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Energy futures reimagined: the global energy transition and dependence on Russian energy as issues in the sociotechnical imaginaries of energy security in Finland

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ABSTRACT

European countries are facing a dual challenge in 2022 with regard to how to reimagine energy security after cutting ties to Russian energy, but without undermining the imperative for a continent-wide energy transition. In this article, a sociotechnical imaginaries framework is utilised to capture the broader sociotechnical dynamics beyond the typical connotation of energy security through supply-side economics. This is implemented by situating discursive struggles over the framing of the global energy transition and energy dependence on Russia vis-à-vis predominant visions of energy security in Finland. By utilising argumentative discourse analysis based on interview and documentary data focusing on debates in Finland during 2015–2019, the article uncovers predominant sociotechnical imaginaries connected to energy security and discursive struggles over potentially reframing them. The identified tensions focused on 1) how future energy security should be governed, 2) whether Russia is a threat or reliable trading partner and supplier of energy, and 3) how to approach the energy transition in relation to energy security. While the focus is on controversies, the analysis also identifies increasing coherence in attaining both security and sustainability goals. There are attempts to imagine energy futures in a more sociotechnical fashion that would capture the societal dynamics more broadly. The predominant ways of imagining societal development coproduced with energy technologies tend to be constrained by techno-economic rationality. Up to the early months of 2022, this typically undermined societal and political risks in favour of interdependence and market-driven liberalism, also widely shared across the European Union.

1. Introduction

Energy is often characterised as the master resource and therefore an object of strategic concern and politics, but similarly an object of increasing commodification. Many uncertainties exist in contemporary energy governance, however, and hence it is replete with a multitude of policy proposals seeking to address how hoped-for futures could be achieved, or feared futures could be avoided. Energy transition is one of the key pressures increasingly challenging and restructuring the ways energy provision has been secured. The shift is not only technical but also societal, conceptual and political: policies, concepts and practices developed as a part of fossil fuel-driven energy systems need to be reconsidered in the low-carbon world [1–3]. However, we are not there

yet, as past lock-ins driven by fossil fuel dependencies delimit potential futures. The solutions to these uncertainties include numerous proposals that are shaped by sociotechnical imaginaries (STIs), future-oriented visions connected to technological advances and societal order. Visions based on centralised and technocratic socio-political orders tend to promote continuity and incremental shifts driven by techno-economic solutions, whereas the more “decentred” visions questioning dominant ways of knowing can disclose potentially more democratising, structural and socially just energy futures [4]. Stemming from science and technology studies and political theory, STIs connect energy provision to national identity, a state's position in international affairs, and technological development [5–8]. They also delimit the scope of possible and feasible solutions and perceptions of risk and uncertainty [7]. Visions

Abbreviations: EU, European Union; ES, Energy security; ET, Energy transition; IR, International relations; MEAE, Ministry of Economic Affairs and Employment of Finland; NESAs, National Emergency Supply Agency of Finland; NESOs, National Emergency Supply Organisation of Finland; NGOs, Non-governmental organisation; STI, Sociotechnical imaginary.

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are often constrained by the national context that determines their scope and content [6,9]. However, as energy systems and their value chains are increasingly global, visions on a national scale respond in varying depth to international developments [6].

In this article, I focus on energy security (ES), often referring to national security of supply concerns [10], which has been perceived to be relatively easily optimised and rather immutable in mainstream research and public policy. Wider social science scholarship, however, has seen it as being contingent upon a combination of historical, societal and geopolitical factors [8,11]. It can therefore duly be considered a sociotechnical imaginary consisting of a rather rigid institutionally stabilised, but nationally determined vision of possibilities and risks that societal order coproduced with energy technologies could entail. To evaluate its strength, I weigh it against two matters of concern – global energy transition and dependence on Russian energy – and how they are predominantly debated and imagined vis-à-vis ES. It is productive to assess the challenges of secure and sustainable energy futures through these issues for multiple reasons. Energy transition (ET) guided by renewability has progressed globally and is increasingly exerting pressure to reimagine ES [12,13]. Assessing how ET is approached in dominant ES imaginaries in turn portrays predominant forms of governance and the values to be protected or reconciled, as it entails a likely change to the current sociotechnical order. In turn, Russian agency and related dependencies have been more contingent in the concerns of European countries. Some countries, such as the Baltic states, have assertively and publicly stated to reduce their ties to Russia, while countries such as Germany have retained or even strengthened its dependence and questioned whether Russian energy entails any security issues or risks in general [14].

In this article, I use Finland, a prosperous Nordic country with strong diplomatic connections to Russia, as a case study. Energy policy in Finland has been characterised as top-down and consisting historically of a rather small and unitary elite driven by a technoeconomic ethos [15]. However, Finland is also often included in the list of European countries acting as forerunners in ET due to progress in decarbonisation and the intake of renewables [16]. At the same time, Finland has continued to stress good relations with its neighbouring country Russia, which has traditionally provided most of the oil, natural gas, coal, uranium and, to a lesser extent, electricity, and biomass. I look at the Finnish energy policy debate during 2015–2019 when a centre-right government¹ established the “Towards zero-carbon, clean and renewable energy by cost-efficiency” programme. The main policies included coal phase-out, the halving of domestic oil use, and increasing self-sufficiency to 55 % by 2030 [17], which were considered a significant shift compared to previous policy [15,18]. At the same time, regardless of sanctions imposed by the European Union (EU) on Russia due to the annexation of Crimea in Ukraine in 2014, Finland continued strengthening its ties to Russian energy value chains and its emphasis on Russian energy as merely an economic issue. Recent studies on Finnish energy policy have mainly focused on ET, concluding that carbon neutrality is a widely unifying vision where the differences lie in policy proposals [15,19]. This article expands on these studies by identifying how ES is predominantly imagined [20] and potentially discursively restructured as a result of broader sociotechnical developments.

The article contributes to the STIs literature on energy, and to the emerging research agenda of critical energy security studies aiming to broaden dominant policy-orientated inquiry [8], and to literature assessing the interplay between energy and national identity [5]. Empirically, I have conducted semi-structured interviews among a wide range of energy and security experts and collected public documents focusing on energy or security policy. The data has been analysed using

content analysis and with the help of argumentative discourse analysis with a focus on controversies underpinning storylines, which helps in accentuating the limits of STIs connected to ES [21].

The analysis highlights some of the key tensions of energy futures by comparing ET and Russia as issues of ES. The connections between these concerns are increasingly being addressed, albeit in a typically partial way [4]. Predominantly imagining ES as an issue of energy supply and generation adequacy enables narrowing down risks and their governance to a techno-economic focus. This framing tends to exclude societal and political uncertainties such as increasing evidence of the geopolitical and geoeconomic assertiveness of Russia. Whereas energy transition is increasingly taken into consideration and debated with broader policy proposals of electrification providing support for it, at the same time risky biofuels are continuously put forward as a key means of securing energy supply. The dominant STIs driven by technoeconomic solutionism and interdependence thus tend to neglect uncertainties in favour of economic growth and industrially driven societal progress.

The article is structured as follows. First, I outline conceptual nuances in the ES literature and how other energy governance concerns are connected to it. I then establish a framework for integrating discursive approaches to analyse struggles in attaining energy futures. This is followed by a description of the Finnish national context and the research design. The results section uncovers dominant and competing storylines driving sociotechnical imaginaries of ES in Finland. The discussion highlights the implications of energy for STIs, as well as the broader ES and ET literatures, and reflects on the events after the period analysed. Lastly, the study concludes with consideration of its relevance from a wider international perspective.

2. Background and conceptual framework

2.1. Situating energy security within concerns about energy futures

Energy security is defined in a multitude of ways in the research literature with no clear consensus, yet some dominant features exist [23]. In general, ES is connected to risk management, but it varies depending on the temporal scope, the system in question, or the national context [24–27]. As the complexities of energy systems and the types of risks have increased, the conceptualisation of ES has broadened [23] from the traditional connotation of the geopolitics of securing the oil supply [28] to issues such as increasing electrification and critical infrastructure protection [20], while the inclusion of other issues, such as the imperative to decarbonise energy provision, are a matter of debate [29,30].

Social scientific research on ES stems predominantly from International Relations (IR) and hence conceptualisations of ES tend to perform its knowledge-making [23,27]. A realist or strategic perspective frames ES through geopolitical rivalry, overt political or military influence by supplier countries with the direct issuance of threats and import dependence. This results in policies focusing on strategic autonomy and leading to discursive securitisation, namely framing issues as a matter of an existential threat, and beyond traditional politics [9]. A competing perspective to this approach draws on mainstream economics [31] and (neo)liberal institutionalist theory in IR, stressing interdependence, not conflict, as key elements of ES. It is thus based on policies of cooperation connecting with and developing international and integrated energy markets [31–33]. This perspective also has a depoliticising function as it focuses on the commodification of energy. The risk in this perspective is typically not geopolitical rivalry as in the realist approach, but rather price volatilities [27]. Studies assessing energy security or energy dependence in Europe often focus on European perspective towards Russia, especially in the context of natural gas [34]. European nations are often considered to be guided by a ‘liberal’ imagination [33], whereas Putin’s Russia, for example, is considered to exemplify a realist actor basing its agency on antagonism with the West and using energy as (geo)political leverage against the ethos of market efficiency [5]. The

¹ The government of Juha Sipilä consisted of only three political parties: the Centre Party (centre), the National Coalition Party (centre-right), and the True Finns (populist right).

struggle between these approaches is therefore whether global energy policy is “zero-sum, securitised and conflictual; or positive-sum, non-securitised and cooperative” [27].

These approaches tend to neglect the sociotechnical context of national politics such as distinct materialities of energy forms [27,35] or the wider socio-cultural dynamics [8]. A range of alternatives have sought to uncover the limitations of the dominant framings. The geo-economic approach questions the rationale of liberalism whereby markets pacify and depoliticise energy. Rather, it takes a strategic perspective, but considers the use of markets for advancing political goals [36]. By also acknowledging that competing and multiple knowledge exists, it comes close to discursive and interpretative approaches drawing on IR theories of constructivism [14] and post-structuralism [26], but also the STIs literature [11]. These approaches [13,26,27,37,38] depart from the dominant goal-oriented, reductionist and objectivist framings by stressing the contingency and performativity of meanings, namely that the framing duly makes visible certain elements of the policy issue [31,39]. For example, Bridge [37] notes that favouring the nation-state perspective in dominant ES framings tends to reproduce a consumption-driven national imaginary flattening inequalities to energy access within countries by undermining human security in favour of national security. This reproduces the policy focus of the dominant sociotechnical order as ES entails strong institutionalisation due to its basis in dominant energy forms, the practices of incumbent actors, and economies of scale [10,38,40,41].

As ES typically focuses on single events impacting the current system, it tends to neglect discontinuities, namely long-term interlinked processes that broader technological or societal shifts could entail [42]. Energy transition (ET) is such a discontinuity, entailing at least a shift from one energy form to another, yet it is similarly fungible like ES [12,43–45]. For instance, Sovacool [43] identifies three typical ways that ET has been conceptualised. The first framing is that ET is about change in an energy system in terms of fuel, technology, or prime mover, namely a technological artefact converting energy to a useful service. The second framing broadens the change to include a shift in the relations between suppliers, distributors, and end users, but also institutional change in regulation, conversion and trade, or structural change in service delivery. The third framing considers transition to be like a transformation or revolution, requiring a radical or disruptive shift across society (see also [3]).

Social scientific studies typically fall between the second and third framing and often build on the sustainability transitions literature [40], which portrays ET as a normative promotion of sustainability in the energy system with the increasing use of renewable energy and the weakening of non-sustainable regimes [2]. The incumbency of the current order may delay these transformations, as the required change may be proposed to be resolved with non-structural change through the inclusion of fossil fuels as a solution for climate change mitigation, such as natural gas as a “bridge” [38,46], or through a techno-economic focus on the uptake of renewables and market development while neglecting broader societal repercussions. In terms of scale, the focus has typically been national and hence global patterns and competition between states and their different roles have gained less attention [47].

Detailed comparisons between ET and ES have thus far been a rare concern in socio-technical transitions research, with the exception of Kivimaa and Sivonen, who compared the interplay between energy transition and national security in Norway, Estonia and Finland and

noted a weak coherence between the two spheres [48]. Due to issues such as electrification, the intake of renewables and the changing global security and geopolitical environment, there is increasing research aiming to integrate these two concerns [12,42,48]. A typical way of attaining these two policy goals has been centred around the goal-driven energy trilemma that adds competitiveness or economic growth as a third axis.² This framing tends to be used for narrowing down issues and typically reinforces dominant energy visions [50]. For example, in their study on UK energy STIs, Longhurst and Chilvers [4] noted that the trilemma was utilised by incumbent actors favouring neoliberal models of economic growth and progress, and for resolving issues in techno-economic terms, whereas civil society stressed a broader socio-technical transformation that included a wider range of issues and alternative economic models. Although increasing efforts have been made to further the dialogue between these literatures, the debate between ES and ET is largely between policy-oriented strands, such as what constitutes the security features of the low-carbon world. As Stirling [51] notes, there is inherent tension between these logics: from the security perspective, strengthening the dominant socio-technical order is the main goal, whereas from the transition perspective, the ideal future is often the opposite: the disruption of unsustainable orders.

2.2. Uncovering discursive struggles over national energy futures with sociotechnical imaginaries

This article utilises the concept of sociotechnical imaginaries, as developed by Jasanoff and Kim [6,52], as a framework for assessing the institutionalisation and performativity of future-oriented visions of social life and order supported by science and technology, which, in turn, materialise into policies, practices and physical infrastructures. [11,19,52]. That is, technological visions are inseparable from the societal dynamics that Jasanoff refers to idiom of coproduction [53]. Energy visions can have utopian tendencies [54], yet they are typically constrained by techno-economic framings [11,54,55]. Studies utilising the framework have also noted that published visions such as scenarios are not objective projections describing possible pathways; rather, they also describe what the sociotechnical order ought to be [13,56]. Delina [57] highlights that STIs of energy typically materialise into visions of transformation or continuity. ES typically leans towards reactivity or conservatism regarding the future [58], where contingency planning is more typical, namely not structurally altering the current system, but preparing for risks [59].

The advantage of the STIs framework lies in enabling one to assess how framings of ES delimit certain questions or rationalities, and (de) legitimise the materialisation of specific energy forms and socio-political relations [3]. Imaginaries structure nationhood domestically by constructing a shared perception of belonging and attachment to the political community, and externally by establishing a view of the Other [6], thereby shaped similarly by visions of international affairs [5,38]. The STIs literature has typically comparatively studied national energy policies or the enacting of ET at various scales [4,19,60], while only a handful of studies have explicitly engaged with ES literature [8,11,31,38]. However, ES is particularly appropriate as an object of study as it is filled with descriptions of risk, a major differentiating feature of the sociotechnical imaginary [7]. The framework enables consideration similar to that in constructivist IR of the interplay between national and international [14], yet the key difference is the analytical

² The World Energy Council is a United Nations accredited non-governmental organisation. The organisation publishes annual reports for the Energy Trilemma Index, which frames ES as “a nation’s capacity to meet current and future energy demand reliably, withstand and bounce back swiftly from system shocks with minimal disruption to supplies”. In addition, ES contains three metrics: import dependence, diversity of electricity generation and energy storage, where, for instance, Finland is ranked second globally [49].

symmetry between the material and the normative [56]: advances in science and technology such as energy infrastructures are inscribed into the visions of what a good society should be.

The emerging research agenda on critical energy security studies is close to the ethos of STIs with focus on materiality and knowledge-making. Szulecki [38] and Kester [13] point out that ES or the speech act of securitising energy can be used to prevent change, such as ET, yet these discursive dynamics have been studied relatively little. Berling et al. [8] illustrate that national energy security is typically constructed against other countries, such as gaining independence from Russia in the case of Ukraine. Similarly, Finnish identity cannot be understood without the long tradition of forestry [61] the geographical location between the Arctic, the Scandinavian peninsula and the Baltic Sea, while belonging to the Nordic countries and Russia as the largest neighbouring country and key trading partner provide the geopolitical backdrop.

Rudek [62] notes that research on sociotechnical imaginaries typically assesses what imaginaries are and how their visibility influences public discourses on energy and on performing policies at distinct scales. Less attention has been paid to competition between dominant and marginal imaginaries or the processes of their mediation. As Longhurst and Chilvers [4] stress, debates on energy futures are not narrow single-issue controversies, but are interlinked with a broader set of issues. I pay attention here to these constitutional moments [3] to identify tensions in dominant STIs [63]. They are shaped by the degree of significance that actors attach to issues and the respective risks that structure proposals for governance [4].

Combining the STI framework with an analysis of storylines and the broader methodological toolkit of argumentative discourse analysis enables a more detailed analysis of tensions vis-à-vis the inclusion and exclusion of issues regarding an STI. Thus, instead of a structured comparison of visions of energy futures as in the study by Longhurst and Chilvers [4], in this article I focus on how dominant STIs could be potentially challenged or restructured through the inclusion of issues. For example, ES not only includes visions of how it should be governed, but is also shaped by constructions of nations supplying energy (whether they are reliable or not), or the forms of energy that are considered feasible and legitimate (which the global ET imperative reconstructs). These momentary framing struggles [21] help to identify differences and frictions between storylines that perform the political work of STIs [64]. With its focus on discursive strategies and coalition-building [64], the concept helps in investigating the political manifestations and contestations of STIs, thus enabling clarity on where an imaginary ends, which is a typical analytical challenge [65]. Previous research has provided a multitude of differentiating concepts for the identification of STIs [4,6,53]. Here, I identify STIs by firstly determining the storylines and typical protagonists advancing them. I then turn to an analysis of risks, be they technical or societal. This is followed by the identification of proposals for governance. Lastly, I consider the typical technologies in focus.

3. Research context and design

3.1. National context

As STIs are conditioned by the respective national context and view of international affairs, I outline here some of the characteristics of Finnish national energy governance and foreign and security policy. The Finnish energy supply is diverse, with wood fuels, hydropower, nuclear power, and oil providing the largest share in energy consumption. The share of renewable energy is relatively high due to hydropower and a significant proportion of biofuels resulting from a historically significant forest industry that is also one of the most significant lobby groups [67]. Yet the intake of “new” renewables – solar and wind power – only progressed in the 2010s, gaining pace towards the 2020s [18]. The industry in Finland is one of the most energy-intensive in Europe, with forest, chemical and metal industries generating 45 % of national energy

demand [18]. While in general energy import dependence has decreased [68,69], still roughly 34 % of Finland's energy consumption in 2021 was based on Russian energy, including oil, coal, natural gas, uranium, biofuels and imported electricity [68]. Nordic countries also play a significant role as they provide roughly two-thirds of imported electricity [69,70].

During the course of this development, the Finnish energy sector has encountered many shifts, and the governance of energy issues is considered to have been relatively stable and centred around a rather narrow set of actors and rationalities throughout the decades [18,71]. There is a tradition of consensus politics and corporatism, driven by a powerful and limited group of mainly industrial actors, lobbies and bureaucrats that Ruostetsaari [71], for one, characterises as an “energy elite”. This tendency has remained, while the policy culture is considered open, as interested actors are able to participate in policy processes [72], yet industrial and economic actors seem to have more power due to their informal networks [67,72]. Hence, imagination vis-à-vis energy futures tends to follow technoeconomic rationality [67,73,74], stressing “security of supply, affordable energy, an engineering ethic and the importance of economies of scale” [41]. These rationalities seem to connect with a broader shift towards neoliberalism, emphasising competitiveness, innovation and economic growth as the main basis of politics [74].

The Finnish model of security policy is conceptualised as comprehensive security [20,75–78], consisting of “critical infrastructure protection, vital societal functions, and societal security” [75]. Comprehensive security is divided into seven vital functions [59], of which “Economy, infrastructure and security of supply” are connected with energy concerns, namely critical infrastructure protection and energy supply chain management and procurement [20,76]. The form of governance is structured around public-private networks where participation is based on voluntarist measures [75].

At 1309 km, Finland has the sixth longest joint border with Russia, which arguably shapes the Finnish imagination of national security. However, Russia's role as a part of Finnish security policy and foreign policy is contradictory. It has been both an object of fear in the Finnish national imagination, and a potential friend [14]. Russia's annexation of Crimea in 2014 led to a more critical stance, and to the first set of sanctions by the EU, yet Finland continued to stress bilateral cooperation and sought to undermine the EU's position, as any cooling of relations was liable to harm trade [78]. There has therefore been a tendency to keep economic and security concerns separate, including energy provision [14].

Finland also has significant ties to Russia through state-owned energy companies. Utility company Fortum continuously expanded its presence in the Russian energy value chains up to Russia's war in Ukraine in 2022 [79]. Most notably, the company acquired 78 % ownership of German company Uniper in 2019, the second largest supplier of Russian natural gas in Europe and one of the owners of the now cancelled Nord Stream 2 pipeline [14]. Whereas, nuclear power company Fennovoima with a one-third ownership since 2015 and a ten-year nuclear fuel contract of Russian nuclear firm and state agency Rosatom had to cancel construction of its only power plant in 2022 due to sanctions [69,80]. In comparison, in 2016, Russian state-owned gas company Gazprom sold its one-fourth share of the Finnish gas utility Gasum, making it fully state-owned, while oil and biofuels company Neste sold its petroleum station business in Russia in 2019 due to a strategic shift to renewables.

3.2. Research design and data

The analysis was performed by conducting semi-structured elite interviews and documentary analysis consisting of public and private documents, including strategies, reports and commentaries focusing on Finnish energy policy. The data collection was narrowed down to the years 2014–2019 for two specific reasons. Nationally, during the centre-

right government of Juha Sipilä, 2015–2019 energy issues were increasingly debated in public and ET emerged as a policy concern [19,81], highlighted by a separate 100 % renewable energy system scenario as a part of the National Finnish Energy and Climate strategy [82]. At the EU level, however, energy policy shifted after the Russian annexation of Crimea in 2014 to avoid increasing dependence on Russian energy.

Relevant documents and interviewees were found via a literature review, institutional and stakeholder mapping³ [83], and snowballing. As ES overlaps with security policy [38], a handful of documents and interviews were chosen due to expertise on national security to maximise variation in relation to energy-specific topics. I conducted 28 semi-structured interviews with 32 informants in two phases: February–August 2017 and September 2017–January 2018 (See Table 1 and Appendix A for a more detailed listing). The focus was firstly on energy policy and energy trade in general, but also on more specific questions related to ES and ET in their broadest possible sense. In the second phase, I focused on the governance of energy supply, as it was the most emphasised understanding of ES. I chose actors either actively involved with the institutional arrangements of energy supply security or those focusing on ET or long-term anticipation, which helped to uncover the way that conceptual nuances in the energy sector are understood. Every informant received a one-page document describing the key themes and background information concerning the research project.⁴ Both phases were thematically flexible, allowing informants to freely discuss issues that they considered important. All the interviews were conducted in Finnish, for the most part on the respective interviewee's premises. Names and affiliations are anonymised due to politicised nature of the research topic.

The documentary data consists of 29 documents, including strategies and scenarios of governmental bodies; policy programmes of political parties; reports, and shorter commentaries or position papers published by research organisations, consultancy firms, and energy companies that all have an imperative to shape energy policy (See Appendix B for a detailed list). Both security and sustainability aspects are typically discussed as a part of energy or climate policy documents, or in national security documents [76]. This is noted in the interview design: in the first phase, special attention was paid to *National Energy and Climate Strategy* [82], and in the second phase to *Security of Supply Scenarios and Decision on the Security of Supply*, both including the energy sector. In 2019, the government released the final version of the *National Integrated Energy and Climate Plan* [84], which is included in the analysis.

Table 1
Summary of interviews.

Type of organisation	Phase 1	Phase 2
Public organisations, including ministries and subsidiary organisations	3	–
Environmental non-governmental organisations	2	–
Energy companies owned by the state or municipality	4	1
Private companies	1	1
Industrial lobby, including energy and main industrial sectors	2	2
Political parties, including opposition and ruling parties	4	–
Consultants with expertise on energy	2	–
Non-fiction writers with expertise on energy	2	–
Research organisation	–	1
Investor	–	1
Total	22	6

³ The mapping of institutions and stakeholders was part of the work of the 'From Failand to Winland' consortium.

⁴ The document explained that ES in the 'From Failand to Winland' project is assessed from the perspective of three subprojects, including Energy Economics and Engineering; Energy Law; and Energy Policy.

Finnish energy and climate strategy has aligned both with European Union and domestic policy goals up to 2030, and with a further 80–95 % reduction in greenhouse gases up to 2050. The scenarios largely focus on domestic developments and the supply side of energy, while broader societal or geopolitical trends or activities of state-owned energy companies are not considered. The National Emergency Supply Agency (NESA) and the Ministry of Economic Affairs and Employment (MEAE) commissioned two relevant reports in 2017 and 2018 that discussed the interplay between security and transition: *Energy, Security of Supply and Geopolitical Transitions* and *Security of Supply in Energy Transition*,⁵ the latter of which I focus on in this paper.

The analysis followed analytical strategies presented by Gross et al. [85] and Tozer and Klenk [64], for example, using qualitative content analysis [86] for identifying storylines with the help of software, in this case Atlas.ti. This common method in discourse analysis [64] helps to avoid methodological ambiguity in the identification of storylines [87], and reduces and describes key content in large textual datasets [88]. Content analysis is often presented in a narrative form [88] and enables the grouping of shorter texts consisting of similar problematisations into a denser storyline, a concept stemming from argumentative discourse analysis [89]. The inductive analysis started with a close reading of data to find regularities and nuances, and was followed by the coding of sentences without setting pre-given categories. This was followed by dividing codes into themes that were used as the basis for shorter single-issue narratives and subsequently grouped into more generic storylines. The narrative can be understood in a multitude of ways, although I use it here in a fairly narrow sense as a context-dependent element consisting of problematisation that actors use to form broader storylines [74,90]. Storylines and typical actors associated with them were then identified with a focus on differences and controversies. In line with the STI framework, I paid particular attention to 1) how a given issue is constructed, 2) what kind of risks are attached to it, 3) how it is proposed to be governed, and 4) the typical technologies in focus [4,6,85]. As a single technology can itself include a wide variety of storylines [21], an exhaustive discursive description of the debate is beyond the scope of this article. Rather, storylines are analytical constructs for heuristic purposes and used for illustrating tensions, differences, and similarities between STIs [64,85]. They are, in this sense, interchangeable terms [85] referring to dominant or alternative ways of envisioning energy futures.

4. Results

The analysis is divided into two parts (See Table 2 for an overview). First, the predominant ways of imagining ES in the Finnish context are outlined (storylines D1 and C1). This is followed by an analysis of issues potentially shaping these imaginaries. Imagination concerning Russia forms the second framing struggle, while the third framing struggle focuses on reimagining ES in relation to global ET. In general, storylines D1–D3 could be considered part of the predominant STIs, as they connect discursively with techno-economic arguments driven by security of supply, while storylines C1–C3 provide critique or alternatives and are often less structured, “in the making” [50], and appear less frequently in the data.

4.1. Imagining governance of energy security

D1 with its stress on security of supply and market-driven interdependence forms the core of STIs of ES that other dominant storylines typically relate to (see Table 3). The direct translation of ES is rarely used, but is conceptualised instead with the duality of *energian huoltovarmuus*, namely ‘security of energy supply’ and *energian*

⁵ The latter was chosen for analysis as the author was involved in conducting the former.

Table 2

Summary of dominant and competing storylines connected to sociotechnical imaginaries of energy security in Finland among decision-making elites and experts, and documents addressing state-level energy or security policy.

Storyline	Protagonists	Risks	Governance	Technologies
Imagining governance of energy security				
[D1] Energy security is a matter of supply and adequacy	State actors responsible for energy issues, incumbent energy companies	Market volatility, Unpredictable energy policy, Infrastructural failures	Energy trilemma, Market-driven material and systemic preparedness, public-private partnerships	Current energy mix
[C1] Energy security should be reimagined	Actors focused on energy transition and electrification	Wide range of risks, Current governance temporally and spatially narrow and silo-driven	Current form of governance not sufficient for meeting future challenges and possibilities	Renewables, electricity interconnectors, electrification, smart grids
Imagining Russia as a part of energy security				
[D2] Russia is a reliable energy supplier	Incumbent actors associated with energy elite	No risks beyond typical supply-side economics	No additional measures for Russia are required	Alternatives exist for each energy form purchased from Russia
[C2] Russian energy is a general security threat	Academia, civil society, and security and foreign policy experts in general	Geoeconomic influence, Russian dependence on hydrocarbons	Actively reducing Russian influence and dependence and strengthening evaluation of geopolitical and national security risks	Natural gas (Nord Stream 2), nuclear power (Fennovoima)
Imagining energy transition as a part of energy security				
[D3] Energy transition poses a challenge for energy security measures	Incumbent energy companies	Fossil fuel phase-out, intermittency of wind and solar	Continuing to secure production of fossil fuels for security of supply reasons	Nuclear power, biomass, peat
[C3] Energy transition is a challenge, but it can be overcome with structural changes	Actors focused on energy transition and electrification	Climate change	Combining security and sustainability goals with systemic change	Small emergency supplies of fossil fuels could be retained for exceptional situations, but otherwise system based on low-carbon energy

Table 3

Framing struggles over energy security.

Dominant storyline	Typical narratives	Typical narratives	Competing storyline
[D1] Energy security refers to security of supply and generation adequacy	⇒ ⇐ Energy supply is secured with well-functioning energy markets, long-term energy policy attracting investments, diverse and efficient energy sources and reliable and distributed energy. Security of supply and generation adequacy are sufficient for assessing risks related to energy security	Silo-driven organisational structure not well-suited to adaptation of new risks. Structuring governance between oil and power pools is outdated. Too narrow a set of actors involved with energy security	[C1] Energy security refers to a wide range of uncertainties and is to be reconsidered

toimitusvarmuus, ‘energy generation adequacy’. Informants from state and business stressed that energy security as a concept is not typically utilised in Finland. The direct translation of ES only appears in the context of EU-level policy such as in the debates on EU-Russia relations regarding natural gas. When relating this issue to broader energy policy, it is typically considered an element of the energy trilemma, where both ET and ES are drivers of economic growth, as in the framing of the Energy Department of the Ministry of Economic Affairs and Employment (MEAE). The storyline emphasises market-driven and technocratic

forms of governance, securing the functioning of markets and infrastructures. Foreign policy and geopolitical aspects of energy are typically excluded, as security logic is concerned with short-term events such as blackouts or situations where the state functions under conditions of scarcity.

As the storyline is structured around official discourse, the included organisations can be straightforwardly identified as including MEAE, its subsidiary organisations implementing policies, NESO and the Energy Authority, and state-owned energy companies considered critical. This storyline largely connects with the praxis of security of supply in general such as preparedness exercises coordinated with a pool-type organisational structure by NESO. Oil and power pools consisting of key companies that are considered critical for supplying energy form the broader National Emergency Supply Organisation (NESO), based on voluntary participation. The key principle of NESO/NESO is continuity planning based on the principle of enabling actors considered critical to act in the case of an emergency, but also to protect business interests and value creation [91]. Energy generation adequacy is steered by the Energy Authority and relates to the electricity market, as well as the natural gas market from 2020 due to its liberalisation. It denotes measures that optimise energy supply in a very short time, from seconds to hours.

The scope has been broadened recently from storing fossil fuels to systemic preparedness, namely securing infrastructures, markets, and global supply chains. Due to dependence on marine logistics,⁶ the storyline could be captured with a spatially driven metaphor of being in isolation or ‘off the beaten track’. Self-sufficiency is often linked with ES, and the Energy and Climate Strategy [82] has a 55 % self-sufficiency goal. However, it is always mirrored against foreign trade and cost-effectiveness. Concerning the spatial scope, the energy policy documents mainly focus on domestic developments, whereas the security of supply documents look at domestic, regional, and global scales, and consider the geopolitical landscape in more detail.

In comparison, C1 is structured around a critique of the dominant

⁶ Roughly 90 % of Finnish import and export is transported via the Baltic Sea [92].

imaginary concerning ES and broader energy governance. There are hopes of broadening the spatial scope of anticipation, especially with regard to the Energy and Climate Strategy [82], but also the perceived silo-driven governance of ES and general security of supply. For example, a representative of a state-owned energy company (Phase 2, Interview 4) considered that a structure based on ministerial divides is ill-suited to multifarious risks such as climate change, while a representative from an industrial lobby noted that the division between oil and power pools in NESAs was outdated for keeping up with contemporary societal trends (Phase 2, Interview 1). The EU's energy market integration and ET are perceived to enable broadening cooperation beyond national borders and hence there is concern that Finland has an excessive focus on the domestic level and energy system optimisation. The traditional ES imaginary is considered to focus on energy-dependent sectors, whereas the new concern would be the livelihood of the energy sector itself, such as its profitability, but also its ability to attract new actors producing renewable energy, in particular wind power that has been possible to produce without state subsidies since 2018.

The last typical element in this storyline is the concern about the governance of security or strategic aspects of energy. As energy is such a wide-ranging issue, informants from an NGO questioned whether energy affairs should be under MEAE in the first place, and under the Prime Minister's Office instead, which could more comprehensively integrate various concerns connected to energy such as national security (Phase 1, Interview 7). Moreover, an industrial lobby noted that the list of representatives of NESAs largely consisted of incumbent companies, and could identify only one actor as an ET expert, thus pondering whether sufficient expertise exists to address the future energy challenges (Phase 2, Interview 5).

Some change has occurred in D1 as NESAs launched the *Energia 2030* (Energy 2030) programme in autumn 2019 to rethink the security of energy supply during ET [93] and duly encountered some of the narratives associated with the critiques in C1. The programme highlights that some future technological solutions such as wind power are already known, but there are contingencies regarding the specific pathways and timelines. Hence, some fossil fuels are to be held in reserve as emergency supplies until other technological solutions are available.

4.2. Imagining Russia as a part of energy security

The second framing struggle (see Table 4) focuses on the external

Table 4
Framing struggles over Russia as an issue of energy security.

Dominant storyline	Typical narratives	Typical narratives	Competing storyline
[D2] Russia is a reliable energy supplier	Purchase of Russian energy based only on short logistical distance and cheap price Russia could not enact any influence through energy that would not also harm itself It is difficult to identify what security risks related to Russia could be Russia not relevant as the focus on energy cooperation is with Europe and Nordic countries	⇒ ⇐ Russia charges different energy prices for EU countries to exert geoeconomic power Fossil fuel dependency of Russian society has security implications Due to import dependence of Russia, Finland should increase self-sufficiency	[C2] Russian energy is a general security threat

dimension of STIs through storylines connected to Russia, namely whether it should be understood as a threat or as a feasible trading partner. It is worth highlighting that Russia is not actively raised in public documents discussing energy, only documents focused on security in general consider its agency.

D2 is – in practice – based on the same underlying discursive logic as D1 and portrays Russian energy dependence as a manageable issue by stressing a market-liberal understanding of ES based on interdependence and cooperation [58]. In D2, the substantial share of Russian energy is viewed as a matter of economic efficiency. For example, a state official (Phase 1, Interview 15) noted that Russian Urals oil quality is more profitable to refine compared to Norwegian Brent quality, which is the main reason for utilising Russian oil. As plans are underway for alternative energy suppliers for every form of energy, and due to the fluidity of the energy markets [20], Russia does not pose a risk from a techno-economic perspective.

Most state actors and incumbent companies note that there are uncertainties in Russian societal development, but do not regard it as an issue with geopolitical or national security implications. This tends to follow liberal logic that it would be irrational to influence Finnish decision-making with overt measures such as direct threats and would harm Russia's reputation as an energy supplier. As the rationale here is that the markets provide security, geopolitical risks are typically excluded [35].

Another rationale for not considering Russia is that energy futures are largely imagined around Nordic or European cooperation, where electrification is a much more significant concern such as lack of sufficient transmission capacity. One of the informants from the business field noted that it would not make diplomatic sense to discuss the role of Russia, a country that is perceived to be one of the losers in the global ET, whereas there is a need to increase cooperation between Nordic countries (Phase 1, Interview 16). Although D2 tends to exclude geopolitical risks, the Armed Power Politics scenario in the Security of Supply Scenarios of NESAs [94], for example, notes energy dependence on Russia and the potential to use energy for strategic purposes.

C2 questions the feasibility of understanding Russian agency through a market-driven or liberal rationale but is unstructured due to its limited institutionalisation. It is utilised mainly by academics and organisations with security or foreign affairs expertise, civil society, and some politicians. This storyline is thus not connected to import dependence like D2, but to broader geopolitics or geoeconomics and national security. It expands the temporal scope to understanding energy as a long-term and emergent security issue in general, and questions the explanations of Russian agency being based on market-liberal reasoning, or that European countries could persuade Russia to align with European values by increasing economic interdependence. Concerning the imagining of international relations, C2 comes close to geoeconomic and discursive perspectives, with the reports of Finnish Institute of International Affairs aligning its arguments directly with geoeconomic literature, for example. Documents focusing on energy and informants basing their arguments on technical or economic knowledge rarely use this storyline.

C2 contains a varied description of risks connected to Russia in three distinct narratives. First, the techno-economic dependence on Russian oil, gas, coal, and uranium is used to legitimise increasing self-sufficiency. A typical example of the first narrative is the state-owned company Vapo, which has widely used the threat of Russian energy dependence as an argument to continue the production of peat [95]. Second, Russian-owned energy infrastructures are considered to increase geopolitical or foreign policy influence, such as the Nord Stream 2 natural gas pipeline in the Baltic Sea or the Fennovoima nuclear power plant under construction in Finland. Broadening energy and security relations beyond supply allows one to consider, for example, the security implications of Nord Stream natural gas pipelines with no physical connections to the Finnish energy system [69]. The debate on natural gas pricing connects with the geoeconomic reasoning, namely using

lower prices as a mechanism for exerting influence [36]. The third narrative concerns the security implications of Russia failing to enact ET, and stresses the general uncertainty of continued carbon lock-in and its impacts on Russia's societal and political development, which can have negative repercussions for its neighbouring countries such as Finland, as informants from an environmental NGO noted (Phase 1, Interview 7).

4.3. Imagining energy transition as a part of energy security

The last framing struggle (see Table 5) considers how energy security should be reimagined as a response to the global ET. The dominance of either of these storylines is unclear compared to the previously described storylines, as there is general uncertainty regarding the future with no clear discursive closure. A key differentiating feature in these storylines is whether the focus is on the security of the current system (D3) or the security of the new system (C3).

D3 is shared by some incumbent energy firms that have few or no alternatives to reorganise their main business, some state organisations not directly connected to energy policy, and conservative parties. As the governance of security is largely mapping uncertainties and preserving dominant values, the connection is discursively logical. D3 acknowledges the ongoing ET but focuses on the impacts and risks of the current system and favours incremental change. Therefore, technologies that are close to the materiality of the current energy regime are favoured. Wind and solar do not fit conveniently into this storyline, as they cannot guarantee security of supply in the same way. Biofuels in particular do fit into this storyline as there is, on the one hand, a large forest industry in Finland with a strong political lobby for generating waste to be used as energy [61], and which is close to the materiality of oil in that it can use partially the same infrastructures and supply chains [96]. Nuclear power can be considered in a similar way to biofuels. As a non-fiction author argued, nuclear power fits conveniently into the energy trilemma as it is low-carbon, secure and cost-efficient (Phase 1, Interview 1).

In this respect, Germany's ET – *Energiewende* – is also invoked at times in a negative fashion to stress nuclear phase-out, increased use of coal, and the intermittency of renewables (see also [97]), whereas Finland is considered to have managed well with ET due to its high share of biomass and nuclear power, which are not prone to the risk of intermittency. Improving the functioning of the energy market continues to be a common concern as there is a narrative that energy subsidies have disrupted it and made only wind power profitable. The framing of the relations between ES and climate change mitigation (where ET connects) is, however, contradictory. In the Security of Supply Goals Agreement, there is a sentence which ends with “unless securing supply requires the other means” [98]. As Hakala [76] notes, this tends to portray the evaluation and mitigation of climate change impacts as subordinate to the security of supply targets that will be prioritised if there is a conflict between the two.

In comparison, C3 views ET largely as a positive change, yet it does not question the challenges of reconciling these two concerns. In general, there is a view that the current system is not sustainable and new sociotechnical arrangements could provide improved security in the broader sense. The challenge of ET is acknowledged, and the normative goal of climate change mitigation is accepted. Multiple actors ranging from business to civil society and politics considered that not all of the renewables should be valued similarly. In particular support for biofuels is viewed excessive, whereas wind power lacks sufficient support, although it is viewed as a vital component of the new energy system. There is also variation in focus: business actors stress the use of market mechanisms for integrating security and sustainability into day-to-day practices, whereas civil society, some politicians and academia stress the benefits of being less reliant on fossil fuels, and the associated insecurities. One of the informants from academia highlighted the current framing of security as negative, namely as focusing on the avoidance of threats (Phase 2, Interview 2). Rather, a more positive, empowering security is proposed: from improved local livelihoods to more peaceful

geopolitics based on increased interdependence and an abundance of renewables.

As the storing of renewable energy is more challenging than fossil fuels, the question duly arises as to whether the same requirements for security are applicable for renewable energy producers. For example, wind power companies do not operate in the same way as traditional utilities, which were able to provide all three axes of the energy trilemma. Therefore, demanding security of supply guarantees from them is considered a step too far by some informants. Typical energy actors have previously been state- or city-owned near-monopoly utilities with generous resources to be used for energy security. The energy sector, however, is facing increasing concerns about market efficiency where resources are more challenging to find, and therefore energy security may be considered something of an extra effort. This is also connected to the question of responsibility. Previously, preparedness for risk has been the responsibility of the distributing company (Phase 1, Interview 5). ET is anticipated to develop a more distributed system and also enables citizens to share the responsibility for securing the energy supply in the more scattered actor landscape.

5. Discussion

This article reviews sociotechnical imaginaries connected to energy security in the Finnish national context between 2015 and 2019. The way in which Russia's energy agency and the global energy transition are addressed in storylines helps in illuminating the extent to which they can shape and align with the dominant imagination. Theoretically, and by means of comparison, the study outlines that the STIs are structured not only by how nations imagine themselves, but also by how imaginaries of other nations or specific sociotechnical progress are included in or excluded from those visions. Methodologically, analysing storylines as competing bundles of framing struggles helps to uncover the discursive content and controversial elements of potentially competing STIs. Empirically, the article accentuates the ways in which dominant technoeconomic knowledge shapes and incorporates issues and risks concerning energy futures in Finland. The analysed framing struggles were centred around relatively broad issues and thus their mediation portrays tensions between distinct worldviews. Documentary data relied on technocratic discourse and only a few of the documents explicitly assessed the role of Russia or ET in ES or broader energy governance. The following section discusses the key tensions of STIs and elaborates on the limitations of this study by briefly comparing the analysed period to Finnish energy policy responses to Russia's war on Ukraine in spring 2022.

5.1. Discursive tensions in imagining secure and sustainable energy futures

This section addresses the research questions, namely how energy security is predominantly imagined in Finland and how energy transition and Russian energy dependence are included or excluded as matters of concern for its governance. Briefly put, energy security is predominantly conceptualised as a supply and generation issue that tends to some extent to serve as a measure for depoliticising energy security to risks and uncertainties that can be made visible with calculative techniques. This framing, however, also has a practical function, as clear-cut boundaries are vital in organising action in emergency-related situations. It clearly seems that the epistemic knowledge of the more day-to-day preparedness practices, typically consisting of more short-term and technical uncertainties, proved to be able to connect involved actors. The desired energy futures were largely to be attained with technoeconomic measures, although there is an indication of increasing attention to socio-political aspects of energy governance such as increasing transparency and activating citizenship. Nationhood, however, continues to be imagined without consideration of the broader geopolitical connections of ET, while Russia is passively (not

Table 5
Framing struggles over energy transition as an issue of energy security.

Dominant storyline	Typical narratives	⇒	⇐	Typical narratives	Competing storyline
[D3] Sustainability and security may be irreconcilable at times	New and alternative technologies are a grave challenge for a traditional system focused on material storage Production of peat should be secured <i>Energiewende</i> is not a good example for energy transition or energy security Renewables should meet all three axes of the energy trilemma			Energy transition does not contradict energy security as it reduces fossil fuel dependence and increases self-sufficiency During energy transition, some specific arrangements may be needed, but in the longer term they should be abandoned so as not to harm markets Framing energy security through positive security could enable integrating it with energy transition	[C3] Reconciling security and sustainability with structural change

mentioning) and actively (framing Finnish-Russian relations through trade policy) excluded in dominant STIs of ES.

Analysing the agency of Finland in relation to energy proved to be challenging, as documents focusing on energy policy lacked descriptions of international affairs, but provided details of the internal dynamics, such as the role of prosumers. In particular, the Energy and Climate Strategy contained little consideration of relations to neighbouring countries and Finland's role in the global energy race [47], while security of supply scenarios [94] did contain such information, but the rare mentions of the latter in interviews and documents suggests that they are seldom utilised outside security of supply or the national security community. The understanding of foreign affairs in ES STIs typically followed liberal or economic perspectives, whereas other perspectives were much less common [31,33]. This is evident in the typical hopes of increasing cooperation with Nordic and Baltic countries, as there is significant cooperation based on the Nord Pool electricity market, and in foreign policy in general. It reveals some of the limits of the liberal framing guiding the predominant STIs and thus identification of risks as, for example, the failure of fossil-fuel-dependent Russia to enact ET and its possible societal and geopolitical repercussions tend to be beyond the scope of anticipation. Based on the analysis, the assessment of energy relations with Russia appears to be excluded from the dominant imaginaries anticipating Finnish energy futures, but it seems to apply to other uncertainties, as well as being discussed in the literature on the geopolitics of renewables, such as the role of critical materials needed in the energy transition [12].

Despite the critique of the technoeconomic ethos of the dominant ES imaginaries, there are increasing efforts to bolster convergence between ES and ET. Broad support for electrification and renewables, in particular wind power, are probably one of the key reasons. While ES is typically based on technologies one can trust and rely on in any situation, it is publicly acknowledged that energy security measures need to be constantly evaluated. The Energy 2030 programme launched by NESA in 2019 epitomises the increased intent to integrate ET as a part of energy security governance. After the analysed period, ES governance was reorganised into burning fuels, gas, electricity, and heat pools in 2021. A narrower set of actors continue to be involved compared to those in broader energy policy, namely public officials, energy companies and industrial lobbies [99].

5.2. Limitations and remarks on events after data collection

This article has some limitations regarding research design and methodology. First, due to the interpretative nature of the analysis, subjectivity cannot be completely avoided. The constructed storylines involve a high level of abstraction for analytical reasons and hence they do not necessarily apply to all the energy technologies that I have acknowledged when describing the storylines. This is also evident in the data as the discourses more typically focused on the technologies or energy forms, not on the phenomena or concepts they connect with. Second, I cannot claim that the identified STIs are shared by the broader public as the analysis focused on the views of experts and the decision-making elites crafting and aiming to influence state-level policies. Third, major shifts have occurred in Finnish energy and climate policy during

the analysed period, such as the emergence of new initiatives and actors [18], but also in wider international affairs and security [77], and hence this material provides limited detail on the discursive change due to its fairly short timeframe. As the identified storylines are likely to change, I elaborate below on some recent developments through the draft version of the Energy and Climate Strategy published on 14 April 2022 [100].⁷

The draft strategy [100] retains the dominant techno-economic narrative on Russia. It notes the political risk that has materialised, yet it repeats the dominant storyline of Russian energy as a non-issue by arguing that the only rationale for buying Russian energy was the competitive price and short logistical distance. The question remains, however, as to why such an assessment was not included in energy policy documents before, as Russia has provided a significant proportion of the Finnish energy supply. It holds true that in terms of *import dependence*, other suppliers exist. Therefore, the more urgent energy-related security risks are not connected with the energy supply per se, but rather with the Finnish energy companies, which were overlooked probably due to the focus on the state level in the strategy. For instance, state-owned company Fortum is at risk of losing billions of investments in Russia and Germany combined with the cancellation of the Nord Stream 2 pipeline through its ownership of Uniper.

The most significant differences compared to governmental strategic documents published during 2015–2019 are related to the assessment of the interplay between ES and ET, increasing attention to critical materials and cybersecurity, and – probably the most salient addition – the introduction of a ‘just transition’ as a concept. The renewal of the pool structure of NESO is discussed in more detail together with a more thorough analysis of the energy transition, while security of supply is viewed as a prerequisite for the success of ET. Consideration of sectors due to ET impacts on ES is also broadened: preparedness is increasingly connected to heat, sectoral integration, and new fuels. Security of supply measures did not exist for gas, as oil was used as a substitute in such outage situations, yet Finland and Estonia have now agreed on a joint generation adequacy agreement for natural gas, and joint purchase of LNG storage. Due to electrification, increasing attention is paid to the electricity grid and critical value chains. ES continues to be largely discussed in technoeconomic terms and its societal aspects are only occasionally referred to, while the geopolitical implications of ET go unnoticed. ET is rather split into two narratives. On the one hand, there is continuation of technoeconomic rationalism [74], while on the other hand a ‘just transition’ stresses fairness and justice across the population and globally. It is also proposed as a framework for political processes and for acceptance of climate and energy policies, including a more balanced representation of societal actors.

6. Conclusions

Based on the Finnish interview and documentary data, socio-technical imaginaries of energy security are increasingly accommodating broader societal shifts, yet there is significant variation in how uncertainties connected to these issues are approached. The central

⁷ The draft version is only available in Finnish.

claim of this article is that in the Finnish documents and interviews between 2015 and 2019, energy transition was increasingly addressed in relation to energy security, whereas geopolitical or national security risks concerning Russia were continuously undermined or considered manageable. I consider that this is due to the dominance of techno-economic knowledge, as evidenced in previous research [15,74], which tends to narrow down energy futures to market development concerns and technological progress, combined with a more traditional focus on preparedness for natural hazards to energy infrastructure. While it is clear that no one wants to suffer from electricity outages, this framing undermines societal and geopolitical uncertainties concerning both matters of concern in relation to ES – Russia and ET. Imagining international relations predominantly guided by a liberal ethos of interdependence and cooperation seems to have failed to anticipate warnings by security and foreign policy experts to take Russia's assertiveness and geoeconomic influence more seriously, to great detriment in 2022.

The identified tensions in the Finnish interview and documentary data underlying STIs of ES portray the predominance of supply-side economics-driven anticipation, while there is also interest among some actors in the energy elite to envision differently. Assessing energy security with a STIs framework enabled uncovering the ontological politics of energy futures and broader societal development. ET appears to be coproduced as renewability, albeit largely relying on biomass, a strategy that is frequently questioned in the interviews, while the deployment of wind power has progressed significantly faster than in governmental visions and without strong institutional support. The analysis has highlighted the relevance of analysing STIs not only by paying specific attention to context, but also with disciplinary reflexivity in connection to literatures on sustainability transitions and international relations. This went some way towards explaining why specific meanings of ET or ES are adopted and duly delimit the scope of feared or hoped-for futures and their institutionalisation and performances.

While the analysis comprises a single country case study, there are broader implications for policy and research, as Russia's war on Ukraine is forcing the EU and its member countries to reconsider their energy visions. A particular concern is how to combine the more urgent and short-term ES concerns when cutting ties to Russian value chains and the more long-term concerns of ET without creating new high-carbon lock-ins. This also points to the relevance of increasing attention to geopolitical or strategic concerns and the ability to openly debate them. The

article similarly highlights the relevance of increasing dialogue between actors operating across distinct energy policy spheres, but also further, such as national security and foreign policy. This could help in advancing the credibility and comprehensiveness of anticipating energy futures.

There is a wide range of possibilities for future research as the dynamics between sustainability and security are only just starting to unfold. The STI literature is beginning to engage with ES concerns, although there is significant potential for further dialogue with critical security studies or interpretative IR approaches, which could benefit from taking the technical and the normative into better account, and developing the already strong understanding of power from those perspectives. As ES is now at the point of being reimagined, STI literature could help to conceptualise the type of orders that may be created as a result of those processes. Finally, as the dominant way of imagining energy futures is typically based on the technocratic 'trilemma', future research could assess whether it can be coproduced with other ways of knowing. Is there space for accommodating more radical futures such as those based on social justice and alternative economic models.

Declaration of competing interest

The author declares no known competing financial interests or personal relationships that could have appeared to influence the research conducted in this paper.

Data availability

The data that has been used is confidential.

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Appendix A. Detailed list of interviews

#	Organisation	Date	Persons
Phase 1			
1	Non-fiction writer	17/03/2017	1
2	Public company	21/03/2017	1
3	Consultancy	03/04/2017	1
4	Non-governmental organisation	07/04/2017	1
5	Public company	10/04/2017	1
6	Public organisation	12/04/2017	1
7	Non-governmental organisation	12/04/2017	2
8	Industrial lobby	18/04/2017	1
9	Industrial lobby	03/05/2017	1
10	Consultancy	04/05/2017	1
11	Political party	05/05/2017	1
12	Public organisation	08/05/2017	1
13	Non-fiction writer	16/05/2017	1
14	Public company	18/05/2017	1
15	Public organisation	19/05/2017	1
16	Private company	22/05/2017	1
17	Public company	29/05/2017	1
18	Political party	30/05/2017	1
19	Private company	21/06/2017	1
20	Public company	27/06/2017	1

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#	Organisation	Date	Persons
21	Political party	27/06/2017	1
22	Political party	29/06/2017	1
Phase 2			
1	Industrial lobby	13/08/2018	1
2	Academia	15/10/2018	2
3	Investor	24/10/2018	2
4	Public company	12/12/2018	2
5	Industrial lobby	19/12/2018	1
6	Private company	19/12/2018	1

Appendix B. List of analysed documents

#	Organisation	Title and date	Translation
Party programmes			
1	True Finns	Perussuomalainen ympäristö- ja energiapolitiikka (2019)	Environmental and Energy Policy of True Finns
2	Green League	Vihreä Energiavisio 2035 (2016)	Green Energy Vision 2035
3	Left Alliance	Vasemmistoliiton ilmasto-ohjelma (2018)	Climate Programme of the Left Alliance
Reports			
4	National Emergency Supply Agency/Motiva	Huoltovarmuus ja energiatehokkuus (2016)	Security of Supply and Energy Efficiency
5	National Emergency Supply Agency	Huoltovarmuuden Skenaariot 2030 (2018)	Security of Supply Scenarios 2030
6	National Emergency Supply Agency/Pöyry	Huoltovarmuus Energiaturvassa (2019)	Security of Supply during Energy Transition
7	Finnish Institute of International Affairs	Venäjän muuttuva rooli lähialueilla (2016)	The Changing Role of Russia in Neighbouring Regions
8	Finnish Institute of International Affairs	Huoltovarmuus muutoksessa: Kansallisen varautumisen haasteet kansainvälisessä toimintaympäristössä (2016)	Security of Supply in Transition: National Preparedness Challenges in an International Environment
9	Jorma Ollila/Nordic Council of Ministers	Nordic Energy Co-operation: Strong today – stronger tomorrow (2017)	
10	Smart Energy Transition	Uusia näkymiä energiaturvasta Suomeen: Murrosareenan tuottamia kunnianhimoisia energia- ja ilmastotoimia vuosille 2018–2030 (2017)	New insights to Finland of energy transition: Ambitious Energy and Climate Actions Produced by Transition Arena 2018–2030
Strategic documents of Finnish government			
11	Ministry of Economic Affairs and Employment of Finland	100-prosenttisesti uusiutuviin energialähteisiin perustuva energiajärjestelmä: Kansalliseen energia- ja ilmastostrategiaan liittyvä tarkastelu (2016)	100 % Renewable Energy System: Assessment Related to National Energy and Climate Strategy
12	Ministry of Economic Affairs and Employment of Finland	Valtioneuvoston selonteko kansallisesta energia- ja ilmastostrategiasta vuoteen 2030 (2017)	Prime Minister's Office Report for National Energy and Climate Strategy up to 2030
13	Ministry of Economic Affairs and Employment of Finland	Taustaraportti kansalliselle energia- ja ilmastostrategialle vuoteen 2030 (2017)	Background Report for National Energy and Climate Strategy up to 2030
14	Ministry of Economic Affairs and Employment of Finland	Finland's Integrated Energy and Climate Plan (2019)	
15	Prime Minister's Office	Valtioneuvoston päätös huoltovarmuuden tavoitteista (2018)	Agreement on Security of Supply Goals
16	Ministry of Economic Affairs and Employment of Finland	Esitys Valtioneuvoston päätökseksi huoltovarmuuden tavoitteista 2018: Perustelumuistio (2018)	Presentation of Agreement on Security of Supply Goals: Brief of Reasoning
17	Ministry of Economic Affairs and Employment of Finland	Joustava ja asiakaskeksinen sähköjärjestelmä: Älyverkkotyöryhmän loppuraportti (2018)	Flexible and Customer-driven Electricity System: Smart Grid Working Group Final Report
18	Ministry of the Environment	Valtioneuvoston selonteko keskipitkän aikavälin ilmastopolitiikan suunnitelmasta vuoteen 2030: Kohti ilmastoviisasta arkea (2017)	Prime Minister's Office Report on Mid-term climate policy plan up to 2030: Towards Climate Smart Everyday Life
19	Ministry of the Interior	Kansallinen riskiarvio (2018)	National Risk Assessment
Public presentations			
20	National Emergency Supply Agency	Energian huoltovarmuus Suomessa (2018)	Energy supply in Finland
21	National Emergency Supply Agency	Suomen valmiudet kriisitilanteissa, tuotannossa, energia- ja elintarvikehuollossa	Finnish Preparedness in Crisis Situations, Production, Energy and Food Supply
Industrial Lobby			
22	Finnish Wind Power Association	Tuulivoima ja energiaturvassa nyt – 2030 (2018)	Wind power and energy transition now – 2030
23	Energy Industry	Lausunto Valtioneuvoston Päätöksestä Huoltovarmuuden Tavoitteista	Position on Prime Minister's Office Agreement of Security of Supply Goals
Company reports and positions			

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#	Organisation	Title and date	Translation
24	Fingrid	Johtokatu – tietarkka vihreään sähköjärjestelmään (2016)	Grid Street – Roadmap to Green Electricity System
25	Fingrid	Energiamurros haastaa kantaverkon – pelissä on Suomen kilpailukyky (2018)	Energy Transition Challenges Main Grid – Finnish Competitiveness at Play
26	Fingrid	Ilmastonmuutoksen torjunta asettaa sähköjärjestelmän huoltovarmuuden uusien haasteiden eteen (2018)	Climate Change Mitigation Puts Security of Supply of Electricity System to New Challenges
27	St1	St1 Nordic Energy Outlook (2016)	
28	Vapo	Otetaan mallia Tanskasta - mutta vain rikossarjoissa ja brändäyksessä (2018)	Let's Use Denmark as an Example – But Only Detectives and Branding
29	Vapo	Ei saa puhua huoltovarmuudesta (2018)	One Should not Talk about Security of Supply

References

- [1] E. Shove, Time to rethink energy research, *Nat. Energy* 6 (2021) 118–120, <https://doi.org/10.1038/s41560-020-00739-9>.
- [2] C. Roberts, F.W. Geels, M. Lockwood, P. Newell, H. Schmitz, B. Turnheim, A. Jordan, The politics of accelerating low-carbon transitions: towards a new research agenda, *Energy Res. Soc. Sci.* 44 (2018) 304–311, <https://doi.org/10.1016/j.erss.2018.06.001>.
- [3] S. Beck, S. Jasanoff, A. Stirling, C. Polzin, The governance of sociotechnical transformations to sustainability, *Curr. Opin. Environ. Sustain.* 49 (2021) 143–152, <https://doi.org/10.1016/j.cosust.2021.04.010>.
- [4] N. Longhurst, J. Chilvers, Mapping diverse visions of energy transitions: co-producing sociotechnical imaginaries, *Sustain. Sci.* 14 (2019) 973–990, <https://doi.org/10.1007/s11625-019-00702-y>.
- [5] S. Bouzarovski, M. Bassin, Energy and identity: imagining Russia as a hydrocarbon superpower, *Ann. Assoc. Am. Geogr.* 101 (2011) 783–794, <https://doi.org/10.1080/00045608.2011.567942>.
- [6] S. Jasanoff, S.-H. Kim, Containing the atom: sociotechnical imaginaries and nuclear power in the United States and South Korea, *Minerva* 47 (2009) 119–146, <https://doi.org/10.1007/s11024-009-9124-4>.
- [7] S. Jasanoff, S.-H. Kim, Sociotechnical imaginaries and national energy policies, *Sci. Cult.* 22 (2013) 189–196, <https://doi.org/10.1080/09505431.2013.786990>.
- [8] T.V. Berling, I. Surwillo, S. Sorensen, Norwegian and Ukrainian energy futures: exploring the role of national identity in sociotechnical imaginaries of energy security, *J. Int. Relat. Dev.* 25 (2022) 1–30, <https://doi.org/10.1057/s41268-021-00212-4>.
- [9] J. Nyman, Rethinking energy, climate and security: a critical analysis of energy security in the US, *J. Int. Relat. Dev.* 21 (2018) 118–145, <https://doi.org/10.1057/jird.2015.26>.
- [10] A. Cherp, J. Jewell, The concept of energy security: beyond the four as, *Energy Policy* 75 (2014) 415–421, <https://doi.org/10.1016/j.enpol.2014.09.005>.
- [11] A.S.D. Tidwell, J.M. Smith, Morals, materials, and technoscience: the energy security imaginary in the United States, *Sci. Technol. Hum. Values* 40 (2015) 687–711, <https://doi.org/10.1177/0162243915577632>.
- [12] D. Scholten, M. Bazilian, I. Overland, K. Westphal, The geopolitics of renewables: new board, new game, *Energy Policy* 138 (2020), 111059, <https://doi.org/10.1016/j.enpol.2019.111059>.
- [13] J. Kester, The scare behind energy security: four conceptualisations of scarcity and a never-ending search for abundance, *J. Int. Relat. Dev.* (2022) 31–53, <https://doi.org/10.1057/s41268-021-00216-0>.
- [14] M. Siddi, *European Identities and Foreign Policy Discourses on Russia: From the Ukraine to the Syrian Crisis*, Routledge, Abingdon, Oxon ; New York, NY, 2020.
- [15] T. Haukkala, A struggle for change—the formation of a green-transition advocacy coalition in Finland, *Environ. Innov. Soc. Trans.* 27 (2018) 146–156, <https://doi.org/10.1016/j.eist.2017.12.001>.
- [16] M.de la E. Mata Pérez, D. Scholten, K. Smith Stegen, The multi-speed energy transition in Europe: opportunities and challenges for EU energy security, *Energy Strat. Rev.* 26 (2019), 100415, <https://doi.org/10.1016/j.esr.2019.100415>.
- [17] Prime Minister's Office, Finland, a land of solutions. Strategic Programme of Prime Minister Juha Sipilä's Government 29 May 2015. <https://vnk.fi/julkaisu?pubid=6407>, 2015.
- [18] L. Kainiemi, K. Karhunmaa, S. Eloneva, Renovation realities: actors, institutional work and the struggle to transform Finnish energy policy, *Energy Res. Soc. Sci.* 70 (2020), 101778, <https://doi.org/10.1016/j.erss.2020.101778>.
- [19] K. Karhunmaa, Attaining carbon neutrality in Finnish parliamentary and city council debates, *Futures* 109 (2019) 170–180, <https://doi.org/10.1016/j.futures.2018.10.009>.
- [20] A. Silvast, *Making Electricity Resilient: Risk and Security in a Liberalized Infrastructure*, Routledge, Taylor & Francis Group, London, 2017.
- [21] D. Rosenbloom, H. Berton, J. Meadowcroft, Framing the sun: a discursive approach to understanding multi-dimensional interactions within socio-technical transitions through the case of solar electricity in Ontario, Canada, *Res. Policy* 45 (2015) 1275–1290, <https://doi.org/10.1016/j.respol.2016.03.012>.
- [22] A. Cherp, J. Jewell, The three perspectives on energy security: intellectual history, disciplinary roots and the potential for integration, *Curr. Opin. Environ. Sustain.* 3 (2011) 202–212, <https://doi.org/10.1016/j.cosust.2011.07.001>.
- [23] L. Chester, Conceptualising energy security and making explicit its polysemic nature, *Energy Policy* 38 (2010) 887–895, <https://doi.org/10.1016/j.enpol.2009.10.039>.
- [24] F. Ciutà, Conceptual notes on energy security: total or banal security? *Secur. Dialogue* 41 (2010) 123–144, <https://doi.org/10.1177/0967010610361596>.
- [25] J. Kester, Energy security and human security in a Dutch gasquake context: a case of localized performative politics, *Energy Res. Soc. Sci.* 24 (2017) 12–20, <https://doi.org/10.1016/j.erss.2016.12.019>.
- [26] J.D. Wilson, A securitisation approach to international energy politics, *Energy Res. Soc. Sci.* 49 (2019) 114–125, <https://doi.org/10.1016/j.erss.2018.10.024>.
- [27] G. Bridge, Energy (in)security: world-making in an age of scarcity: energy (in) security, *Geogr. J.* 181 (2015) 328–339, <https://doi.org/10.1111/geoj.12114>.
- [28] Y.B. Blumer, C. Moser, A. Patt, R. Seidl, The precarious consensus on the importance of energy security: contrasting views between Swiss energy users and experts, *Renew. Sust. Energ. Rev.* 52 (2015) 927–936, <https://doi.org/10.1016/j.rser.2015.07.081>.
- [29] B.K. Sovacool, Differing cultures of energy security: an international comparison of public perceptions, *Renew. Sust. Energ. Rev.* 55 (2016) 811–822, <https://doi.org/10.1016/j.rser.2015.10.144>.
- [30] G. Valkenburg, F. Graceva, Towards governance of energy security, in: *Low-Carbon Energy Security and Human Security in a Dutch Gasquake Context*, pp. 207–229, <https://doi.org/10.1016/B978-0-12-802970-1.00008-5>, 251484862110493.
- [31] A. Månsson, B. Johansson, L.J. Nilsson, Assessing energy security: an overview of commonly used methodologies, *Energy* 73 (2014) 1–14, <https://doi.org/10.1016/j.energy.2014.06.073>.
- [32] A. Goldthau, N. Sitter, A Liberal Actor in a Realist World: The European Union Regulatory State and the Global Political Economy of Energy, *Oxford University Press*, 2015, <https://doi.org/10.1093/acprof:oso/9780198719595.001.0001>.
- [33] F. Ciutà, Conceptual notes on energy security: total or banal security? *Secur. Dialogue* 41 (2010) 123–144, <https://doi.org/10.1177/0967010610361596>.
- [34] M. Balmaceda, P. Högselius, C. Johnson, H. Pleines, D. Rogers, V.-P. Tynkkynen, Energy materiality: a conceptual review of multi-disciplinary approaches, *Energy Res. Soc. Sci.* 56 (2019), 101220, <https://doi.org/10.1016/j.erss.2019.101220>.
- [35] A. Vihma, M. Wigell, Unclear and present danger: Russia's geoeconomics and the Nord Stream II pipeline, *Global Affairs* 2 (2016) 377–388, <https://doi.org/10.1080/23340460.2016.1251073>.
- [36] G. Bridge, Energy (in)security: world-making in an age of scarcity: energy (in) security, *Geogr. J.* 181 (2015) 328–339, <https://doi.org/10.1111/geoj.12114>.
- [37] K. Szulecki, Securitization and state encroachment on the energy sector: politics of exception in Poland's energy governance, *Energy Policy* 136 (2020), 111066, <https://doi.org/10.1016/j.enpol.2019.111066>.
- [38] A. Judge, T. Maltby, J.D. Sharples, Challenging reductionism in analyses of EU-Russia energy relations, *Geopolitics* 21 (2016) 751–762, <https://doi.org/10.1080/14650045.2016.1222520>.
- [39] F.W. Geels, Regime resistance against low-carbon transitions: introducing politics and power into the multi-level perspective, *Theory Cult. Soc.* 31 (2014) 21–40, <https://doi.org/10.1177/0263276414531627>.
- [40] E. Heiskanen, E.-L. Apajalahti, K. Matschoss, R. Lovio, Incumbent energy companies navigating energy transitions: strategic action or bricolage? *Environ. Innov. Soc. Trans.* 28 (2018) 57–69, <https://doi.org/10.1016/j.eist.2018.03.001>.
- [41] S. Heinonen, J. Karjalainen, J. Ruotsalainen, K. Steinmüller, Surprise as the new normal – implications for energy security, *Eur. J. Futures Res.* 5 (2017), <https://doi.org/10.1007/s40309-017-0117-5>.
- [42] B.K. Sovacool, How long will it take? Conceptualizing the temporal dynamics of energy transitions, *Energy Res. Soc. Sci.* 13 (2016) 202–215, <https://doi.org/10.1016/j.erss.2015.12.020>.
- [43] V. Smil, Examining energy transitions: a dozen insights based on performance, *Energy Res. Soc. Sci.* 22 (2016) 194–197, <https://doi.org/10.1016/j.erss.2016.08.017>.
- [44] P. Johnstone, P. Newell, Sustainability transitions and the state, *Environ. Innov. Soc. Trans.* 27 (2018) 72–82, <https://doi.org/10.1016/j.eist.2017.10.006>.
- [45] W.F. Lamb, G. Mattioli, S. Levi, J.T. Roberts, S. Capstick, F. Creutzig, J.C. Minx, F. Müller-Hansen, T. Culhane, J.K. Steinberger, Discourses of climate delay, *Glob. Sustain.* 3 (2020), e17, <https://doi.org/10.1017/sus.2020.13>.
- [46] E. Lachapelle, R. MacNeil, M. Paterson, The political economy of decarbonisation: from green energy 'race' to green 'division of labour', *New Polit. Econ.* 22 (2017) 311–327, <https://doi.org/10.1080/13563467.2017.1240669>.

- [48] P. Kivimaa, M.H. Sivonen, Interplay between low-carbon energy transitions and national security: an analysis of policy integration and coherence in Estonia, Finland and Scotland, *Energy Res. Soc. Sci.* 75 (2021), 102024, <https://doi.org/10.1016/j.erss.2021.102024>.
- [49] World Energy Council, World energy trilemma index. <https://www.worldenergy.org/transition-toolkit/world-energy-trilemma-index>. (Accessed 22 May 2020).
- [50] R. Bosman, D. Loorbach, N. Frantzeskaki, T. Pistorius, Discursive regime dynamics in the Dutch energy transition, *Environ. Innov. Soc. Trans.* 13 (2014) 45–59, <https://doi.org/10.1016/j.eist.2014.07.003>.
- [51] A. Stirling, From sustainability to transformation: dynamics and diversity in reflexive governance of vulnerability, *SSRN J.* (2014), <https://doi.org/10.2139/ssrn.2742113>.
- [52] S. Jasanoff, S.-H. Kim, *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, The University of Chicago Press, Chicago ; London, 2015.
- [53] S. Jasanoff, Future imperfect: science, technology and the imagination of modernity, in: S. Jasanoff, S.-H. Kim (Eds.), *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, The University of Chicago Press, Chicago, 2015, pp. 1–33.
- [54] M. Kuchler, G. Bridge, Down the black hole: sustaining national socio-technical imaginaries of coal in Poland, *Energy Res. Soc. Sci.* 41 (2018) 136–147, <https://doi.org/10.1016/j.erss.2018.04.014>.
- [55] I.F. Ballo, Imagining energy futures: sociotechnical imaginaries of the future Smart Grid in Norway, *Energy Res. Soc. Sci.* 9 (2015) 9–20, <https://doi.org/10.1016/j.erss.2015.08.015>.
- [56] S. Jasanoff, H.R. Simmet, Renewing the future: excluded imaginaries in the global energy transition, *Energy Res. Soc. Sci.* 80 (2021), 102205, <https://doi.org/10.1016/j.erss.2021.102205>.
- [57] L.L. Delina, Whose and what futures? Navigating the contested coproduction of Thailand's energy sociotechnical imaginaries, *Energy Res. Soc. Sci.* 35 (2018) 48–56, <https://doi.org/10.1016/j.erss.2017.10.045>.
- [58] M. Gruenig, P. Lombardi, B. O'Donnell, Challenging the energy security paradigm, in: *Low-Carbon Energy Security from a European Perspective*, Elsevier, 2016, pp. 1–11, <https://doi.org/10.1016/B978-0-12-802970-1.00001-2>.
- [59] M. Minkinen, The anatomy of plausible futures in policy processes: comparing the cases of data protection and comprehensive security, *Technol. Forecast. Soc. Chang.* 143 (2019) 172–180, <https://doi.org/10.1016/j.techfore.2019.03.007>.
- [60] M. Burnham, W. Eaton, T. Selfa, C. Hinrichs, A. Feldpausch-Parker, The politics of imaginaries and bioenergy sub-niches in the emerging Northeast U.S. bioenergy economy, *Geoforum* 82 (2017) 66–76, <https://doi.org/10.1016/j.geoforum.2017.03.022>.
- [61] V. Kellokumpu, The bioeconomy, carbon sinks, and depoliticization in Finnish forest politics, *Environ. Plan. E: Nat. Space* (2021), <https://doi.org/10.1177/25148486211049322>, 251484862110493.
- [62] T.J. Rudek, Capturing the invisible. Sociotechnical imaginaries of energy. The critical overview, *Sci. Public Policy* 49 (2022) 219–245, <https://doi.org/10.1093/scipol/scab076>.
- [63] J. Hoffman, M. Davies, T. Bauwens, P. Späth, M.A. Hajer, B. Arifi, A. Bazaz, M. Swilling, Working to align energy transitions and social equity: an integrative framework linking institutional work, imaginaries and energy justice, *Energy Res. Soc. Sci.* 82 (2021), 102317, <https://doi.org/10.1016/j.erss.2021.102317>.
- [64] L. Tozer, N. Klenk, Discourses of carbon neutrality and imaginaries of urban futures, *Energy Res. Soc. Sci.* 35 (2018) 174–181, <https://doi.org/10.1016/j.erss.2017.10.017>.
- [65] B.K. Sovacool, D.J. Hess, Ordering theories: typologies and conceptual frameworks for sociotechnical change, *Soc. Stud. Sci.* 47 (2017) 703–750, <https://doi.org/10.1177/0306312717709363>.
- [66] M. Ratinen, Social embeddedness of policy actors. The failure of consumer-owned wind energy in Finland, *Energy Policy* 128 (2019) 735–743, <https://doi.org/10.1016/j.enpol.2019.01.004>.
- [67] Statistics Finland, Share of energy imported from Russia 34 per cent of total energy consumption in 2021. <https://www.stat.fi/en/publication/cl1xmekvw1pp80buvn1cznmxmy>, 2022. (Accessed 6 May 2022).
- [68] J. Jääskeläinen, S. Höysniemi, S. Syri, V.-P. Tynkkynen, Finland's dependence on Russian energy—mutually beneficial trade relations or an energy security threat? *Sustainability* 10 (2018) 3445, <https://doi.org/10.3390/su10103445>.
- [69] S. Kilpeläinen, P. Aalto, P. Toivanen, P. Lehtonen, H. Holttinen, How to achieve a more resource-efficient and climate-neutral energy system by 2030? Views of Nordic stakeholders: views of Nordic stakeholders, *Rev. Policy Res.* (2019), e0001, <https://doi.org/10.1111/ropr.12347>.
- [70] I. Ruostesaari, Stealth democracy, elitism, and citizenship in Finnish energy policy, *Energy Res. Soc. Sci.* 34 (2017) 93–103, <https://doi.org/10.1016/j.erss.2017.06.022>.
- [71] J. Vesa, A. Gronow, T. Ylä-Anttila, The quiet opposition: how the pro-economy lobby influences climate policy, *Glob. Environ. Chang.* 63 (2020), 102117, <https://doi.org/10.1016/j.gloenvcha.2020.102117>.
- [72] M. Laihonon, *Political Foreplay for Nuclear New Build: Defining Good at the Intersection of Politics, Economy and Technology*. Aalto University, 2016.
- [73] T. Teräväinen, Political opportunities and storylines in Finnish climate policy negotiations, *Environ. Polit.* 19 (2010) 196–216, <https://doi.org/10.1080/09644010903574475>.
- [74] A.-E. Hyvönen, T. Juntunen, From "spiritual defence" to robust resilience in the Finnish comprehensive security model, in: S. Larsson, M. Rhinard (Eds.), *Nordic Societal Security: Convergence and Divergence*, Routledge/Taylor & Francis Group, London ; New York, 2020, pp. 154–178.
- [75] E. Hakala, V. Lähde, A. Majava, T. Toivanen, T. Vadén, P. Järvensivu, J.T. Eronen, Northern warning lights: ambiguities of environmental security in Finland and Sweden, *Sustainability* 11 (2019) 2228, <https://doi.org/10.3390/su11082228>.
- [76] H. Räisänen, E. Hakala, J.T. Eronen, J.I. Hukkinen, M.J. Virtanen, in: *Comprehensive Security: The Opportunities and Challenges of Incorporating Environmental Threats in Security Policy*, PaG 9, 2021, pp. 91–101, <https://doi.org/10.17645/pag.v9i4.4389>.
- [77] J. Laine, The Ukraine crisis and ontological (in)security: implications from a Finnish perspective, in: G. Soroka, T. Stepniowski (Eds.), *Ukraine after Maidan: Revisiting Domestic and Regional Security*, Ibidem Press, 2018, pp. 63–92.
- [78] D. Zimin, in: *How Can Foreign Companies Influence Russia's Economic Course? The Cases of Finnish Firms Fortum and Neste*, *Post-Soviet Affairs* 28, 2012, pp. 209–231, <https://doi.org/10.2747/1060-586X.28.2.209>.
- [79] P. Aalto, H. Nyyssönen, M. Kojo, P. Pal, Russian nuclear energy diplomacy in Finland and Hungary, *Eurasian Geogr. Econ.* 58 (2017) 386–417, <https://doi.org/10.1080/15387216.2017.1396905>.
- [80] T. Haukkala, A struggle for change—the formation of a green-transition advocacy coalition in Finland, *Environ. Innov. Soc. Trans.* 27 (2018) 146–156, <https://doi.org/10.1016/j.eist.2017.12.001>.
- [81] Ministry of Economic Affairs and Employment, *National Energy and Climate Strategy for 2030*, 2017. <https://tem.fi/documents/1410877/2769658/Government+report+on+the+National+Energy+and+Climate+Strategy+for+2030/0bb2a7be-d3c2-4149-a4c2-78449ceb1976> (accessed December 20, 2017).
- [82] P.D. Aligica, Institutional and stakeholder mapping: frameworks for policy analysis and institutional change, *Public Org. Rev.* 6 (2006) 79–90, <https://doi.org/10.1007/s11115-006-6833-0>.
- [83] Ministry of Economic Affairs and Employment, Finland's integrated energy and climate plan. <https://julkaisut.valtioneuvosto.fi/handle/10024/161977>, 2019. (Accessed 16 March 2022).
- [84] P.L. Gross, N. Buchanan, S. Sané, Blue skies in the making: air quality action plans and urban imaginaries in London, Hong Kong, and San Francisco, *Energy Res. Soc. Sci.* 48 (2019) 85–95, <https://doi.org/10.1016/j.erss.2018.09.019>.
- [85] H.-F. Hsieh, S.E. Shannon, Three approaches to qualitative content analysis, *Qual. Health Res.* 15 (2005) 1277–1288, <https://doi.org/10.1177/1049732305276687>.
- [86] K. Isoaho, K. Karhunmaa, A critical review of discursive approaches in energy transitions, *Energy Policy* 128 (2019) 930–942, <https://doi.org/10.1016/j.enpol.2019.01.043>.
- [87] H. Lovell, H. Bulkeley, S. Owens, Converging agendas? Energy and climate change policies in the UK, *Environ. Plann. C. Gov. Policy* 27 (2009) 90–109, <https://doi.org/10.1068/c0797j>.
- [88] M. Hajer, W. Versteeg, A decade of discourse analysis of environmental politics: achievements, challenges, perspectives, *J. Environ. Policy Plan.* 7 (2005) 175–184, <https://doi.org/10.1080/15239080500339646>.
- [89] M.A. Hajer, *The Politics of Environmental Discourse*, Oxford University Press, 1997, <https://doi.org/10.1093/019829333X.001.0001>.
- [90] National Emergency Supply Agency, *Continuity management*. <https://www.huoltovarmuuskeskus.fi/en/security-of-supply/continuity-management>, 2021. (Accessed 11 November 2021).
- [91] Finnish Shipowners' Association, *Key figures of maritime transport in Finland*. <https://shipowners.fi/en/competitiveness/key-figures-of-maritime-in-finland/>, 2022. (Accessed 25 May 2022).
- [92] National Emergency Supply Agency, *Energia 2030 [Energy 2030]*. <https://www.huoltovarmuuskeskus.fi/huoltovarmuusorganisaatio/huoltovarmuuskeskus/4962-2/energia-2030>, 2021. (Accessed 11 November 2021).
- [93] National Emergency Supply Agency, *Huoltovarmuuden Skenaariot 2030 [security of supply scenarios up to 2030]*, National Emergency Supply Agency, 2018, 251484862110493, https://www.huoltovarmuuskeskus.fi/files/8a8638cbd80fef6cd2179d6935ee4be1a3173953/www_loppuraportti_skenaariot_2030.pdf. (Accessed 5 July 2018).
- [94] H. Lempinen, "Barely surviving on a pile of gold": arguing for the case of peat energy in 2010s Finland, *Energy Policy* 128 (2019) 1–7, <https://doi.org/10.1016/j.enpol.2018.12.041>.
- [95] K. Birch, K. Calvert, Rethinking 'Drop-in' Biofuels, *S&TS* 28 (2015) 52–72, <https://doi.org/10.23987/sts.55357>.
- [96] M. Antal, K. Karhunmaa, The German energy transition in the British, Finnish and Hungarian news media, *Nat. Energy* 3 (2018) 994–1001, <https://doi.org/10.1038/s41560-018-0248-3>.
- [97] Prime Minister's Office, *Valtioneuvoston päätös huoltovarmuuden tavoitteista [Prime Minister's Office Agreement on Security of Supply Targets]*. <https://www.finlex.fi/fi/laki/alkup/2018/20181048>, 2018.
- [98] Ministry of Economic Affairs and Employment, *Uusimuotoinen energiahuoltosektori kokoonnut [Newly formed energy supply sector met]*. <https://tem.fi/-uusimuotoinen-energiahuoltosektori-kokoonnut>, 2022.
- [99] Ministry of Economic Affairs and Employment, *Hiilineutraali Suomi 2035 – kansallisen ilmastojä ja energiastategian luonnos [Carbon Neutral Finland 2035 – Draft for National Climate and Energy Strategy]*. <https://www.lausuntopalvelu.fi/FI/Proposal/Participation?proposalId=d10bc350-8679-468e-9d04-8e07cd5114f7>, 2022. (Accessed 14 April 2022).