Nordregio

Discussion Paper: A "Just Green Transition" for Rural Areas in the Nordic Region: key concepts and implications

Project:	A Just Green Transition for Rural Areas: Local benefits from value creation
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Table of Contents

At Glance

When estimating the impacts of the green transition, cross-Nordic comparisons are not as illuminating as comparisons of the different geographical, industrial, and social characteristics of the rural localities concerned. However, some common pathways can be observed in the efforts to increase the share of renewables in energy production.

Rural agency and the specific needs of these areas with regard to energy transition remain understudied.

The rural impact of the green transition is more complex than just compensating for, e.g., the loss of agricultural land. Future policy-making should address this by also taking into account effects that are difficult to measure, such as perceptions of nature.

Coordinated policies and building municipal capacity are key to managing energy transition impacts in rural areas; rural economic development cannot be expected as a side product of green energy transition.

Current security concerns related to the war in Ukraine underline that rural locations are directly connected not only to national energy transitions but also global ones and underpin that energy questions are also security questions.

Introduction

In this discussion paper, we focus on the green energy transition, specifically the renewable energy mix and low-carbon electricity production. All of the Nordic countries have committed to mitigating climate change and its effects on society through a variety of policies, strategies, and measures across a vast array of sectors aimed at curbing greenhouse gas emissions, ensuring the preservation of biodiversity and phasing out fossil fuels.

At the core of the green transition lies a shift to renewable energy in order to reduce greenhouse gas emissions (onwards referred to as "GHG emissions") and mitigate climate change – this is known as an "energy transition". This transition to a higher share of renewable energy generation, distribution and consumption poses great societal challenges but also brings new opportunities and potential social, economic and environmental benefits.

The energy transition will be experienced differently in different countries and geographical areas, be they rural or urban, as well as between different population groups, due to the physical allocation and distribution of energy sources and infrastructure and the varying effects on wealth distribution. Rural areas are particularly interesting in this regard due to their abundance of natural resources. There is significant potential in linking climate and energy transitions with environmentally sustainable social and economic development in rural areas. However, managing energy transitions is extremely complex, and expected outcomes are hard to foresee and measure.

Sustainable land use is a core aspect of the objectives of decreasing emissions and managing biodiversity loss, as well as ensuring energy transitions that contribute to rural areas and facilitate local participation in transition processes. However, in research and policy-making, less attention has been paid to the potential of rural areas, in terms of benefitting from and contributing to climate and energy transitions, than urban areas (OECD, 2021). Addressing this requires considering the green transition from perspectives that seek to ensure that the process does not exacerbate social, economic or spatial inequalities.

The Nordic Thematic Group for Green and Inclusive Rural Development's (2021–2024) project "A Just Green Transition in Rural Areas: Local benefits from value creation" examines the just green transition and its effects on rural areas and populations by exploring value-creation opportunities and challenges related to rural energy transitions. The project pays particular attention to land-use planning and spatial governance and their role in ensuring a just green transition for rural areas, as well as policies that support or hinder these areas in terms of benefits and values related to the green transition. As a first step, this literature review provides a knowledge base outlining the core concepts, namely the energy transition, just transitions, value creation, and the implications in a (Nordic) rural context for the actual societal and physical changes implied by these concepts.

Aims and research questions

This paper presents conceptual guidance and working definitions of aspects related to energy in the just green transition. The analysis focuses, in particular, on the key implications for rural areas in the Nordic Region.

We examine three research questions:

1. **What are the key implications of the renewable energy transition (as part of green transition efforts) for rural areas in the Nordic context in current academic and policy-related literature?**
2. **How prominent is the Nordic rural perspective in academic literature and green transition policy documents, and how is this perspective expressed?**
3. **What possible gaps are there in current green energy transition policies from the rural perspective in terms of addressing the just transition and local benefits from value creation?**

Methods

This study is based on a literature and policy study, but we stress that it is not a bibliometric study. For the literature overview, academic papers and documents were chosen based on their thematic relevance, date of publication and geographical orientation – primarily relating to the Nordic countries and self-governing territories and, in some cases, in a European and/or OECD context. The main emphasis was on social science and governance literature in the energy transition. We conducted an extensive search at GreenFile.[1] Of these papers, more than 15,000 were identified as relevant for analysis – far too many to manage in an overview of this type. The scoping was mostly in English but also in Nordic languages (Icelandic, Norwegian, Danish, Swedish and Finnish). Hence the following sets of keywords were identified as relevant, of which a number were selected: *"energy transition*"; "just transition*"; "green transition*"; "social just*"; "spatial just*"; "justice"; "rural*"; "Nordic*"; "Nordic region"; "Finland"; "Sweden"; "Iceland"; "Denmark"; "Norway".* In the fields "Title, abstract, keywords", these keywords were applied in a variety of combinations with a temporal delimitation of a publication date between 2008 and 2022. We had to reduce the number of articles referred to in order to make the work on this discussion paper more manageable.[2]

[1] GreenFILE indexes academic and general interest titles, as well as government documents and reports about environmental concerns. It provides indexing and abstracting services covering more than 1 million records relating to the environment. Topics include global warming, green building, pollution, renewable energy, recycling and more. It is of use to those studying human geography, law, social sciences, environmental sciences, and sustainable development, which is why we chose this database rather than, e.g. ScienceDirect (which is owned by the MNC Elsevier and primarily shows their own articles in searches rather than having a broader reach that includes non-commercial projects).

[2] As an example, for Norway, our first search returned 2,652 results. We narrowed the search to the period 2008–2022, only academic and only peer-reviewed, and reduced this figure to 2,185. After reviewing several hundred abstracts and excluding many articles on spruce, bioindicators, forest, pollution, contamination, and more technical subjects, the list or articles was narrowed down to around 50. We also searched Nordic DIVA (the Nordic cooperation publication base) and other Norwegian publications (in Norwegian) that cover climate, energy, policy and rural regional development.

To further the scope of relevant literature and research, the analysis also includes grey literature, including studies and publications by Nordregio or other bodies under the Nordic Council of Ministers. Finally, we carried out a review of key policies addressing climate and energy transitions in the Nordic countries and self-governing territories so as to provide an overview of current priorities in climate and energy transition policy, especially with regard to the impact on rural areas. The selection of policy documents is based on their thematic and temporal relevance, their function in relation to land use and spatial governance, and their cross-comparability. Our initial categorisation consisted of climate laws, national climate and energy policies and strategies, and long- and mid-term GHG emission-reduction targets. This turned out to be too general, so we added national land-use plans, strategies, or guidelines, as well as national rural or regional development policies and strategies. Other policies or policy instruments have been included where relevant.

Methodological considerations and delimitations

The focus of this paper is on just energy transitions and their implications for rural areas in the Nordic countries. Even though a transition to a low-carbon energy system entails broader aspects, such as consumption patterns, market mechanisms, and technological and infrastructure changes, **this paper will not address every possible aspect of low-carbon energy transitions**. For example, as the focus is on production, **energy use and consumption (of fossil fuels or renewables) are excluded from the scope as we focused on production**. As this is a desk study, we also had to exclude interesting topics that are not yet visible in policy-making documents, even as future directions, such as the future impacts of reduced energy use and alternative transportation methods or building materials, carbon storage, and whether current mineral resources will be sufficient to support the needs of the energy transition. Furthermore, a more detailed discussion from the local perspective is better realised via case studies and media analyses, which will form part of the later phases of this project. We consider these directions in the **Next steps** section (at the end of the paper).

Our attention is primarily on Nordic national energy policy priorities, processes, and policy instruments and their links to rural areas and rural policies in each country. Since energy transition in the Nordic Region is an ongoing process, and the policy and energy landscapes are in flux, it is possible that the policies and perspectives covered in this paper may change. As such, the discussion paper is not intended to be an endpoint but to provide a broad knowledge overview, develop a framework for the project based on the current state of energy transitions in rural areas, and discuss potential knowledge gaps. The GHG emissions described in this paper primarily refer to territorial or domestic emissions, which in the Nordic Region largely depend on the territory, the composition of economic sectors, transport system dependencies, the natural environment, and socio-demographic composition. Regarding the terms used, we note that there is no region-wide consensus on what a climate and energy transition entails (Weber & Søyland 2020). All of the countries use different terminology and concepts when describing different green transition and energy transition processes, and the purpose of the reviewed policies and strategies also varies between the countries. We took all these factors into account when reviewing and comparing key policy documents.

Conceptual overview: Renewable energy transitions

In order to conceptualise just green transitions against the backdrop of Nordic rural impacts and policy perspectives, we will next outline key approaches. In the Nordic countries and regions, the just green transition always seems to be coupled to other concepts. We, therefore, start by exploring the ideas behind the just green transition as coupled to energy transitions and link it to rural areas. We then reflect on concepts of value creation from different perspectives relevant to rural areas and energy development, and nature's instrumental and intrinsic value for people. We then provide an overview of renewable energy transitions, as described in the policy documents, with a particular emphasis on

the implications for rural areas. Finally, we offer insight into policy gaps that our future research will address.

Green energy transitions: Concepts relevant to rural areas

Just green transitions: Energy, climate, and environmental aspects

Transitions towards sustainability inevitably result in social, economic, and/or environmental consequences, which have both positive and negative impacts on the status quo. As a consequence, the justice perspectives involved in green transitions (or just transitions) cannot be ignored (Bennett, Blythe, Cisneros Montemayor, Singh, & Sumaila, 2019). The concept is increasingly important in local, national and international climate and environmental policy discourse (Pinker, 2020), a good example of which is the European Commission's *Just Transition Mechanism* (JTM), which relates to the European Green Deal (European Commission 2020; Cedergren et al., 2022). This is also the case for Nordic cooperation (Høst et al., 2020; Cedergren et al., 2022).

Defining "just" in this context is somewhat problematic. Often, definitions of justice are limited to the consequences of inequalities – and consequently to adaptation strategies (Heffron & McCauley, 2017). However, combatting the potential negative outcomes of the just transition would require more proactive management and public support to help diversify the economy in affected regions (Markkanen & Anger-Kraavi, 2019). Instead of focusing on outcomes, it would be best to concentrate on causes and on preventive legal and geographical measures. When working towards this goal, **the following three forms of justice are the most important: distributive, procedural, and restorative.** *Distributive* justice refers to the distribution of environmental goods, costs and benefits, and the related vulnerability regarding energy access and affordability, and it divides regions into territories responsible for the impacts and those affected by them. *Procedural* justice focuses on inclusion and exclusion in decision-making processes and touches upon community resilience in the face of climate change mitigation. *Restorative* justice concerns community involvement in the governance of green transitions and recognising the identity and values of these communities (McCauley & Heffron, 2018; McCauley, Pettigrew, Bennett, Todd, & Wood-Donnelly, 2022; Williams & Doyon, 2019).

Discussion and debate on just transitions may be approached from an energy-use, climate-change, or environmental-policy point of view, all of which overlap. Difficulties in differentiating between the three suggest that the most sensible approach may be to combine all of them into one single operational concept. In the context of this project, the most important consideration is that green transitions concern not only local places and people but also the global community. An excessive focus on the immediate stakeholders of energy transition policies (e.g. national energy companies) may exclude local rural engagement and disregard rural population interests. This makes it more difficult to set clear end goals, partly due to a lack of a holistic overview and, therefore, may increase social inequality. Overemphasising the objectives of the energy transition may even endanger efforts to reach the Agenda 2030 goals (and, ultimately, achieve a low-carbon economy). The reason for this is that it allows for a slow phasing out of fossil fuels, thereby favouring the status quo at the expense of more vulnerable groups. In essence, a just green transition means different things for different societal groups (Heffron & McCauley, 2018; Heffron & McCauley, 2022). To avoid making this mistake, reviewing policies requires a holistic interpretation of the "just transition" concept – simply including it is only the first step.

Concept: Value creation in a local benefit perspective

The concept of value creation has increasingly replaced terms like economic growth. The economic debate now also takes into account change and development in the ability to improve one's life, which simultaneously opens the door to a broader value concept (De Souza, 2018).

One approach is "use value", which refers to the goals and needs that a commodity can accomplish and satisfy, while "exchange value" is "the power of a commodity to exchange for other commodities" (Pirgmaier, 2021, p. 2). For example, one use of electricity is for domestic heating, but the exchange value can be expressed as the amount of money that households exchange to obtain electricity. Based on this distinction, the exchange value of a commodity takes precedence over its use value. In other words, the value of a commodity lies in its power to be bought and sold rather than the goals and needs it may satisfy. In this sense, the value of electricity lies in its tradeability rather than its utility. According to Pirgmaier, the reason for this is that market-based societies produce goods for exchange rather than for use (Pirgmaier, 2021).

Values are complex concepts – they can be direct and/or indirect, material and/or intangible, and lie in profit or process (i.e. values can be expressed in terms of absolute and dynamic categories). Other forms of value, apart from monetary, include social, knowledge, competence, social capital, replenishment of emotional energy, personal development and so on. Nature has value as a resource for aesthetic and contemplative enjoyment and experience, as a space with various kinds of utility and other indirect forms of value. At the same time, however, nature is a resource in terms of its physical resources, such as geothermal heat, water, forests, etc. But its value in economic terms can also be expressed from an exploitative perspective. In other words, a differentiation can be made between nature and natural resources, as resources are defined by humans (Rees, 1990). The transition between nature and natural resources includes a process in which knowledge, skills, and technologies are transferred, as a result of which nature becomes a resource realised by demand (Wicken, 2008), which makes its value instrumental (Baard, 2019). Yet another approach consists of nature's contribution to people (NCP) (Diaz. et al., 2018) – an approach that recognises the central and pervasive role of culture in defining links between people and nature. The use of NCP elevates, emphasises, and operationalises the role of indigenous and local knowledge in understanding nature's contribution to people and therefore presents value pluralism beyond the monetary and instrumental approach and links to policy (Diaz et al., 2018, Pascual et al., 2017).

As such, it is important to acknowledge that values are contextually defined. As a resource, nature's substance is subject to change. The development of untamed rivers to regulate energy production illustrates a basic process by which scientific breakthroughs and new technologies create processes of development – from useless to useful, from worthless to wealthy. The development of concepts like "payments for ecosystem services", as developed by biologists, ecologists and economists in the early 21st century (Ipbes, 2019; Ipbes, n.d), can have an indirect impact on other resources like fish, etc. The production of electricity has spectacular utility (in, e.g. electrochemistry, electro-metallurgy, petrochemicals, food, etc.) and, as such, expands the indirect definition of valuable nature (Wicken, 2008 in De Souza, 2018). However, when linking it to local benefits and determining what has value and what does not, the social and spatial equity dimension of power is often forgotten.

Shifting perceptions of value are a key consideration in the energy transition. An example of this is the forest, the conventional utility of which is timber, which also transforms into a source of biomass for energy production. However, in an alternative and competing perspective, the forest is a healthy environment that provides a source of amenity and recreation, relieves stress, and has therapeutic value.

Value is, therefore, contextual and depends on the eye of the beholder. Immaterial needs, such as a beautiful environment, a rich cultural life and leisure time, are increasingly important lifestyle priorities for people in the Nordic region. Many people who live in Norway, Iceland, Greenland, Sweden and Finland – countries with vast tracts of wilderness and sparsely populated areas – greatly appreciate the intrinsic value of the nature and landscape of these countries for purposes other than their utility (Anker, 2013; Árnason, 2005). This appreciation is also a vital motivating factor in conserving the biosphere (Baard, 2019).

The irreversible effects of building hydropower plants and sinking wilderness areas for hydropower dams have fuelled fierce debate around how to electrify Iceland. This has been an ongoing issue for over two decades, challenging the master plan for energy, which requires a broad consensus (see the section on Iceland). However, hydropower is a green, renewable and regulable source of electricity. This is an example of a collision between two or more different value sets (Valkonen, 2007). A similar debate has arisen around wind power, the argument being that it disturbs scenic views, which may negatively affect the tourist experience (Ólafsdóttir, 2020) or make the area less attractive to those who have second homes there (Johansen, 2019). Energy plants can exist in symbiosis with or in opposition to the surrounding environment or biological diversity – for example, fish stocks and bird life are among the stakeholder groups for offshore wind farms. Even power lines and infrastructure can trigger debate, further illustrating the diverse values surrounding energy questions in the Nordic Region.

Value creation can also be translated to a value chain logic, in which function, production, consumption and geography are analysable conditions and quantities. The actors involved in the value chain are suppliers, producers, supporters and consumers. Functional relationships can be exemplified in terms of proximity. Value chains can be regarded as kinds of social – and sometimes geographical – force fields in which the position of each element (company, business, local community) is dependent on the overall structural shifts (De Souza, 2018). For example, will local ownership of an energy extraction site in a rural area always make a difference in how the energy for use is traded through the value chain? Does it definately mean value at an affordable price for the local community?

Intrinsic and instrumental values are often debated in environmental politics in relation to conservation ethics and ecosystem services (Baard, 2019). In an attempt to transcend this binary, the term "relational value" has been suggested. Relational values are described as "not [being] present in things but derivative of relationships and responsibilities to them" (Chan et al., 2016). Relational values are justified by the fear that the distinction between instrumental and intrinsic values "may fail to resonate with views on personal and collective well-being, or 'what is right,' regarding nature and the environment" and that "the usual framings of instrumental and intrinsic values fail to resonate with many lay-people and decision-makers" (Baard, 2019, p.196).

Every society is imbued with certain values, which are expressed at various levels. Some values determine – or encompass – other values at lower levels and, therefore, determine other values in society, which may otherwise be opposed to them, resulting in what the renowned anthropologist Dumont termed "value hierarchies" (Hylland Eriksen, 2001).

Energy transitions: Characteristics, challenges and land-use planning as a solution

The need to mitigate and adapt to climate change processes, protect biodiversity and ecosystems, and halt environmental degradation has led to a greater focus on green economic and societal transition (OECD, 2022). The various approaches to and conceptualisations of transitions towards more sustainable societies – which, in recent years, researchers and policy-makers have termed the "green transition" – include a range of perspectives. This "green transition", which happens across different levels of society and between different systems, as well as in various spatial and temporal settings, can broadly be understood as encompassing wide-ranging changes in both society and the composition of economic sectors (Potts, Niewiadomski, & Prager, 2019). The types of research studying green transitions vary – spanning technological, environmental, social or interdisciplinary research environments focusing on potential designs for the transition to a fossil-free or climate-neutral society (Bjerkesjö, Isaksson, Malmaeus, Sanne, & Wennerholm, 2021). The transition to a low-carbon or fossil-free society is relevant across all sectors of society, especially energy, transport,

manufacturing, agriculture and forestry (Bjerkesjö et al., 2021; Gunashekar et al., 2021). A number of terms are used to describe the end goal of the transition process, e.g. "carbon neutrality" – a broad concept that refers to near-zero emissions in a specific area but without necessarily implying a fossil-free economy (Weber & Søyland, 2020).

Green transition discourse mainly revolves around energy transitions – which, broadly speaking, can be understood as a switch from an economic system dependent on one or a series of energy sources and technologies to another or a transition away from a system of energy production based on fossil fuels towards a system based on renewable energy sources and high levels of energy efficiency (Edomah, Bazilian, & Sovacool, 2020). Social and energy technology reforms occur on different scales in society (local, regional, national or international), emphasising their interconnected nature (Geels 2002; Geels 2019). Energy transitions typically take a long time and lead to long-term shifts in energy production (energy generation), distribution, and consumption, although more temporal or smaller-scale transitions also occur. Typically, the progress entails a switch from fossil-based energy sources to renewable ones but also includes a transition within economic systems, thereby creating new dependencies on one particular form of energy source or type of technology (Edomah, Bazilian, & Sovacool, 2020). The reason for this is that the current energy mix, in conjunction with historical, social and economic development, technological innovation, and policy change, has strong implications for how energy transition pathways develop and for the impacts on natural resources and geographic features (Cherp, Vinichenko, Jewell, Brutschin, & Sovacool, 2018; Bridge et al.,2013).

Energy transitions imply many different forms of interconnectivity between sectors, governance levels and stakeholders. Specifically, there are three key challenges associated with the Nordic energy transition: *technological contingency* (which applies to the reliance on continued technical innovations across renewable electricity systems, sectors and markets); *political contestation* (unstable and unpredictable policy landscape, social acceptance and intolerance to energy targets); and thirdly, *social energy justice and recognition* (e.g. loss of jobs and retraining needs, energy literacy and outsourcing of fossil fuel emissions in the transition) (Sovacool, 2017).

Decarbonising energy systems while ensuring sustainable, affordable and stable energy supply is a major societal challenge that implies a large-scale socio-economic transition and has an impact on the whole of society, including institutions, regulations, business models and user behaviours (Edomah et al., 2019; Upham, Bögel, & Katinka, 2019). Related societal, economic, and environmental goals may also compete or conflict with each other – a phenomenon known as the "energy trilemma", which describes the imbalance between the competing aims of economics, politics and the environment in energy transitions. This covers issues such as energy finance and affordability, energy security and capacity questions, and the environmental harm resulting from energy instalments and mitigating climate change (Heffron, McCauley, & Sovacool, 2015). A trilemma may emerge, for example, when three political aims are all fairly desirable but mutually incompatible – as is often the case in the intersection between agriculture, energy and climate policies (Vik, 2020; Harvey & Pilgrim, 2011).

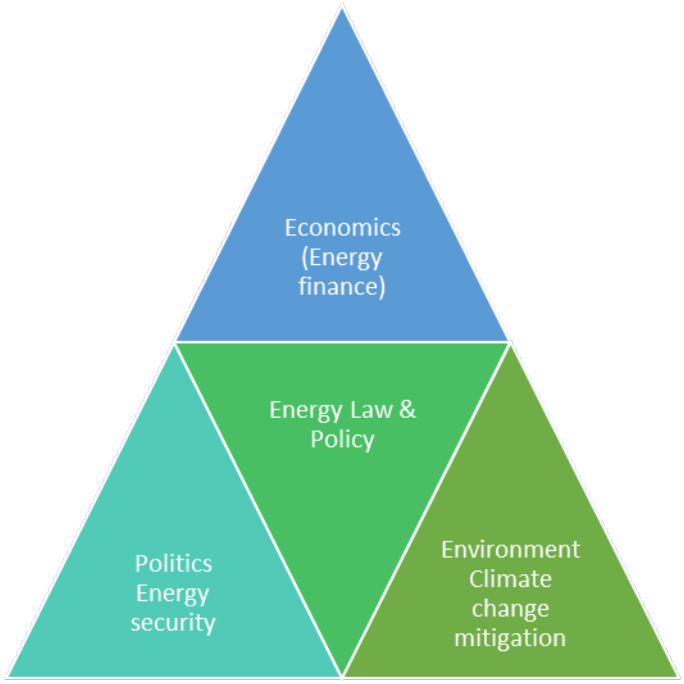

Figure 1: The Energy Law and Policy Triangle – "The Energy Trilemma" (Heffron et al., 2015).

The need to navigate energy trilemmas addresses the need to carefully consider land-use aspects when policing green transitions, especially in rural areas. Energy production and transmission have had large-scale effects on the landscape, both culturally and environmentally, since the beginning of the 20th century. Recently, the rapid rise of renewable energy production –in particular hydro, wind, solar, bio and geothermal, as well as energy storage facilities – has increased the transformative impact on the landscape (Soini & Birkeland, 2014; Frolova et al., 2019; Kempenaar, Puerari, Pleijte, & van Buuren, 2021). Like any other landscape, renewable energy landscapes are shaped by the perceptions of the people who use, share and value them (Olwig, 2007). This has created and is leading to new opportunities, conflicts and environmental burdens. As has been seen in other instances of large-scale landscape changes (e.g. wind farms and greenhouses), the prospect of building new infrastructure invariably gives rise to strong opposition, even when people in principle support the idea of a green transition (Christofel, 2019; Hallan, 2020). This phenomenon suggests that the social impacts of green transitions cannot be measured using a simple system of gains and losses, further underlining the need for policymakers to regularly revisit the discourse surrounding just transitions. Renewable energy not only affects aesthetic outcomes but also soil, water, and biodiversity, as the loss of habitat diversity probably has a negative impact not only on landscape aesthetics but also on fauna and flora, emphasising the range of stakeholders related to renewable energy and land use (Huth et al., 2019).

Renewable energy not only involves new elements but also completely new land-use systems in rural areas, which have the potential to change the pattern of the landscape. Historically speaking, energy landscapes have often caused societal conflicts related to people's perceptions of them. For example, bioenergy has a large land-use footprint, and wind power remains a widely debated element in our cultural landscape. (Soini & Birkeland 2014; Frolova et al., 2019; Plieninger & Bieling, 2012; Warren et al., 2011). Research even suggests that all kinds of infrastructural additions to the landscape (e.g. electrical transmission structures) are first perceived as negative before later becoming established and accepted. Local residents may dislike the infrastructure less once it has been constructed, meaning that wind farms become increasingly acceptable the closer people live to them. The observers' own relationship to the landscape also affects their perception – for example, tourists are

more likely to associate windfarms with clean energy than with damage to the landscape (Warren et al., 2011).

Stimulating institutional and social innovations that integrate technical solutions is a key element in solving challenges related to integrating new energy elements into rural and urban landscapes. However, as many experts have pointed out, this remains understudied in energy transition literature (Kempenaar et al., 2021; Naumann & Rudolph, 2020). Spatial planning may be fundamental to whether a low-carbon transition succeeds or not. For example, little attention has been paid to the dilemma of investing resources into regions that previously produced fossil fuels in an effort to achieve a local just transition, given that, in terms of renewable energy production, the most profitable regions may be somewhere else entirely. This undermines the global just transition perspective (Heffron& McCauley 2022). The natural resources available for renewable energy use, the increasing demand for carbon-free electricity, heating and transport, and an integrated market are among the main enablers for the energy transition in the Nordic countries. Renewable energy use also constitutes a key element in a changing energy landscape, in which the electrification of energy systems is a key mechanism for carbon neutrality (Wråke et al., 2021). The Nordic countries depend on a variety of sources for their renewable energy production, including hydropower, wind, solar and bio-based sources. Heat is primarily produced from electricity, district heating, biomass, and geothermal sources, all of which are primarily generated from renewable energy sources. The deployment of variable renewables, such as wind and solar power, is another important factor in the green transition of Nordic energy systems (Nordic Energy Research, 2021).

What is an energy trilemma?

The "energy trilemma" is a term coined by the World Energy Council and is a succinct summary of the most pressing international problems surrounding energy and climate change. While there are several definitions of the term, they all address three fundamental challenges: those emanating from economics (affordability), politics (energy security or security of energy supply) and the environment (including climate change and sustainability) (Heffron et.al., 2015).

Green transition as stated in policy documents – (Nordic) rural implications

A comparative Nordic study in Denmark, Norway and Sweden focused on how the green economy is conceptualised in policy terms. All relied on a transformative model for greening the economy, in which the state plays an active role in supporting innovation and technological development, facilitating cooperation among social actors, and securing social welfare and human wellbeing. The countries also shared an optimistic view that sought to balance economic growth with sustainable development but lacked more ambitious beyond-growth approaches (Khan, Johansson, & Hildingsson, 2021).

An analysis of the inequality-creating effects of green transitions and of opportunities to promote socially sustainable transitions in the Nordic Region discovered that green transitions increase geographical inequalities and affect rural and urban areas in different ways (Olson, Hildingsson & Khan, 2020; Høst, Lauritzen & Popp, 2020). For example, a Nordic overview showed that **investment and physical infrastructure related to energy transition will have more direct effects on rural areas than on urban ones.** Furthermore, jobs in sectors typically associated with rural land use, such as agriculture, forestry and oil extraction, are likely to be particularly affected by the transition (Høst, Lauritzen, & Popp, 2020). The findings suggest that there will be considerable spatial implications during energy transitions. Rural areas are highly entwined with and shaped by energy transitions

because these areas accommodate the most renewable energy infrastructure. This infrastructure is, in turn, affected by the surrounding rural region and its policies. In other words, new energy developments may give rise to social tensions, yet this relationship is little studied and has been overshadowed in the academic literature by studies of urban areas (Naumann & Rudolph, 2020). To date, academic attention has largely focused on carbon dependencies and the conflicting practices that shape energy transition pathways. These studies then inform discussions of energy geographies, socio-spatial consequences, and development dynamics (Shucksmith, 2018). Although issues of energy geography and justice have attracted new interest among researchers and policymakers, little attention has been paid to the needs and opportunities of rural communities (Naumann & Rudolph, 2020).

There is significant potential in creating synergies by linking the energy transition with sustainable rural planning in order to tackle ongoing social, environmental and economic challenges. However, this requires that both rural communities and municipalities participate in the transition and work to ensure just outcomes and acceptance of transition measures. Efforts to link these two goals have been largely underutilised in policymaking and planning (OECD, 2021). Energy-transition processes cover many aspects of rural societies, economies and sectors, which means that profit distribution and the anticipated effects of regional socio-economic development are central questions. Supply chain benefits, community or shared ownership, and community benefits are particularly topical issues (Clausen and Rudolph, 2020). We still do not know enough to determine whether renewable energy projects support local job creation and local procurement or to what extent locally sourced labour boosts long-term rural development (OECD, 2021).

Compared to urban communities, rural ones have less human capital, financial means, infrastructure and resources to address the environmental and economic challenges linked to energy transitions, all of which make planning sustainability transitions more difficult (Halseth, 2019). Institutional capacity is, therefore, a key factor in enabling just and sustainable rural energy transitions (OECD, 2021). Although rural policy-making has evolved from being strongly sector-oriented to being cross-sectoral and more integrative in OECD countries, some gaps remain in terms of linking rural development with energy or environmental transitions. There is a need to overcome fragmented land-use governance between sectoral ministries and different levels of government in order to facilitate coordination at a level that can support the transition to sustainable land use (OECD, 2020). Another factor is the lack of mechanisms for benefit-sharing from renewable energy projects, as demonstrated by case studies of wind-power development in Northern Sweden and its related challenges and trade-offs (Ejdemo & Söderholm, 2015).

Energy transition targets in the Nordic countries – comparison

This section outlines the key energy targets and challenges in the Nordic countries' energy transitions. We focus on domestic energy generation, with an emphasis on renewable energy sources and excluding energy imports and consumption patterns. All Nordic countries have ambitious targets for increasing electrification via renewable resources and reducing GHG emissions, but all have differing pathways, energy transition targets, and current statuses in terms of the design and implementation of these targets. These differences depend greatly on the territorial context and national path-dependency trajectories (Weber & Søyland, 2020).

The natural resources available for renewable energy use, the increasing demand for carbon-free electricity, heating and transport, and an integrated market are among the main enablers of the energy transition in the Nordic countries. In turn, renewable energy use constitutes a major part of the transforming energy landscape (Wråke 2021). The Nordic countries rely on a variety of sources for renewable energy production, including hydropower, wind, solar, and bio-based sources (Nordic Energy Research, 2021). The European Union (EU) Renewable Energy Directive (Directive

2009/28/EC) sets legally binding targets for the renewable share of final energy consumption for each of the Nordic countries. RED's core 2030 targets include cutting GHG emissions by at least 55% (compared to 1990) and reducing energy consumption by 32% by increasing energy efficiency (Directive 2009/28/EC). This goal has been endorsed in each Nordic country's climate and energy policies, albeit with different renewable energy mixes (see Appendix 1).

Policy review

The previous sections of this paper described energy transition pathways in terms of natural resources and climate targets in the Nordic countries. This section focuses on each country's main climate and energy transition policies and how they address rural areas. Overall, in the Nordic context, the discussion of justice has mainly centred around spatial and distributional justice, specifically in relation to regional policy actions and mechanisms. There has been little discussion of energy transition, justice, and the implications for rural areas, except in local academic literature critical of regional policy integration.

Finland

Renewable energy sources represent about 40% of energy end-consumption. The National Energy and Climate Strategy to 2030 aims to increase this to over 50% by 2030. The Finnish policy documents discuss in detail renewable energy and its climate impacts, as well as land-use planning and its potential impacts on industries and the green transition. However, the policies tend to overlook rural aspects, particularly justice in rural energy transitions, land-use planning and local energy production.

The EU-regulated and -funded Rural Development Programme for Mainland Finland 2014–2020, governed by the Ministry of Agriculture and Forestry, is the main tool for regional and rural development. Other guiding policy documents are the National Rural Policy Programme and the National Archipelago and Waterway Development Programme for 2020–2023. The Rural Development Programme for Mainland Finland 2014–2020 includes measures related to land-use planning and localised energy production in rural areas, such as the promotion of small-scale electricity production and decentralised heat production in rural areas via agricultural investment subsidies and business support (Ministry of Economic Affairs and Employment, 2017). Since agriculture is the most dominant industry and employer in rural areas (Ministry of the Environment and Statistics Finland, 2017), many energy-policy measures target agricultural practices. For example, one aim of the environmental compensation payments specified in the Rural Development Programme is to promote renewable energy production on farms that produce goods for private consumption, as well as to encourage related enterprises (Ministry of Economic Affairs and Employment, 2018).

One perspective that may influence political processes and rural-urban relations is the country's decision-making culture. According to Peterson (2004), Finnish management culture favours powerful leaders who often communicate in a straightforward manner in a patriarchal atmosphere. Executives are "securely positioned, and they govern with authority and charisma. Even if gradually diminishing in Finland, it is specifically prominent in the Finnish forest industry, where changes are slow" (Takala et al., 2022). The role of the state in homogenising its territory entails certain urban cores serving as the state's strategic command centres, others acting as production units, and some functioning as resource peripheries (Ahlqvist & Sirviö, 2020).

Citizen participatory methods include hearings at local and regional levels. For example, the Citizens' Climate Pledge, launched in 2015, aims to place citizens at the centre of the societal transition to low-carbon development (Ministry of the Environment and Statistics Finland, 2017). Local acceptance of land-use planning reforms, such as wind-power construction, and the strengthening of rural centres and villages fall under both the Rural Development Programme and the National Energy and Climate

Strategy 2030. The new Rural Policy Programme for 2021–2027 also addresses community participation as one of its five themes. Its measures are directed at improving the rural operating environment, environmental justice, inclusivity and democracy – which in practice means improving, e.g. local services to meet societal needs (Mari Kattilakoski 2021)

Norway

Norwegian green transition policies commit the country both to the UN Sustainable Development Goals (UN SDGs) and to the Paris and Glasgow agreements through nationally determined contributions (UNFCCC 2020, UNFCCC 2020b). According to the Norwegian government, successful transition to a low-carbon society (*lavutslippssamfund*) requires that the regional and municipal levels provide a framework for regionally and locally embedded industries and businesses (Ministry of Local Government and Modernisation, 2019, Norwegian Climate Change Act, 2017). The Climate Change Act and the Planning and Building Act present the legal framework for efforts related to the low-emission transition (Wøien Meijer & Wolk, 2021).

Part of Norway's Climate Plan 2021–2030 (Stortingsmeldingen nr.13) specifically addresses rural areas (Det kongelige Klima og Miljø department/KMD, 2020), and the EU Green Deal is among the drivers for reducing emissions in rural areas. The Climate Plan explicitly mentions that Norway is not contributing to carbon leakage in agricultural and energy-producing rural areas since these are location-specific activities. In the long run, Norway expects agriculture to limit conventional bioenergy use because global emissions may increase deforestation elsewhere. Annual negotiations between the state and farmers (*jordbruksforhandlingane*) provide a forum for following up on action aimed at reducing emissions (not including subsidies). In addition, a range of actions target carbon capture and storage in forests, agricultural areas and green areas, as forests have the highest carbon storage levels (KMD, 2020). The Norwegian farmers organisations has responded by identifying eight strategic ways to reach the goal of cutting GHG´s till 2030 (Norges Bondelag, 2022).

In Northern Norway, research suggests that the local populations generally associate energy-transition effects related to oil and gas with an increased gap between elites and ordinary people, at least when it comes to wealth inequality (Aberge & Stubbhaug, 2018). One example of this is the "New North" policy, which is meant to break the image of a remote region in need of support (Aasjord & Hønneland, 2019; Lotherington, 2006; Regjeringen 2022, Storholm, 2014). However, this may not be a majority view. The oil era not only saw Hammerfest's exploitation of Snøhvit and the establishment of LNG infrastructure in Melkøya but also brought surplus migration and wealth to the region and a series of positive societal effects. In addition, this high conjuncture period also led to increased inequalities in financial ownership as a result of housing investment and property prices (Aasjord, 2020; Aberge & Stubbhaug, 2018). The green transition related to renewable energy generation in rural areas differs from oil extraction in that it may be more embedded in local community energy efficiency and provision, as households tend to be more prominent actors in the transition, i.e. related to solar cell implementation.

Energy policy documents regard wind power as a preferred future source of renewable energy, despite some studies on onshore and offshore wind-power plants identifying negative impacts on the biodiversity of bird species as plant capacity increases – a phenomenon that is currently neglected when building new sites (May, Jackson, Middel, Stokke & Verones, 2021; Naustdalslid, 2022). The driving forces and characteristics of a green transition in Norway are inextricably linked with the country's ambition of assuming global leadership in new technology (in floating offshore wind power). The predominant focus at national level is green competitiveness – from regional connectivity to skills development and climate technology leadership. Ultimately, policy incentives drive the direction of the energy transition and make interaction between policy-makers and industry essential in

understanding the conditions for "greening" contemporary energy systems (Haarstad & Rusten, 2016; Wøien-Meijer & Wolk, 2021).

It is important to make a distinction between Norwegian district policy and regional policy. While regional policy encompasses both urban areas and the countryside, district policy is concerned with the periphery. In the history of territorial planning, the question of central planning vs degrees of decentralisation has been of key importance. Due to a shift in planning approaches, sectors have become more important than territories, leading to some central institutions being terminated while others have taken over (Teigen, 2019; Teigen, 2020). From a spatial justice perspective, these changes have made the district policy even more fragmented and invisible to the general population. Instead, smaller local communities, organisations, and competence environments should be involved in creating system capacity (Aarsæther, 2020). The principles of ground rent are not applied to some forms of renewable energy exploitation, such as wind energy and regulating principles for other potentially important resources are not yet in place (Rønningen, 2022). Further, a historic Supreme Court decision protecting the rights of the reindeer-herding Sámi communities (see box below) may have profound consequences for licensing processes, the local embeddedness of such developments, and the implications for land-use rights (Ibid, 2022).

"Fosen-dommen" is about Norwegian Supreme Court Judgement from 11. October 2021. It determined that a wind power park extension in Storheia and Roan at Fosen peninsula in Trondelag conflicted with indigenous people´s rights to graze reindeers on the land, even if authorities had given concession rights to the wind power park in 2016 (Norges Høyesterett Dom, 2021; NRK 2021). The reindeer herding interests and land-use needs collided with renewable energy transition in the sparsely populated coastal part of the region. By this verdict determining Norway's commitment to United Nations Universal Declaration of Human Rights on indigenous peoples rights, article 27 - Norway is the frontrunner country that may be precedent example for other Nordic countries in green transition implications for rural areas with indigenous population (Nordlys 2021, Norges institusjon for menneskerettigheder, 2022). Article 27 (formally "folkerettsligt" bound for Norway from 1976) protects cultural heritage and nature resource basis for practising the culture (Beskytter kulturen og naturgrunnlaget for kulturutøvelsen) (Jon Gauslan, 2021; Øyvind Ravna, 2021). The court decision shows that Sami rights have to be part of Norwegian lawyers' knowledge basis and that it has its place in the Law education (Jon Beldo, Oral Source, 2021).

Denmark

Energy transition is regarded as a promising opportunity for economic development in Danish rural areas, especially via (co)ownership of decentralised (small-scale) renewable energy facilities (Savaresi, 2019). However, the means by which this development would be realised have not been sufficiently cultivated, either conceptually or practically. This means that while renewable energy-based rural development is seen as a desirable by-product of energy transition, its potential has remained largely unfulfilled. One problem is that growing capitalisation tends to separate renewable energy from the local economy, meaning that the economic potential of renewable energy should not be taken for granted without adequate support and coordinated policy efforts (Clausen & Rudolph, 2020). As a world-leading wind-power nation, Denmark's renewables profile differs from those of its Nordic neighbours. Wind power has been the main element in Danish renewable energy policy for decades, but public support has favoured, for example, the development of biogas and solar collectors (Meyer 2004). As wind-power turbines have gradually grown larger and now operate on an industrial scale, support for local wind farms has become more contested, encompassing issues such as ownership structures, the role of social psychology and representation biases (Johansen, 2021). A survey mapping attitudes towards local renewable energy technology (RET) in rural Denmark discovered that second-home-owners respond more negatively to wind-farm plans than the permanent population (Johansen, 2019). This indicates that the stakeholders' uses of and attachment to a place influence how they perceive landscape change related to renewable energy.

A range of policy reports, as well as agreements between the government and parliament, are relevant to rural areas and cover a spectrum of issues from transport agreements to a roadmap for green transition (Regeringen 2021a; Regeringen, 2021). The green transition policy launched in Denmark, titled "*Danmark kan mere*", consists of two phases. The first aims to solve labour shortages while supporting the green transition and building competences and skills development (Regeringen, 2021). During this phase, the government reached an agreement on green transition in the field of agriculture, the goal of which is to reduce energy consumption or conduct a shift toward renewable energy sources to reduce emissions, boost competitiveness, and improve social cohesion (Finansministeriet, 2021). The second phase involves a shift in emphasis from cheaper green energy to speeding up energy transition in order to decrease dependence on Russian energy sources (Klima, energi og forsyningsministeriet, 2022).

The current debates in Denmark emphasise the importance of securing local benefits from energy transition processes. As the new policy included an objective of increasing the production of solar energy provision and wind power on land four times over by 2030, the rural interest organisation Landdistrikternes fællesråd insisted that the related plans and action programmes should address local support ownership. The rural stakeholders here include the rural districts (*landdistrikterne*) that provide soil and landscape to wind and solar cell farms, as well as biogas and power to new installations – which also means accommodating the ensuing possible harm and nuisance (Klima, Energi og forsyningsministeriet, 2022; Landdistrikternes Fællesråd, 2022). In recent years, the rural districts' fund has allocated approx. DKK 10 million p.a. to a compensation fund for rural populations living in close proximity to wind farms (Bolig og planstyrelsen, 2022a). The planning act also dedicates a special section to disagreements regarding wind-turbine extensions (Bolig & Plansstyrelsen 2022[3]). Due to the exceptionally dense (albeit varied) concentrations of wind power in Denmark, some areas are more affected than others.

Iceland

The debate regarding green transition in Iceland is dominated by the utilisation of renewable energy opportunities. The location and purpose of the country's power plants are another long-standing rural development issue involving strongly opposing interests. In an effort to reach a compromise between the conflicting positions on power plants and natural protection, the government has upheld the Master Plan for Nature Protection and Energy Utilisation, based on act no. 48 (2011) on protection and energy utilisation (Alþingi, 2011). The purpose of the plan is to evaluate the power plant options and assign them to three categories: *energy utilisation*, *on hold*, and *protection*. The aim is to ensure that decisions regarding power plant investment are based on a comprehensive, long-term evaluation (Rammaáætlun, Act No 48/11). In theory, the parliament should pass proposals for parliamentary resolution of the Master Plan, but due to strong disagreement, no proposals were passed since 2015 until summer 2022. Furthermore, the Icelandic government is yet to situate wind-power utilisation within the energy framework, its relation to the Master Plan (*Rammaáætlun*), and the municipalities' role in wind-farm planning and construction (Ministry of Environment, Energy and Climate, 2022). A reviewed version of the National Planning Strategy for 2015–2026, introduced to Althingi 2021, included new chapters on climate planning policies for municipalities, including sections on wind-power planning policies, energy transition, and the social impacts of climate change in rural areas (Althingi, 2020–2021). On 15 June 2022, the proposal for changing the prioritisation for power-extraction locations, in terms of their classification as ready for utilisation, on hold or preserved for protection, was at last approved (Rammaáætlun, 2022; Alþingi, 2022).

None of the current policy documents specifically address the topics of spatial justice or energy justice in the rural context. However, the Energy Policy does include essential grounds for local inclusion, as well as incentives such as public ownership of energy resources, profit sharing between municipal and

state levels (Action Plan A.2. p.14), and how the development of power infrastructure should benefit local communities/municipalities (Ministry for the Environment and Natural Resources, 2020). The Energy Policy also recognises the main urban-rural energy imbalance issues in Iceland, namely the access to geothermal heating, reliable electricity distribution/grid systems (addressing grid instability in rural areas), and power supply opportunities for industries (i.e. economic development of rural municipalities). These urban-rural energy imbalances are also mentioned in the Rural Development Strategy 2018–2024 (Althingi, 2017–2018) and the Icelandic government Coalition Agreement (2021). One new development is that states, that viable agricultural land shall not be exploited for other purposes (i.e. energy exploitation) (Árnason, oral source 2022). The newest proposal for a parliamentary resolution for a rural development policy 2022–2036 includes a section on energy transition (B.2.), the objective of which is to support the energy transition in line with the aforementioned Energy Policy. This will be quantified by the number of new projects in terms of electrification of harbours, geothermal prospecting, small-scale power plants and heat pumps (Althingi, 2021–2022). However, the inefficient preparation and permission process constitutes a challenge for small-scale power projects (Ministry of Environment, Energy and Climate, 2022).

Investment in energy development has not previously been aligned with the official energy goals, mainly due to debates on how to define Iceland's energy *needs* (Ministry of Environment, Energy and Climate, 2022). Increased energy demand for economic development based on heavy industries, data centres or possibly an undersea cable to the UK would challenge the current affordability of energy units in Iceland and, therefore, affect the cost of electrified transport. In recent decades, high-temperature geothermal fields have been increasingly utilised for electricity production, but their long-term renewability is by no means certain (Arnórsson, 2017, in Huijbens & Benediktsson, 2022). Geoscientists, engineers, politicians and businesspeople have all noted the existence of a distinct "geothermal sociotechnical imaginary" (Benediktsson, 2021), with clear eco-modernist characteristics, which strives for a "good" Anthropocene and contributes to a "new Nordic extractivism" (Kröger, 2016 in Huijbens and Benediktsson, 2022). Excessive geothermal extraction could affect pressure in drill holes and lead to declining power plant capacity – a so-called geothermal drawdown (Spittler et al., 202et al.) Despite Iceland already topping the global list of electricity production per capita, many developers and investors have indicated an interest in establishing wind farms. Whereas investment in the hydro and geothermal sectors mostly comes from domestic companies, many of the wind proposals are backed by international players in the wind sector. Numerous larger wind-farm projects are entering the environmental impact assessment stage, even though planning authorities are somewhat ill-equipped to deal with this new category of land use (Skipulagsstofnun, 2017 in Huijbens and Benediktsson, 2022).

Sweden

As mentioned, policy tools and strategies inform the design and implementation of the energy transition in Sweden, the main basis of which is set out in the Climate Policy Framework and the GHG emission reduction targets.

In particular, electrification of the industry and transport sectors is considered essential (Government Offices of Sweden, 2022). A recently adopted national electrification strategy is expected to set out the conditions for a fast, smart and socio-economically efficient electrification that relies on there being an energy transition. In the Swedish context, renewable energy sources consist mainly of wind, solar and hydropower, as well as bioenergy. In addition, large-scale wind-power development (especially offshore) is considered particularly important (Swedish Energy Authority, 2021). Policies and mechanisms concerning the development of wind power in Sweden address two core policy areas: energy policy and land-use policies. Energy supply and systems, as well as energy consumption, fall under energy policies, while land and water use, representing both conflicting and aligning interests in decision-making, fall under land-use policies. Spatial governance is an important puzzle

piece in the Swedish energy system and its pathways toward reducing GHG emissions. The development of wind power, for example, depends on a set of planning targets for wind-power expansion, as well as national interests. Governance measures do not include specific targets for planned outputs but seek to integrate them into strategic spatial planning documents, such as the municipalities' comprehensive plans. As such, the implementation of renewable energy planning largely takes place at local level via comprehensive municipal planning and particular projects (Liljenfeldt & Mels, 2019). In addition, these strategies do not prioritise rural aspects, aside from stipulating that electrification should be "compatible with other interests, such as a safe electricity supply and overall defence mission, an attractive living environment in rural areas, the cultural environment and nature conservation. The focus should be on identifying and managing goal conflicts through various measures" (Ministry of Infrastructure, 2022, p.85). "*The government calls for increased coexistence between greatly expanded electricity production and other interests" (ibid).* In Swedish official policies and strategies, measures can be assigned to other institutions and authorities (Se/uppdrag), and within that process, the goals and measures are more clearly defined. As such, some of the strategic governmental decisions are very generally formulated, as they will later be defined in more detail by the implementing institution tasked with carrying out follow-up work. Another supplementary tool is the regional development policy (Näringsdepartmentet, 2022), which explicitly states that the country as a whole, including the more sparsely populated areas, must unite sustainability and resilience (ibid, p.2). The policy clearly sets out the goal of zero carbon emissions by 2045 and identifies the state authorities and institutions responsible for implementing regional development policy – specifically, the energy authority (Statens energimyndighet, statens jordbruksverk and boverket) (Näringsdepartementet, 2022. P.8). Generally speaking, however, the coupling between the green transition and rural development is weak.

Swedish municipalities struggle with the conflicting goals and impacts of energy transition, e.g. regarding intensive land use and potentially disruptive energy production, which on the other hand, may give a boost to the labour market and local and regional development. In rural areas, long-term development and investment in different types of energy arenas pose particular challenges. Although there is investment in green jobs, there is a lack of a long-term strategy aimed at supporting small companies in different energy fields (County Administrative Boards, 2021; Glaas & Hjerpe, 2018).

The role of municipalities in establishing new renewable energy-production sites has long been debated, as their right to veto the allocation of wind farms has a strong legal status in Sweden and often presents obstacles when planning new wind farms and processing permits.

While this underlines the importance of spatial planning as a governance tool that can support the energy transition,
at present, there are no official approaches to or methods for rural planning. Issues of rural change are usually handled within a framework of comprehensive municipal planning, often in terms of rural development, as Sweden makes little distinction between rural planning and rural development. Rural development and change are often managed as issues of economic growth or agricultural policy (Nilsson, 2020). Regional policy also provides valuable tools for implementing rural policy and energy and climate goals in accordance with regionally specific needs and conditions (Ministry of Enterprise, 2021).

In examining the underlying problems of environmental planning for a sustainable energy transition, particularly with regard to ecological contexts and issues of scale in Sweden, Malmsten (2022) found that Swedish legislation lacks steering capacity in its overarching environmental goals. Fragmented planning processes and the lack of more comprehensive perspectives in decision-making concerning land and water use have been identified as significant reasons for this system failure. There is a significant risk that the current energy transition will take place at the expense of other environmental values, such as preserving biodiversity and the protection of cultural values. As such, there is a need

for increasing consensus vis-á-vis the importance of landscape approaches and landscape planning in order to better balance competing interests and coordinate regulations for multiple and sustainable land and water uses within a given area (Malmsten, 2022).

A policy analysis of key strategic documents reveals that rural areas are addressed in a range of ways in relation to the energy transition. Firstly, rural areas are often regarded as the engines for energy transition. For example, the rural development policy (2017) states that "rural areas are an asset for seizing future opportunities for sustainable development and meeting the challenges posed by climate change and the need to transition to a more circular, bio-based and fossil-free economy" (Government Offices of Sweden, 2017: 15). Secondly, official discourse acknowledges that climate change mitigation affects rural areas and various (predominately rural) sectors in different ways. Thirdly, as outlined in the national strategy for sustainable regional development 2021–2030, policy tools should promote equal labour opportunities and well-being in rural areas as fundamental prerequisites for sustainable development. Balancing conflicting interests in the energy transition with the electrification of the economy poses challenges to transition work. Meanwhile, there is a need for greater co-existence – and, potentially, intervention – between expanding electricity production and other interest groups, particularly with regard to rural and cultural environments, as well as nature conservation (Ministry of Infrastructure, 2022). Another programme promotes job creation and local business development in renewable electricity generation. The Swedish Energy Agency's current research and innovation strategy (2021–2024) outlines local energy production as an important part of the energy transition, as local and regional flexibility solutions are expected to reduce pressure on grid capacity (Swedish Energy Agency, 2021).

Rural municipalities dominate wind-power production and are also the key source of the necessary biomass (Swedish Energy Agency, 2021). The 2017 rural development strategy highlights, under the goal of "promoting circular, bio-based and fossil-free economy and sustainable use of natural resources", that rural areas are essential for developing the climate and environmental innovations needed for sustainability transitions. The strategy notes that energy solutions suitable for cities are not always effective in rural areas (Government Offices of Sweden, 2017). The EU's common agricultural policy drives the development of Swedish rural areas. The 2021–2027 program period will contribute to climate impact and sustainability transition work and raise the profile of bio-based energy.

Swedish climate policies focus more on technological innovation and economic incentives than on social dimensions. Contribution to GHG emissions, vulnerability to climate impacts and participation in climate policy-making vary across the population, depending on socio-economic factors, location and gender, among other factors (Magnusdottir and Kronsell, 2021). While there is a vast body of literature on public perceptions of the development of energy sources in Sweden, there is no consensus regarding which socio-demographic factors are most influential in determining acceptance and resistance or have the greatest impact on different groups. In fact, the rural perspective has generally been an under-addressed research area. A study of energy injustice in wind-power development among Sámi indigenous people discovered that while the Swedish government aims to be at the forefront of sustainable development, the Sámi people generally experience injustices during energy-transition processes, as wind-power installations tend to be sited in the northernmost regions of Sweden (Cambou, 2020). Historically, every form of large-scale power production (e.g. hydro, nuclear and wind) has given rise to resistance motivated by environmental arguments across societal groups, e.g. in relation to place-based values and ecological threats (Anshelm & Simon, 2016).

To sum up, the development of renewable energy and the electrification of economic sectors, infrastructure and society are characterised by dependence on national and sectorally driven policies that need to be coordinated across policy areas and governance levels. This process can be understood as three-tiered national energy policy integration. Regional development policy plays an

important role, as do the municipalities' spatial planning competences. Private and civil-society organisations must have the capacity to help facilitate this shift. Integrating energy transition across regions and municipalities differs depending on the context and on how energy policy and development intersect with rural policy and rural development. Finally, a territorially sensitive lens is key for understanding rural needs, drivers and institutional capacities and for managing transition pathways in order to meet the current targets.

Discussion & conclusions

As described above, all of the Nordic countries and regions have committed to climate agreements at various levels and across a range of sectors, all of which affect rural areas in different ways. When considering the green energy transition, and specifically the renewable energy mix, a comparison of low-carbon electricity production shows the differences between the countries and regions in terms of their potential for producing non-fossil fuel energy and reveals the possible side-effects of this.

The implementation of the energy transition and increasing electrification in the Nordic countries has been accelerated by the energy crisis in winter 2021/22, when electricity prices rose so high that authorities in some countries decided to subsidise or compensate households with high electricity bills (Regeringskansliet, 2022a; Bonde, 2022; Energistyrelsen, 2022). However, there are some regional variations. While Iceland and Norway may face challenges in terms of effectivisation, rather than a need to expand, Sweden, Finland and Denmark must increase their share of renewable energy in total domestic energy production. This means that different countries are in different positions in relation to the green energy transition.

While Sweden is aiming for 100% electricity production from renewable sources by 2040, Finland aims to increase the share of renewable energy consumption by 50% by 2030. Norway aims to reduce emissions by 50% by 2030. Iceland expects renewable energy consumption to increase by 160% by 2060, and Denmark will completely phase out coal by 2030.

Many countries are focusing on wind power as their primary means of implementing energy transition (both offshore and on land), but also as means to rapidly increase the share of renewable energy production. Over the next decade, bioenergy, solar electricity and hydropower will also help speed up the green energy transition.

The scientific literature makes it clear that the just transition means different things for different societal groups. However, there are some patterns in the different countries' priorities. An overview of the key features of the just energy transition(s) in current scientific literature reveals that justice is perceived from different perspectives. The distributive justice aspect is perhaps the most prominent, as expressed in concerns about economic disadvantages or the devaluation of property values as a consequence of living near wind farms. Examples from Denmark indicate that this seems to be the case among second-homeowners to a higher degree than the permanent rural population. What is important is that this consequence is one driven by perception rather than raw economic calculation. What remains unclear, therefore, is whether the devaluation consists of a loss of amenity value or real financial loss (i.e., declining property values). While distributive justice is highly debated in the media due to energy crises and rising prices, this discussion paper's focus is more on governance perspectives and recognising the value of communities. Procedural justice focuses on inclusion and exclusion in decision-making and, as such, is relevant in a regional and spatial perspective for rural areas.

In this discussion paper, we have addressed a range of points and raised new questions regarding the sustainability of the green transition in rural areas in terms of both the population and the

environment. Due to the current situation, the shift from fossil fuels to renewable energy sources will probably take place very rapidly in the next few years. The war in Ukraine and the problematic energy dependency of Russia further emphasise the need to bring new perspectives to the green transition debate. The EU is working collectively to speed up the transition and remove Russian oil from its energy mix – a process that is happening very quickly (6–12 months, with some exceptions). Further consideration should be given to how we can alleviate these problems and ensure that the local/rural point of view is taken into account. The current war and related energy/food crises underline that just transitions are not only local civil rights issues but also global human rights issues, which therefore require ambitious, holistic and long-term visions.

We identified several challenges. Three key challenges associated with the Nordic energy transition are as follows: *technological contingency* (which applies to the reliance on continued technical innovations across renewable electricity systems, sectors and markets); *political contestation* (which refers to an unstable and unpredictable policy landscape, social acceptance and intolerance to energy targets); and thirdly, *social energy justice and recognition* (e.g. loss of jobs and retraining needs, energy literacy and the outsourcing of fossil fuel emissions in the transition). Decarbonizing energy systems while ensuring sustainable, affordable and stable energy supply is a major societal challenge, which requires large-scale socio-economic transition and impacts on society as a whole, including institutions, regulations, business models and user behaviours. Related societal, economic and environmental goals may also compete or conflict with each other – a phenomenon known as the "energy trilemma", referring to the tension between the competing aims of economics, politics and the environment in energy transitions. Yet another challenge is that, in rural areas, renewable energy not only involves new elements but also completely new land-use systems, which may change the pattern of the landscape. In addition, energy landscapes have historically been a cause of societal conflict, often arising from people's perceptions of them.

It seems that the recent shortfall of oil will largely be replaced by renewables. In at least some of the Nordic countries, energy production has become a question of safety and self-sufficiency. The scientific literature does not, to any substantial extent, address the time factor – i.e. the fact that new energy installations and plants take around 10–15 years from the issuing of concessions/licenses to fully functional energy-provision sites. However, this aspect is addressed in Iceland's latest policy document.

The energy transition does not primarily happen at the national level, but the EU emphasises its importance at the local and regional levels. Locally owned and produced energy is also a matter of self-sufficiency. So how can local ownership help facilitate the energy transition?

Several additional issues have been raised that address challenges for rural areas so that they may reap local benefits from the value generated by new renewable energy production. Based on a material-economic value approach, it is conceivable that different kinds of compensation schemes may contribute to increased local content. Developments in Denmark show that growing capitalisation tends to separate renewable energy from local economies. As wind-power turbines have gradually grown to industrial-scale heights, support for local wind farms has become more controversial, encompassing issues such as wind-farm ownership structures, the role of social psychology, and representation biases. However, given that hydropower plants that have been functioning for over 40 years have less energy-production capacity than turbines, due to rapid development in wind-power technology, it becomes more complicated to compare the relative values of different renewable energy sources, especially in relation to the external implications for landscape, biodiversity, etc.

Securing local benefits from energy-related value creation in rural areas can also be a matter of securing local ownership – in other words, enabling more locally embedded energy efficiency and

provision so that rural communities are more prominent actors in the energy transition. Locally produced energy may, in some cases, bring energy self-sufficiency and safety to the community, secure jobs, and perhaps even generate wealth. However, the policies that enable or support this are still not all-encompassing, and research into how well-managed value creation can benefit the local community is ongoing.

Transformative values are important in the sense that nature-based resources or ecosystem services can be redeployed to energy production. However, this raises questions regarding what is more valuable – producing energy or enjoying these resources in other ways, e.g. as picturesque landscapes or hiking trails. In this way, conflict arises between different forms of value creation, further complicating the debate about local benefits.

Relational values will remain important in the green energy transition precisely because unequal relationships and power positions between, e.g. large-scale investors, official bodies and the local population need to be resolved to prevent conflicts from escalating, which may slow down or speed up green energy transition in the regions concerned.

From the rural perspective, energy transitions have considerable spatial implications. Rural areas are highly entwined with and shaped by energy transitions since they accommodate the most renewable energy installations, which in turn are affected by the surrounding rural region and its policies. This relationship remains understudied in the academic literature and is overshadowed by urban areas.

The value generated by these transition efforts for the benefit of rural areas should focus on key rural sectors but must also be conscious of different business combinations across regions. Supply chain benefits, community or shared ownership, and community benefits are debated issues. In terms of the local benefits in rural settings, it is still uncertain whether renewable energy projects support local job creation and local procurement and to what extent locally sourced labour boosts long-term development in these areas. Institutional capacity is highlighted as a key factor in enabling just and sustainable rural energy transitions. Sparsely populated areas with an asymmetric power position vis á vis big energy investors, and scarce human resources may therefore encounter challenges associated with dealing with large-scale investor capacity when it comes to negotiating and securing local benefits.

The need to navigate energy trilemmas emphasises the importance of carefully considering land-use aspects when policing green transitions, especially in rural areas. There is significant potential for creating synergies by linking energy transition with sustainable rural planning in order to tackle ongoing social, environmental and economic challenges. However, this requires that both rural communities and municipalities participate in the transition and ensure just outcomes and the acceptance of transition measures.

Regulatory challenges and possibilities

While the Nordic countries have similar but varying timeframes for common goals, e.g. reducing their carbon footprint and fulfilling international agreements, the national governments are struggling with their efforts to combat climate change.

Swedish municipalities are having to contend with conflicting goals and the impacts of energy transition, e.g. regarding intensive land use and potentially disruptive energy production, which on the other hand, may also boost the labour market and local and regional development. A recent programme launched in Sweden promotes job creation and local business development in renewable electricity generation. The current research and innovation strategy for the Swedish Energy Agency (2021–2024) has the potential to generate rural value by emphasising local energy production as an

important part of the energy transition, with local and regional flexibility solutions expected to reduce pressure on grid capacity.

In Denmark, one problem is that growing capitalisation tends to separate renewable energy from the local economy, meaning that the economic potential of renewable energy should not be taken for granted without adequate support and coordinated policy efforts.

Nature should be thought of as a collective entity consisting of *plural natures* – however, planning tools do not always grasp this. These natures' meanings are negotiated within a multitude of social situations and practices, with particular histories and geographies (Häkli, in Lehtinen, 2022, p.101), and the diverging claims of nature and the clashes between them influence the practices of culture-nature (Valkonen, 2007). As we saw in the Norwegian Supreme Court case "*Føsen Domen*", the politicisation of nature occurs where various coalitions of nature use arise due to conflicting definitions and valuations of nature, its history and its role. Additional approaches, e.g. dialogue and community vision workshops, are required to resolve these conflicts. They cannot be addressed by planning measures alone.

Complex situations arise when there are varying and opposing perceptions and perspectives regarding what is valuable. Different stakeholders have different and potentially incompatible views on different energy sources and their feasibility or potential for increasing the share of the renewable energy mix in a fair way. There is, therefore, a need to look more closely at regional or local specificities in the challenges faced by each Nordic country in the green energy transition.

In several cases, the overall climate benefit of land-use planning is in conflict with other interests. For example, in Iceland and Finland, peatlands and farmlands should be restored to natural habitats to serve as carbon sinks, but there is a lack of not only information but also political will and support. In Iceland, at least, the farmers are waiting to see whether the government or the EU will compensate them for rewilding efforts. Land-use policies and support mechanisms need to be updated, and many countries are working to develop new land-use laws and strategies.

One curious but relevant perspective, which is not always taken into account, is that natural processes and non-human actors participate in politics by affording "material, which fuels the debate on the feasibility of human coexistence within the conditions set by nature" (Haila & Dyke, 2006). In other words, renewable energy sources and their location in space/place/region/rural areas have a political dimension, as windy locations, sunny spots, forest spaces, watersheds and hydrological cycles, geothermal and seismological spots, etc., attract interest and potential investment to the countryside. The expansion of renewable energy production installations must be assessed against their impact on the vitality of nature and socio-environmental vulnerability to ecological catastrophes (ibid).

How prominent is the rural perspective in the Nordic Region in academic literature and green transition policy documents, and what form does this take?

Overall, the rural perspective on local benefits, other than the objective of working towards balanced communities, is not prominent, but how it is addressed varies depending on the country. Sectoral policy documents and strategies might mention some agricultural implications, interference with biodiversity issues, or address a nature conservation perspective vs utility perspective.

Overall, the rural perspective – with an emphasis on securing local benefits – is far from a dominant perspective. However, one common aim should be to find solutions for a bigger proportion of the population so that diverse rural populations can live in peace with the decisions taken and the concessions given. Denmark is an example of a country in which policy-makers have increasingly

adopted measures aimed at stimulating renewable energy generation, thereby turning local and rural communities into prominent actors in the energy transition.

However, there remain many possible gaps in current energy transition policies from the rural perspective. Governments know where they are heading, but in some cases, they do not know how to get there. Given that energy extraction contributes to energy transition, the potential pathways for reaching these goals might include an ownership strategy for public companies, tendering approaches that favour energy transition, the implementation of concessions/licenses, incentive schemes in energy investment, etc. One remaining challenge is how to work with various groups of stakeholders in terms of land use and rural areas in order to encourage reconciliation.

Next steps

This discussion paper and policy review is the first milestone in the project A "Just Green Transition in Rural Areas" and does not in any way complete the ongoing discussion from the perspective of local benefits and creating value. Several issues, stakeholders and energy fields have not been discussed in this paper, as the current policies and target programmes may have too narrow a view of the social impacts of green transitions and their land-use implications. The next steps will involve a series of workshops to discuss this topic further, the aim of which is to focus in more detail on selected areas in the case studies in order to shed more light on the gaps and potentials identified.

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Appendix

Overview of renewable (low carbon) energy production mix in each Nordic country (and targets to increase the share of renewable energy production of total energy production).

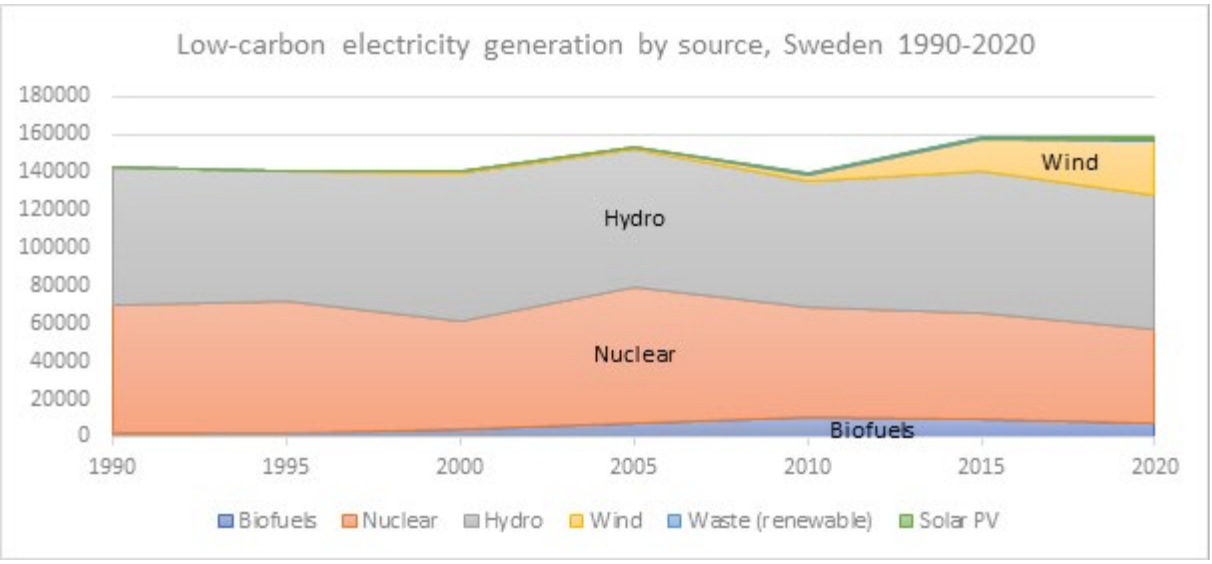

Figure 2. Low Carbon Electricity generation by source in Sweden 1990-2020, by year and GWh´s (IEA 2022).

In **Sweden**, the target is to achieve 50% more efficient energy consumption by 2030 (compared to 2005), with 100% of electricity production from renewable sources by 2040 (Swedish Energy Agency, 2020). To achieve this, the Swedish Energy Agency plans to expand renewable electricity production by up to 100 TWh in annual energy volume by 2040 (Swedish Energy Agency, 2021a). Hydro, nuclear, wind and solar power already represent approximately 90% of the country's total electricity mix (Statista, 2022). However, there is a need to continuously increase the share of renewable electricity production. Targets for increasing net electricity production per type of energy source differ depending on the target year. According to a short-term forecast, wind power will more than double, from 20 terawatt hours (TWh) in 2019 to 46 TWh in 2024 (International Energy Agency, 2022). Electrifying the industry and transport sectors is considered crucial (Government Offices of Sweden, 2022). A recently adopted national electrification strategy is expected to set out the conditions for a fast, smart and socio-economically efficient electrification that relies on energy transition. Renewable energy sources consist mainly of wind power, solar and hydropower, as well as bioenergy. In addition, large-scale wind-power development (especially offshore) is considered to be particularly important (Swedish Energy Authority, 2021).

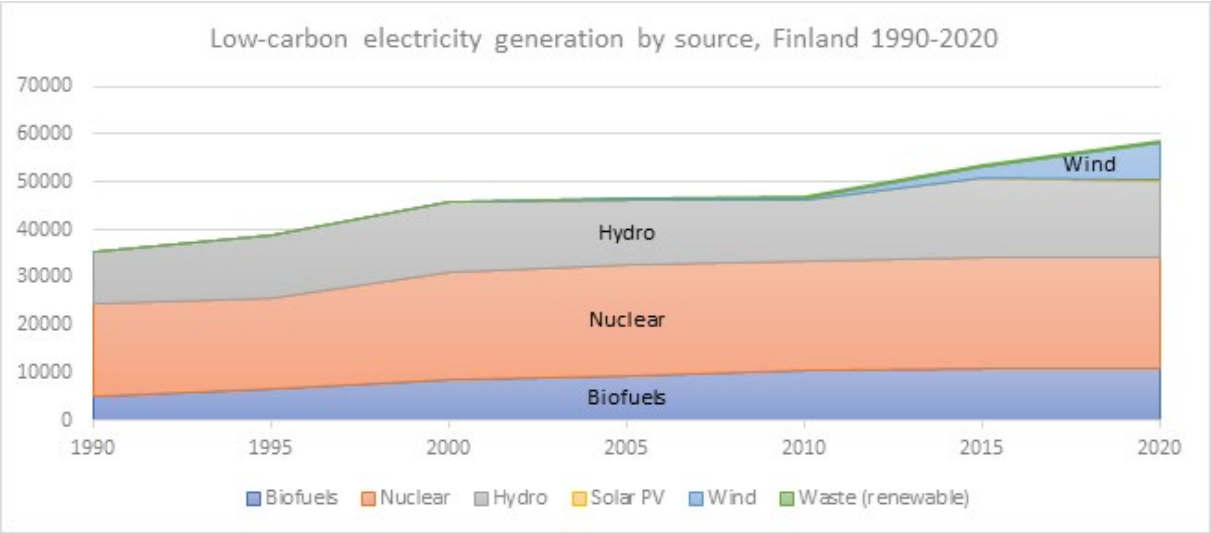

Figure 3. Low Carbon Electricity generation by source in Finland 1990-2020, by year and GWh´s (IEA 2022).

Finland has several key guiding documents related to the aim of achieving carbon neutrality by 2035. Besides the national targets, the EU adaption strategy and the new EU climate law also steer the national climate work actions. The Nordic countries are among those with the highest concentration of energy-intensive industries in the OECD. In Finland, total energy production has increased by 52.07% (in 2020) since 1990, but total Co_2 emissions have declined by 33.68%, and the pace of this reduction has been accelerating since 2007. The same has happened in almost all of the Nordic countries due to a reduction in oil and gas consumption. The industrial sector is characterised by high levels of electrification, and biomass also plays a key role in the energy supply, particularly in Sweden and Finland (Grunfelder, Norlén, & Randall, 2020). The energy sector is by far the largest producer of GHG emissions in Finland and accounted for 74% of the country's total GHG emissions in 2017, including emissions from transport fuels and fugitive emissions related to the production, distribution and consumption of fuels. Agriculture was the second-largest source of emissions at approximately 12% (Ministry of the Environment and Statistics Finland, 2019).

In **Finland,** the most important forms of renewable energy are bioenergy, biofuels from forest industry side streams and other wood-based fuels, hydropower, wind power and geothermal. Biodegradable waste, side streams from agriculture and industrial production, and municipal waste are also sources of bioenergy. Solar electricity has a growing role, especially where on-site energy generation is a substitute for energy bought from the grid, and solar heating supplements the main heating system (Renewable Energy in Finland, 2022). Renewable energy sources accounted for half of all electricity production in 2020. 45% of renewable electricity was generated by hydropower, 23% by wind, and the rest mostly by wood-based fuels. Nuclear power generated 34% of electricity, while fossil fuels and peat accounted for 14%. The National Energy and Climate Strategy for 2030 sets a goal of increasing the share of renewable energy in end-consumption to more than 50% (Ministry of Economic Affairs and Employment of Finland, n.a.). Hydroelectric power plants represent 22% of the country's total energy production mix (Statistics Finland, 2021). Increasing investment in renewable energy production is a key target. Future objectives include increasing the share of bioenergy (especially wood-based fuels), as well as hydropower, wind power and geothermal energy (Ministry for Economic Affairs and Employment of Finland, n.a.). Solar electricity has become increasingly important, particularly regarding on-site energy generation substitutes for energy bought from the grid, and solar heating is used to supplement the main heating system (Ministry of Economic Affairs and Employment of Finland, n.a.).

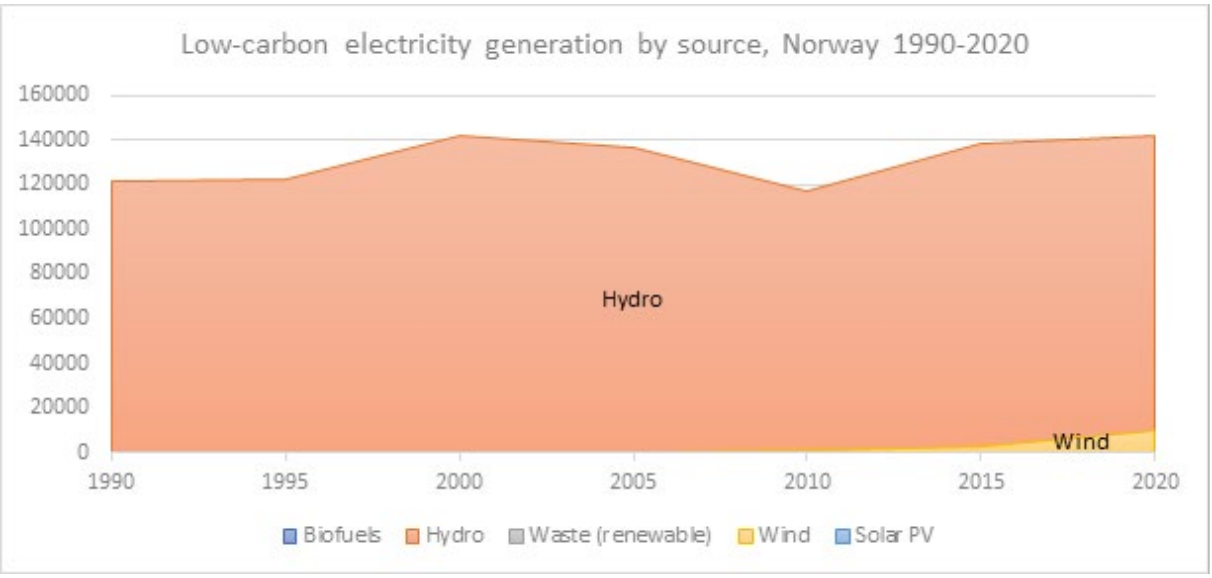

Figure 4. Low Carbon Electricity generation by source in Norway 1990-2020, by year and GWh´s (IEA 2022).

Norway adopted its new low-emission strategy for 2050 in October 2019. Under that framework, the commitment is to reduce emissions by at least 50% and head towards 55% by 2030 (compared with 1990) (Government of Norway, 2020). The EU green deal is a key driver in reducing emissions via the green transition and renewable energy in rural areas (KMD, 2020, p.20). It is explicitly mentioned that Norway will not contribute to carbon leakage from protected/shielded agriculture and energy production in rural areas since these are location-specific activities. In the long run, Norway will demand that agriculture limits the use of conventional bioenergy because, in the worst case, emissions can increase as a result of deforestation elsewhere. From 2024, requirements to lower emissions on vessels used to service aquaculture will be gradually introduced (s.21). The annual negotiations between the state and the Norwegian farmers' organisation (*jordbruksforhandlingane*) will be the forum for following up on actions and tools (not including subsidies) aimed at reducing emissions. The farmers' organisation has identified eight strategic ways to reach the GHG reduction goal for 2030 (Norges Bondelag, 2022). In terms of forest and land use, a range of actions will be implemented in order to increase carbon capture and storage in forests, agricultural areas and green areas. The highest expectations for carbon storage are linked to the forests (KMD, 2020, p.24).

The country's domestic energy supply mix is strongly dependent on hydropower and natural gas, while oil and gas are an important part of the energy landscape. There has been a stable dependency on hydropower as a low-carbon electricity generation source since 1990, while wind-power generation and bioenergy input have both increased slightly in recent years (International Energy Agency, 2022). Hydropower accounts for over 98% of renewable electricity generation, making Norway one of the world's leading hydropower countries, but it has attracted little research attention (International Energy Agency, 2022). However, studies on the impact of policy actions and future energy prices in a cost-optimal development of the Norwegian and Swedish energy systems show that the future role of large hydro reservoirs depends on both adopted policy actions and future energy prices. The development of energy systems is mainly driven by political actions (Seljom & Tomasgaard, 2017). Small-scale hydropower and the upgrading of existing hydropower plants, as well as new transmission lines to cover supply deficits, also represent regional energy potential (Sandsmark, 2009). The share of wind and solar power has been increasing, but it is still minimal compared to hydropower.

Following a three-year hiatus, Norway will resume the licensing process for onshore wind power developments, limiting it to municipalities willing to accommodate giant turbines (Reuters, 2022). While the oil and gas industry engaged in offshore power construction during the 2000s, its

motivation to do so fluctuated in response to market movements, so declining oil and gas markets led to increased interest in wind power. This suggests that Norwegian transition policies should target the economic conditions faced by already existing industries (Mäkitie, Normann, Thune & Sraml Gonzales, 2019). Official agencies consider offshore wind power a priority in the green transition and renewable energy generation (Det kongelige klima og miljø departementet, 2020), and two major floating wind-power projects are already underway. One of them was due to start during the third quarter of 2022. Hywind Tampen is the first 88 MW floating wind farm to service the power needs of oil and gas platforms in the Norwegian North Sea. Another, the Utsira Nord, will be located west of Utsira Island and Haugesund region and has the potential to generate 6,000 MW (Regjeringen, 2022). Statnett (a state-owned energy infrastructure company) has been given the responsibility for the overall planning of offshore grid installations.

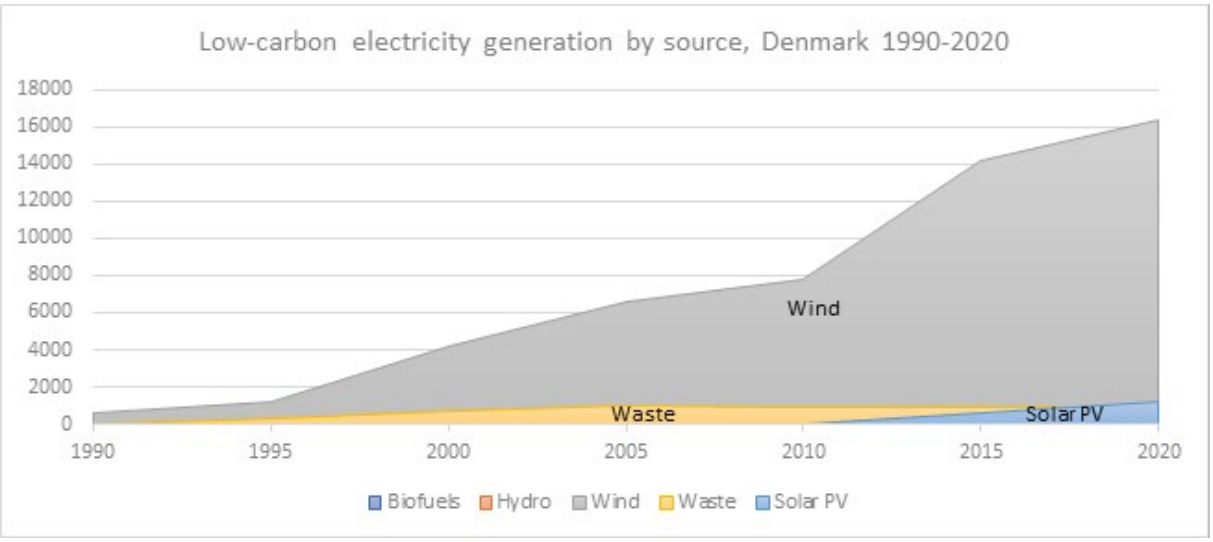

Figure 5. Low Carbon Electricity generation by source in Denmark 1990-2020, by year and GWh´s (IEA 2022).

Denmark aims to achieve net-zero emissions by 2050 and to phase out coal-fired power by 2030 (IEA, 2022). In addition, Denmark plans to cut GHG emissions by 70% by 2030 (compared to 1990) and to ensure that renewables cover at least half of the country's total energy consumption by 2030, such that 100% of electricity consumption and 90% of district heating comes from non-fossil fuels (IEA, 2021).

Denmark is among the few pioneering EU states with significant experience in mainstreaming community energy (Savaresi, 2019). National and subnational authorities and policy-makers have increasingly adopted measures to stimulate renewable energy generation, thereby turning local and rural communities into prominent actors in the energy transition (Johansen, 2021; Savaresi, 2019). Denmark also stands out internationally in terms of district-heating efficiency and sustainable development, with a top World Energy Council ranking for its energy trilemma-based system. The plan is to continue the decarbonisation process by decreasing biomass-import dependency, changing the role of combined heat and power plants in the energy system, transitioning to non-combustion heat supplies, and increasing individual heat pumps in single-family houses – the latter being particularly relevant to the country's more remote and sparsely populated areas (Johansen & Werner, 2022).

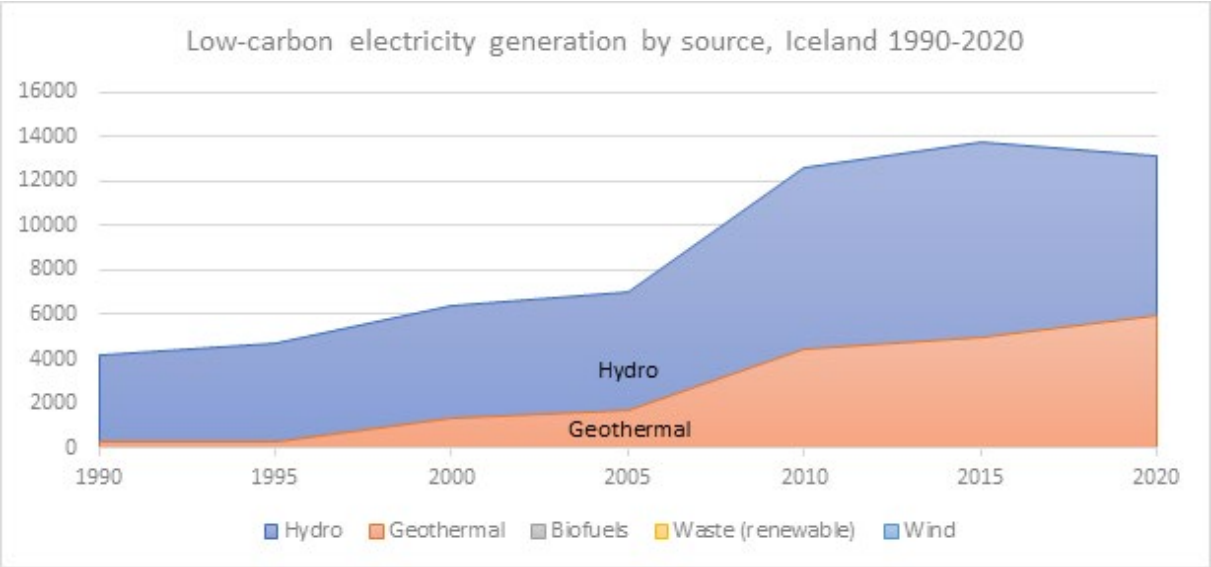

Figure 6. Low Carbon Electricity generation by source in Iceland 1990-2020, by year and GWh´s (IEA 2022).

The Icelandic government has committed to carbon neutrality and full energy conversion by 2040, supported by the Energy Policy and its Action Plan, as well as the 2021 Coalition Agreement. Electricity generation and space heating in Iceland comes almost entirely from hydro and geothermal sources. This means that the targets for the green transition are largely limited to land and sea transport and the fishing industry, which are jointly responsible for 90% of GHG emissions from the energy sector (Keller, o.fl., 2021). For this reason, the official aim is to improve the energy status of the fishery fleet and transport sector. The electrification of cars, trucks and harbours will significantly increase local electricity demand, and the most recent Energy Use Projections for 2021-2060 forecast an increase in energy usage by 30% in 2030 and by 110% by 2060. If the government's goals for green transition are to be achieved, common energy usage will increase by 160% by 2060 (National Energy Authority, 2021).