Finland was 5,5 million in 2015. *Dagens Nyheter* (DN) is the most read national morning/daily newspaper in Sweden with a circulation of 282,800 and some 1.5 million readers in 2013. *Svenska Dagbladet* (SvD) is a morning/daily newspaper in Sweden with a circulation of 157,500 in 2015 and an estimated readership of around 900,000. The population of Sweden was 9,8 million in 2015. The readership figures for all four newspapers include both print and on-line readers.

(e.g. *Dagens Industri* and *Talouselämä*). However, it is evident that different societal actor groups would strive to get their messages through in the leading newspapers, which form an important part of national level media landscape. Furthermore, the aim in this article is to study the national-level nuclear waste regimes, rather than the interaction between local and national debates or attention of print media at different levels [95], which would deserve a separate study. Finally, past research has often opted for a similar approach, selecting for example two nationally significant newspapers to represent national level print media [e.g. 96], [97], [98].

To collect articles we used the search functions available at the newspapers' own online pages, except in the case of *Aamulehti*, in which the search was made through the Finnish Media Archive (mediaarkisto.com). Practically identical search terms were used, except for *Dagens Nyheter*, whose search engine did not allow the use of Boolean operators or breakdown signals. Slightly different search terms were therefore used for this newspaper. For the other three papers, a first search was done with the term nuclear waste in the respective languages (i.e. “ydinjäte”, “kärnavfall”), using a breakdown signal when available to identify different hyphenations. The second search applied the terms nuclear (“ydin”, “kärn”) and final disposal (“loppusijoitus”, “slutförsvar”), using the Boolean operator AND and breakdown signals. For *Dagens Nyheter*, only the term ‘final disposal’ was used, without a breakdown signal. The final search applied the names of the respective nuclear waste management companies “Posiva” and “Svensk Kärnbränslehantering”.

Our initial search gave, once three erroneous hits and one entry including only the heading of the article had been removed, 962 potentially relevant articles. Three rounds of data analysis were then conducted and exclusion criteria applied to reduce the number of articles. First, clearly off-the-topic items were discarded. Secondly, we

removed items concerning low-level, intermediate-level, and military nuclear waste, unless civil high-level nuclear waste was specifically mentioned. Thirdly, we discarded items related to reprocessing of waste. The number of articles considered relevant was thus brought down to 676. We then considered the relevance of these articles to our topic, i.e. the licensing of final disposal in Finland and Sweden. Articles concerning final disposal in other countries were eliminated, unless a connection to the Finnish or Swedish plans and projects could be identified. This gave a total of 482 relevant articles, of which we selected only news articles and letters to the editor. Our final data set hence consisted of 342 articles. These two article categories illustrate both the ways in which final disposal is presented in the news, and the nature of the public debate on the issue. The data set is presented in Table 1.

Insert Table 1. here

The analysis of print media attention to the nuclear waste issue was operationalised via three lines of enquiry. First, we analysed the main thematic categories of news items and letters to the editor to identify which issues were reflected on the media agenda (Table 2). The three main and nine sub-categories were created via empirical analysis, i.e. based on our interpretation of the data. The number of topics is much smaller than for instance in the study by Egan Sjölander [24, p. 23–24], but comparable with that of Kaspersen et al. [2, 139, 160]. Secondly, we analysed the predominant tone of items with regard to their orientation towards technology. We classified the items into predominantly negative, neutral, positive, and mixed categories (Table 3) based on the number of negative, neutral, and positive statements. In case these were even, the predominant tone was categorised as mixed [99]. Thirdly, we analysed which actor groups were given a voice in the print media, that is, which speakers set the agenda in the news items (Table 4). Speakers or persons interviewed

have also been analysed in earlier studies [51], [24, p. 29], but we applied a common categorisation of actor groups to enable comparison. Given that we did not interview journalists or other actors [cf. 41], [45], the conclusions regarding agenda-setting power rely only on the frequency of topics, speakers, and tones appearing in the data, and do not take into account other possible sources that may influence media attention.

Insert Table 2. here

Insert Table 3. here

Insert Table 4. here

5. Results

As Figures 1 and 2, and Table 5 demonstrate, the annual number of relevant items was rather similar in all four newspapers. The peak numbers of items in the Finnish papers, especially letters to the editor, occurred in 2010, at the time of the debate on new NPP applications. Figure 2 shows that our data set would have been considerably smaller if items concerning only nuclear new-build had been omitted. However; Figure 2 also illustrates that debate on nuclear new-build generated debate relating to final disposal more generally.

Insert Table 5. here

Insert Figure 1. here

Insert Figure 2. here

5.1 Thematic categories

Figure 3 illustrates the media attention to the different themes in the news articles. It is hardly surprising that descriptions of the evolution of projects (category 1.1) constituted the largest category – 69% in Finland and 50% in Sweden. However, whereas the second-largest category in Finland was 2.1. – overall safety (59%) – in Sweden, category 2.2 – specific safety issues and features – was second (45%). Next in line were, in Finland, themes concerning politics (38%, category 3.1), the site (36%, category 1.3), and authorities (32%, category 3.2). In Sweden, themes concerning general safety (30%, category 2.1), and authorities (29%, category 3.2) were most prevalent. In the letters to the editor (Figure 4), the main themes were the same for both countries, but there were also some interesting differences. Overall safety (category 2.1) drew most of the attention in both Finland (75%) and Sweden (68%), leaving project accounts (category 1.1) second in both countries (Finland 42% and Sweden 52%). The next frequently represented categories were more specific safety issues and features (35%, category 2.2) and politics (26%, category 3.1) in Sweden, but export/import and national responsibility (25%, category 3.3) and sentiments towards final disposal (24%, category 3.4) in Finland.

Insert Figure 3. here

Insert Figure 4. here

5.2 Tone of media attention

The predominant tone of news items and opinions was mostly negative in both Finnish and Swedish newspapers, with 42% negatively toned news items and letters to the editor in the Finnish and 55% in the Swedish media. In Finland, 28% of the items were positive, 25% neutral and 5% mixed, whereas in Sweden 20% were positive, 21% neutral, and 4% mixed. Thusly, the tone of the newspaper articles towards final disposal

was more critical in Sweden than in Finland. The difference between countries is even more marked when only the news items are considered (Figure 5). Negative tone dominated in 55% of the news items in Sweden, but only in 28% in Finland. Negatively toned reporting peaked in the Swedish media in 2011 (Figure 6), whereas in the Finnish media, 2010 saw a peak in neutral reporting (Figure 7).

Insert Figure 5. here

Insert Figure 6. here

Insert Figure 7. here

5.3 Societal actor groups as 'speakers'

Industry was given a voice in a clear majority of news articles in both Finland (61%) and Sweden (66%) (Figure 8). Next on the list of most visible actor groups were politicians (40%) and authorities (31%) in Finland, and authorities (34%), experts (25%) and NGOs (24%) in Sweden. The general public was practically absent from reporting in both countries (1% in Finland, 3% in Sweden). In Sweden, politicians (19%) did not get a voice to the same extent as in Finland (40%), while the situation concerning NGOs was the reverse (6% in Finland, 24% in Sweden). In the category of letters to the editor, there was a remarkable difference between the countries. In the Finnish newspapers, 73% of the writers were, according to their self-disclosed associations, members of the public, whereas in Sweden, experts and members of the public each accounted for 30% of the authors. In Sweden, authors of letters to the editor were more frequently (16%) than in Finland (4%) associated with the industry. Table 6 and Figure 9 show, however, that these figures should be taken with caution, as the low number of cases in some groups have to be taken into the consideration.

Insert Figure 8. here

Insert Figure 9. here

Insert Table 6. here

5.4 Actor groups as speakers in negatively and positively oriented news items

The two extremes, i.e. news items in which the predominant tone was either negative or positive, were further studied by comparing how frequently different actor groups appeared as speakers (Figure 10). This analysis does not allow determining the position of an actor group, but it shows how often a given actor group appeared in news items with a predominantly positive or negative framing. Industry and the authorities appeared as speakers almost equally often in both countries while industry was the most common speaker both in news items having a predominantly negative framing and in those with a predominantly positive framing. In Finland, this was the case in 34% of the negative and 36% of the positive items, and in Sweden, in 32% of the negative and 29% of the positive items. It is interesting that the industry was the most frequent speaker also in negative news items, despite the fact that it is probably the actor group with the most positive attitude towards final disposal. This suggests that the newspapers frequently gave industry representatives a chance to comment on negative claims and concerns regarding the final disposal.

Insert Figure 10. here

Our data reveals noteworthy differences between the Finnish and Swedish press media with regard to the visibility of the actor groups. Firstly, in the Finnish news items, experts appeared as speakers more frequently in the positive (9%) than in the negative news items (4%). In Sweden, by contrast, experts appeared as speakers in 14%

of the negative and only 3% of the positive news items. Secondly, Swedish politicians appeared as speakers more often in positive (12%) than negative (4%) news items. In Finland, the relation was the reverse: 26% for the negative and 21% for the positive news items. Thirdly, NGOs in Finland were speakers more unevenly and less often than in Sweden. NGOs appeared as speakers in 8% of the negative and only 2% of the positive news items in Finland, but in 13% of the negative and 9% of the positive items in Sweden. This finding suggests that, in the case of NGOs, journalistic norms in Sweden favour more neutral and unbiased reporting than in Finland. In the medium to long-term, the strategies and resources of NGOs may partly explain the difference [100].

5.5 Frequency of safety discussion and the tone of news items

A major difference between the two countries, as noted in Section 5.1, was the dominance of reporting on overall safety in Finland while in Sweden, there was a more detailed discussion on safety. More detailed analysis revealed further differences concerning the predominant tone in the news items concerning safety topics (Figure 11). A critical tone dominated in the Swedish newspapers: 60% of the items related to overall safety (category 2.1) and 67% to specific safety features (category 2.2) were negatively framed. By contrast, in the Finnish reporting, only 34% of news items concerning overall safety and 30% of those discussing specific safety features were negative. Positive and neutral tones on these topics were more frequent in Finnish than in Swedish news items.

Insert Figure 11. here

6. Discussion

We studied the similarities and differences in media attention to the licensing of the final disposal of SNF in four leading national newspapers in Finland and Sweden. The comparative and longitudinal study reveals differences between these two frontrunner countries with similar final disposal concepts, but somewhat different societal and regulatory frameworks governing repository licencing. The findings are in accordance with earlier research indicating that media representations of energy technologies are shaped by national characteristics [27, p. 313], [26], [101], [29]. Although longitudinal research of news coverage of a single issue helps to monitor the changes, one should be aware of the theoretical and methodological challenges in such a study. What the changes in news coverage actually mean is a matter of interpretation [102, p. 210].

We conducted a longitudinal content analysis of topics, tones, and speakers appearing in articles published in chosen newspapers. Despite the increasing competition especially from online media and the subsequent decline in subscriptions, the four leading newspapers analysed in this article would certainly have sufficient editorial resources to publish news items independent from the nuclear waste regime actors, and thereby fulfil their journalistic duty as watchdogs of democracy. During the 2008–2015 period of analysis, the respective nuclear waste regimes prepared for the licensing of the repository through pre-licensing in Finland and an international peer review in Sweden. The two companies submitted their respective applications in 2011 and 2012. The Finnish government granted the construction licence in 2015, whereas in Sweden, government decision is still pending. In the Finnish pro-nuclear policy context, the nuclear waste issue attracted media attention, particularly in 2010, when applications for three new NPP units were on the policy agenda. The dispute over a

joint national repository for SNF also attracted media attention, to some extent overshadowing other issues related to the final disposal.

The news stories covered a more diverse range of themes in the Finnish than in the Swedish media, the latter placing relatively more emphasis on specific safety features and attitudes towards final disposal. This concurs with the finding by Rowe et al. [103, p. 75] concerning the much greater interest in risk issues in the Swedish than in the UK press. The Finnish news reported on more general issues, such as the project, siting and general safety issues. Crucially, newspaper reporting on safety issues had much more often a critical and negative tone in the Swedish than in the Finnish newspapers. More than half of the safety-related discussion in the Finnish media while only about a third of such discussion in the Swedish media appeared in neutral and positive news items. Comparison with results from a study by Raittila [22, p. 69] from 1999–2001 suggests that media attention has over time become more positive in Finland. In view of the discussion focused specifically on safety features, the difference between the critical Swedish and the relatively more positive Finnish reporting was even more noticeable. The letters to the editor covered a fairly diverse range of themes in both countries. However, the letters in Finland more often addressed safety in general terms, while in Sweden they discussed more specific safety aspects. Interestingly, the imports and exports of nuclear waste as well as questions of responsibility were addressed more often in Finland than in Sweden.

The predominant tone of the news items were ‘pro-technology’ more often in Finland than in Sweden, where reporting was clearly more critical if not anti-technologically oriented. The Finnish news attention was also characterised by a tendency towards neutrality – an observation in line with that of Vehkalahti [95] concerning news reporting on the Fennovoima NPP project. More generally, Teräsväinen

[27] has argued that in representations of energy technologies *Helsingin Sanomat* has “embodied the national consensus-seeking orientation”. Ruostetsaari [104, p. 225] has gone as far as stating that energy policy experts and government parties establish the media agenda on energy policy, while the media in turn controls issue framing and the scale of attention. Peaks of highly critical media reporting on nuclear energy in Sweden occurred already in the early 1970s [100, p. 424], and in nuclear waste in the second half of the 1970s [5, p. 87–88] and again in 2002 and 2005 [24, p. 21]. However, the highest peak in negatively-oriented news during our analysis period occurred in 2011, when SKB submitted its applications. The peak can be seen as an indication of societal pressure on the disposal plans. In Finland, the highest peak occurred in 2010, when the applications for new NPP units were on the policy agenda – not when the construction licence application was submitted. In both countries, the majority of letters to the editor had a negative orientation towards final disposal. Anshelm and Galis [100, p. 425] associated the weakened media attention with the transformation of the concerned groups into core techno-scientific actors, which “has contributed to the re-confinement of technoscience and the disappearance of the nuclear waste issue from public debate” and Nord and Stúr [5] with depoliticization of the issue since the 1990s and attention given to other environmental-related issues. Our study suggests that the leading print media has only weak interest in the final disposal projects. Understanding how this relates to the possible changes in actor groups and their strategies would require separate analysis.

Analysis of the types of speakers in the print media revealed clear differences between the two countries and their nuclear waste regimes. In Finland, speakers in the news items tended to represent industry (61%), politicians (40%) and authorities (31%), whereas in Sweden, more actors were involved: industry (66%), authorities (34%),

experts (25%), NGOs (24%) and politicians (19%). In both countries, industry and authorities appeared as speakers nearly equally often in both negatively and positively oriented news items. Experts, however, appeared as speakers in critically oriented news items more frequently in Sweden than in Finland.

In Sweden, the reporting tended to be more even-handed than in Finland, and more often gave a voice to the NGOs. This became apparent in the category of “subtly anti-technological” reporting (See Section 2), in which the media consulted the representatives of opposing sides and sought to provide an equal amount of publicity for both parties. This echoes the notion that the Nordic political communication culture tends to be media-driven [17]. Possible further explanations include the openness and supportiveness of the Swedish regulatory framework towards civil regulation – as compared to the more closed Finnish regulatory framework [18] – the Swedish corporatist and consensus-oriented decision-making culture [105], and pressure exerted by the anti-nuclear movement to democratise decision-making on nuclear waste management [100]. The Finnish communication culture appears to be more closed, as journalistic norms seem to favour the core actor groups of the nuclear waste regime, i.e. industry and authorities, and also politicians. Teräväinen et al. [106] characterised the Finnish discursive orientation in nuclear new build debates as ‘technology-and-industry-know-best’ – a description that also concurs with the findings of Raittila and Vehmas [51, p. 24–26], [22, p. 73–74]. However, citizen inputs were clearly more frequent in the Finnish media at the Decision-in-Principle stage in 1999–2001 than during our research period.

The high share of industry representatives as speakers in news items in both countries is not surprising given that the industry is responsible for implementing the final disposal. Earlier studies have also identified the industry as the most frequently

interviewed or consulted actor [24, p. 29], [51, p. 24–25]. However, we also take this as evidence of the success of waste management organisations in gaining favourable media attention. Nuclear operators have understood the power of the media in agenda-setting and framing processes, and have indeed earned a reputation as a credible source of information in the eyes of the local citizens [107], [108], [109]. Finland and Sweden are among the top three countries in media freedom [7], but along with other means of influencing policy and public debate [100, p. 424], various key actors in the nuclear waste regime compete for media attention and seek to shape media reporting concerning final disposal. [51], [41], [52], [54.]

One of the most striking differences between media reporting in the two countries concerned the frequency of experts as speakers. It seems that in Finland, experts were not very interested in participating in the public debate on final disposal. The structural features of the nuclear waste regimes, for instance the absence in Finland of such a public-oriented actor as the Swedish National Council for Nuclear Waste, may partly explain the difference. However, future research could explore topics such as the role of the varying communication strategies and resources of the involved organisations; possible self-censorship, for example due to funding opportunities or connections of journalists with key stakeholders; and the success of nuclear waste research programmes in encouraging experts to engage in public debate. For example, in 2010 VTT Technical Research Centre of Finland explicitly forbade its researchers from appearing in public in ways that could be detrimental to its customers [110], [111, p. 68]. Raittila [22, p. 78–80] noted the weak visibility of experts in debates during the Finnish Decision-in-Principle stage, whereas in Sweden counter-expertise has a rather long history and a firm foothold also in the anti-nuclear movement [100]. In Sweden, experts were relatively more active in writing letters to the editors and more broad range

of actor groups were represented as speakers in the public debate more generally: experts (30%), the general public (30%), the industry (16%), politicians (11%) and others (16%). In Finland, by contrast, the most active groups were the general public (73%) and experts (10%). Members of the public were also the most common authors of letters to the editor from 1999–2001 in Finland [22, p. 74].

On the whole, certain actor groups in Finland seem to dominate both in news stories and as authors of letters to the editor. The Finnish newspapers tended to give voice to the core actors of the regime, whereas in Sweden, news stories included a more heterogeneous range of speakers. It is interesting to note that letters to the editor appears in Finland as a forum of expression for the general public, but provides in Sweden a space for a wider range of actor groups.

7. Conclusions

National-level media attention to the licensing of the repositories – designed to solve the wicked problem of nuclear waste management⁷ for tens of thousands of years to come – was rather lame in our two frontrunner countries, as found in previous studies [22, p. 87–89], [24, p. 39], [5]. Our main finding is that the Swedish nuclear waste regime gave rise to a more multifaceted discussion than the Finnish one in the leading newspapers. Diversity of speakers in public debate can foster public awareness and robust political decision-making on a controversial technology project. Particularly significant was the finding that experts and NGOs attracted media attention more frequently in Sweden than in Finland. These findings indicate that societal pressure and critique is weaker in the Finnish pro-nuclear policy context than in the more critical

⁷ A problem can be qualified as wicked when no straightforward solutions can be identified for the lack of a definitive formulation of the problem or acceptable solution; differing stakeholder frames of reference, interests and values; and because of institutional complexity and scientific uncertainty [e.g. 112]. On nuclear waste management as wicked problem, see Bergmans et al. [6], Ferraro [113].

Swedish atmosphere. This may also help to better understand the smooth progress of the final disposal project in Finland, as compared to Sweden, where media attention seems to amplify critical views of the project. It is worth noting, however, that critical NGO networks in Sweden have prioritised other channels of influence than mass media [100, p. 416, 424]. Even so, in the material studied in this research, NGOs received more frequent media attention in Sweden than in Finland.

Industrial actors appeared as the main agenda-setters in the chosen print media of both countries. This is not a surprising finding as such, given that the industry carries the responsibility for costs and implementation of final disposal, and in view of recent research on, for instance, media attention to Carbon Capture and Storage (CCS) technology in the Nordic countries [26], [114]. However, the relatively more positive tone of reporting in Finland suggests that the Finnish industry has been particularly successful in its efforts at managing publicity concerning nuclear waste. Lammi [68] and Teräväinen et al. [106] have noted that the Finnish anti-nuclear movement has struggled to play a significant role in the ‘production of debate’ and thereby to influence Finnish nuclear policy. Possible explanations for the relatively greater influence of critical voices in the Swedish debate include particular attributes of the respective risk regimes (such as an independent Swedish programme oversight entity, which engages in active communication, and provides funding for NGOs), different editorial norms and communication strategies, and training for journalists organised by the regulator in Finland.

In Finland, the print media paid attention to nuclear waste partly as an element of debates on possible nuclear new-builds and plans of the nuclear power company Fennovoima, whereas in Sweden the focus was more clearly on nuclear waste in and of itself, due to the nuclear phase-out decision in 1980 (see Section 3), and the public and

scientific controversy over the corrosion of copper canisters used in final disposal [e.g. 115], [116], [85]. Although the political Decision-in-Principle on the final disposal of SNF was taken in Finland already in 2001, it was surprising how much less attention specific safety issues (e.g. copper corrosion) attracted in Finland, as compared with the vivid debate in Sweden, although the disposal concept is technically almost identical in both countries. Copper Corrosion in Finland was presented as another issue which needs to be investigated further and solved before submission of the operating licence application, and not as a possible showstopper as in Sweden [see 19]. In Finland, the dispute between Posiva and Fennovoima on a joint repository at Olkiluoto was awkward for the Finnish nuclear waste regime, yet it also helped to relieve potential societal pressure by diverting some of the media attention away from the construction licence review process. This kind of clear confrontation was not part of the general ‘dramaturgy’ of the licensing process and therefore did not attract media attention. Fennovoima has been advocating for a common site and a ‘national solution’, whereas Posiva has declared its unwillingness to dispose of SNF from other sources than its owners. Posiva and its owners have not receded even under pressure from the Ministry of the Employment and Economy, and Fennovoima has therefore had to initiate site selection for its own repository [73], [109]. The dispute, however, did not obstruct the granting of the construction license.

Our results indicate clear national differences in the roles assumed by the leading newspapers in the handling of risk and technology issues. As suggested by Buhr and Hansson [26] in their comparative study of Carbon Capture and Storage (CCS) in Sweden and Norway, the development, perceptions and social interpretations of technology are intimately intertwined, and grounded in national specificities [see also 117]. Differences in media attention stem not only from factors endogenous to the

nuclear waste regime, but also from exogenous reasons such as a country's energy policy choices and economic structure. Hence, just like CCS technology in Buhr and Hansson [26] study, the final disposal concept was subject to critical treatment in the two Swedish newspapers. In Finland, like CCS in Norway, final disposal of SNF is perhaps perceived as a necessary part of a national project, designed to ensure the prosperity of the energy-intensive export industry reliant on nuclear electricity. It may be understandable that nuclear waste disposal would receive favourable media coverage in a country whose industry has already invested and indeed will continue to invest billions of euros in new NPP units. In Sweden, by contrast, the critical handling of the project can be understood against the background of a long history of controversy over nuclear power in the country, and the nuclear phase-out decision of 1980.

Future research could usefully explore the ways in which the issue of nuclear waste repositories is discussed in press media not included in this research: the evening newspapers, specialised magazines and weeklies, but also regional and local newspapers at the nuclear localities. This would shed light on the possible two-way relationships between regional and local news reporting on one hand and national reporting on the other. Furthermore, print media discussions in the two Nordic forerunner countries' print media discussions could be contrasted with those in another forerunner country, such as France, with its distinct media culture and nuclear waste regime. All in all, our findings invite research into the conditions under which print media can indeed fulfil its role as a watchdog in communicating risk issues.

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Table 1. Number of news articles and letters to the editor relevant to the issue by country per year

	2008	2009	2010	2011	2012	2013	2014	2015	Total
Finnish newspapers	21	24	81	26	28	15	17	12	224
News articles	13	11	29	17	20	11	11	9	121
Letters to the editor	8	13	52	9	8	4	7	3	104
Swedish newspapers	9	19	17	26	10	6	10	20	117
News articles	5	13	8	20	10	6	4	14	80
Letters to the editor	4	6	9	6	0	0	6	6	37
Total	30	43	98	52	38	21	28	32	342

Table 2. Thematic categories identified

1. The project and the licensing application

1.1 Schedule, plans, collaboration, options, costs, transportation etc.

1.2 Site selection, benefits, compensation, competition

1.3 Finland/Sweden as a front runner, exemplary countries

2. Risks and safety of final disposal of SNF

2.1 Risks, safety, concerns, open questions, and difficulties in general

2.2 Specific uncertainties regarding i.e. host rock, permafrost, canister, copper corrosion etc.

3. Governance and decision-making

3.1 Decisions by government, ministries, municipalities

3.2 Requirements of authorities

3.3 Export / import of SNF, national responsibility

3.4 Acceptance, confidence, resistance and support

Table 3. Example statements indicating tone (negative, neutral, positive) towards final disposal of nuclear waste.

Tone	Example statement
Negative	<p>”The protesters were opposed to the nuclear waste repository proposed by Posiva.” Mielenosoittajat vastustivat ydinjäteyhtiö Posivan suunnittelemaa ydinjätehautaa (AL2008604, news item)</p>
	<p>“Before the final disposal can begin, Posiva will need to give answers to many questions, including the environmental risks of burying the nuclear waste.” Ennen loppusijoituksen aloittamista Posiva joutuu vielä antamaan vastauksen moneen kysymykseen muun muassa ydinjätteen hautaamisen ympäristöriskeistä. (HS 201522232, news item)</p>
	<p>”In recent years there has been a remarkable increase in the price of taking care of the Swedish nuclear waste.” Notan för att ta hand om det svenska kärnavfallet har ökat rejält de senaste åren (DN20090126, news item)</p>
	<p>”The copper capsules filled with spent nuclear fuel from Swedish nuclear power plants are not going to last as long as has been claimed” ”Kopparkapslarna med utbränt kärnbränsle från svenska kärnkraftverk kommer inte alls att hålla tätt så länge som man hävdar, anser ett internationellt forskarlag.”(DN20090930, news item)</p>
Neutral	<p>”Fennovoima has 6 years to decide how to deal with, store and solve the problem of permanent disposal of the nuclear waste from the NPP” Fennovoimalla on kuusi vuotta aikaa ratkaista ydinvoimalan jätteiden käsittely, varastointi ja loppusijoitus (HS201101161, news item)</p>
	<p>”In the most recent Environmental Impact Assessment report on extending the Olkiluoto repository, Posiva has presented preliminary models for positioning the final disposal cave in the bedrock.” ”Tuoreimmassa Olkiluodon loppusijoituslaitoksen laajennuksen ympäristövaikutusten arviointiselostuksessa Posiva on esitellyt alustavia malleja loppusijoitusluolaston asemoinnista peruskallioon” (AL200812081, news item)</p>
	<p>”SKB will place the radioactive material 500 meters deep, in copper capsules that are encased in bentonite.”</p>

	<p>”På 500 meters djup vill kärnkraftsindustrins bolag, Svensk Kärnbränslehantering AB (SKB), placera det radioaktiva materialet i kopparkapslar, omslutna av bentonitlera.” (DN201103161, news item)</p>
Positive	<p>”Finland and Sweden have had intense cooperation in developing the nuclear waste disposal concept, and see themselves as industry leaders worldwide”</p> <p>”Suomi ja Ruotsi ovat tehneet tiivistä yhteistyötä loppusijoittamisen kehittämiseksi ja katsovat olevansa maailman johtavia maita alalla” (HS200811202, news item)</p>
	<p>”Even in Östrhammar, many people are pleased because the SKB’s decision (to site nuclear waste repository) was made based on the fact that long-term security is better in Forsmark than in Laxemar Oskarshamn.”</p> <p>Glädje uttrycks av många, även inne i Östhammar, över att det beslut som SKB tagit grundas på att den långsiktiga säkerheten anses bättre i Forsmark än i Laxemar i Oskarshamn. (DN200906031, news item)</p>
	<p>”We have absolutely no doubts that Fennovoima’s spent nuclear fuel will be brought to Eurajoki [to Posiva’s repository]. The owners of Posiva would earn huge income due to final disposal of material from Fennovoima, says Natri.” (a representative of Fennovoima)</p> <p>-Meillä ei ole minkäänlaista epäilyä siitä, etteikö Fennovoiman ydinjätteitä sijoitettaisi lopulta Eurajoelle. Posivan omistajat saisivat valtavasti tuloja Fennovoimalta loppusijoituksesta, Natri sanoo (AL20080462, news item)</p>

Table 4. Societal actor groups and the main organizations belonging to 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 Parliament or the EU Parliament, political parties, and their representatives
Province, county, city or community representatives	Eurajoki, Östhammar, Oskarshamn, Åland etc. and their representatives
Members of the public	
Others	Journalists, Artists

Table 5. Numbers of news articles and letters to the editor relevant to the issue by country per year after omitting nuclear new build related items

	2008	2009	2010	2011	2012	2013	2014	2015	Total
Finnish newspapers	14	10	39	17	9	7	4	5	105
News articles	8	6	9	9	7	5	3	5	52
Letters to the editor	6	4	30	8	2	2	1	0	53
Swedish newspapers	8	14	12	19	10	6	4	19	92
News articles	4	11	6	17	10	6	3	14	71
Letters to the editor	4	3	6	2	0	0	1	5	21
Total	22	24	51	36	19	13	8	24	197

Table 6. Extent of letters to the editor contributions by association (f) by country. (n=102 Fin / n=37 Swe)

	Finnish newspapers	Swedish newspapers
Public	74	11
Experts	10	11
Politicians	8	4
Industry	4	6
NGOs	1	4
Other	3	2
Authorities	1	2
Provincial & local representatives	1	1
Total	102	41

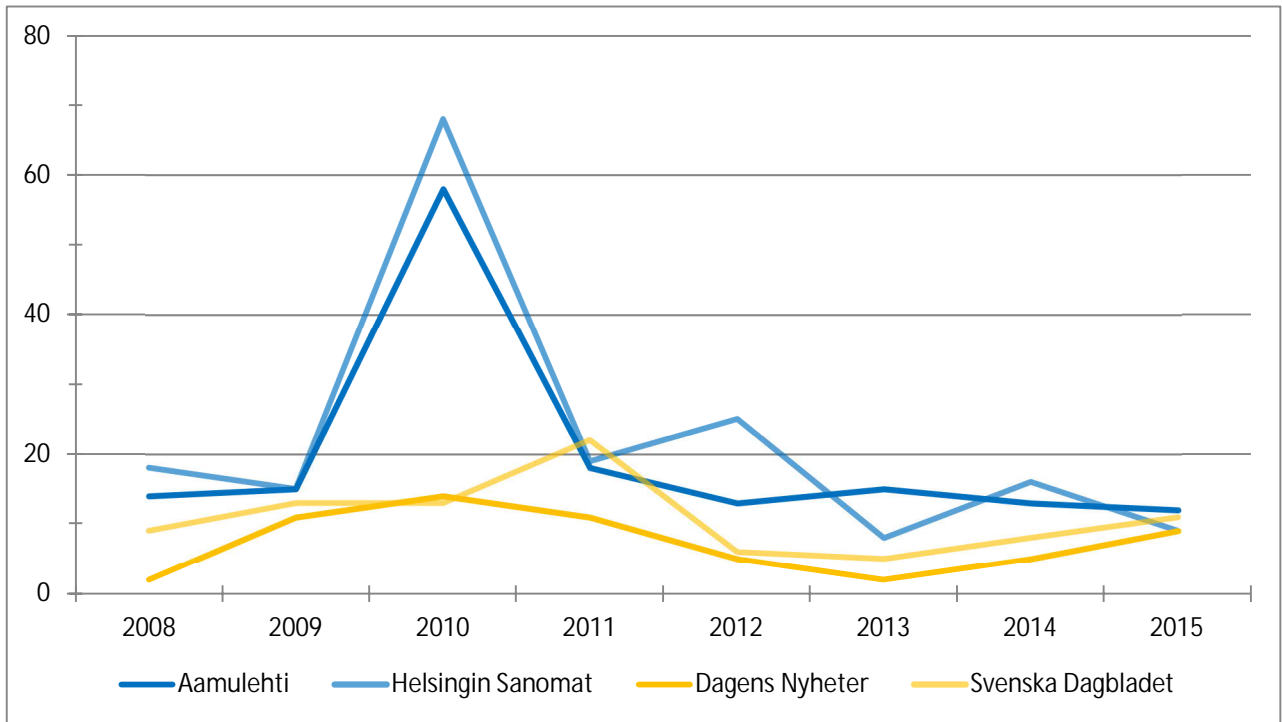


Figure 1. Number of articles relevant to the issue by newspaper per year

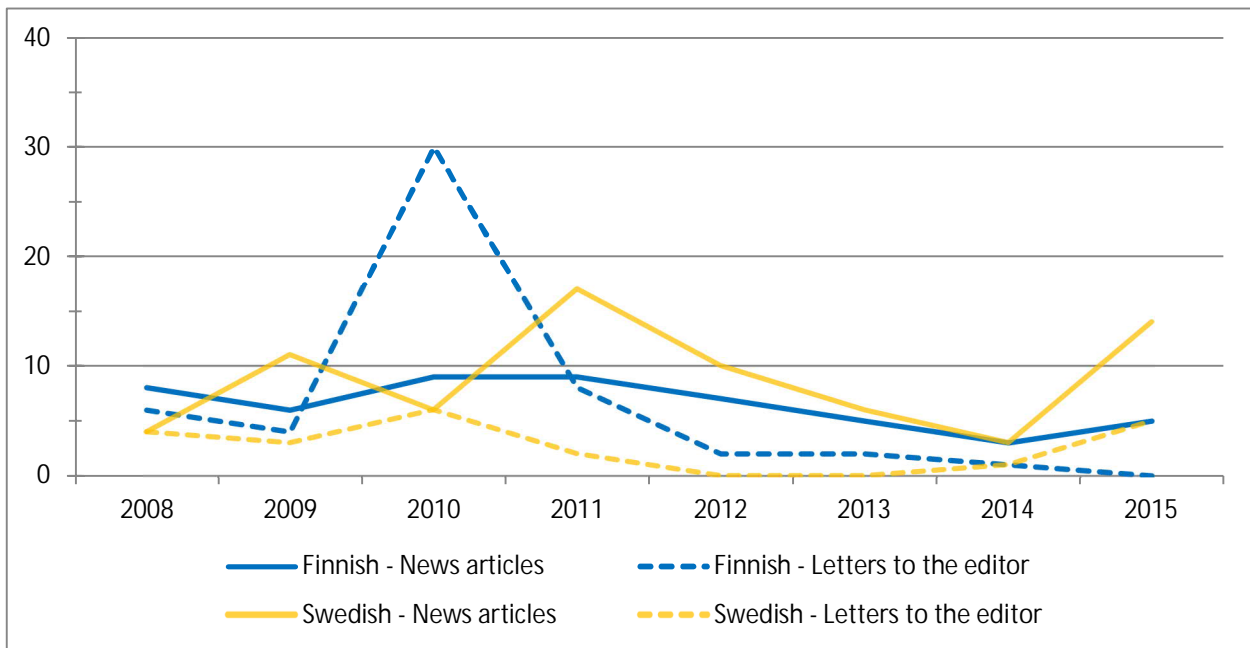


Figure 2. Number of news articles and letters to the editor relevant to the issue by country per year, specifically nuclear new build related cases omitted

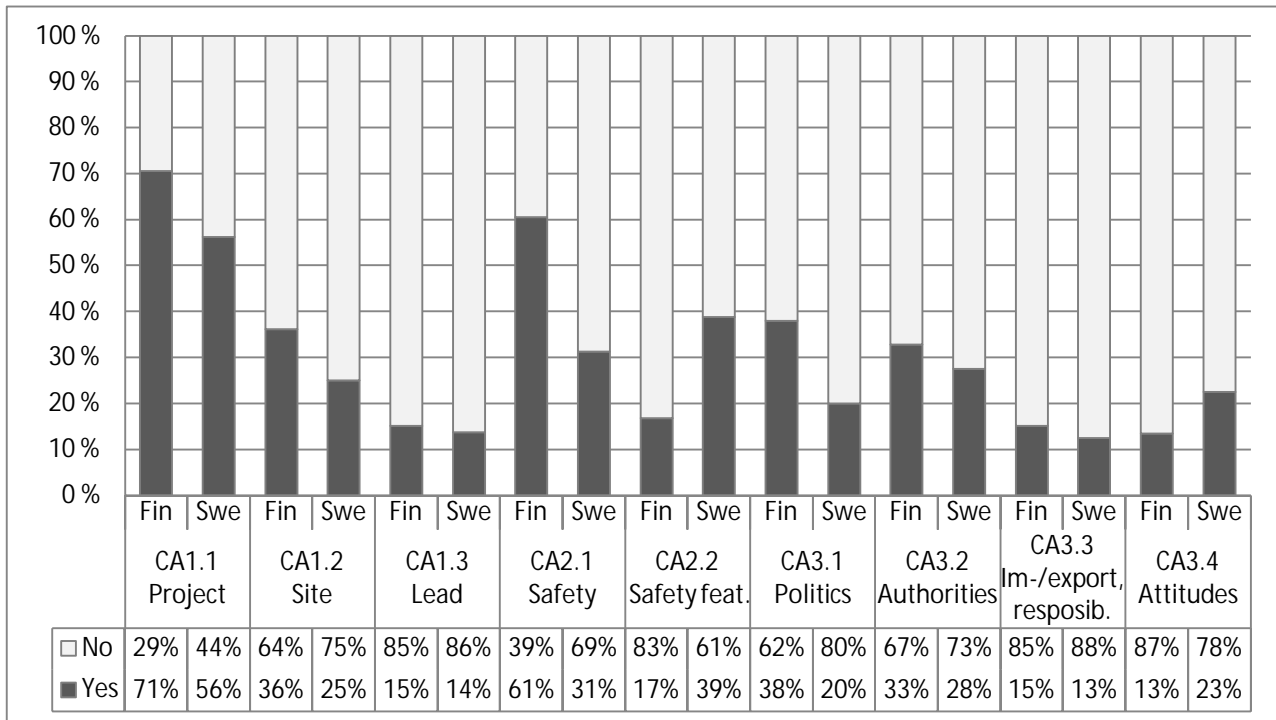


Figure 3. Extent of certain issue categories identified (Yes/No) in news articles (%) by country. (n=119 Fin / n=80 Swe)

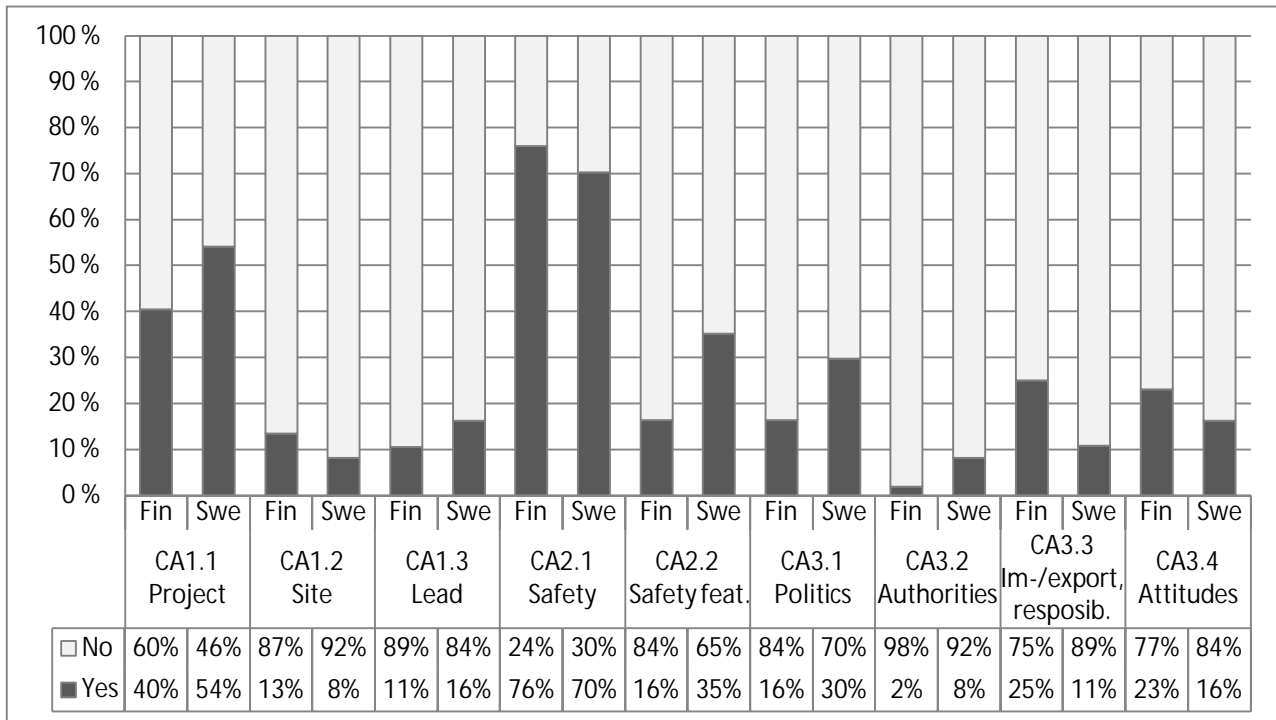


Figure 4. Extent of certain issue categories identified (Yes/No) in letters to the editor (%) by country. (n=104 Fin / n=37 Swe)

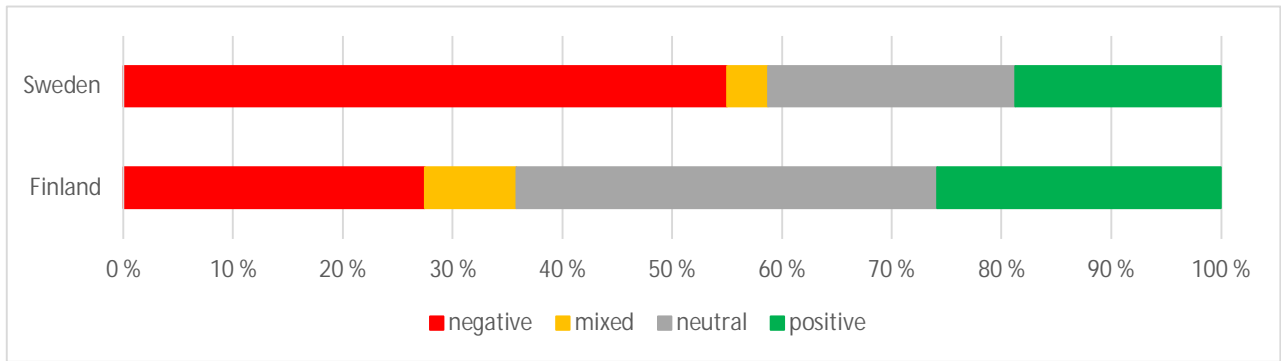


Figure 5. Extent of different predominant tones in news articles relevant to the issue (%) by country. (n=120 Fin / n=80 Swe)

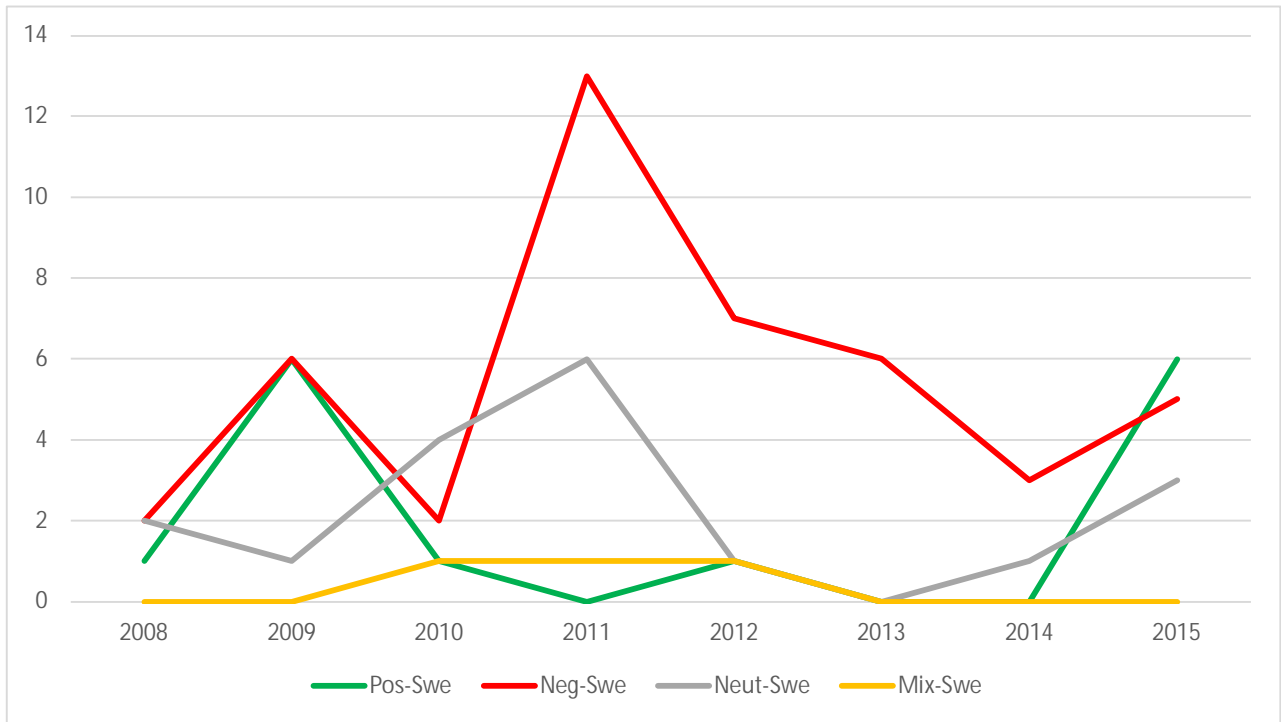


Figure 6. Tone of Swedish news items per year

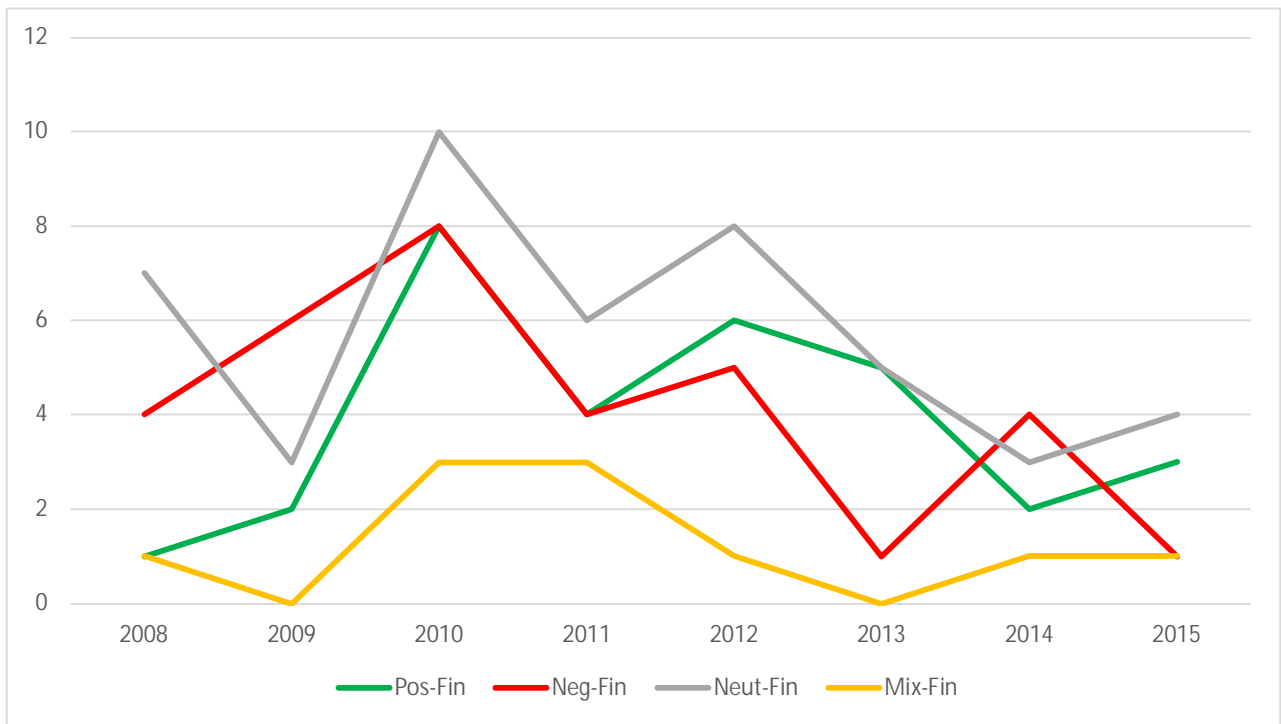


Figure 7. Tone of Finnish news items per year

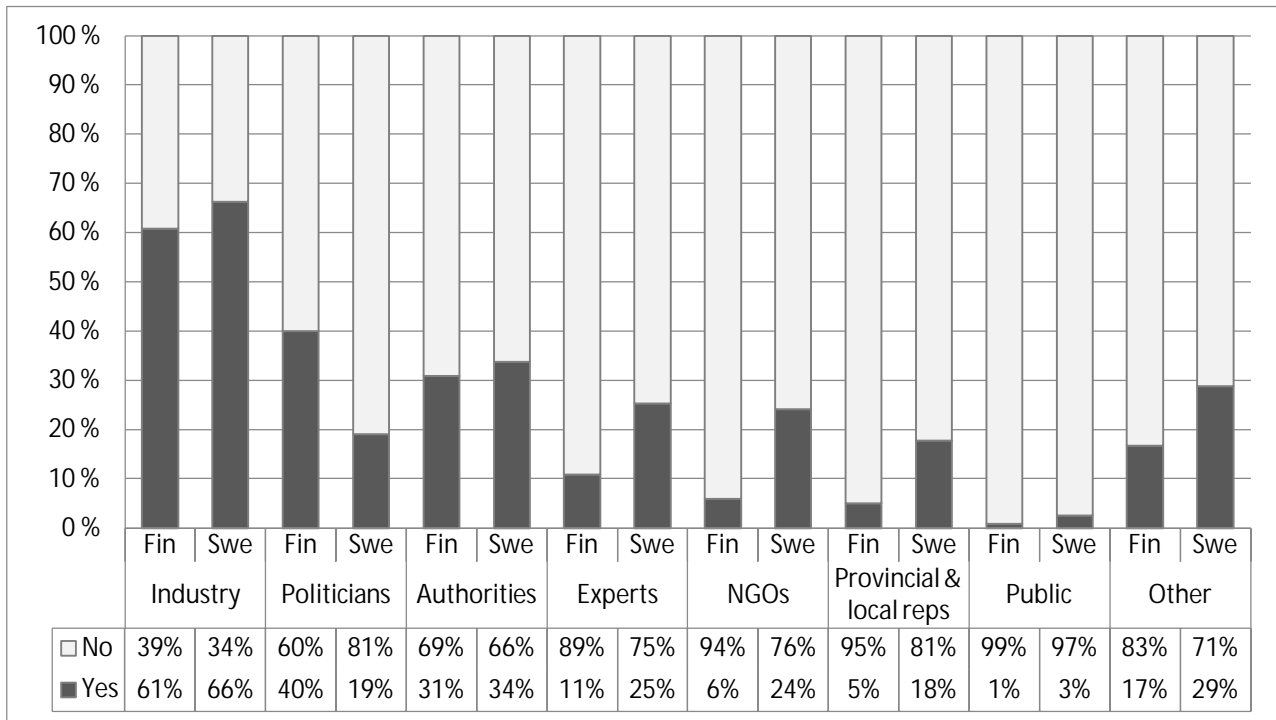


Figure 8. Extent which a voice is given (Yes/No) to certain actors in news articles relevant to the issue (%) by country. (n=120 Fin / n=80 Swe)

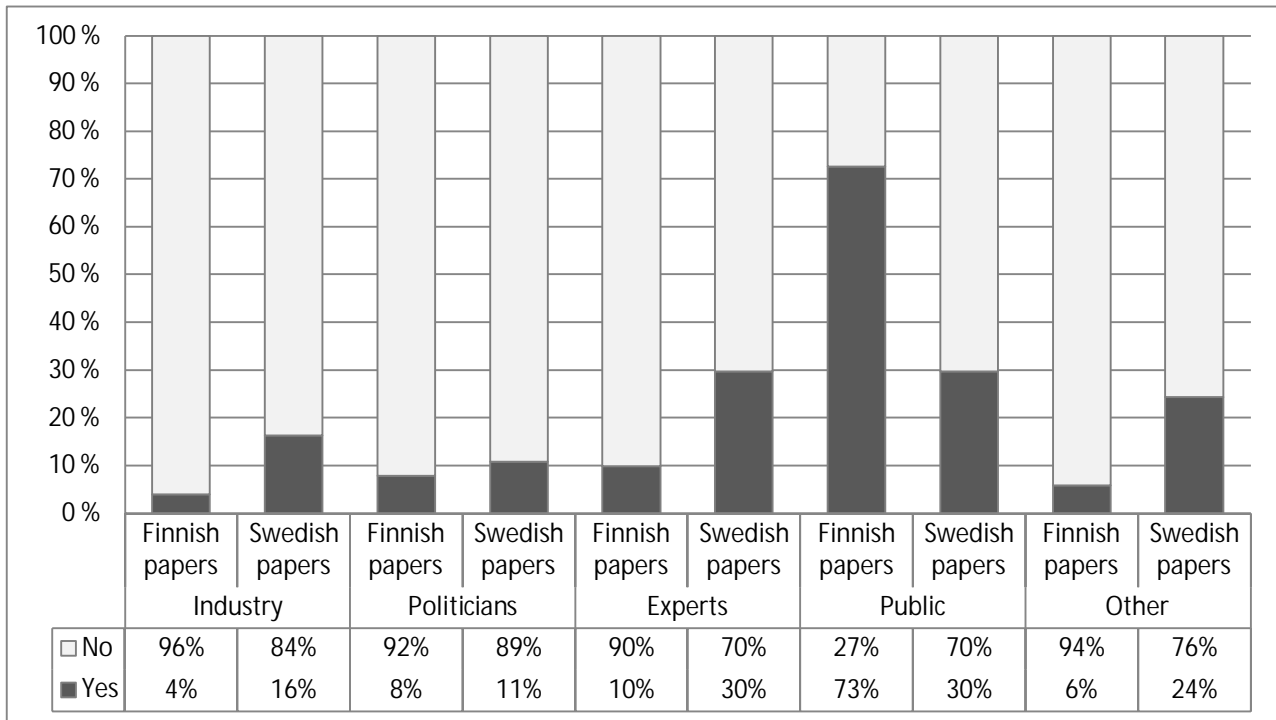


Figure 9. Extent of letters to the editor contributions (Yes/No) by association (%) by country. (n=102 Fin / n=37 Swe)

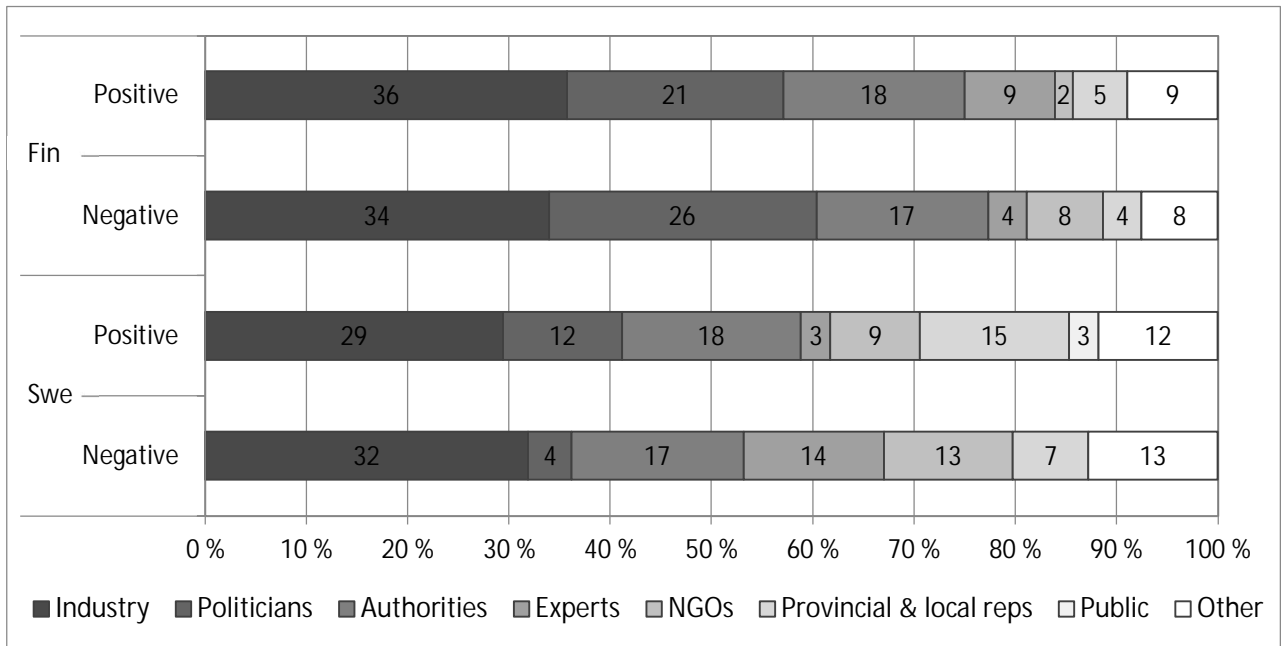


Figure 10. Appearance of actor groups as speakers in Finnish and Swedish news items with overall negative (Fin n=53; Swe n=94) and positive (Fin n=56; Swe n=34) tone

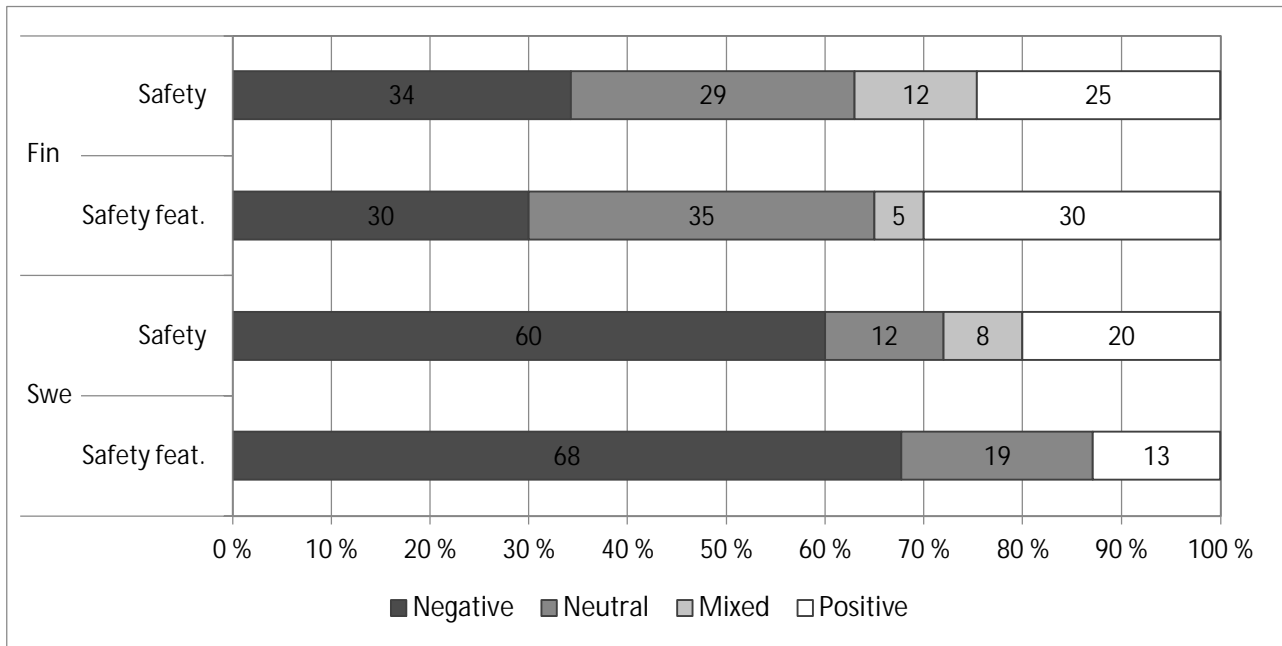


Figure 11. Extent of different predominant tones (%) in news articles regarding the topics of safety (CA2.1) and safety features (CA2.2) by country