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Building New Nuclear in Finland: Crises Challenging Core Beliefs around Nuclear Energy

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Abstract

This paper examines the building of a new nuclear plant as a greenfield operation in Pyhäjoki, Finland. A newly-founded energy company, Fennovoima, was granted a license by the Finnish parliament to build a new power plant in 2010. In the years following this Decision in Principle the project faced several obstacles. Through interviews with key actors, this paper identifies the interests and core beliefs associated with building the plant. It posits that, in Finland, the underlying ideas and values surrounding nuclear energy are deeply embedded in conventional belief, or 'doxa'-like, and as such are very difficult to challenge or change. Through the lens of this example, it offers suggestions and conclusions concerning the more general social logic behind energy policy decisions in the Finnish context and why nuclear energy has become a hegemonic solution in the Finnish polity. The paper also discusses the viewpoint of geopolitics, which has had historical relevance and has become of paramount concern in the current world situation.

Keywords

Nuclear energy; Finnish energy policy; Fennovoima; doxa; social practices; policy processes

1. Introduction

This paper discusses the role of nuclear energy in Finnish energy policy by examining the specific case of Fennovoima, a new company established in 2007. The decision to build new nuclear and the origins of this solution will be analyzed through interviews with key actors involved in the Fennovoima process. What was the underlying logic and reasoning behind choosing to build a new nuclear plant in Finland in a context where the project faced several obstacles? The paper will discuss how the narratives formed in relation to this decision-making exhibit 'doxa'-type core beliefs, why this is, and the implications of this. The question this paper poses queries the common, shared narrative around the nuclear energy solutions in Finland and explores why this narrative continues to persist. The paper offers a social-scientific perspective regarding energy policy and draws on a constructivist understanding of language. It provides new insights into understanding how the social reality surrounding energy solutions is constructed in a community by examining a specific case of building a new nuclear plant in Finland. The aim is to contribute new empirical research to the field of social-scientific analysis in relation to nuclear energy, with a special emphasis on the case of Finland. Research has been conducted concerning the politics surrounding nuclear energy in Finland, and numerous publications in recent years have addressed, for example, the (de)politicization of nuclear politics and the role of different stakeholders in nuclear energy policies [1-7], the role of public debate in nuclear energy policies [8, 9] and the societal power structures around energy policy [10, 11].

To understand the concept of an 'energy elite' and its social practices, it is important to understand the shared beliefs and norms that can be become rigid ('doxa'-like) if there is no room for healthy contestation and free deliberation both in public and among those who are closely involved in the decision-making process. These underlying social practices become visible in the narratives communicated by the actors themselves, as they describe the process and unfolding of the Fennovoima nuclear plant project. In the face of difficulties or a crisis, as certain beliefs which were previously incontestable become challenged, they also become more visible and detectable. These points of conflict create dissonance and ruptures in something that was, until that point, more or less intact and solid. In this paper, I describe how this happened between 2010 and 2015, after which the Fennovoima project only occasionally appeared on the radar of public discussion. That was until there was a dramatic revival of the debate when Russian military action in Ukraine became a reality in February 2022. In the context of the EU sanctions imposed upon Russia as well as national geopolitical concerns, the future of the Fennovoima project, which is partnered by Russian Rosatom, has inevitably become highly uncertain. To date, Fennovoima still does not have the final license to begin the actual construction work on the power plant, but it has submitted its application to be reviewed by the Finnish Government. At the end of February 2022, the current Finnish Minister for Economic Affairs and Employment, Mika Lintilä, announced that he would not present this matter to the Governemnt, and that the Fennovoima project would be at the very least considerably delayed.

2. Historical Context: Relations and Decision-Making around Finnish Nuclear Energy

Nuclear power has long been an important component in Finnish energy solutions and energy policy. In 2020, 27% of the electricity supply in Finland was sourced from nuclear energy [12]. A common argument for its continued role emphasizes its low emissions and the absence of any

credible and economically viable alternative. Since the 1990s, nuclear power has been promoted both in Finland and abroad as a sustainable and emissions-free form of energy that can help tackle the challenge of climate change without the need to reduce energy consumption.

Today, Finland has four functioning nuclear reactors. A fifth has been under construction at Olkiluoto since 2005 with considerable delays and problems, but the company Teollisuuden Voima (TVO) finally received permission to load the fuel in the summer of 2021, to become fully operational in the spring of 2022 [13]. As for Fennovoima's project, the company submitted its last updated version of the construction license application in April 2021, and a public hearing was organized between June and September 2021. The Government was supposed to decide on the application at a later date [14].

The history of nuclear power construction in Finland is characterized by some recurring patterns and trends. Several Finnish scholars have offered interesting analyses [7, 15-20]. At least three points are worth mentioning here: first, the construction of nuclear energy has been dependent on foreign powers delivering the plants and the technological expertise; second, the processes have involved clashes between state and private operators, which have been resolved through various collaborative arrangements; and third, in addition to many projects, there have been numerous plans that never materialized. The latter were ultimately abandoned or postponed for financial reasons, primarily electricity prices, but also because of nuclear accidents such as Three Mile Island in 1979 and Chernobyl in 1986. These facts are relevant to this paper's analysis of the Fennovoima project.

Finland's first nuclear power projects were launched in the 1960s by the state-owned Imatran Voima (IVO, currently Fortum Power and Heat) and the industry-owned Teollisuuden Voima (TVO). In the Cold-War era, the battle over Finland's first nuclear power plants was fierce and involved intense political pressure, especially from what was then the Soviet Union. Finland was keen to solidify its technological independence, particularly in relation to the Soviet Union, but what began as competitive bidding for Western nuclear power plants ultimately transitioned into negotiations over the construction of Soviet-built power plants for IVO and over what kind of Western power plant commissioned for TVO would be acceptable to the Soviet Union [16]. Early energy decisions were closely intertwined with issues related to national security and state sovereignty. Nuclear power, at this time, intersected not only with business interests but also with the ongoing political and ideological battle between the superpowers for technological and economic supremacy. For the Soviet Union, achieving this position of supremacy in Finland appeared to be so important that it was eager to sell a power plant at almost any price [16].

Energy [in]dependence has thus been a matter of long-standing debate in Finland that can be traced back to the Cold War years in the 1950s when the Soviet Union began to use technical cooperation as an avenue of intervention in Finland's internal affairs. For Finland, reduced energy dependence on the Soviet Union was one of the key motives behind its nuclear projects [16, 21-23]. Today, Russia is one of the world's leading developers and users of nuclear technology, and from the outset, was keen to export its technologies to Finland. Finland continues to be dependent on imported energy, and it imports oil, gas, coal, nuclear fuel, and electricity. Fossil energy sources are not found on Finnish soil; thus, all fossil fuels are imported [24]. Total energy imports were worth 10,059 million euros in 2019, of which over half (6,221 million euros) were from Russia [25]. Table 1 gives the different types of imported energy. Nuclear power has never been simply a solution for electricity generation but has always been intimately connected with questions related to security

and geopolitics, international spheres of interest, technical expertise and competition, and energy dependence [16]. Energy independence was one of the key arguments put forward in the case of Fennovoima.

Table 1 Energy imports from Russia. Source: compiled by Laura Solanko, Bank of Finland, from the PxWeb database of Statistics Finland (https://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin__ene/). Accessed 25.1.2022.

	Imports from Russia, % of total imports		Total value of Finnish energy imports, million euros		Imports from Russia, million euros	
	2018	**2019**	**2018**	**2019**	**2018**	**2019**
Coal	42%	32%	592,3	431,4	248	138,7
Natural gas	100%	100%	577,6	512,4	577,6	512,4
Crude oil	85%	91%	5 081,3	4 936,5	4 343,1	4 494,9
Oil products	31%	33%	3 321,9	3 171,2	1 033,9	1 055,6
Wood fuels	88%	69%	11,4	195,2	10	135
Electricity	29%	29%	1 024,4	1 072,1	301,7	306,5
Nuclear fuel	22%	28%	97,9	85,6	22	23,8

Before the revival of nuclear power in Finland, when TVO was finally granted a Decision in Principle (DiP) for the construction of Olkiluoto 3 in 2002, there were numerous nuclear projects in the 1980s and early 1990s that, ultimately, were abandoned. According to Vehkalahti, these were no less viable than those that went ahead, but the conditions prevailing at the time - and no doubt, the actors involved - contributed to their failure [7]. Notable common features include the economic situation - the price of electricity and energy consumption were both declining because of the state of the economy - the nuclear accidents at Three Mile Island in Pennsylvania, USA in 1979, in Chernobyl in 1986; and the serious incident at Sosnovy Bor in Leningrad in 1992. The economic situation and these nuclear accidents played roles in causing these projects to fail, but Parliament's decision in 1993 to reject a nuclear power plant application also marked an important political turning point. Throughout the post-war period, energy policy had been geared toward securing the energy needs of the country's energy-intensive industries, but now Parliament was turning down an industry project for environmental reasons, faced as it was with burgeoning calls for the use of alternative energy sources [1]. At this point, Lammi suggests [26], nuclear power gained heightened importance in the struggle for power in society. At the next stage, when TVO was granted a license in the early 2000s, the nuclear industry itself had assumed the initiative in environmental issues and in combatting climate change, re-branding itself as an emissions-free alternative. The media have also turned increasingly pro-nuclear since the 1990s [27], frequently marginalizing critical views by attributing them to a particular political faction and a single political party, the Greens [3]. At the same time, the tendency to depoliticize the energy debate in Finland [11, 28], and more particularly debates on nuclear power [3, 29] and nuclear waste [4, 5], has been strong.

The turning of the tide for nuclear energy also 'reopened the game' for the additional construction of nuclear power plants, and there were others who were keen to take advantage of

this apparently inexpensive energy source. In the case of Fennovoima, similar challenging conditions as those described above were met, but they have not thus far overthrown the project. Table 2 presents important events in the nuclear energy sector on a timeline.

Table 2 Some key events in Finnish nuclear history and the Fennovoima case.

TIMELINE	EVENT
1977	The first state-owned, Soviet-built IVO reactor in Loviisa starts to operate
1978	The first industry owned, Swedish Asea-Atom built TVO reactor in Olkiluoto starts to operate
1980	The second state-owned, Soviet-built IVO reactor in Loviisa starts to operate. The second industry owned, Swedish Asea-Atom built reactor in Olkiluoto starts to operate
1987	A new Atomic/Nuclear Energy Act comes into force. This includes stricter safety rules for nuclear power plants and a strengthened legal status for the independent safety regulator STUK. A parliamentary Decision in Principle (DiP) becomes required to license a nuclear facility to be built.
1993	The Finnish Parliament rejects the application to build a new nuclear plant by TVO
2002	The Finnish Parliament approves the application of TVO to build a new nuclear plant and issues a positive DiP. TVO begins the Olkiluoto 3 project.
October 2012	Prompted by the Fukushima accident, Germany decides to give up nuclear energy by 2022. E.ON leaves the Fennovoima project.
March 2014	The Russian State Atomic Energy Agency (Rosatom) is officially announced to take a 34% stake in Fennovoima.
Fall 2014	Fennovoima is granted an amended DiP in Parliament on the condition of 60% European ownership. The Greens leave the government.
Spring-summer 2015	Fennovoima applies for the construction permit, announcing a new Croatian owner Migrit Solarna Energija, which is revealed to be a Russian front organization.
July 2015	The Ministry of Economic Affairs & Employment does not approve the application but grants more time until August 2015.
August 2015	Fortum and SRV become new partners in Fennovoima, and the government supports Fortum in its negotiations on the Karelian hydropower deal. The construction permit application is now valid, as the European ownership is raised to 60%. A permit will be given once the construction plans and safety documentation are approved by STUK.

For its owners, the nuclear energy business has offered an opportunity to not only purchase cheap electricity but also to sell the excess for a profit[1]. As mentioned, the business has traditionally been divided between two major players, namely the state-owned Fortum, previously IVO, and TVO, mostly owned by the forest industry, but today there is also significant state ownership via companies like Fortum, Ruukki, Outokumpu, and Kemira. The Finnish national economy has been traditionally heavily dependent on exports, and energy production has been largely geared toward satisfying the needs of the country's forest industry. The three key players in energy decision-making to date have been the state, the forestry industry, and energy producers. Power and influence in the energy sector have traditionally been concentrated within these companies and their owners in Finland [11]. Fennovoima challenged the power structures and the position of established players in the field: it started as a small project, integrating the interests of metal industry companies, local Finnish electricity companies owned by different cities or municipalities, and other Finnish SMEs such as retail businesses. These actors had previously been excluded or had only minor shares in the Loviisa and Olkiluoto plants. Many attempts to reconcile and negotiate the shares of nuclear energy for different players had failed. Fennovoima was founded to serve the interests of private Finnish companies seeking a cheap source of energy that they could control, combined with the interests of E. ON to enter the Finnish market and remain up to date with nuclear energy technology and construction. However, these questions easily become intertwined with national interest and security questions in a small country like Finland with insufficient energy supply to be self-sufficient. It is thus an interesting balance of arguments, drawing on the one hand from a purely business perspective and on the other from national economic, security, and environmental/energy policy issues.

The public arguments that Fennovoima's owners advanced during the campaign for the nuclear plant were carefully planned to address several interest groups and political parties. For the Center Party (former Agrarian League), which is concerned with regional balance and the economic development of remote areas, the argument focused on the fact that the plant would be built in Northern Finland, thereby creating employment and business opportunities in a region that was struggling economically. In addition, the owners of the nuclear company consisted of the Finnish metal industry and retail companies as well as many local electricity companies. For the Social Democrats and the political left, the argument concerned industrial employment, and for the right-wing Coalition Party, it concerned strengthening Finnish companies with cheap energy produced in Finland. For the public and the entirety of the political spectrum, the idea of energy self-sufficiency as a national aim was promoted. To appeal to the Greens and others concerned with global warming, nuclear energy has been presented as the climate-friendly solution to energy problems for the past two decades[2]. These arguments were kept, even though the circumstances changed considerably after the Fennovoima plant was granted its original approval in the Finnish Parliament in 2010.

The next section presents the narratives and core beliefs, or doxa, which can be identified in connection with the Fennovoima process, and, ultimately, in connection with deciding to continue building nuclear power plants in Finland.

[1] The Finnish nuclear plants operate on a Mankala principle, where owners have agreed a set price for the energy they buy from the company according to their ownership share.

[2] These arguments were presented by several Fennovoima representatives in the interviews, in public discussion at the time, and can also be found in the original application made for the power plant.

3. Theoretical-Methodological Framework: Examining Internalized Schemes of Perception Called Doxa Shared by A Community

In a political community, shared narratives are constructed to keep the community alive and progressing forward - drawing elements from various cultural sources and layers in the nation's history, for example. Benedict Anderson has proposed the idea of a national or collective narrative as an imagined community [30]. Such a narrative can serve to communicate a common belief system or to share information about the community's core pillars. However, if the narrative and its underlying beliefs are fixed and restrictive, this may enter the domain of dogma. When they become sufficiently rigid and unquestioning, arguments presented as objective statements begin to assume a hegemonic and orthodox, or even religious, tone - they become 'doxa'-like. 'Doxa' is a rigid and fixed belief or system of beliefs that surfaces in narratives that are uttered and social practices that are performed in the form of recurring and persistent claims.

Doxa refers to a situation in which accepted values and beliefs are enacted reflexively in practice, without much questioning both by those who are dominant, possessing power and resources, and those who are in a subordinate position [31]. The French sociologist Pierre Bourdieu sought to explain social practices in terms of differentiated social domains called 'fields', in which social agents interact. These culturally inscribed human agents would share a core of beliefs and schemes of perception and thought - he called these 'doxa' [32, 33].

Rather than personally tested faith, doxa arises from a collective decision— in other words, the source authority is found outside of oneself, in the collective that represents greater wisdom or truth. It cannot accommodate any major contradictions, and it will continue to be adhered to even when the surrounding reality begins to shift. As faith is anchored to this kind of abstract belief system that is external to or above oneself, decision-making will often also be outsourced. People do not trust their judgment but refer to those who represent authorities in their shared belief system. Through doxa, socially and culturally constructed ways of observing, assessing, and acting become accepted and unchallenged - in other words, they become natural. In a certain society or community, a shared doxa reinforces shared social practices, which makes it seamless to organize collective action [31, 33].

Doxa is only made explicit through the interrelation of the divergent, novel, or competing discourses and practices. This is most often found in the context of cultural contact or political and/or economic crises. For Bourdieu, a crisis is necessary but never sufficient for the questioning of doxa to arise within any one specific community or field [32]. The theoretical-methodological concept of doxa, therefore, provides a useful tool for describing the rationales and premises for building a new nuclear power plant and abiding by this decision, even in the face of mounting challenges. Social practices and underlying beliefs that can amount to a doxa are shared by a specific community, in this case, the community centered around nuclear energy. After the Fukushima nuclear disaster in Japan in 2011, a debate arose in the international community centered on the 'nuclear village'; the argument was that nuclear utilities, politicians, regulatory authorities, and academia in Japan had become an overly close-knit community. Critics maintained that those advocating nuclear power were a close-knit and strong circle who shared important interests in common. In such a situation, it was ultimately impossible to reach an objective assessment, and private, and public interests became blurred and muddled [34].

The notion of the nuclear village has been used to refer to an imagined pro-nuclear collective bound by solidarity. The core beliefs its members share include, in the case of Japan, the idea that nuclear energy is critical to the Japanese economy, a national priority because of a lack of oil and a dependency on energy imports, and the belief that as an energy source, it is safe, cheap, and reliable [35]. This situation has precipitated what is often described as 'regulatory capture', wherein regulators of an industry defer to the desires and agenda of the industry which they are meant to regulate. This community is not necessarily monolithic in terms of policy but rather a gated community with disagreements, but where cooperation and reciprocity prevail. In practice, this has materialized in the authorities relying on the utilities to monitor their safety standards, giving them 'the benefit of the doubt' and allowing them to shape regulations and policies affecting their energy business. At the same time, as historian and Asian Studies expert Jeff Kingston views it, this nurturing of solidarity and groupthink has marginalized dissenting opinions while simultaneously denying outsiders access and benefits that members enjoy [35].

According to research conducted by Funabashi and Kitazawa [36] and the Hatamura reports conducted after the Fukushima disaster [37], this phenomenon of regulatory capture has produced a deteriorating culture of safety and collusive relations. The idea of a nuclear village has been proposed in the Finnish context as well, with similar attributes like close cooperation and affinity between key actors and a strong public discourse around the benefits of nuclear power. Finnish researchers have also used related terms such as 'nuclear oasis' and 'industry awareness' [38]. In the following, empirical material will be presented to analyze the shared narrative in the case of the Finnish nuclear energy solution. Moments of crisis will be described, as well as the views that attempted to contest the legitimacy of the beliefs connected to the doxa. These points of contention and contradiction offer a window to help view and understand what is generally regarded as incontestable and fixed.

4. Data and Methodology

The empirical material gathered for this research includes 25 semi-structured interviews[3] with various actors involved in the energy sector and the Fennovoima project: politicians, regulators, energy company executives, and employees, as well as NGO representatives. The full list can be found in Appendix 1. The different actors involved in the project, those still working for it at the time of the interviews, and those who had left the project, offered differing perspectives of events. This made it easier to distinguish the premises upon which a doxa-type narrative rests. Those contesting or contradicting the doxa were typically people who had left the project or people who had opposed the project from its inception and attempted to strive toward alternative solutions either on the local or national level of politics.

The semi-structured interviews encompassed a broad range of themes centered on the nuclear decision-making process and the different challenges facing the project. The interview structure can be found in Appendix 2. All themes were discussed with all the interviewees, but in keeping with the style of a semi-structured approach, the discussion flowed freely, and the interviewees were

[3] The interviewees were guaranteed anonymity; only the sector/organization where they were working is listed in the appendix. The author conducted all the interviews either in the premises of the interviewees, or in public places. Interviews lasted between 1 and 2 hours. They were recorded and transcribed word-for-word by a professional service, and saved as audio and text files by the author. The samples were translated from Finnish by a professional, and are presented in a form respecting the original expression.

able to express themselves freely and to introduce their own themes [39, 40]. In the analysis, a social-constructivist approach was applied to identify and interpret the underlying values and beliefs - in their rigid form, forming a doxa - that underpinned the narratives offered by the interviewees. The analysis grew out of reading the transcripts several times and identifying the original themes, as well as new themes that emerged from the material. The themes were coded into categories, and claims made under each category were then integrated to determine whether a common logic could be found and what kinds of contradictions were potentially present. Mere opinion was not sought. The analysis will be presented as interwoven with the actual events that occurred: trust in the Fennovoima project was shaken by several events or developments in the external environment in the years following the 2010 DiP. Each of these events or developments created a situation in which discussions about the whole premise of building new nuclear power were required.

5. Analysis and Results: Core Beliefs Underpinning Social Practices in the Fennovoima Case

The 2011 Fukushima disaster triggered an international debate about the safety culture at nuclear facilities and the 'nuclear village' phenomenon. In the Finnish public sphere, the belief in Finnish supremacy in terms of nuclear safety held strong, and the Fukushima disaster was framed as an event that could never happen in Finland: Finnish safety culture was simply altogether superior [41]. Neither the news coverage (in the Finnish newspapers Helsingin Sanomat, Kaleva, and Raahen Seutu) nor the public debate around Fukushima made any connection to Fennovoima [29]. In Finland, in the wake of Fukushima, most other countries were framed as technically and institutionally unreliable and therefore vulnerable, but Finland itself was an exception: the Finns had no such problems, and therefore an accident could never happen here. The ethical dimension of nuclear power did not feature prominently in the public debate. Anyone who expressed fears and emotions associated with nuclear power was deemed somewhat irrational [41]. In many other European countries, nuclear power was placed under a magnifying glass both in the public realm and in political networks; however, in Finland, the subject was never subjected to an in-depth system-level analysis [42].

In line with the public narrative, the premises strongly present in the speech of many of the respondents interviewed for this research demonstrate that trust in nuclear power springs from, first, trust in the supremacy of technology and engineers as well as natural science and scientists, and second, trust in human infallibility--in this case, a Finnish national trait manifested as high integrity and honesty. A third component in the belief system adhered to by those promoting the new power plant was that nuclear energy, cheap and profitable, is an economically beneficial means to produce energy.

Other researchers in the field of nuclear energy policy have uncovered similar tendencies. Lehtonen et al. [5] found in their interview research regarding nuclear stakeholders a generally held view of Finland as an 'engineer nation', where factual and rational argumentation in energy issues in public debate is of paramount importance. Another recurring finding has been a strong trust in the honesty and high morals of engineers [1, 2, 5].

5.1 The Deep Conviction in the Power of Science and Technology

First, the interview analysis indicated a very strong reliance on rationality and the ideal of natural science as objective and neutral. A neutral stance toward nuclear power was often portrayed as

accepting nuclear energy as an immutable fact, even as something one does not need to form a personal opinion about. Many emphasized their rational, non-passionate relationship toward nuclear energy:

'. . . I have never had an extreme opinion...I see it as a rational way to produce energy and such, but I'm not the kind of person to go on the barricades, neither for nor against. Very neutral' (Respondent 3, Fennovoima employee).

'I have always had a neutral relationship to it so that I have never had any passion to one or the other direction . . . starting point being that it is responsible activity and safe all the way...one cannot play around with it nor make compromises' (Respondent 17, ex-ministry representative).

Research has determined that in international comparisons, it is typical for the Finnish people to have higher trust in the institutions of science and technology and to harbor minimal opposition toward nuclear energy [43-45]. This entails a high degree of trust in the ethical behavior of nuclear experts, in the institutions involved, in technology, and in the engineering profession [1, 2, 46]. A worldview based on the natural sciences is often believed to represent an all-encompassing truth, applicable to all sectors of society, and any ideology related to it is often not recognized. Argumentation using other value judgments appears illegitimate in this context [8]. This rationale was evident in many of the interviews.

'Well, it is like this, political reasoning. First, they decide [politicians], and then they figure out some good justification. This I would say as an engineer because political decision-making is not based on being able to count the causes and effects . . . but it is based on what they want and what they believe they can accomplish. In other words, it is based on images' (Respondent 6, ex-Fennovoima representative).

Natural and technical science and its research results have been a strong point in Finnish nuclear lobbying since at least the start of the 21st Century [2]. This has led to the use of scientific research as a pawn to promote one's interests by politicians, civil servants, companies, and different interest organizations [10, 11]. The tactical use of research in political debate can include converting conflicts and argumentation from political to technical - resulting in only those with technical expertise being able to participate in the discussion about societal problematics [47]. A discussion regarding values appears to have been absent in the Fennovoima debate as well:

'I believe these questions did not really come up in the public hearings organized in the potential nuclear site locations - or it never really rose up to that level . . . there were some arguments against nuclear that were clearly from environmental NGOs or nuclear opponents, but these were never really discussed openly in a value-based debate' (Respondent 6, ex-Fennovoima representative).

Any commentary that deviated from the technical and economic appeared to be meaningless and irrelevant:

'I understand, of course, that this is a field-day subject for the media, especially in Finland, but that's not necessarily how it's seen here on the inside. It just stirs up, not redundant debate but

stuff that's not technically and economically relevant to this project, it isn't really meaningful' (Respondent 5, Fennovoima representative).

The phenomenon of depoliticization has surfaced repeatedly in recent research [3, 5]. Ylönen et al. [3] define it as 'scientization, technicization, economization and legalization of issues', often resulting in transferring the discussion from the public sphere to circumscribed expert circles.

5.2 Trust in Honesty and High Integrity in Matters of Safety

Discussions of the nuclear village phenomenon with Finnish public sector regulators suggested that they felt that the same phenomenon was recognizable but not a problem as long as people maintained their integrity. What was deemed important was that people within the community could be trusted, rather than any overly controlling system, as in post-Fukushima Japan. Trust referred to people's judgment and honesty, even in situations where there was no one providing oversight or no strict control mechanisms in place:

' . . . we once had a reporter here from Le Monde after Fukushima, and she asked, it's now been established that Japan is a nuclear village, and our France is a nuclear village, so is Finland a special case and I said this [the situation in Finland] is worse than a nuclear village. And that means that when everyone knows everyone else, they've studied at the same place and all that, and the same people are doing these jobs, then either you have to have the same systems that they have in Japan now that you don't move from one place to another [across the energy sector] . . . you know it has gone completely mad there. . . . you won't make it in this job if you don't have high moral standards.---they speak of a safety culture, that means that if you go somewhere, say, to the power plant . . . or you're doing paperwork and you see something that's not right, and you'll get into trouble if you fix it, but no one will notice whether you do it or don't, and you still do it, so you create that small inconvenience for yourself. That's safety culture [fixing things even if no one asks you to and might even react negatively], real safety culture if you want a simple system' (Respondent 2, ministry representative).

' . . . and then trust, honesty that among ourselves we have these values of trust and honesty, I'd say in Finland, but then do we know how to work with other cultures based on these assumptions' (Respondent 1, STUK representative).

Another indication of the sense of mutual trust that exists among Finnish people that came up in the interviews was that issues are not necessarily discussed at great length. Instead, people trust that everyone will intuitively agree or understand the true state of affairs. The regulator's representative contends that this is precisely the challenge for Finnish people: discussions only start once the decisions have been made, rather than discussing beforehand what the potential consequences of the decisions could be.

'Fukushima prompted discussion about the impact of national culture, safety culture. It's funny how it's such a sensitive subject internationally. We at STUK have tried to push it in international working groups that this is something we should be talking about. It's nothing negative. . . . Like just off the cuff, knowing that Finnish people make decisions very quickly and then off they go, rather than perhaps looking at the bigger picture so . . . Q: So, what are the Finnish challenges in this

respect? A: I think it's precisely that, making decisions very quickly. We don't tend to engage in much debate before arriving at a decision. Often the discussion only gets underway once the decision has been made, and then people start grumbling. So, the rapid decision-making and then just go straight to implementation and that perhaps, you know, give a bit more thought to assessing in hindsight whether this was a wise thing to do' (Respondent 1, STUK representative).

In a Nuclear Energy Agency NEA Country-Specific Safety Culture report [46], challenges of the Finnish culture for nuclear safety are acknowledged by the nuclear community itself, namely the strong trust in individuals, experts, and organizations and the tendency to avoid conflicts. It is concluded that these features may lead to a lack of a healthy, questioning attitude and less vigilance among individuals or within an organization as a whole.

Research on the nuclear sector in Europe (for example, nuclear waste management in Finland, Sweden, and France) has identified an inner circle of experts who have built strong ties over time and who share professional values and principles. These experts have established a strong culture of trust among themselves, and this often extends to citizens, who regard the experts as competent and progressive [2, 5, 48]. Some posit that strong bonding within communities can also breed self-sufficiency and complacency, exclude alternative perspectives and actor groups, and ultimately undermine citizens' trust in institutions [49].

5.3 Economics Comes First: Nuclear Energy is Cheap and Profitable

Another component of the belief system around nuclear energy and the promotion of the new power plant was the notion that nuclear energy is an economically beneficial means to produce energy. This belief relates to a deeper conviction that any economic benefits override all other concerns or values. However, in the wake of the economic recession that started in 2008, prior projections of strong energy demand and higher electricity prices gave way to downward forecasts: the costs of electricity produced by the new power plant suddenly began to appear steep. Furthermore, the final bids submitted by the plant suppliers were higher than anticipated. In 2013 the energy company E.ON sold all its ownerships in Finland. This happened after Fukushima and Germany's announcement that it would be abandoning nuclear power in its national energy policy. It has been suggested that these two matters were connected, but E.ON's ownerships in Finland were controlled by the company's Swedish branch. It is difficult to decipher what the ultimate reason was - perhaps there were many - but it also became clear from the interviews that the Swedish operators were losing trust in the Finnish owners and their ability to pull off the project. Financial reasons certainly came into play: it was becoming increasingly clear that the project would not turn a profit and possibly not even break even. These events led several Finnish companies and local, municipally-owned electricity utilities to decide to abandon the project. The public mood toward Fennovoima was also turning sour. Politicians and the ministry in charge of nuclear power were also beginning to identify problems in the project. Without a supplier and a credible ownership base, the project would never get off the ground. A former representative from a company with a large stake in Fennovoima noted that the blame was being deflected to the management, not the actual market situation:

'The founder-members or domestic owners were all hugely unanimous and excited as well as E.ON. I mean, there was a really strong shared view behind this project. And the trust, it remained

strong within the group, really strong until they got the bad news that the bids from Areva and Toshiba were financially unsustainable. It was at this point that the cracks began to appear. And then the hunt for scapegoats in management, or you know that market prices had collapsed, and it was like, there was huge pressure within the system. . . . these domestic, regional energy companies were really keen to get a new CEO installed. They thought it was the CEO's fault that the bids received were so crappy . . . which in practice led to a lack of trust . . . they set out to find mistakes. . . . my interpretation is that this was all just a general sense of disillusion that bloody hell, this wasn't as lucrative a business as it originally seemed. But that's just my interpretation. It's quite possible that they see this. I'm sure they do see this differently themselves' (Respondent 19, former representative of a Fennovoima owner).

When adhering to a given direction, this was a course of action that could be pursued: find those who could somehow be held accountable and lay them off, thus, outsourcing the problem. It resembles the Fukushima case and how things were handled in connection with the accident and its aftermath: identifying those who could be blamed and attributing the consequences to their action instead of looking at the larger context [37]. In Fennovoima, the company's current representatives decided that trust toward the management had been lost, and the natural solution was to hire new people, not to consider whether the economic viability of the project had been undermined:

' . . . when something happens, then everyone gets together to try and figure out ways forward. And then of course just as in other companies if there's a lack of trust between the owner and the company, then usually there'll be changes in the company, which means that new people are brought in which is exactly what we've done here' (Respondent 5, Fennovoima representative).

Many interviewees also referred to difficulties in information sharing, open communication, and questioning more generally. These all point to a social practice that is restrictive and rigid and that does not allow for contestation of differing views - signs of a doxa-type belief system:

' . . . they are things that are known about, but that can't be said out loud . . . it's considered bad form. Then, of course, there's always someone in every organization who feels they're in such a strong position that they can afford to say it' (Interviewee 6, former Fennovoima representative).

During the Fennovoima process, the climate of opinion began to shift against the company because it was presumed that projections of electricity demand were exaggerated. Representatives of other energy companies, viewing the situation from the outside, shared different perspectives regarding the viability of the new plant:

' . . . at this point, it had, in fact, been pretty tough going for quite some while, and it was very unclear whether we really needed all this extra electricity in Finland like a whole nuclear power plant's worth after Olkiluoto 3. And I don't completely understand, or know this, in my opinion there would have been perfectly sound reasons to ditch this thing then and there, but there wasn't the willingness to do that' (Respondent 25, Fortum representative).

'Somehow this principle that you can get electricity for your own use at a cheaper rate, . . . in some circles it's like a fact that has not yet been redressed. . . . now that the markets are what they

are and there's electricity in the market, I mean calculating profitability into the future that's pretty imaginary stuff, you know the profitability of a long-term project if it's completed by what [was it now], 2024, and of course, it won't come in on schedule. So, I mean it's, there are positions that people have adopted, a certain position that they don't want to change. Many people don't want to admit they've made a mistake, or then they don't want to change their opinion. So, I'm sure all of this is part of a kind of Finnish determination never to give in' (Respondent 18, TVO representative).

The economic equation of constructing a nuclear power plant and producing energy is far from straightforward. It is noteworthy that, as a general rule, nuclear companies have limited liability for damages in the event of an accident. The costs of decommissioning nuclear power plants can be extremely high, and building costs can far exceed budgets, especially under today's rigorous safety and security standards. Around the world, nuclear power plants have been shut down, as other forms of energy have become cheaper. The safety question relates directly to money: higher safety requirements translate into higher nuclear construction costs. Where is the threshold for profitability, and at what point may safety be compromised to ensure that building a power plant is still financially viable?

' . . . there's only one direction, and that's toward better safety, to always demanding a bit more, but right now we're at a very sensitive moment because we don't necessarily have the money to do that. So are we strangling nuclear energy to death? Perhaps that might happen; if we do that, then it didn't make it [nuclear as an energy solution]. So this shouldn't be the be-all and end-all' (Respondent 2, ministry representative).

Laihonen suggests that a certain 'obstinacy' of Finnish politics has led politicians to break the promise that the state will not become involved in nuclear projects during times of economic hardship [41]. Fennovoima was initially intended as a private industry project until the state-owned energy company Fortum joined it[4]. It remained afloat despite mounting financial difficulties, but the company's owners would not have managed to drive it forward without external help. They needed the government to become involved. The necessary institutional and economic support was eventually found, as Fortum became involved, and the Russian state nuclear agency Rosatom was announced as the new supplier of the Fennovoima nuclear power plant, with a 34% share of the company.

5.4 Integrity as Independence: The Geopolitical Twist

In summer 2013, Rosatom had made a public bid to construct the Fennovoima power plant. Rosatom's spokesperson was former Director-General of the Finnish Radiation Safety Authority STUK Jukka Laaksonen, who had joined Rosatom in early 2012. In the autumn, Rosatom had expressed an interest in investing in Fennovoima, taking the place of E.ON [41][5]. This spurred a

[4] Fortum had set a condition for its involvement in Fennovoima; to strike a deal with Gazprom on Karelian hydro power. The new Finnish Minister of Economic Affairs and Employment at the time, Olli Rehn, travelled to Moscow in the summer of 2015 to discuss co-operation with the Russian state agencies Rosatom and Gazprom.

[5] The initiative to probe potential Russian interest came from Fennovoima's Finnish owners, who were determined to get the project off the ground, stated by respondent 12, a Fennovoima representative.

contentious debate in Finland about national and EU ownership and the Russian share of the nuclear facility, prompting calls for a new DiP or a supplement to the existing DiP because of changes in both the type of reactor and the ownership structure. The required threshold for a favorable decision was 60% EU ownership; reaching this proved to be a major challenge for Fennovoima, and its owners ultimately turned to a Croatian company, which was later revealed to be a Russian-funded front organization. This chain of events sparked a political scandal in the summer of 2015. With a credible two-thirds ownership basis seemingly out of reach, the Ministry of Economic Affairs and Employment was already expecting the project to fall through; it seemed unlikely that a new or supplementary DiP would be granted. In the end, the ministry mustered the political will to execute the project, and the company was given more time to find new EU investors. In August 2015, Fortum announced its decision to purchase a small ownership share and join the project. The construction company SRV also joined in, and the metal company Outokumpu increased its share [6]. A supplemented DiP was passed in Parliament (the legality of which was heavily debated) to eventually grant the construction permit.

Regulatory capture, as stated, refers to a situation in which regulators of an industry defer to the wishes and advance the agenda of the industry that they regulate [35]. Nuclear building decisions are such massive societal decisions that they are committed to by not only those performing the building but also the public regulators and the political machinery. According to some respondents, the belief in this commitment among officials was so intense that the company presumed it could bend the rules a little bit:

'somehow they [Fennovoima] imagined Fennovoima was so important to Finland . . . "they" is a bit of a strong generalization, but part of the decision-makers in the owner companies thought that Fennovoima was so important to Finland that even if Vapaavuori [the Minister in charge at the time] and the government had said that it has to be 60%, [at] the end of June [20]15, they thought . . . .well in the words of Elina Engman [Fennovoima's CEO at the time], that "approximately 60% will be enough"' (Respondent 8, Fennovoima employee).

The Russian state agency's involvement added a completely new, foreign policy dimension to the project. This relates to the core belief centered on integrity, which implies that the Finns are incorruptible, independent in their decision-making, and not susceptible to external influence or pressure. However, one of the original core arguments of the Fennovoima project was energy independence, especially from Russian energy sources. The technology used changed considerably as the reactor type changed, and having a substantial financial investment from Russia also created other ties[7]. Those civil activists who were opposed to the project were shocked as they felt that the argument of self-sufficiency and independence and the foundation of the whole setup were an exchangeable value after all - subordinate to other objectives:

' . . . what happened was there was some hope that okay, people won't be accepting it anyway and decision-makers won't be able to accept it either because all the arguments up until then had been precisely that we'll see the end of this Russian energy and energy supplier, and in general see

[6] Fortum came along even after the hydropower deal with Gazprom failed, as Fortum's investments in Siberia were being jeopardized. This came out in several interviews but is beyond the scope of this paper.

[7] It came out in the interview with respondent 2, a ministry representative, that the Russian counterpart brought 4 billion euros loan money into the project.

the end of that energy policy. So yes, for a short while, it was like a glimmer of hope that this will be a game-changer. That now it can't go ahead. But the shock and the fear set in when it was realized how quickly things turned around. Like "they're so excellent in the energy business these Russians" and "this is a good partner," and everything. So perhaps it was a bit of a shock to see how these things can turn around' (Respondent 9, NGO representative).

Concerns about nuclear safety also give rise to questions regarding integrity and independence: what will ultimately guarantee continued adherence to these principles through to the very end - especially if the other option is to endlessly postpone the granting of the plant building permission if security and security documentation are not up to scratch? Work to build a nuclear power plant will not be given the go-ahead until the main contractor has provided detailed documentation of every aspect of the project, demonstrating full compliance with all safety regulations. Since the construction process will also involve new foreign contractors from outside of Finland - the belief being that all Finnish partners will be assumed to be fully reliable - questions will need to be asked regarding these foreign partners' position concerning safety requirements. In the words of a former minister:

'For me, the biggest concern still remains what I did make clear to the Russians several times, that the French [Areva building the TVO reactor] underestimated the Finnish authorities' insistence that we will not allow anything else here than the world's . . . safest nuclear power plant. So, I mean, I hope the Russians understand this. And I'm not sure they do' (Respondent 24, politician, former minister).

That part of the belief system that underscores independence and integrity is severely put to the test in the context of Fennovoima working with Rosatom. It might even be suggested that a small country such as Finland, with Russia as its neighbor, has a historical economic dependence on Russia and continues to remain dependent. It is possible that the Rosatom, operating under a highly different political system and decision-making structure, believes there is always room for negotiation and even some flexibility to keep things moving forward, as testified to by a regulator's representative:

'Nobody's contacted me directly. Of course, we - I mean the CEO has openly admitted that there have been a couple of official letters from Russia, directly addressed to the CEO that the only question is how they can support the work of STUK to ensure this project continues to move forward. [laughter] To which we've very diplomatically and politely pointed out that we're evaluating this project against Finnish standards and that we cannot have direct discussions with Russian partners, that Fennovoima must be involved in these discussions, this sort of thing' (Respondent 1, STUK representative).

6. Conclusions

In this paper, the narrative surrounding a Finnish nuclear power plant decision has been analyzed by interviewing 25 professionals, mostly top-level, connected with the Fennovoima project. Certain core beliefs, here called 'doxa', were identified, as the respondents identified the non-negotiable or accepted ideas and values in connection with advancing the project. It was found that believing in

the infallibility of technology and science and the economic benefits of nuclear power represented the material sides of the narrative, whereas human integrity and its twin components of honesty and independence represented the immaterial values and ideas. These ideas, as well as the nuclear energy community supporting them, resemble their Japanese equivalent.

In Finnish culture, economic growth and material welfare have often been regarded as the ultimate guarantors of safety and security. The economic concern relates closely to security concerns: it is not possible to achieve self-sufficiency without sufficient economic leverage. Furthermore, Finland values a pragmatic engineering culture, particularly in the energy sector. Argumentation deriving from other values is not considered convincing, as the worldview originating from natural sciences appears to represent the truth, one that applies across sectors and societal questions. Nuclear power represents a rational and economical solution, and at the point when it does not do so anymore, even in the shorter term, it is highly difficult to deconstruct this doxa, as it would result in major consequences in energy and industrial policy as well as the balance of power in society. Even those who have identified that the parameters of the project are no longer valid, base their judgment on the fact that the technical and economic equation of Fennovoima does not work. However, there appears to be a lack of balance between the elements of this narrative: It lacks openness and has become rather narrow and constrained. In his nuclear policy studies, Lammi has observed that nuclear power epitomizes Western faith in technology, which holds that humans can, by means of technology, harness nature to their purposes and resolve any problems that are confronted along the way. Nuclear power has been regarded as an ideal energy source because it is massive, limitless, and always available, allowing humans to break away from nature's unpredictable and restrictive rhythm of production [26].

In the past, Finnish nuclear projects have been abandoned not only due to financial reasons but also because of nuclear accidents. This brings us to the third component of the doxa, which is, firstly, the belief in honesty and incorruptibility. Here, it must be stated that the moral high ground assumption that one's actions always promote the common good, and that this feature is somehow shared among everyone in the nuclear industry, is liable to cause moral and other catastrophes. There will always remain the human element in the nuclear safety equation, and even if people have excellent training and qualifications and presumably high morals, if the official regulations and ethical standards are not always adhered to or sufficiently high, this will result in problems at some point. This is also connected to the phenomenon of regulatory capture. As the regulators, industry representatives, and politicians (possibly also media and academia) are in close contact, this can result in myopia, corruptive relations, and insufficient control. Trust is an essential part of any human activity, but it must be backed up by appropriate control structures and an open atmosphere for discussion and involvement.

The role of national security and geopolitics has been historically important in Finnish (nuclear) energy policy. As the Fennovoima project shifted from an EU project regarded as a step toward independent energy production, back to the dependence on Russian energy (especially regarding technology and financing), which had been deemed as a situation to get away from, this seemed to pose no problem for those representing or supporting Fennovoima. There remained a strong belief in being independent in terms of nuclear policy and energy decisions. This independence was often justified on technological and economic grounds. The question of independence, in a foreign policy context, is, however, very interesting: does independence truly materialize, or is it merely a fixed and immutable belief? At what point does dependence become harmful, and at what point will it

begin to compromise decision-making? And is it possible for a small country to maintain separation, at the state level, between the economic and the political, or foreign policy spheres? It is important to recognize that the owners of Fennovoima chose to seek out the Russian partner, making a conscious choice. After committing to the deal, backing away again has become difficult for the private owners as well as the state. This is the point where geopolitics comes in, bringing with it serious questions of independence and sovereignty, which are especially emphasized in the current situation (as of February 2022), where sanctions are being imposed on Russia because of the situation in Ukraine.

Overall, the larger questions remain: what makes a doxa type of narrative or argumentation sustain and not be contested more widely, and what makes it define the direction of nuclear policy and, in the larger context, energy policy? The decision to hold on to the Fennovoima project was made and adhered to not only by the major owners of the company but also by the politicians and the public administration, even if they showed some reservations along the way. One can offer some thoughts on why this was. Firstly, more general socio-cultural explanations can be offered. Path dependency and cultural inertia, along with a rather fixed idea about the structure of the Finnish economy and power relations, can be viewed as one possible explanation. Once a certain direction - such as building nuclear power plants - has been taken, it is very difficult to change, as major (financial) sacrifices have already been made. Secondly, even if one believes that one is independent in making policy decisions and has a high degree of integrity, it is still very difficult to withdraw from a contract made with a powerful neighbor such as Russia. And here, it is obvious that the arrangement was sealed at the highest political level as the other counterpart is Rosatom, charged with enacting Russia's nuclear energy business. In addition, for those Finnish companies formerly left out of the lucrative nuclear business, it is surely a sore spot to abandon the idea of the economic and power-political benefits brought in by this project. Maybe it is also difficult to simply admit to making the wrong decision.

All of this also has implications for the wider energy policy field in Finland. It would be highly difficult to identify new and alternative solutions to providing energy in society if many of the parameters in the equation are fixed and rigid by nature. This can also be related to the rather weak civic vigilance and the absence of broad-based, legitimate counter-expertise, as demonstrated by research in Finnish nuclear waste management. In addition, the absence of significant nuclear incidents, relatively weak trust in the competence of NGOs, especially in energy policy, the steadily advancing spent fuel repository project, and the exceptionally strong trust in the nuclear safety authority undoubtedly play a role here [5].

It is the nature of politics and human social activity that one must be able to imagine events before they can become material; however, this is hindered if society decides to adhere perpetually to a chosen plan. An example of this is the current drive for small-scale nuclear plants in Finland, which do not resolve the core problems related to using nuclear energy. At the same time, the Fennovoima plant is still awaiting either final approval -or its death knell. Time will tell whether the Fennovoima case will also have a more general effect on the direction of energy policy.

Author Contributions

The author did all the research work of this study.

Competing Interests

The author has declared that no competing interests exist.

Additional Materials

1. Appendix 1: List of Interviewees
2. Interview Structure: Fennovoima Nuclear Plant Project

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