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Introduction

The Challenge of Zero-Carbon Energy Transitions and National Security

Energy transitions based on decarbonized energy sources, electrification, and digitalization have, since 2015, accelerated in many places throughout the world. Shares of renewable energy have increased, new climate targets and policies have been set, and new interconnections have enabled increasing electrification and cross-country electricity markets. More modestly, developments in the energy efficiency of housing and transport have advanced, and citizen energy ownership has gradually grown. The events of 2022, when Russia began a war in Ukraine, changed the energy landscape of Europe substantially. Due to Europe's dependence on Russian energy sources, the war has also meant an acceleration of the ongoing energy transition away from fossil fuels and toward the improvement of energy efficiency. This book is based on research that began in 2019 and was completed in 2023. It examines the energy transition and its security and defence connections in selected European countries before and after this changed energy landscape.

Energy transition can mean many things. This book takes the lens of electrification and expansion of renewable energy sources as its particular foci. Electrification means increasing the use of electricity and the number of its applications across different sectors. For example, transport, heating, and industry are shifting from other power sources to electricity. Electricity can be used in transport via electric vehicles, in heating directly or via heat pumps, or to produce electric fuels (e.g., e-kerosene, e-methane), via so-called power-to-x processes connecting to the hydrogen economy and used for a variety of needs. Renewable energy sources – in particular wind and solar – can be used in increasing capacities to produce electricity. For instance, globally renewable sources are expected to cover 40 percent of electricity production in 2027 (IEA, 2023). Thus, electricity will have a significant role in decarbonizing the use of energy and improving energy efficiency. This transition will require the construction of new electricity distribution and transmission capacity within and across countries.

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There are expectations of regional grid communities that will arise between countries with shared electricity networks and markets. The Nordic Electricity Market NordPool is a good example of such a community. It was initiated in 1996 with the establishment of a power exchange between Norway and Sweden; Finland joined two years and Denmark four years after. In the twenty-first century, NordPool has expanded by opening bidding areas in Germany and the Baltic countries. In 2023, in the NordPool power exchange, the share of wind power at times reached around 30 percent on the spot market, so the decarbonization process is underway but is still far from complete.

At the same time, however, the share of hydrocarbons in the world's energy production remains significant, in total over 2 million megawatts (MW). New facilities are being planned or are under construction in China, India, and elsewhere in Asia, as well as in Poland.[1] The International Energy Agency (IEA) has estimated that coal-fired power generation increased by 3 percent in 2022. Globally, the demand for energy is rapidly increasing. The IEA has forecast that electricity demand will grow more rapidly than the installed capacity of renewable energy. Further, the growing competition for energy is estimated to lead to more unstable global energy markets, with the rise of renewable energy and digital technologies driving an increasing demand for raw minerals and metals, some of which have been labelled "critical" and others also "rare earths." It has been estimated that the shift from hydrocarbons to renewable energy will substantially increase the demand for critical materials, a demand that is not wholly solvable by recycling these materials (Michaux, 2021). Thus, with the global energy transition unfolding, we see a shift from hydrocarbon-based fuel dependency to broader mineral dependency. This not only impacts global trade and geopolitics, but, via pressures to increase mining and refining, has also created new challenges for social justice, conflict reduction, and innovation – locally, regionally, and globally.

The zero-carbon energy transition based on renewables, combined with electrification, has an array of implications for different aspects of security, which is the topic of this book. These range from traditional military security concerns and geopolitics to security of energy supply, and to internal domestic security, touching upon human security, cybersecurity, and climate security. This book explores some of these security aspects from the perspectives of selected small Northern countries in Europe – Finland, Norway, and Estonia – and via the ambitions of the nation of Scotland in the UK, which has often looked to the example of the Nordic countries.

Such security implications were little discussed in Europe before 2022. Energy was mainly seen from a free market perspective, with an emphasis on open energy

[1] www.carbonbrief.org/mapped-worlds-coal-power-plants/ (accessed September 6, 2021).

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markets as creating the most inexpensive and efficient European energy system. This stance remained until 2022, despite openings in academic research that raised concerns about the security risks of European energy systems (e.g., Scholten, 2018; Tynkkynen, 2021). Russia's aggressive military attack on Ukraine, however, brought the geopolitical aspects of energy, as well as energy and resource security, to the top of the European Union's political agenda. Suddenly, wider audiences were fully aware of the connections of energy policy and energy transition to European security.

While an alternative or a complementary pathway to the zero-carbon energy transition is presented by expanding the use of nuclear power, this book focuses mainly on the diverse security implications of renewable energy-based transitions. While the nuclear path is also relevant from the security perspective, this has been addressed elsewhere.[2] This book is concerned with the vision of future energy systems that are based on renewable energy and electrification. Such a vision has been driven, for example, by the International Renewable Energy Agency (IRENA). However, I also make some remarks regarding nuclear power as a security-related question in Finland and Scotland.

Two of the countries examined in this book, Finland and Scotland, use nuclear power as part of their energy portfolio. Finland's newest nuclear reactor, Olkiluoto 3, began operating in 2022, twelve years behind its initial schedule. It, however, suffered from several technical problems, with further delays until 2023. Finland has no direct military security interests linked to nuclear power; although Rosatom – a Russian government-owned company – was involved in Finland's new Hanhikivi nuclear power plant development, the link was an indirect one. Scotland, in turn, opposes the construction of new nuclear power plants, despite nuclear power being connected to military interests in the UK (Johnstone and Stirling, 2020). Estonia and Norway do not have any nuclear power plants. In 2011, the Estonian government approved plans for a nuclear power plant to be constructed by 2023 but this was not realized. However, a government-level working group was established in 2021 to investigate the possibilities of small modular nuclear reactors. Yet, as things stand, energy transitions in the four countries addressed in this book are more likely to follow the renewable energy path.

This book explores energy transitions from the standpoint of sustainability transitions – a research field with particular conceptual perspectives and approaches. It also draws from concepts in security studies to expand the outlook of sustainability transition studies. Energy transitions, together with energy and

[2] For example, the connections of nuclear power to security have been made via human and environmental security (Szulecki and Kusznir, 2018), terrorist attacks (Li et al., 2012), and military use of nuclear power (Johnstone and Stirling, 2020).

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security policies in the case countries, are the empirical contexts in which these conceptual perspectives are applied.

Talking about security in the context of sustainability transitions may be tricky. I acknowledge that, with this book and the research it builds on, I contribute to "security talk" in energy transitions. This means that I am directing specific attention to security in connection with zero-carbon energy transitions and opening up transitions as a security question. However, initiating such security talk for sustainability transitions research does not amount to "securitization." Moreover, I argue that the issue is so important that it needs addressing. Further, I am not claiming that security trumps decarbonization. In fact, I take the opposite view – that decarbonization is vital and should be accelerated urgently but that the processes of accelerating transitions need to openly and critically consider how they influence different dimensions of security, so that societies are more prepared for these implications. There is also a positive dimension to security. Positive security can be thought of as the presence of conditions that further human wellbeing and promote peace (Hoogensen Gjørv, 2012; Roe, 2008). Such examples exist where renewable energy has been used to support peacebuilding efforts in different parts of the world. In turn, peace and prosperity, including the absence of armed conflict and promotion of human rights and social justice, are argued to be advanced "through accountable systems of governance and effective institutions of mature democracy" (Cortright et al., 2017, p. vii). This also supports the focus of this book on established and mature democracies.

So why does this book matter? First, when carrying out the early stages of this research, I encountered only a handful of people in each country who had expertise in both zero-carbon energy transitions and security. I hope that this expertise is continuously growing as transitions progress and, following the events of 2022, security has become a more pressing concern. The fifteen interviews conducted in each of the four countries in 2020–2021 probably covered almost all the expertise on this topic in those countries at the time of the interviews. Even many of those interviewed did not consider themselves experts but were all contributing some pieces to the puzzle. About a half of these experts were reinterviewed in 2022–2023, with some new experts added to the interview pool. Therefore, this book makes some of this rather limited knowledge accessible to more people and provides a holistic overview of security in connection to energy transitions.

Second, the scholarship on sustainability transitions has focused on innovations as a route to transitions and on the obstacles transitions may face. At the same time, the transitions themselves have mostly been seen as positive developments with little attention paid to their flipsides, the potentially negative developments arising from them. Some openings have been made, for example, in relation to mining (Marín and Goya, 2021). Yet, when I began writing this book, security was

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hardly addressed in this field of study. The exception was Phil Johnstone and colleagues, who were working on the military and the world wars in connection with sustainability transitions (Johnstone and McLeish, 2022; Johnstone and Stirling, 2020). Therefore, this book reveals new insights into sustainability transitions by focusing on security.

Third, research on the geopolitics of energy is often focused on mega states, such as the US, China, or Russia, or relatively large European countries, such as Germany or Poland, which can be seen as major geopolitical players. This book approaches the phenomenon of security in sustainable energy transitions from a small country perspective, of nations with circa five million inhabitants or less, where militaries are often focused on defence only. By doing so, the book may be of interest also to larger audiences regarding the different ways in which security plays a role in energy transitions. The small countries selected for the study are by no means similar or homogenous and provide different insights into the topic.

Next, I briefly introduce the conceptual background for this book, drawing from sustainability transition studies, security studies, geopolitics of energy, and policy studies, which are further elaborated in the following chapters.

1.1 Conceptual Background

This book is positioned in the sustainability transitions literature, which examines how sociotechnical change for societal service provision, such as energy, mobility, food, or water, is proceeding toward environmental sustainability and how such change can be better promoted. Integrating the security perspective into the transitions literature, the book addresses two points: first, how issues of security influence sustainability transitions and, second, what implications the transitions have for security in the energy sector context. The book also draws on policy studies, in particular the concepts of policy integration and policy coherence, to examine how energy, security, and defence policies are connected to each other, and together influence sustainability transitions.

The first domain of interest here, sustainability transition studies, has evolved since the late 1990s (Kemp et al., 1998; Rip and Kemp, 1998) as an interdisciplinary field of social science that looks at how large-scale transformations in systems for societal service provision occur and how such transitions can be promoted. It draws on the idea of *sociotechnical systems* that can be shaped by a dynamic interaction with disruptive niche innovations or broader landscape changes (Geels, 2004) and looks at how new sociotechnical systems emerge via technological innovation systems (Markard, 2020). In effect, the research field combines different types of frameworks – with historical, present, and future orientations – to examine sociotechnical transitions. The origins of this field drew substantially

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from science and technology studies, especially innovation studies, as well as evolutionary economics and historical studies. Over time, however, new perspectives have been added, for example, from geography, policy studies, and sociology. The field has developed into a substantial contribution to academic literature, with transitions scholars as authors in leading journals, such as *Research Policy* and *Global Environmental Change*, and on lists by Clarivate and Elsevier of highly cited academics. The number of publications on sustainability transitions has rapidly increased and accumulated, and the field's policy impact is visible in the European Commission and the Organization for Economic Co-operation and Development (OECD). Given the field's interdisciplinary nature, I argue that interconnections to security studies are also relevant when transitions accelerate in the real world.

Studying security is no longer just the prerogative of international relations scholars but of rising interest to scholars from other disciplines, such as law, criminology, anthropology, geography, and philosophy (Floyd, 2019). Thus, an application of security is also fitting for sustainability transitions research and is the second domain of interest in this book. The term security is used to refer to the absence of threats to or sufficient protection for acquired values (Booth, 1991; Wolfers, 1952), such as territorial integrity or political autonomy. Security is often also used in reference to peace, that is, the absence of armed conflicts or, more broadly, the presence of human rights and social justice (Cortright et al., 2017). Whereas, in the past, security may have been associated mainly with military threats and the protection of states, critical security studies challenged this conceptualization and opened up other security questions. These have concerned, for example, the environment, economy, or politics, and different reference objects (i.e., the objects to be secured); the field has also focused on the consequences of securitizing non-military issues (Peoples and Vaughan-Williams, 2015). The contemporary focus, further, examines security in relation to, for example, natural catastrophes, economic distress, shortages of essential supplies (e.g., food, water, energy), and people's everyday safety.

In this book, I make a distinction between negative and positive security following Roe (2008, 2012) and Hoogensen Gjørv (2012). Hoogensen Gjørv (2012, p. 836) has argued that "negative security can be understood as 'security from' (a threat) and positive security as 'security to' or enabling." Thus, for example, energy transitions can reduce or increase threats to the energy system, or the society at large, or they can improve wellbeing and, in this way, add to positive security. Indeed, positive security has also been connected to enabling individuals and communities (Booth, 1991, 2007). Positive security offers a different way to look at security (Hoogensen Gjørv and Bilgic, 2022). It can be increased, for example by providing social goods, such as education, healthcare, and public infrastructure, and, more generally, by means of good governance (Cortright et al., 2017).

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Energy questions have been one aspect in security studies (Natorski and Herranz-Surralles, 2008). Moreover, energy security studies has become a rather extensive field in itself (Cherp and Jewell, 2011; Szulecki, 2018a). In addition, research on the geopolitics of energy is a particular field of international relations. This field has addressed the geopolitics of renewable energy (Scholten, 2018) and the geopolitics of hydrogen (Van de Graaf et al., 2020), which have become more important as energy transitions have progressed. Classical realist geopolitics is concerned about the ways in which *geographical factors* influence international relations. In contrast, critical geopolitics questions such straightforward investigation and is more interested in how *geographical assumptions* play a role in global politics. Literature on the geopolitics of renewables has expanded rapidly, focusing especially on questions such as the peace and conflict potential of renewable energy, potential winner and loser countries in the energy transition, and the consequences of renewable energy for international relations (Vakulchuk et al., 2020). Blondeel et al. (2021) highlighted the need to address the consequences of not only increased use of renewable energy but also hydrocarbon decline on geopolitics and international relations.

A third stream of research, which I draw from conceptually, are studies on policy coherence and integration, which have theorized different mechanisms of policy interplay. Since the late 1990s and early 2000s, there has been specific interest in these concepts in both environmental and development policy communities. Multiple empirical studies in these contexts have resulted in rather widely adopted conceptualizations of policy coherence and integration. In this book, I refer to policy integration as "the integration of a specific policy objective into another policy sub-system [or policy domain], for instance the integration of national security objectives into energy policy" (Kivimaa and Sivonen, 2021, p. 3). Policy coherence, in turn, is defined "as an attribute of policy that systematically reduces conflicts and promotes synergies between and within different policy areas to achieve the outcomes associated with jointly agreed policy objectives" (Nilsson et al., 2012, p. 396). The idea for both concepts is that solving complex policy dilemmas, such as the decarbonization of societies, requires connecting different policy domains and administrative sectors to reduce the number of conflicting incentives and rules given to stakeholders and to improve synergies. Specific processes in society are influenced by multiple administrative sectors. Different policy domains may inadvertently give conflicting messages to different actors who are meant to change their actions based on public policies, thereby reducing the effectiveness of these policies. Such policy incoherence may also be more costly to public administrations and transition pursuits.

Studies on policy coherence and integration offer specific frameworks to analyze the connections between and within different policy domains via different

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processes and levels of governance. Common analytical dimensions include, for example, horizontal, vertical, internal, and multilateral coherence (Carbone, 2008). Integration, by contrast, has been divided into four types of approaches: normative approaches that emphasize the principled priority of environmental or climate change issues; organizational and procedural approaches that propose mechanisms to deliver policy integration; output-based assessments of the achievement of policy integration; and approaches focused on learning and reframing (Russel et al., 2018). This book is interested in how the dynamics of policy coherence and integration play out in the context of energy transition policy and national security and defence policy.

1.2 A Small Country Perspective: Estonia, Finland, Norway, and Scotland as the Research Foci

As mentioned, in contrast to previous studies addressing energy security from the perspective of major states or larger countries, this book is interested in how smaller countries approach the interface of zero-carbon energy transitions and security. The focus is on the nation-state level because states have historically been, and still are, the entities responsible for energy infrastructure, security, and public policy.

The countries addressed in this book are geographically located in Northern Europe and have populations of around five million people, or less. They are also all part of the same interconnected electricity network that spans the Nordic and Baltic countries, with the connection between Norway and the UK opened most recently. The North Sea link – over 700 kilometers (450 miles) long – became operational in October 2021.

The countries also show a lot of variation, for example, in their energy profiles and their stance to security and policymaking. Estonia, Norway, and Scotland (as part of the UK) are longtime members of the North Atlantic Treaty Organization (NATO), while Finland became a member in 2023. Finland and Estonia are member states of the EU. Estonia, Finland, and Norway share a border with the energy and military superpower Russia, but, as the analysis in this book shows later, this has had very different effects on energy policymaking in each country. This is because the countries' stances on hydrocarbon phaseout, their import dependencies, and geopolitical positionings have differed as has their history with Russia.

In Estonia, oil shale has been an important domestic energy source, providing energy independence and employment. The climate change mitigation policies of the EU have challenged the Estonian energy system and thus Estonia has faced the need to phase out oil shale and expand its wind power sector. The latter has

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created a complicated situation regarding the defence of the country, because high wind turbines near the Russian border interfere with the operation of air surveillance radars and signal intelligence. Further, Estonia, alongside the other Baltic States, is seeking to desynchronize its electricity network from Russia by 2025, if not sooner. Estonia, alongside other post-Soviet countries, has considered security to be part of energy policy for a long time. Therefore, the analysis of this country helps in understanding differences in national energy transitions across Europe, given the strong contrast between Estonia's situation and those of my other case countries. Chapter 5 goes into these topics in more detail.

Finland has a very different energy profile to Estonia because it has no domestic oil, coal, or gas reserves, and its share of peat (a carbon-intensive fuel) is small. It has a high share of renewable energy in its mix but faces still a challenging task in moving its heating and transport sectors away from imported fossil fuels and increasing the electrification of society with the help of wind power and the new nuclear reactor that began operating in 2023. Finland has experienced a similar debate as Estonia regarding the interference of wind power with the operation of their national air surveillance systems. Yet, prior to 2022, it much less explicitly connected energy to national security than Estonia, and energy was intentionally desecuritized (see details in Chapter 6).

Norway differs from these two countries by being completely self-sufficient in energy thanks to its large hydropower reserves, as well as extensive hydrocarbon production, which is mostly exported. In addition, Norway has been the leading country worldwide in electrifying transport. Wind power has been under much debate, because the intention has been to provide electricity for the European market, a proposal not liked by all Norwegians. Security was not a big question prior to 2022 and was related mostly to: (1) economic security following calls for hydrocarbon phaseout, because oil has been such a large source of income for Norway; and (2) the Norway–Russia dialogue pertaining to oil exploration in the High North. Chapter 7 describes the Norwegian case.

Scotland is a special case in this study as it is not an independent nation but a constituent nation of the UK. While Scotland has its own policies, for example regarding energy efficiency and spatial planning, it is dependent on decision-making concerning security and energy policy by the UK parliament. The independence debate in 2016 and related documentation revealed Scotland's own ambitions for energy in terms of increasing renewable energy and avoiding nuclear power, but also the challenges of phasing out hydrocarbons. The security questions around the energy transition pertaining to Scotland are multifaceted due to the country being an integral part of UK electricity and gas networks as well as the fact that UK nuclear submarines have their base on the Scottish coast (see details in Chapter 8).

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1.3 Research Method and Materials

When writing this book, I sourced different materials, including eighty-eight in-depth interviews in Estonia, Finland, Norway, and Scotland/the UK; over seventy policy strategy documents published during 2006–2023, the period of focus in this study; and a range of secondary materials such as media articles and reports.[3] The interviews were conducted in two separate rounds and in a semi-structured manner, where the same set of main questions was followed by supplementary questions added based on the interviewees' backgrounds. The interviewees were identified as having expertise at the cross-section of energy, security, defence, or international affairs. Therefore, they had complementary skills to each other even if their position leant toward a particular direction. The interviews, conducted in English or Finnish, were recorded and transcribed for analytical purposes. The first round of sixty-one interviews, with sixty-six interviewees, took place between September 2020 and May 2021 in the form of online video calls. Five interviews comprised more than one person placed in the same organization. The interview durations ranged from 28 to 107 minutes, on average lasting 69 minutes. The second round of interviews was smaller, with an aim to reinterview around half of those who had been involved in the first round, to get a sense of changes in thinking and policy development since the 2022 events. The second round also included six completely new interviewees due to the unavailability of some of the previous experts. The structure of the second-round interviews was updated based on contemporary developments. The second round comprised twenty-seven interviews, with thirty-two interviewees, conducted between November 24, 2022 and March 6, 2023. The interviews lasted from 26 to 78 minutes, on average 56 minutes. Three interviewees included more than one person from the same organization.

Table 1.1 shows the division of interviewees based on their country and primary affiliation, noting that some interviewees had worked in both the private and public sectors or academia and the public sector. Around two-thirds of the interviewees had energy system or energy policy-related expertise. A third were experts in security and defence. A sixth had expertise in international relations, and a similar number were involved in party politics. The interviewees worked in ministries for economic affairs (in charge of energy policy), foreign affairs, and defence. In addition, the interviews covered people working for research institutes (especially on international affairs) and universities, government agencies, transmission network operators, and energy companies, or those who were members of national or EU parliaments.

The interview material is rich and brings forth diverse issues. These include, for example, the influence of energy transitions on security questions that range

[3] The interview and document material were collected jointly with Marja H. Sivonen.

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Table 1.1 *Principal affiliations of the interviewees*

	Public sector (ministries, agencies)	Private sector (e.g., energy companies)	Research (universities, research institutes)	Politics (members of national/EU parliaments)
Estonia (n = 19)	9	2	6	2
Finland (n = 19)	8	4	4	3
Norway (n = 19)	7	5	5	2
Scotland (n = 15)	5	1	6	3
Total (n = 72)	**29**	**12**	**21**	**10**

from energy security via geopolitics to cybersecurity; the interplay between different ministries involved in energy and security questions; the worldviews guiding policymaking and public administration; the policy developments taking place; and the influence of Russia on the countries' energy sectors and policymaking.

Policy strategy documents from the period 2006–2023 were, furthermore, extensive, at around 8,000 pages (Table 1.2). Examples include the "National Development Plans for the Energy Sector" and "National Security Concept" publications in Estonia, the "National Energy and Climate Strategies" and "Government Reports on Security and Defence Policy" in Finland, "National Climate Policy" and "Cybersecurity Strategies" in Norway, and the "Scottish Energy Strategy" and the "National Security Reviews" in Scotland/the UK. The paragraphs in the documents that connected energy policy to security questions or security policy to energy questions were identified and coded in the NVivo software program. While some policy documents made rather broad connections between energy and security, others hardly addressed it. More detailed document analyses conducted in the project that this book draws from are reported elsewhere (Kivimaa and Sivonen, 2021; Sivonen and Kivimaa, 2023), but they are also referred to in this book's country analyses (Chapters 5–8).

During the study, the material was processed and analyzed in different ways. For example, the materials were systematically analyzed using the software tool NVivo and the spreadsheet program Excel for qualitative analysis. However, in this book, a broader approach was also taken by putting this material together in writing the country chapters and telling the story of how zero-carbon energy transitions connect with security questions in each country. Thus, the resulting book is a mix of inductive and deductive analyses of the materials collected for the research project, generating a summary of the topic and insights from the past and for the future.

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Table 1.2 *The number of policy documents studied*

	2006–2010	2011–2015	2016–2020	2021–2023
Estonia	4 energy/ climate, 3 security/defence documents	1 energy/ climate, 3 security/defence documents	3 energy/ climate, 4 security/defence documents	0 energy/ climate, 1 security/defence documents
Finland	2 energy/ climate, 3 security/defence documents	3 energy/ climate, 4 security/defence documents	3 energy/ climate, 6 security/defence documents	1 energy/ climate, 1 security/defence documents
Norway	2 energy/ climate, 4 security/defence documents	4 energy/ climate, 6 security/defence documents	6 energy/ climate, 9 security/defence documents	1 energy/ climate, 0 security/defence documents
Scotland	5 energy/ climate, 2 security/defence documents	5 energy/ climate, 7 security/defence documents	6 energy/ climate, 6 security/defence documents	2 energy/ climate, 3 security/defence documents
Total	**13 energy/ climate, 12 security/defence documents**	**13 energy/ climate, 20 security/ defence documents**	**18 energy/ climate, 25 security/defence documents**	**4 energy/ climate, 5 security/defence documents**

1.4 Contents of the Book

This book is divided into three parts. It starts, in Part I, with the theoretical and conceptual foundations of connecting sustainability transitions and security with each other. This part contains Chapter 2, which introduces research and key concepts in the field of sustainability transitions and moves into introducing security studies and its central concepts. It also discusses how security has thus far been addressed in the field of sustainability transitions and explores what conceptual developments are needed to address security more thoroughly among other side effects of sustainability transitions. Chapter 3 reviews previous research on energy security and the geopolitics of renewable energy as an important context in which research on the interconnections of sustainability transitions and security is placed. Chapter 4 presents the conceptual–analytical framework to examine the country cases, drawing from sustainability transition studies, security studies, and the literature on policy coherence and integration. It also explains the concepts of policy coherence and integration and reviews relevant literature, some of which ties policy interplay into the literature of sustainability transitions.

Part II contains four country-specific analyses of the connections between zero-carbon energy transitions and security, and the domains of energy policy and

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security and defence policies. Chapter 5 focuses on Estonia (energy independence and oil shale), Chapter 6 is about Finland (ambivalent links between energy and security policy), Chapter 7 looks at Norway (contradiction of oil and renewables for economic security), and Chapter 8 is about Scotland (from oil to wind under devolved government). My research team members have provided contextual material for some of these chapters. Chapter 5 draws partly from a background document produced by Claire Mosoni on Estonia, and Chapter 7 on Norway benefits from background work and insights provided by Marja H. Sivonen.

Part III consolidates the theoretical foundations and the country cases to generate new insights for the academic study of sustainability and energy transitions, as well as for policymakers and other experts interested in the topic. Chapter 9 compares the country findings and brings together the conceptual and empirical insights presented. It first discusses the interplay between energy, security, and defence policies, followed by securitization and politicization. Subsequently, focus is placed on the security implications of energy transitions, and negative and positive security. The chapter ends by summarizing the key technological, actor-based, and institutional aspects of the country cases, Russia as a landscape pressure, and final conclusions.

One of the things that this book aims to uncover is whether there is or has been a hidden side to policymaking that considers energy questions from the perspective of national security, and how this hidden side could have influenced (or may in the future influence) the achievement of sustainability transitions. It also discusses whether the security implications of energy transitions are similar or different under centralized versus decentralized renewable energy transition pathways, paying attention to both negative and positive security. It is, nevertheless, clear that, with or without the energy transition, the security issues connected to the energy system will change. The world is facing an increasing demand for energy, a further electrification of energy systems, and new types of cyber and hybrid threats, which will shape how energy and security policies evolve and need to interconnect. Further, the rise of the far right and the rising contradictions between the thinking of the far right and liberal environmentalists pose a different kind of risk for societal stability. The global energy transition (or the lack of it) is connected to domestic stability within countries as well as to international relations and global stability. This means that new kinds of interactions and coordination efforts are needed among policy domains responsible for climate change, energy, international relations, security, and defence. In addition, a redefinition of what energy security and security of supply mean in this new context may be necessary.

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