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A Comparative Analysis of Interlinkages between National Forest and Climate Policies in Norway, Finland and France within the European Union Policy Framework

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Sammendrag

I arbeidet med å finne effektive løsninger som kan bidra til å nå de ambisiøse utslippsreduksjonsmålene i Parisavtalen, synes det å være et økende søkelys på den viktige rollen skogen og skogsektoren kan spille i klimasammenheng. Dette har ført til at skog- og klimapolitikk i stadig større grad henger sammen. Formålet med denne masteroppgaven var å studere disse sammenhengene i ulike land for å få en bedre forståelse av hvordan klimamålene påvirker skogpolitikken, hvilke typer nasjonale klimamotiverte skogpolitiske virkemidler som er iverksatt, og i hvilken grad EUs klimarammeverk påvirker nasjonal skogpolitikk. Det ble benyttet en kvalitativ forskningsmetode for å gjennomføre en sammenlignende analyse av den nasjonale skog- og klimapolitikken i Norge, Finland og Frankrike. Sammenhengene mellom skog- og klimapolitikk ble analysert langs to dimensjoner: horisontale sammenhenger mellom politikken på de ulike områdene på nasjonalt nivå, og vertikale sammenhenger mellom nasjonal politikk og EUs klimarammeverk. Tre ulike nivåer ble vurdert i den horisontale analysen: overordnede målsettinger, virkemidler, og tematiske elementer i gjennomføringen av politikken. Resultatene viste komplekse og tydelige sammenhenger mellom nasjonal skogpolitikk og klimapolitiske målsettinger, inkludert mål for fornybar energi. Variasjoner mellom de tre landene bekreftet betydningen av tilpasninger mellom politikkutformingen og situasjonen i det enkelte land. Flere eksempler på klimamotiverte nasjonale skogpolitiske virkemidler ble identifisert, både virkemidler rettet mot produksjonssiden og mot etterspørselen etter trevirke og treprodukter. Mange av virkemidlene i de tre landene hadde en lignende utforming og var innrettet mot å fremme tilveksten i skogen gjennom aktiv skogforvaltning eller øke bruken av treprodukter og trebasert bioenergi. Det var også eksempler på unike, nasjonale virkemidler som det kan være aktuelt også for andre land å vurdere og tilpasse til sin nasjonale situasjon. Resultatene fra den vertikale analysen viste at EUs klimarammeverk hadde påvirket den nasjonale skogpolitikken på ulike måter og i varierende grad. Det ble konkludert med at påvirkningen vil kunne tilta som følge av EUs nye ambisiøse klimamål og de forventede endringene i EUs politikk som vil være nødvendige for å nå disse målene. Resultatene av studien kan være nyttige for beslutningstagere i offentlig forvaltning og andre som jobber med å utvikle effektive skog- og klimapolitiske løsninger i en situasjon med stadig mer komplekse og ambisiøse politiske målsettinger.

Abstract

As governments around the world struggle to develop effective policies to achieve the ambitious emissions targets set by the Paris Agreement, there seems to be a growing recognition in Norway and other countries of the important role that forests and the forest sector can play in mitigating climate change. As a consequence, forest and climate policies appear increasingly interconnected. The objective of this study was to investigate the nature of these interconnections across different countries with a view to better understand how climate objectives impact forest policies; what types of climate-motivated policy instruments targeting the forest sector exist; and to what extent EU's climate policy framework affect national forest policies. The study employed a qualitative research method and a comparative design focusing on the national forest and climate policies of Norway, Finland and France. Policy interaction was analysed along two dimensions: horizontal interaction between national level policies, and vertical interaction between EU level policies and national policies. In addition, the analysis distinguished between three layers of policy: general policy objectives, policy instruments and thematic elements in implementation. The study found complex and strong interconnections between national forest policies and climate change mitigation and renewable energy policy objectives. Variations across the three case countries confirmed the importance of fit between national situations and policy choices. Several examples of climate-motivated national forest policy instruments were identified, targeting both the production side and the demand for wood. Many of the policies were similar in design across the three case countries and focused on promoting forest growth through active forest management or increasing the demand for wood and wood-based bioenergy. There were also examples of unique national policy instruments that other countries could consider and adapt to their national circumstances. The findings from the vertical analysis showed that the EU's climate policy framework had impacted national forest policies to various degrees and in both direct and indirect ways. There was also evidence that this impact is likely to grow in importance as a result of EU's new, ambitious greenhouse gas emissions reduction targets and the anticipated policy changes that will be necessary to reach those targets. The results of the study may be useful for policymakers and others involved in developing effective forest and climate policies in response to increasingly complex and ambitious policy objectives.

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1. Introduction

Climate change is one of the greatest challenges of our time. Governments around the world are struggling to develop effective policies that will reduce greenhouse gas emissions enough to reach the ambitious targets set by the Paris Agreement. The forest sector is recognised as playing a particularly important role as trees can absorb and store large quantities of carbon and help remove CO_2 from the atmosphere. How countries manage their forest resources can therefore have a major impact on future global greenhouse gas emissions. In Norway, the net CO_2 removal by forests in 2018 was approximately 28 million tonnes (Norwegian Environment Agency, 2020a). In recent years this net annual removal has on average been equivalent to approximately half of total Norwegian CO_2 emissions. As a consequence, there has been an increasing focus in Norway and other countries on the role of forests and the forest sector in mitigating climate change.

Since the 1990's, when climate change became a major issue on the international agenda, the question of how best to use our forest resources to maximise their positive climate impact has been the subject of intense discussions. There are different views, and also uncertainty as to what measures have the greatest impact on greenhouse gas emissions. Is it best to maximise the carbon sink in existing forests and expand the forested area as much as possible, or is it better to increase the harvesting level to maximise the climate benefits from expanding the use of wood as a substitute for more carbon intensive materials and non-renewable sources of energy? Moreover, climate policy objectives may come into conflict with other important forest goals, such as economic profitability, biodiversity conservation and recreation. Although there has been a movement towards greater consensus in some respects, there is still an ongoing debate about objectives and the actual climate impact of alternative policies for the forest sector.

The objective of this study is to investigate how climate policy objectives impact forest policy and to what extent the forest sector is integrated into the overall climate policy framework. The main focus is thus on policy interaction and design. In order to assess variations in how climate and forest policies interact, the study will look at policy choices and interlinkages across

different countries. In addition to Norway, two cases – Finland and France - have been selected. Both Finland and France have large, forested areas and are major producers of roundwood. At the same time, the differences between the three countries offer some interesting perspectives in a comparative context.

The study will also explore the impact of European Union (EU) climate and energy policies on national forest related policies. Although not a member of the EU, Norway is closely aligned with the EU when it comes to climate objectives and policies. This close relationship affects policymaking in many areas and is likely to have a growing impact on Norway's forest sector. Also, EU's climate policy framework is expected to evolve in ways that may have a significant impact on future national policymaking options.

In particular, the study will focus on the following research questions:

- How do national policies to mitigate climate change interact with forest policies and how do these interactions compare across countries?
- What climate-motivated policy instruments targeting the forest sector have been put in place and do they differ across countries?
- To what extent does EU's climate policy framework affect national forest policies?

A large number of cross-sectoral and climate-motivated policies and policy instruments may affect the forest sector. This study will not attempt to cover all of these but will focus on traditional forest policy instruments and those that most directly target the demand for wood and forest products within a climate policy framework.

The results of the study may be useful in several ways. First of all, knowledge about policy interlinkages, the possible impact of EU policies and ongoing processes, and the policy choices of other countries may be helpful for policymakers and others involved in developing effective measures to achieve increasingly complex objectives. Secondly, such knowledge may also be valuable for private actors in the forest sector who are affected by these policies and want to actively participate in policy discussions and implementation. Thirdly, the results may serve as a useful reference for further work on an important topic.

The study will proceed with a brief reminder of the various ways in which forests and wood impact greenhouse gas emissions and of applicable provisions in international agreements on climate change that form the basis of national and EU policies. This is followed by a review of relevant literature on previous forest policy studies relating to the three case countries as well as studies of the impact on forest policymaking of developments in the EU. The subsequent section (section 3) describes the method and material. The results are presented in section 4, with separate subsections on relevant EU and national policies and on policy interaction at national level and between EU and national policies. In section 5 the results are discussed within a comparative framework where ongoing developments at EU level are also taken into account. Conclusions and recommendations for further work are presented in section 6.

2. Background

2.1 How do forests impact CO_2 emissions?

When considering the importance of forests in reducing CO_2 emissions, it is common first to distinguish between their roles as a carbon reservoir and as a sink. Wood consists of approximately 50% carbon. The carbon reservoirs encompass the carbon stored in all existing forests, including in dead wood and soil. The net change in the reservoirs can be positive or negative in any given year and is considered a carbon sink if it is positive. Strengthening the forests' ability to function as a sink will therefore help mitigate climate change as more CO_2 will then be removed from the atmosphere. This can be done in multiple ways, including by expanding the area covered by forests, by promoting increased growth through forest management regimes, and by harvesting less than the annual increment (Norwegian Environment Agency, 2016).

In addition, forests influence CO_2 emissions through the impact of carbon stored in products from wood, often referred to as harvested wood products (HWPs). Long-lived wood products such as materials used for construction or furniture can store carbon for a long time. Increasing the use of such products therefore provides a carbon sink. Another way in which HWPs can impact emissions is through substitution. Wood can be used to replace materials with a larger carbon footprint, such as concrete or steel (FAO, 2021). Another substitution effect results

from using wood-based raw materials to replace non-renewable fossil fuels in energy production.

Wood-based bioenergy is often considered to be carbon neutral, i.e. have zero greenhouse gas emissions. The carbon neutrality assumption builds on the concept that carbon sequestration and emissions from a forest will balance over a full growth-to-harvest cycle. Bioenergy systems are thus seen as operating within the so-called fast domain of the earth's carbon cycle, as opposed to fossil fuels which transfer carbon from the slow domain to the fast domain (Berndes et al., 2016). The exact climate impact of wood-based bioenergy is, however, subject to scientific debate. This is due both to questions about the balance and timing of sequestration and emissions, and the characteristics of the fossil fuel being replaced. Harvesting wood for bioenergy production will lead to an increase in CO_2 emissions in the short term, and in slow-growing forests, like those in Northern Europe, it will take a long time before these emissions are fully absorbed again. The impact on emissions also depends on whether bioenergy is produced from stem wood or from forest residues or other woody biomass that cannot be used for other purposes. Moreover, harvesting will reduce the amount of CO_2 stored in forest soils, further complicating the calculation of overall forest carbon balances.

For policymakers the carbon neutrality debate is an important one. According to Agostini et al. (2013) the validity of the assumption of bioenergy carbon neutrality depends both on whether the policy objective is to reduce emissions in the short or long term and on the type of wood used. Using stem wood to produce energy will only result in emissions savings in the very long term, i.e. several decades or centuries, whereas using forest residues and other non-stem wood sources may lead to reductions also in the short term. There is a large variability in results, however, depending on modelling assumptions such as the fossil fuel being replaced, efficiency in final use, future growth rate of the forest, the initial forest carbon stock and the forest management practices assumed. The trade-off between promoting forest-based bioenergy versus maintaining and increasing current forest carbon stocks remains an important issue in current climate policy discussions.

More generally when it comes to policy recommendations relating to forests and climate change, the United Nations Intergovernmental Panel on Climate Change (IPCC) plays a crucial

role in setting the agenda for climate policy discussions and proposing policy options. The IPCC was created to provide policymakers with regular scientific assessments on climate change, its implications and potential future risks reflecting international consensus. In its fifth assessment report (IPCC, 2014) the panel discusses three main strategies for using forests as a tool to reduce greenhouse gas emissions: prevent deforestation, enhance carbon sequestration, and use wood as a substitute for fossil fuels and energy-intensive materials. The panel emphasises that the effectiveness of these strategies will depend on several factors. One such factor is whether mitigation benefits are permanent or non-permanent. CO_2 sequestration in forests can for example easily be reversed as a result of forest fires, while substitution effects from increased use of bioenergy to replace fossil fuels or substitution and storage effects from using wood as a building material are considered more lasting. Furthermore, the sequestration ability of forests seems to reach a saturation point as trees grow older.

Another factor is the risk of displacement and leakage (IPCC, 2014). This happens when mitigation activities implemented in one country lead to increased greenhouse gas emissions in other places, for example if reduced harvests in Norway result in higher volumes of imported wood products. The IPCC also points out that the timing of mitigation benefits from the different wood application options must be considered. If wood is burnt to produce bioenergy, it will result in an immediate release of CO_2 into the atmosphere. By contrast, if wood is used as a building material, it can continue to store carbon for a long time. The panel concludes that the most cost-effective mitigation options in forestry are afforestation, sustainable forest management and reducing deforestation (IPCC, 2014). At the same time, the scenarios presented to achieve the goal of a maximum temperature increase of 2 degrees Celsius involve the use of more bioenergy from wood and other sources, combined with carbon capture. According to the panel, bioenergy can play a critical role for mitigation but there is debate about the overall climate impact and concerns about issues such as sustainability and impact on biodiversity conservation.

A number of studies have attempted to quantify the possible effects on greenhouse gas emissions from actively pursuing the strategies outlined by the IPCC. A study by Nabuurs et al. (2017) focusing on emissions within the EU aimed to quantify “a realistic potential mitigation role of EU forests and the forest sector towards 2050.” The quantification was based on a

review of existing literature regarding the potential for increased sequestration as well as material and energy substitution in EU countries. They introduced the concept of "climate smart forestry" to describe a strategy aiming to maximise the mitigation role of forests. According to the results, the combined potential impact of implementing all available mitigation activities would amount to additional emissions reductions of 441 million tonnes of CO_2 per year by 2050. This compares to an estimated mitigation effect of EU forests (forest sink, material substitution and energy substitution) at the time of the study of 569 million tonnes of CO_2, or 13% of total EU emissions. Proposed mitigation activities comprised improved forest management, forest area expansion, material substitution, energy substitution and establishment of protected forest reserves. These results suggest that forests can play a significant role in achieving emissions reductions targets if the right policies are implemented, although the potential will vary considerably from country to country depending on their forest resources and other national characteristics.

2.2 International Agreements on Climate Change: What do they say about the role of forests?

The aim of the United Nations Framework Convention on Climate Change (UNFCCC) according to its article 2 (UN, 1992), is "the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" within a time frame that will allow ecosystems to adapt naturally to climate change. The role of forests is addressed in article 4, which i.a. calls on parties to the convention to promote sustainable forest management and cooperate in the conservation and enhancement of forests as sinks and reservoirs of greenhouse gases. Article 4 also obligates parties to report regularly on national greenhouse gas emissions and removals by forests and other sinks and on measures they have implemented to mitigate climate change.

The Kyoto Protocol, which was adopted in 1997 by the third conference of parties to the UNFCCC and entered into force in 2005, contains more detailed implementation measures, including provisions on the role of forests (UN, 1997). It established binding quantified emissions obligations for developed country parties to the convention for the time period 2008-2012, also known as the protocol's first commitment period. The provisions on the role

of forests can be found in article 3. Article 3.3 specifies that net changes in greenhouse gas emissions resulting from "direct human-induced land use change and forestry activities, limited to afforestation, reforestation, and deforestation since 1990" shall be used to meet parties' individual emissions obligations and be reported in a transparent and verifiable manner. Article 3.4 deals with changes in emissions from existing forested areas resulting from forest management. It allowed for the inclusion on a voluntary basis of net changes in emissions resulting from forest management activities in meeting the obligations for the first commitment period. The protocol also established a cap, however, on how much each individual country could claim as a credit from such activities against its overall commitments. For most countries this was 3% of emissions in 1990.

A set of revised accounting rules and methodologies for forest-related emissions was agreed in Durban in 2011. The reporting of emissions resulting from forest management activities referred to in article 3.4 became mandatory, and the cap on emissions credits was raised to 3.5%. (Ellison et al., 2013). Furthermore, it was agreed to shift to a so-called net-net accounting approach based on a "forest management reference level" (FMRL) for the reporting of future emissions from forestry. Net-net accounting means that emissions are not counted from zero, but from a baseline or reference level against which a country can report its emissions reductions performance (Iversen et al., 2014). Countries could choose whether they wanted to use as their reference level a projection of future emissions based on the continuation of "business-as-usual" forest management practices or simply use historical emissions in 1990 as a reference. Norway decided to maintain 1990 as its reference level whereas the EU selected a forward-looking approach using a "business-as-usual" scenario calculated on the basis of forest management policies in place before 2009. The changes agreed in Durban were implemented for the second commitment period under the Kyoto Protocol, i.e. 2013-2020.

The Paris Agreement, which was adopted by the conference of parties to the UNFCCC in 2015 and entered into force in 2016, supersedes the Kyoto Protocol. It sets a goal of limiting global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels, and expands the emissions obligations to also include developing countries (UN, 2015). One of the key provisions of the agreement is a requirement that parties submit so-called nationally determined contributions (NDCs) outlining their national emissions reduction targets and

actions to achieve these targets. The Paris Agreement does not, however, contain any major new provisions relating to forests. Article 5 of the agreement reiterates the importance of forests by calling on parties to take action to "conserve and enhance" forests as sinks and reservoirs of greenhouse gases and to implement and support measures already agreed under the UNFCCC to help developing countries reduce emissions from deforestation and degradation and enhance forest carbon stocks.

2.3 Literature Review: Forest Policy Studies

Among researchers there has naturally been a growing interest in topics related to forests and climate change mitigation in parallel with the intensifying focus on the climate crisis in society in general. Many studies have focused on trying to quantify the impact on emissions of different mitigation strategies, such as forest management practices to enhance carbon sequestration (Nabuurs et al., 2017) or increased use of bioenergy (Böttcher et al., 2011). There is also great interest in the economic impact of different strategies on such factors as wood pricing, harvesting levels and trade (Kallio et al., 2018). Policy studies have often focused on the trade-offs between biodiversity protection and climate mitigation or bioenergy policies (Söderberg & Eckerberg, 2013). Forest and climate policy interaction seems to have received perhaps somewhat less attention up until now.

Concerning the purpose of this thesis, studies exploring the importance of interlinkages between forest and climate policies at national level in the three case countries are of most interest. Lindstad (2015) provides an interesting perspective on possible effects of the international climate regime complex on Norwegian forest policy. More specifically, she studied the effects of the UNFCCC and the Kyoto Protocol on national forest policies based on two different analytical approaches: measuring so-called simple effects, which are more or less directly linked to regime obligations and considering broader consequences of regimes. She found that there was a causal link between the international climate regime obligations and the introduction of climate-related forest policies in Norway. She also suggested that the forest policy changes in Norway responded to the broader recommendations on protection and enhancement of forest sinks and reservoirs in the regimes, rather than specific legal commitments under the Kyoto Protocol. She cautioned, however, that time-lags in national implementation could impact the analysis.

Turning to France, Sergent (2014) analysed the political impact of "energy transition policy" on the French forest sector, where the term energy transition was understood as "the process of innovation and technological development that society is expected to go through when dealing with climate change". According to Sergent, the ambitious greenhouse gas emissions targets set by the EU would require the Union's energy production to undergo drastic changes, with a doubling of renewable energy's share of total output. He argued that there had been a clear shift in the priorities of French forest policy over the previous decade, partially influenced by the binding national targets for renewable energy set by the EU climate and energy package adopted in 2009. More specifically, he identified a shift in the forest policy framework from a "multifunctionality stage" between 1992-2007 to a "harvesting stage" after 2007. In the first stage, all forest functions were considered to be of equal importance and traditional forestry practices were seen as compatible with sustainable management practices. In the harvesting stage, priorities shifted to wood mobilisation and encouraging more intensive management practices. Sergent concluded that climate change mitigation had become a key issue in recent forest policy developments in France.

A study by Katila (2017) of Finland's forest policy aimed to investigate possible changes in forest development priorities between the end of the 1990's to the present with regard to sustainability. The analysis was based on a review of national forest programmes covering the period 1999 to 2015. The study found that the three programmes included in the analysis had mainly focused on economic sustainability and had been less concerned about ecological and social sustainability. Climate change mitigation was mentioned as a driver of change in all programmes, but it did not feature as a prominent challenge. The focus had shifted from carbon sequestration in the first programme, covering the period 2000 to 2010, towards increasing the use of wood as a substitute for non-renewable raw materials and fossil fuels in subsequent programmes. Another analysis of Finnish forest policy focusing on the period 2010-2015 (Kröger & Raitio, 2016) concluded that the competitiveness of the Finnish forest industry and its contribution to the Finnish economy had been the top policy priorities. Ecological and sustainability concerns such as climate mitigation had been added "at the end of lists" thus featuring in a secondary position in the implementation of policies.

As regards studies of interaction with EU level policy developments, there seems to be a growing interest in how policies that are not necessarily "forest-focused" but "forest-related" such as climate change, biodiversity, agriculture and energy policies, are having an increasingly important impact on forests and forest management at national levels. One such study (European Forest Institute, 2013) found growing concern that legal action affecting the forest sector was primarily taken in other policy areas and that there was a lack of coordination as well as inconsistency in policy goals. Another study on European forest governance post-2020 (European Forest Institute, 2020) focused on the growing complexity of interests and policies affecting the forest sector and concluded that there was a need for greater coordination and integration of separate EU policy objectives. Meanwhile, Nabuurs et al. (2017) found that the role of forests in climate mitigation had not been firmly integrated into the EU climate policy framework nor had climate objectives been integrated into policies affecting forests and the forest sector at either EU or national levels.

The research reviewed here seems to indicate that there has indeed been a shift in recent forest policy discussions towards a greater focus on how forests can contribute to climate mitigation. However, priorities may have developed in different directions in the three case countries considered in this study. There is also evidence of growing recognition of how national forest policies are affected by EU action in other areas and increasing demand for policy coordination. The present study will investigate in more detail how these trends are influencing national forest policies and explore interlinkages between national and EU policies.

3. Method and Material

3.1 Methodological Approach

For this thesis I employed a qualitative research method based on a comparative design where the national forest and climate policies of Norway, Finland and France were analysed. The selection of Finland and France was motivated by the fact that they have large forest resources and are among the most active countries within the EU and in other international fora in discussions affecting the forest sector. At the same time, they have distinct characteristics which make a comparison with Norway interesting from a policymaking perspective.

Furthermore, I chose to build my analytical framework on the methodological approach Lindstad et al. (2015) used when exploring policy interaction related to forest-based bioenergy. I also incorporated elements from the studies they were inspired by when developing their approach, in particular those by Nilsson et al. (2012) and Oberthür & Gehring (2006). Nilsson et al. aimed to improve the understanding of policy coherence by developing an analytical framework for policy interaction in the EU whereas Oberthür & Gehring examined institutional interaction in global environmental governance with a special focus on synergy and conflict among international and EU policies.

Lindstad et al. (2015) compared national policies affecting production and use of forest-based bioenergy in five European countries with a view to contribute to the empirical understanding of policy interaction and facilitate policy development They explored interactions between policies at national levels and between the EU and national level policies. According to Oberthür & Gehring (2006) such interactions can be understood as "situations where developments in one policy area/institution affect developments or performance in another policy area/institution". When analysing possible interactions, Lindstad et al. made a distinction between horizontal and vertical interlinkages. Horizontal interlinkages refer to interactions across national level policies whereas vertical interlinkages refer to interactions between EU level policies and national policies.

In addition to the vertical and horizontal dimensions the method distinguished between three layers of policy: general policy objectives, policy instruments and thematic elements in implementation. Thematic elements in implementation refer to the importance attached to the horizontal interlinkages with respect to implementation of the policy under examination. The approach was developed by Nilsson et al. (2012) as a tool to analyse and understand policy coherence. They defined coherence as "an attribute of policy that systematically reduces conflicts and promotes synergies between and within different policy areas to achieve the outcomes associated with jointly agreed policy objectives". The concept of policy coherence is very relevant in the context of the present study.

The analytical framework thus combines the two dimensions, i.e. horizontal and vertical, with the three layers of policy, as shown in fig. 1 below. The figure was adapted from Lindstad et al.

(2015) to illustrate the method used here. Based on this approach, I first reviewed national policies on forests, climate mitigation and renewable energy across the three case countries and identified variations and differences. Renewable energy was chosen as the third policy dimension because the preliminary analysis revealed several examples of strong links between energy, climate and forest policy goals. I then analysed horizontal interlinkages across policy objectives, policy instruments and thematic elements in implementation.

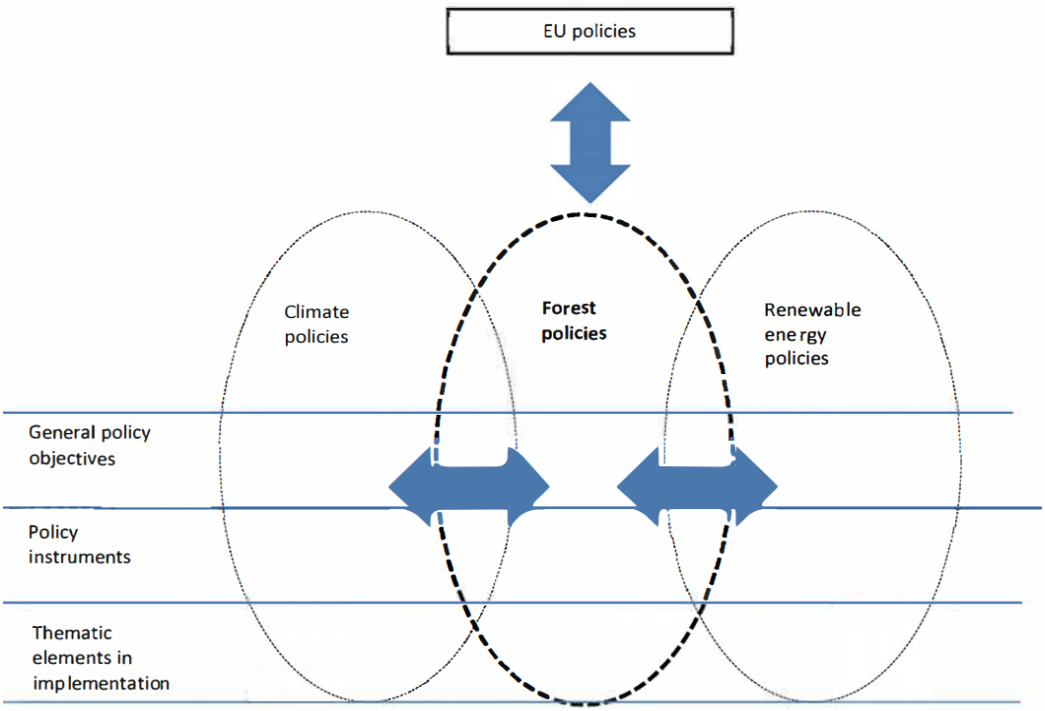

Fig. 1: Analytical framework (adapted from Lindstad et al., 2015)

More specifically, I explored how national documents on forest policy articulated interactions with general climate policy as well as renewable energy objectives, and conversely, whether climate policy documents included forest related objectives or other references, i.e. horizontal interlinkages. Next, I examined whether any of the existing or recently proposed forest policy instruments were motivated by climate or renewable energy policies. With regard to the third policy layer, i.e. thematic elements in implementation, I focused on how forest policies were communicated by those in charge of implementation and to what extent climate mitigation featured as an important issue, especially in relation to forest management. Finally, I investigated whether national policies made references to EU climate or renewable energy

policies, i.e. vertical interlinkages. In this context, it is worth noting that because Norway is not a full EU member like Finland and France, a reasonable assumption was that vertical interlinkages in the Norwegian case would be weaker than in the other two cases.

3.2 Material: Document Analysis and Interviews

The collection of data was based mostly on document analysis and information posted on governmental websites. In addition, a series of semi-structured personal interviews were conducted with officials and researchers in each of the three case countries. The interviews were particularly helpful in identifying additional information and verifying some of the findings from the document analysis. In total, 15 such interviews were conducted, all were off the record. Due to the Covid 19 pandemic, they were conducted by phone only.

In the document analysis, I first reviewed the most recent official documents outlining forest, climate mitigation and renewable energy policies in the three countries under examination. In this context, it might be helpful at the outset to consider what is meant by "forest policies" since the forest sector is affected by action in so many policy areas. For example, a 2019 study aiming to map all public policies concerning the forest sector in France (Bonin & Kleinschmit von Lengefeld, 2019) listed 17 policy areas in addition to those considered directly forest related, including everything from tourism to finance related policies. In this study, the term forest policies refer to those policies presented as such by the governments in the three case countries.

When analysing forest policy-related documents, I searched for references to climate mitigation, renewable energy/bioenergy and EU policies/cooperation, with a special focus on interlinkages in policy objectives. Annex I shows an example of one such document analysis, relating to Finland's National Forest Strategy 2025 (Ministry of Agriculture and Forestry of Finland, 2019). The same method was used when analysing climate policy related documents, i.e. references to the role of forests in meeting climate objectives, including the use of wood-based renewable energy, were identified. These results were then used in the horizontal analysis to assess the level of integration of climate and forest policy objectives, as shown in annex II.

The next step of the analysis involved reviewing relevant policy instruments targeting the forest sector to identify those that were specifically climate-motivated. Policy instruments were identified through document analysis, interviews, and websites. The interviews were particularly helpful in this regard. The objective was not to review all forest policy related policy instruments, but to focus on those deemed to be the most relevant and significant. Collecting data for the analysis of thematic elements in implementation proved the most challenging. Implementation was more complex than the other policy layers as it involved more actors and levels of government. The data collection at this level therefore focused on a few key actors involved in implementation.

4. Results

The presentation of results is divided into four sections. Subsection one describes in further detail EU's forest strategy and its current climate policy framework. In subsection two the main elements of national forest and climate related policies are presented along with a brief overview of the characteristics of the forest sector in each of the three countries. Horizontal interlinkages across forest and climate policies are analysed in subsection three and vertical interlinkages between national and EU policies in subsection four.

4.1 The European Union's Forest Strategy and Climate Change Policy Framework

The EU does not have a common forest policy but has established mechanisms aimed at coordinating national policies. The main such instrument is the EU forest strategy which is intended to provide a coherent framework for both EU forest-related policies and the national forest policies of individual EU countries. The latest strategy covers the period 2014-2020 and focuses on principles of sustainable forest management (European Commission, 2013). A new forest strategy is scheduled to be adopted in 2021.

The strategy for 2014-2020 outlines eight priority areas, two of which are linked to climate mitigation: "fostering the competitiveness and sustainability of the EU's forest-based industries, bioenergy and the wider green economy" and "protecting forests in a changing climate whilst promoting sustainable forestry management to mitigate against climate

change". To implement these priorities, the strategy calls on member states to promote the use of wood as a "sustainable, renewable, climate and environment-friendly" raw material and to consider the climate benefits of using more forest biomass and harvested wood material. With regard to forests and climate, the strategy proposes that member states strengthen their forests' role in combating climate change through measures to increase removals and reduce emissions of greenhouse gases. The other six strategic priorities are: supporting rural and urban communities, protecting forests, and enhancing ecosystem services, strengthening the forest knowledge base, stimulating innovation across the forest sector, improving coordination and cooperation, and ensuring consistency between EU and member state policies at international level. On the issue of policy coordination, the strategy acknowledges that "a growing number of EU policies are making increasing demands on forests" and that there is a need to coordinate sectoral policies.

Another coordination mechanism is the EU's standing forestry committee which has a three-fold role as an advisory committee for specific forestry measures, as an ad-hoc consultation forum on forest-related initiatives under other EU policies, and as a place to exchange information.

Forest policies are thus decided at the national level by individual EU countries. By contrast, climate action has increasingly been subject to common EU policies and regulations and is now one of the most central issues on the Union's agenda. Following the adoption and entry into force of the Kyoto Protocol, the EU has been a leading advocate for taking strong measures to reduce emissions of greenhouse gases and has established ambitious objectives. Several of these measures have a direct or indirect impact on the forest sector.

The EU has gradually raised its emissions reductions targets and now aims to be carbon-neutral by 2050, i.e. to have net-zero greenhouse gas emissions. Current EU legislation is based on the 2030 Climate and Energy Framework which was adopted by member states in 2014 with a view to achieve a 40% reduction in overall emissions (EU, 2014). The framework is divided into three main areas of action, often referred to as pillars: the Land Use, Land Use Change and Forestry (LULUCF) sector, the EU Emissions Trading System (ETS), and the effort sharing sector covering non-ETS and non-LULUCF emissions.

The forest sector is most directly affected by the EU's LULUCF policies. In order to comply with the Kyoto Protocol's provisions on how to measure emissions from the LULUCF sector, the EU adopted its first LULUCF regulation in 2013 (EU, 2013). The regulation established accounting rules concerning greenhouse gas emissions and removals from LULUCF related activities for the period 2013-2020. In relation to managed forests, these rules were based on those agreed for the second commitment period of the Kyoto Protocol, i.e. the FMRL approach explained earlier. The regulation also specified accounting rules for harvested wood products.

In 2018 a revised LULUCF regulation established new accounting rules for emissions from forestry (EU, 2018a). This came in response to the EU's decision to raise its overall emissions reduction target to 40% by 2030 compared to 1990 following the entry into force of the Paris Agreement in 2015. In addition to establishing revised accounting rules, the new regulation addresses more directly how to include LULUCF-related greenhouse gas emissions in EU's overall 2030 climate and energy framework. It establishes a commitment for the period 2021-2030 for each member state "to ensure that emissions do not exceed removals, calculated as the sum of total emissions and total removals on its territory in all of the land accounting categories", i.e. net zero emissions from all LULUCF sources, including forests, also referred to as the no-debit rule.

The regulation also put in place new rules for the calculation of emissions and removals from managed forests after the end of the Kyoto Protocol's second commitment period. According to these rules, future emissions shall be measured against individual forest reference levels (FRLs) for each country. The FRLs shall be estimated on the basis of a continuation of sustainable forest management practices as observed during the period 2000-2009, i.e. the forest carbon sink in a business-as-usual scenario. (The calculation is thus based on a different method than the FMRLs.) According to the regulation, member states shall deduct the estimated FRL when accounting for greenhouse gas emissions and removals from their managed forest land (EU, 2018a). If this results in a negative number, it will be counted as a removal in the overall emissions reductions budget of the country concerned, but only within a limit of 3.5 % of total emissions. There is a flexibility mechanism, however, which among other things allows for net removals in one country to be counted against net emissions in

another country and also allows for transfers of emissions credits between sectors. Moreover, there is no limitation on the counting of removals resulting from harvested wood products.

The ETS and the effort-sharing sector are the EU's other two main areas of climate action. ETS, which became operational in 2005, mainly covers emissions from power production and industry. It applies to some 40% of the EU's greenhouse gas emissions. The overall reductions target for this sector is 43%. The effort sharing sector, which in 2019 accounted for some 60% of total EU emissions (European Commission, 2021) includes non-ETS industry, housing, agriculture, waste and transport (excluding aviation). The current effort-sharing regulation calls for a 30% reduction in this sector by 2030 compared to 2005 (EU, 2018b). It is based on individual binding targets for each member state, with targets varying from 0 to 40% between countries depending on their national wealth. Measures that are put in place to reduce emissions in these two sectors may impact the forest sector both directly and indirectly. The most important are those aiming to increase the share of renewable energy in the overall energy consumption.

The EU's first renewable energy directive, adopted in 2009, established a target of a minimum share of 20% renewable energy in gross final energy consumption by 2020 (EU, 2009). The directive also established differentiated mandatory national overall targets for each member state, reflecting countries' different starting points for renewable energy production and their ability to increase it according to existing shares of renewable energy. In addition, the directive called on members to ensure a 10% share of energy from renewable sources in all forms of transport by 2020. Achieving these targets would require increased use of biofuels and bioliquids, and thus have implications for the forest sector in terms of increased demand for woody biomass. The directive contained a set of detailed sustainability criteria for biofuels and bioliquids, favouring those produced from forestry residues, among other things.

A revised renewable energy directive was adopted in 2018. The directive re-enforced the focus on increasing the use of renewable energy as an important part of the EU's efforts to reduce greenhouse gas emissions and comply with its commitments under the Paris Agreement (EU, 2018c). The target for the share of energy from renewable sources in the Union's overall energy consumption was raised to 31% by 2030 and to 14% in the transport sector. Also, the new

directive established a separate target for the minimum share of advanced biofuels and biogas for transport of at least 0.2 % in 2022, 1 % in 2025 and 3.5 % in 2030 within the overall target of 14%.

The EU is now in the process of undertaking a comprehensive review of its climate and energy policy framework in order to achieve an even more ambitious greenhouse gas emissions reduction target of 55% by 2030 instead of 40%. This new target was first introduced as part of the European Green Deal, a strategy and action plan presented by the European Commission in December 2019 on how to reach the objective of carbon neutrality by 2050 (European Commission, 2019a). The target of 55% was formally agreed by EU member states in December 2020 and subsequently submitted to the UNFCCC as the new NDC of the EU under the Paris Agreement (EU, 2020). One important difference between the EU's old and new target, which is worth noting here as it relates to forestry, is that all LULUCF greenhouse gas emissions and removals will now be fully integrated into the target reported to the UNFCCC.

The review of all relevant policy instruments is scheduled to be finalised by June 2021 and is likely to result in significant changes, as outlined in the Commission's 2030 Climate Target Plan (European Commission, 2020a). For the purposes of the present study the analysis will focus on the EU's existing 2030 Climate and Energy Framework, but the implications of the ongoing review will be discussed at the end. The main elements of the policy framework as described here are summarized in table 1 below.

Table 1: EU Climate Policy Framework Cornerstones

Year	Policy cornerstone	Key measures/objectives
2009	First Renewable Energy Directive (RED)	Renewable energy target of 20% of overall energy consumption and 10% in all forms of transport by 2020.
2013	First LULUCF regulation	Accounting rules for emissions from forestry for the period 2013-2020 based on Forest Management Reference Level (FMRL) under the Kyoto Protocol.
2014	2030 Climate and Energy Framework	Overall emissions reduction target of 40% by 2030. Established "three pillar" framework with separate emissions targets for ETS, effort-sharing and LULUCF sectors.
2018	Revised RED and second LULUCF regulation.	Revised RED: Renewable energy target of 31% of overall energy consumption and 14% in all forms of transport

		by 2030 (of which at least 3.5% advanced biofuels and biogas for transport) LULUCF: New accounting rules for emissions from the forest sector for the period 2021-2030 based on Forest Reference Level (FRL) and obligation of zero net emissions from LULUCF sector.
2019	European Green Deal strategy and action plan	EU to be carbon neutral by 2050.
2020	2030 Climate Target Plan	Overall emissions reduction target raised from 40% to at least 55% by 2030. Commission to review all relevant policy instruments by June 2021 to deliver the additional emissions reductions.

4.2 National Forest and Climate Policies

As a starting point for the comparative analysis, this section will introduce the characteristics of the forest sector and the main forest and climate policy objectives in the case countries Norway, Finland, and France. Key facts about the forest sector in the respective countries are also summarized in table 2 below, along with a list of main policy documents.

4.2.1 Norway

The Norwegian Forest Sector

Approximately 37% of Norway's land area is covered by forests. This is equal to 12 million hectares, of which just over 8 million hectares are considered productive forest. In 2019 the growing stock was estimated at just under 1 billion m^3, a 10% increase over the previous decade, while the annual increment was approximately 25 million m^3. Currently only half of the increment is harvested each year. The most common species are Norway spruce, Scots pine and birch (Statistics Norway, 2021a). In recent years Norwegian forests have captured on average some 25 million tonnes of CO_2 each year, which is equal to 50% of Norway's total annual CO_2 emissions (Norwegian Environment Agency, 2021).

In terms of economic value, the forest sector represents less than 1% of Norway's GDP and employed less than 6000 people in 2019 (Statistics Norway, 2021a). Forest ownership in Norway is mostly private, with 80% being privately held. The average size is quite small, and more than half of the properties are less than 25 hectares. Only 10% is state owned while the remainder is owned by cooperatives. Norway was until 2012 a net importer of roundwood, but

is now a net exporter, following a restructuring of the forest industry after the financial crisis in 2009-2010 which resulted in the closure of several large wood processing plants (Statistics Norway, 2021b, and Norwegian Ministry of Agriculture and Food, 2016).

The fragmented forest property structure and the decline of the Norwegian forest industry with decreasing investment levels and increased competition from abroad have long been seen as main challenges for the forest sector in Norway (Norwegian Ministry of Agriculture and Food, 1998) that are also reflected in Norway's forest policy. According to a strategy prepared in 2015 by the Norwegian forest and wood industries, there was a potential for a fourfold increase in the economic turnover in the forest sector and a 35% increase of the annual harvesting level (Innovation Norway, 2015).

Norway's Forest Policy Objectives

The legal foundation of Norway's forest policy can be found in the Norwegian Forestry Act which was last revised in 2005 (Lovdata, 2021a). The objective of the Act is to "promote sustainable management of the forest resources with a view to promote local and national economic development, and to secure biological diversity, consideration of landscape qualities, outdoor recreation opportunities, and the cultural values associated with the forest". There is a separate regulation on sustainable forestry, which contains more detailed provisions on how to protect the environment and promote regeneration and healthy forests (Lovdata, 2021b). There are no references to climate change mitigation or adaptation in these documents.

The main elements of the forest policy are outlined in white papers from the government to the Norwegian parliament. The most recent such white paper describing the current government's objectives and policies for the forest sector and wood-based industries was submitted to parliament in 2016 (Norwegian Ministry of Agriculture and Food, 2016). The overall policy goals are summarized as increased value creation, sustainable forest management and competitive forest and wood-based value chains.

The following main policy priorities are outlined:

- Strengthening the competitiveness of the forest and wood-based industry.

- Ensuring that the management of Norwegian forests is sustainable both from an economic, environmental, social and cultural point of view.
- Strengthening efforts to take into account the environmental impact of forest management, in particular with regard to biological diversity.
- Making sure future efforts on forests and climate change builds on Norway's overall climate objectives.
- Developing more effective forest property structures and better solutions for transportation from forests to markets.
- Creating incentives for the expansion of domestic forest and wood industries and increased use of raw materials from the forest.
- Supporting research, development and innovation in the forest sector.

While the overall focus is very much on the forest sector's economic benefits for society and the importance of competitive industries, the role of forests in climate mitigation is also highlighted throughout. At the very outset, the importance of Norway's forests as a renewable resource that can help meet the challenges related to climate change, is emphasised. One of the policy objectives is to put greater emphasis on climate objectives in the management of Norwegian forests with a view to strengthen carbon sequestration and secure access to renewable raw materials. A further climate related objective is to promote the use of wood as a substitute for more energy-intensive products and materials in order to reduce emissions and increase carbon storage. Increasing the production of bioenergy and advanced biofuels to achieve renewable energy goals, is also part of the government's forest policy goals.

The 2016 white paper (Norwegian Ministry of Agriculture and Food, 2016) contains separate sections on the climate benefits of forests and on the future role of forests in mitigating climate change and developing the bioeconomy. It affirms that the government will build its policies on the work of the IPCC and its conclusions that afforestation, sustainable forest management and reduced deforestation are among the most cost-effective climate measures in the forest sector. The importance of expanding the use of wood as a substitute for less climate friendly materials, increasing the use of bioenergy and raising the annual increment on forested areas are also discussed.

Norway's Climate Policy Objectives

Following the entry into force of first the Kyoto Protocol and then the Paris Agreement, Norway has gradually raised its greenhouse gas emissions reduction target. Norway has now committed itself under the Paris Agreement to reduce emissions by at least 50% and up to 55% by 2030. The long-term goal is to achieve carbon-neutrality by 2050 (Norwegian Ministry of Climate and Environment, 2021).

Although Norway is not a member of the EU, it has decided to closely align itself with the EU when it comes to climate policy. Because Norway is part of the European Economic Area (EEA), it is legally obligated to comply with certain elements of the EU's climate policy framework such as the ETS directive and the renewable energy directive. In addition, Norway decided in 2019 to cooperate with the EU in implementing the commitments under the Paris Agreement for the period 2021-2030. This was formalised through a bilateral agreement based on protocol 31 of the EEA agreement. This protocol allows for voluntary cooperation in areas where there is no legal obligation under the EEA agreement (Norwegian Ministry of Climate and Environment, 2019). Under the climate agreement with the EU Norway must adopt relevant EU regulations relating to the effort-sharing and LULUCF sectors and has committed itself to reduce emissions from the effort-sharing sector by 40% by 2030. The government recently raised the target to 45% on a voluntary basis (Norwegian Ministry of Climate and Environment, 2021).

The details of Norway's climate policy with regard to objectives, action plans and measures are presented by the government in regular white papers to parliament. In the most recent such white paper submitted to parliament in January 2021, the government presented its climate plan for the period 2021-2030 (Norwegian Ministry of Climate and Environment, 2021). At the outset, it is emphasised that Norway wants to continue its climate policy cooperation with the EU and that any changes in the EU's policy framework will have an impact on Norwegian policy implementation.

The plan contains detailed proposals on how to achieve the ambitious new emissions reduction targets for all three of the EU pillars: the ETS sector, the effort-sharing sector and the LULUCF sector. Norway will have to reduce its effort sharing sector emissions by 16.6 million tonnes of CO_2 equivalents over the ten-year period. Net emissions from the LULUCF sector over the

same period are estimated at 18 million tonnes of CO_2 equivalents based on current projections and must, as explained above, be reduced to zero according to EU's no-debit rule. The plan presents detailed proposals on how to achieve this goal through increased carbon sequestration and storage in forests and reduced emissions from other land use and land use change.

The overall objectives for the forest sector are to maintain existing climate-motivated measures aimed at increasing the forests' carbon reservoirs while at the same time consider some new measures that can be easily implemented and have a high potential for increasing carbon reservoirs. The potential impact of proposed forest measures is estimated to reach between 6.5 – 8 million tonnes of CO_2 equivalents annually by the end of this century.

With regard to renewable energy, this is not a major focus in the plan. It is pointed out that Norway already has a 98% renewable energy share when it comes to power production. In transportation, the goal is to reduce emissions by half. This will mainly be achieved by expanding the use of electric vehicles and gradually increase the mandatory share of biofuels from the current requirement of 24.5%, of which 9% must be advanced biofuels. The government also announced that it would present a new circular economy strategy in 2021.

4.2.2 Finland

The Finnish Forest Sector

Finland has a higher share of forested land than any other country in Europe. 73% of Finland's land area is covered by forests. With 23 million hectares it ranks second only to Sweden in terms of total forested area. The growing stock has been steadily increasing over the past century and now stands at approximately 2.4 billion m^3 according to the most recent inventory (Natural Resources Institute Finland, 2020). In recent years the harvesting level has also been increasing and has now reached about 70% of the annual increment of just over 100 million m^3. The most common tree species is Scots pine, which accounts for 50% of the growing stock, followed by Norway spruce and birch (Ministry of Agriculture and Forestry of Finland and Natural Resources Institute Finland, 2019). The annual carbon sink of Finnish forests has been estimated at between 20 to 30 million tonnes of CO_2 equivalents in recent years, depending on

the harvesting level. This represents 40-50% of Finland's average annual CO_2 emissions of approximately 60 million tonnes of CO_2 equivalents in the same period. (Natural Resources Institute Finland, 2020).

The forest sector plays an important role in the Finnish economy. In 2019 its share of GDP was 4,5% and had been expanding over the previous ten years (Natural Resources Institute Finland, 2020). The total export value of wood and wood products amounted to some 20% of all Finnish exports and approximately 62 000 people were directly employed in the forest sector. 60% of forests are privately owned, while 26% are state owned and the rest is owned by companies or other entities. The average size of private properties is 30 hectares (Natural Resources Institute Finland, 2021). 80% of Finland's renewable energy, which constitutes 37% of all energy consumption, is wood based (Natural Resources Institute Finland, 2020).

The economic performance of the forest sector in Finland has followed a positive trend in recent years (Ministry of Agriculture and Forestry of Finland, 2019). In the period 2013 -2019 the wood processing industry implemented several new investment projects resulting in a significant increase in the annual demand for industrial roundwood. One of the key drivers was the growth in trade with China, which has become one of the most important destinations for the export of Finnish forest industry products.

Finnish Forest Policy Objectives

The Finnish Forest Act serves as the main legal basis for Finland's forest policy (Finlex, 2021a). The purpose of the Act is to "promote economically, ecologically and socially sustainable management and utilisation of forests in order that forests produce a good output in a sustainable way while their biological diversity is being preserved." The forest policy's main elements are set out in Government reports to parliament and in Finland's national forest strategy.

The most recent Government report on forest policy was submitted to parliament in 2014 (Ministry of Agriculture and Forestry of Finland, 2014a). It presents long-term policy guidelines and defines a vision for the forest sector, strategic objectives and main policies for implementation until the year 2050. Although the report primarily deals with the traditional

forest sector and forest management, it takes a somewhat broader view than the documents on Norwegian forest policy referred to above, by placing more emphasis on all the ecosystem services forests provide. More specifically, the forest sector is understood to include forest management, the traditional forest industries and all forest related activities.

The main vision of the forest policy is that "sustainable management and use of forests create more welfare". Based on this vision, the policy articulates three strategic objectives:

- Finland is a competitive environment for forest-based industries and businesses.
- The forest sector and its structures are innovative and diversified.
- The forest is used in an active, sustainable and diversified way.

The report also sets out detailed policies for achieving these objectives. Although the role of forests in mitigating climate change is not a major theme, there are several climate related references. The report highlights the importance of wood as a sustainable resource that can be used for bioenergy and as a substitute for non-renewable energy sources and materials. One of the proposed policies is thus to increase the use of wood-based energy on the basis of domestically produced biomass in order to replace imported fossil fuels, promote climate policy goals and strengthen energy supply security and trade balance. Also, when discussing the sustainable use of forests, the report highlights how the role of forests as a carbon sink can be maintained through good management practices such as regeneration and afforestation and limiting the loss of carbon stocks in forests or forest soil from land use change.

Main priorities include:

- Create better conditions for forest and wood-based industries through industrial policies, laws and regulations.
- Create conditions for an active and profitable forest sector through changes in taxation and improved ownership structures.
- Ensure that the supply of raw materials meets demand and improve the functioning of the market.
- Support R&D activities that contribute to innovation and bioeconomy transition.

- Protect biodiversity, ecosystem services and sustainability.

Finnish forest policy is further elaborated in the National Forest Strategy 2025. The strategy was adopted for the first time in 2015 (Ministry of Agriculture and Forestry of Finland, 2015) and was then updated in 2019 (Ministry of Agriculture and Forestry of Finland, 2019). The National Forest Strategy 2025 is built on the vision and objectives of the Government report on forest policy and describes in more detail the measures that will be implemented to achieve the strategic objectives. More specifically, the strategy outlines main policy priorities for the forest sector, organized around the following seven objectives:

- Forest sector grows, industries are renewed, and new businesses are developed.
- Supply of raw materials allows for increased use of forests and new investments.
- EU and international forest policies promote sustainability and competitiveness of forests and wood.
- Knowledge is diverse and responds to changing needs.
- Administration is flexible, effective, and custom oriented.
- Forestry is active and business-like.
- Forest biodiversity and ecological and social sustainability are reinforced.

The strategy then goes on to propose a set of measures that must be implemented to achieve each of these objectives, with targets and indicators to measure achievement. It also contains a list of strategic projects that will further facilitate implementation of the strategy.

The first version of the strategy (Ministry of Agriculture and Forestry of Finland, 2015) seems already to have a stronger focus on the role of forests in climate mitigation than the government report on forest policy. It emphasises the significant climate impacts of Finnish forests" in particular as a carbon sink. It also highlights how active forest management can contribute to carbon sequestration and wood can replace fossil fuels and other non-renewable raw materials. The strategy is rather positive in its view of bioenergy, calling for measures to fully exploit its potential.

In the most recent updated version of the forest strategy for the period 2019-2025 (Ministry of Agriculture and Forestry of Finland, 2019), the strategic objectives, targets and indicators remain largely the same. The strategy sets a target of increasing the harvesting level from 72 million m^3 of roundwood and 2.9 m^3 of logging residues and stumps in 2017 to 80 million m^3 of roundwood and 6-7 m^3 of logging residues and stumps by 2026. Compared to the first version of the strategy, there seems to be a greater focus on the role of forests in mitigating climate change. There is a separate section entitled "Climate change mitigation and adaptation to be emphasised in forest-based business and activities" where the role of forests in mitigating climate change is discussed. On the topic of carbon sinks, the strategy once again emphasizes that active forest management can strengthen the forests' capacity to bind carbon and promote the replacement of fossil raw materials with wood-based products. The demand for bioenergy as a renewable energy source is expected to grow, along with demand for wood-based and biodegradable products.

Finland's Climate Policy Objectives

As a member of the EU, Finland operates within the climate policy framework of the EU when establishing its national goals. The EU's effort sharing regulation sets a binding emissions reduction target for Finland of 39% by 2030. However, the current Finnish government wants to achieve even more ambitious targets than those required by the EU. According to the government's main programme (Statsrådets publikationer, 2019) Finland aims to be carbon neutral by 2035 and have negative emissions shortly thereafter. Emissions reductions will have to intensify and carbon sinks be strengthened.

Climate policies and objectives are set out in a number of other governmental documents, of which the National Energy and Climate Policy Strategy 2030 is the most relevant for the present study (Ministry of Economic Affairs and Employment of Finland, 2017). The strategy aims to increase the share of renewable energy in overall consumption to over 50% and the share of renewable transport fuels to 30% by 2030. Increasing the use of wood-based bioenergy from domestic sources is presented as a crucial part of the strategy. The strategy proposes several policies with a direct impact on the forest sector and discusses the impacts on wood use and carbon sinks. The objective is that most of the wood-based energy will continue to be produced from so-called side streams from the forestry and wood-processing industries, and not from

raw materials that can be used for other purposes. The strategy is built on a scenario where the annual removal of roundwood by 2035 will not exceed the target set in the National Forest Strategy 2025.

In addition to the energy and climate strategy, another important climate policy document is the Medium-term Climate Change Policy Plan which covers the effort-sharing sector (Ministry of the Environment of Finland, 2017). These two documents together constitute the main basis for Finland's climate polices. Although the plan does not as such deal with emissions from forestry and the rest of the LULUCF sector, it discusses the possible negative impact on biodiversity and carbon sinks of increasing the production of wood-based bioenergy, noting that the impact depends to a large extent on the raw materials used.

The Ministry of the Environment of Finland publishes annual climate reports aiming to provide a comprehensive assessment of progress in achieving emissions reduction targets. In the 2020 climate report (Ministry of the Environment of Finland, 2020) it was announced that new measures to strengthen carbon sinks in the LULUCF sector will have to be considered to meet the more ambitious target of carbon neutrality by 2035. The sector will be included in the Finnish Climate Change Act, and the Act will be updated to reflect the new overall climate objectives and establish a separate target for strengthening carbon sinks. The report also announced that the government would create a new climate plan for the LULUCF sector by the end of 2021, with new measures aiming to increase removals and reduce emissions.

4.2.3 France

The French Forest Sector

France has the third largest forested area in the EU after Sweden and Finland when including its overseas territories. Forests cover some 17 million hectares or 31% of the total area in metropolitan France and 8 million hectares overseas (French parliament, 2020). France ranks third in the EU in terms of growing stock with 2.5 billion m^3, after Germany (3.6 billion) and Sweden (2.9 billion). In recent years, only about 50% on average of the annual increment of approximately 92 million m^3 has been harvested.

A unique feature of French forests in a European context is that they have a higher percentage of deciduous trees than other countries and also a lower density. 64% of French forests are deciduous, and the average density is 168 m^3/ha compared with an EU average of 198 m^3/ha. Main species are oak, beech, and pine, followed by spruce, fir, and chestnut. As regards carbon sequestration, it is estimated that French forests capture up to 96 million tonnes of CO_2 annually. This is equal to almost 15% of France's annual CO_2 emissions (French Ministry of Agriculture and Food, 2016).

In terms of economic value creation, the forest sector represents approximately 1.1% of the French GDP and employs some 378 000 people. 75% of forests are privately owned, while 15% are owned by local governments and 10% by the central government. Of the more than 3 million private properties many are very small. Approximately 2/3 of those properties cover less than one hectare (Cour des comptes, 2020). Despite being among the countries with the highest growing stock in Europe, France has a foreign trade deficit in wood products. It has a trade surplus in roundwood, but a deficit in finished wood products (French Parliament, 2020).

There seems to be a widely shared view in France that the forest sector is in need of revitalization and that its economic potential is not fully exploited. A recent government report on the need for restructuring in the forest sector (Cour des comptes, 2020) lists a number of challenges, and calls for more dynamic forest management as well as better integration between the supply and demand side. In addition, there are also growing concerns about the negative impact of climate change on the health of French forests. France has in recent years experienced major forest damage from storms, drought and fires linked to climate change (Cour des comptes, 2020).

French Forest Policy Objectives

The overall objectives of French forest policy are set out in its forest law (*code forestier*). A 2014 modification added a reference to carbon storage (Légifrance, 2021a). According to article L121-1 of the revised law, French forest policy has seven principal objectives, one of which is to ensure optimal storage of carbon in forests, wood and products made of wood. Another main objective is to maintain biodiversity and ensure the adaptation of forests to climate change.

More detailed guiding principles and forest policy objectives are outlined in the National Forest and Wood Programme, as mandated by the forest law. The current programme covers the period 2016-2026 (French Ministry of Agriculture and Food, 2016). Its starting point is that forests in addition to being a source of renewable products provide a wide range of essential services such as those relating to biodiversity and recreation. The programme emphasises the role of forests in mitigating climate change while also stressing the need to address climate adaptation to reduce the risks associated with more extreme weather conditions. The forest sector is referred to as a sector of the future that should fully contribute to the reduction of greenhouse gas emissions (French Ministry of Agriculture and Food, 2016). A key objective is to increase the annual harvesting level by 12 million m^3 from its current average level of 48 million m^3 by 2026 (Institut National de l'Information Géographique et Forestière, 2020). This would constitute 65% of the annual increment.

The programme lists several problems that must be dealt with to achieve these objectives, including the need to invest more in forest management, promote modernisation and innovation, improve the balance of trade in forest products, secure a better mobilisation of forest resources for raw materials and develop new uses for deciduous trees and new wood-based products. Two main challenges are identified. The economic challenge is to increase the value of French forest resources. The environmental challenge is to protect the forest and its biodiversity and at the same time renew it so that it can adapt to and help mitigate climate change. The forest and wood programme responds to these challenges by outlining a set of actions and policy priorities. Four main objectives are identified:

- Promote value creation in France through sustainable forest management in the context of green growth and transition towards a low carbon society.
- Meet the expectations of the general public and take into account regional projects.
- Combine climate change mitigation and adaptation.
- Develop synergies between forests and industry and adapt forest management practices to better respond to market demand.

Throughout the programme, references to climate change are frequent, and climate change mitigation is the motivation for many of the proposed actions and measures.

There is also a separate Interministerial Forest and Wood Action Plan (Conseil National de l'Industrie, 2018a). It proposes a set of actions organised in three main areas to meet the objective of increasing the harvesting level:

- Mobilise and permanently renew forest resources.
- Develop markets for final products and support innovation and investments.
- Improve the environmental performance of the forest sector.

Although there are few direct references to climate change objectives in the action plan, several of the proposed 18 policy measures are closely linked to such objectives. These include for example a project to promote the use of construction materials from wood to increase carbon stocks and funding to increase the supply of energy wood.

French Climate Policy Objectives

As is the case for Finland, France operates within the climate policy framework of the EU when establishing its national goals. The EU's current effort sharing regulation sets a binding emissions reduction target for France of 37 per cent by 2030. France also aims to be carbon neutral by 2050.

The main elements of France's climate policy are set out in its National Low-Carbon Strategy (French Ministry of the Environment, 2020a). The strategy provides overall guidelines on how to achieve the agreed emissions reduction targets, including how to achieve carbon neutrality by 2050. It is built around a baseline scenario identifying additional public policy measures which will allow France to reach its climate and energy objectives. The strategy includes specific guidelines and implementation measures for the forest sector aiming to strengthen the role of forests as carbon sinks, increase harvest volumes and maximise the effects of carbon storage in wood products as well as substitution effects. In the proposed scenario, the forested area will increase through afforestation and harvests will grow progressively from 48 million m^3 in 2015 to 65 million m^3 in 2030 and then to 83 million m^3 in 2050. The production of wood products with a long lifespan is supposed to triple between 2015 and 2050, making a substantial contribution to increasing the carbon sink. The overall sink is therefore not expected to be reduced, despite the increase in harvesting levels.

Another important part of French climate policy is the National Biomass Mobilisation Strategy (French Ministry of the Environment, 2018). This strategy has its legal basis in the law on energy transition for green growth which was adopted as part of France's implementation of the Paris Agreement and contains provisions promoting the use of renewable energy and sustainable construction materials (Légifrance, 2021b). The strategy forms an integral part of France's climate policy, but is also closely linked to the objectives of the forest programme, as is clear from the strategy's four main objectives which are to:

- promote the use of bioenergy to replace fossil fuels;
- mobilise production of biomass and wood-based biomass based on sustainable forest management that will also increase carbon sequestration;
- improve France's energy independence; and
- improve the competitiveness of the forest and agriculture sectors.

It proposes a set of measures to stimulate demand and improve supply, many of which target the forest sector, within the limits set by the objective of the national forest programme that the annual harvesting level will increase by 12 million m^3 by 2026.

Table 2: Forest Sector Key Facts and Main Policy Documents by Country

Key Facts	Norway	Finland	France (metropolitan)
Forested Area	12 million ha/37%	23 million ha/73%	17 million ha/31%
Growing stock	1 billion m^3	2.4 billion m^3	2.5 billion m^3
Annual increment	25 million m^3	100 million m^3	92 million m^3
Harvesting intensity (percentage of annual increment)	50%	70%	48%
Main species	Norway spruce, Scots pine and birch	Scots pine, Norway spruce and birch	Oak, beech, pine, spruce, fir and chestnut
Annual forest carbon sink	25 million tonnes of CO_2 or 50% of national emissions	20-30 million tonnes of CO_2 or 40-50% of national emissions depending on harvesting level	96 million tonnes of CO_2 or 15% of national emissions
Ownership structure (by forested area)	80% private/10% state/10% other	60% private/26% state/14% other	75% private/25% local or state government
Average size (private properties)	More than half of properties are less than 25 hectares	30 hectares	2/3 of properties are less than one hectare
Economic value creation	Less than 1% of GDP, 6000 employees	4,5% of GDP, 20% of exports, 62 000 employees	1.1% of GDP, 378 000 employees

Main Policy Documents	Norway	Finland	France
Forest Policy Documents	2016 White Paper to Parliament -*Meld. St. 6 (2016-2017)*	National Forest Strategy 2025 (updated version 2019)	National Forest and Wood Programme for 2016-2026 (2016)
Climate Policy Documents	2021 White Paper to Parliament - *Meld. St. 13 (2020-2021)*	National Energy and Climate Strategy 2030 (2017) Annual Climate Report (2020)	National Low-Carbon Strategy (2020) National Biomass Mobilisation Strategy (2020)

4.3 Horizontal Interlinkages: Climate, Renewable Energy and Forest Policies

In this section, the findings from the analysis of horizontal linkages between climate, renewable energy and forest policies are presented for each country. The results are structured along the three layers of policy described earlier: policy objectives, policy instruments and thematic elements in implementation.

4.3.1 Policy Objectives

Norway

The examination of horizontal interlinkages between stated climate and forest policy objectives indicates a high degree of coherence in the case of Norway. The reviewed documents on forest and climate policies are quite consistent in the way they address the role of forests in climate mitigation. They are also consistent in their presentation of objectives and proposed measures. This is illustrated by the fact that the government already in 2009 presented a white paper on how the agriculture and forest sectors could contribute to reaching a set of ambitious new greenhouse gas emissions targets agreed by parliament following the entry into force of the Kyoto Protocol (Norwegian Ministry of Agriculture and Food, 2009). Achieving carbon neutrality by 2050 was one of the new goals.

The 2009 white paper emphasised that forests and forest soil are important carbon sinks that should be strengthened through active forest management. In addition, wood should be used to replace less climate friendly materials and fossil fuels. The white paper argued in favour of a more active use of forest resources to achieve climate policy goals while taking into account the need to protect biological diversity and other ecosystem services. Policy objectives for the forest sector included:

- developing an ambitious and comprehensive approach to forest related issues on the international agenda and working to ensure more focus on forests in future international climate agreements;
- promoting sustainable forest management in Norway and considering measures with a positive climate impact;
- strengthening the use of forest policy measures with a view to increase removals of CO_2 on the basis of sustainable, active forest management;
- promoting increased use of wood as a substitute for other, less climate friendly materials; and
- ensuring that increased harvesting of biomass would not negatively affect biological diversity.

Norway's current forest policy seems to a large extent to incorporate these objectives.

Subsequent climate policy white papers have all highlighted the importance of forests in climate mitigation, with separate chapters or sections on forests. The overall policy goals on climate and forests have largely remained the same, with some changes as regards concrete policy measures. They can be summarised as follows:

- Maintain and strengthen carbon reservoirs through active, sustainable forest management involving enhanced efforts with regard to breeding of forest seedlings, higher seedling density and fertilization.
- Enhance carbon sequestration through afforestation and forest protection.
- Improve incentives for producing wood-based bioenergy, focusing in particular on harvest residues with a short CO_2 "pay-back time".
- Encourage the use of wood as a building material and the commercialisation of wood-based products.
- Support research on how forests can best contribute to mitigating climate change.

Most of these objectives are also reflected in the government's latest climate plan (Norwegian Ministry of Climate and Environment, 2021), although a few new measures are proposed, which will be discussed later on. What is noticeable, however, is that there is no reference to forest-based bioenergy. Norway previously had a separate bioenergy strategy which was

presented by the government in 2008 as a tool to reduce greenhouse gas emissions, promote economic activity in remote areas and strengthen energy supply security (Norwegian Ministry of Oil and Energy, 2008). The overall objective was to double overall domestic production of bioenergy by 2020 from an estimated 15 TWh in 2008, mostly on the basis of wood-based raw materials. To ensure the supply of raw materials the strategy called for an increase in harvesting levels, using a higher share of forest residues, taking out more low-quality roundwood and expanding the practice of pre-commercial thinning. The objective has not been reached, however, as bioenergy consumption in 2019 had barely increased from 2006 (Statistics Norway, 2021c).

In conclusion, there seems to be a high degree of coherence between climate and forest policy objectives in Norway. Interlinkages with renewable energy objectives are less direct, and expanding the production of wood-based bioenergy does not appear to be a priority.

Finland

Compared to Norway, the direct interlinkages between forest and climate policies appear weaker in Finland at the outset, but seem to grow stronger over time, with more frequent references to climate issues in forest policy documents. Nevertheless, although the latest version of the forest strategy (Ministry of Agriculture and Forestry of Finland, 2019) contains a separate section discussing the role of forests in climate change mitigation, none of the main strategic objectives or targets refer explicitly to this dimension. As already noted, there are more general references to the importance of active forest management as a means to strengthen carbon storage and promote the replacement of fossil raw materials with wood-based products and as a renewable energy source, but few concrete proposals.

A more detailed reading of the strategy reveals that climate change mitigation is listed as part of the objective that "forest biodiversity and ecological, social and cultural sustainability are reinforced" (Ministry of Agriculture and Forestry of Finland, 2019, p.69). Forests are expected to play an increasingly important role in climate change mitigation and adaptation supported by diverse sustainable forest management. Wood consumption is expected to grow, and there will be less focus on forests as carbon sinks and more emphasis on replacing fossil raw materials by renewable ones like wood. As a result, Finland's forest carbon sink is expected to shrink from

34 million tonnes of CO_2 in 2016 to just under 28 million tonnes of CO_2 in 2026. Meanwhile the sink in wood products will almost double from 3.6 million tonnes of CO_2 in 2016 to almost 7 million tonnes of CO_2 in 2026.

Also, two of the projects that are proposed as part of the implementation of the strategy are linked to climate change. One of the projects focuses on resource-efficient and sustainable forest management. It aims to support research and development activities relating to forest management seeking to increase forest growth, strengthen carbon sinks and develop new incentive schemes that support sustainable and resource-efficient forest management. The other project, on climate sustainable forestry, aims to increase knowledge about carbon storage and sequestration in forests as well as the impact of forests and forest management on climate change adaptation (Ministry of Agriculture and Forestry of Finland, 2019). One of the outputs will be updated forest management recommendations and more effective communication concerning climate change adaptation, carbon sequestration by forests and carbon storage.

The main message in the strategy seems to be that the best way to achieve climate objectives is to pursue a traditional forest policy that aims to support an active and profitable forest sector based on principles such as competitiveness, a "business-like" approach and increased growth and supply. Active forest management is seen as a "basic precondition for a commercial forest's capacity to bind carbon" (Ministry of Agriculture and Forestry of Finland, 2019, p. 67).

By comparison, the interlinkages between renewable energy/bioenergy goals and forest policies seem more direct. The importance of renewable energy in Finland can be seen in the way climate policies are structured around separate strategies for the effort-sharing sector and climate and energy. As noted earlier, Finland has set ambitious renewable energy goals that will to a large extent depend on wood-based energy production and this is also reflected in the forest strategy (Ministry of Agriculture and Forestry of Finland, 2019). As part of the objective of forest sector growth, the strategy states that "to fully exploit bioeconomy potential, political decisions must support the creation of new enterprises and innovations, and the legislation or its interpretations must not create unnecessary barriers to the sustainable exploitation of forests and wood. Unnecessary bottlenecks caused by current provisions that block

bioeconomy development should be addressed in various branches of administration“ (p.19). At the same time, it is emphasised that measures must be put in place to reduce harmful effects on the environment of increased harvesting volumes.

When assessing horizontal interlinkages in Finland, it should be recalled that Finland is now in the process of preparing an entirely new climate plan for the LULUCF sector to achieve carbon neutrality by 2035, as referred to in the 2020 climate report (Ministry of the Environment of Finland, 2020). In February 2021 the Ministry of Agriculture and Forestry announced that it had appointed an inter-administrative working group that would prepare the plan, with a view to adoption in early 2022 (Ministry of Agriculture and Forestry of Finland, 2021a). One of the key tasks for the working group is to make sure that the plan is consistent with all the other plans related to the energy and climate framework, such as the Climate and Energy Strategy, the Medium-Term Climate Change Policy Plan, and the National Forest Strategy. Earlier, in June 2020, the ministry had launched an initiative to identify additional climate measures for the LULUCF sector with a target of achieving at least 3 million tonnes of CO_2 equivalents in total annual emissions reductions (Ministry of Agriculture and Forestry of Finland, 2020a). The initiative included the “climate sustainable forestry“ project referred to in the forest strategy. The results from the project will feed into the preparation of the climate plan for the LULUCF sector, with new measures expected to target the forest sector. These developments seem to indicate that the interaction between forest and climate policies is perhaps closer than evidenced in the reviewed documents and is growing in importance.

France

In France, the results of the horizontal analysis suggest a high degree of integration between climate and forest policy objectives, with interlinkages at a level comparable to Norway. It is significant that the French forest law explicitly lists carbon sequestration and climate adaptation as key forest policy objectives. These objectives are also reflected in the National Forest and Wood Programme (French Ministry of Agriculture and Food, 2016) where two of the four main forest policy goals are climate related: the management of forest resources should contribute in the transition towards a low carbon society and should also aim to combine climate mitigation and adaptation.

The programme identifies several areas of action directly linked to climate change. It calls for a more dynamic forest management regime to increase forest growth and mobilise resources with a view to enhance carbon sequestration and strengthen the resilience of forests to climate change. It also stresses the importance of stimulating the use of wood to increase carbon storage in products with a long lifespan. In addition, the programme emphasises the need for cross-cutting actions targeting the whole forest sector to ensure an optimal use of forest resources that takes into account the need for carbon capture, substitution of non-renewable materials and energy sources, and mitigation of climate change. Regarding climate adaptation, it calls for new forest management practices to be put in place to prevent damage and maintain the growth and health of forests, while also focusing on monitoring and developing new knowledge.

The importance of climate mitigation and adaptation is highlighted in the national action plan on forests as well (Conseil National de l'Industrie, 2018a), with measures targeting both the development of forest resources and the demand for forest products. Several of the proposed measures are presented as mainly climate-motivated, such as promoting the use of wood as a renewable building material that contributes to increasing carbon storage.

Interlinkages between climate and forest policy objectives are also obvious in the National Low-Carbon Strategy (French Ministry of the Environment, 2020a). As explained in the strategy, it "acts in tandem with all of the major strategies and programmes covering sustainable forest management […] particularly the National Forest and Wood Programme […]". Moreover, the strategy lists a set of overall policy guidelines on how the forest sector can contribute to reaching climate objectives. One of the guidelines is to ensure the long-term preservation and strengthening of forest sector carbon sinks and stocks and their resistance to climatic stress. Proposed policies include improved forest management with a particular focus on adapting forests to deal with climate change, preserving forest soil carbon stocks, promoting afforestation, and preventing deforestation. The other main guideline is to maximise the effects of substitution and carbon storage in wood products through measures targeting supply and demand. Proposed policies focus on increasing the harvesting level (to reach the objective of an additional 12 million m^3 per year by 2026 as referred to in other policy documents) through forest management measures, prioritising uses of wood with a long lifespan and high

substitution potential such as expanding the use of wood in construction and improving the energy efficiency for wood-based renewable energy production. In a separate annex there is a list of more detailed measures specifically targeting the forest sector to implement the strategy.

A further example of interlinkages in policy objectives can be found in the National Strategy for the Mobilisation of Biomass relating to renewable energy (French Ministry of the Environment, 2018). Within the overall objective of the strategy, the mobilisation of forest biomass is linked to sustainable forest management seeking to increase the capacity of forests to store carbon. The main guiding principle for the proposed policies is to develop the use of construction wood.

Overall, the results seem to suggest that forest policy, climate change, climate adaptation and renewable energy objectives are well integrated in France and perhaps more so than in Norway and Finland.

4.3.2 Policy Instruments

The examination of horizontal interlinkages relating to policy instruments focused primarily on two categories of instruments: those targeting the production side, i.e. forest management practices and investments in sylviculture, and those targeting the demand side, i.e. promoting the use of wood for construction or in energy production. The goal was to identify instruments in these categories that were explicitly motivated by climate or renewable energy policy goals. Only those deemed to be the most significant and relevant are included here. Before presenting the main findings by country, as summarized in table 3 below, a very brief overview of some common characteristics of forest policy instruments in the three cases may be useful.

Some Common Characteristics of Existing Forest Policy Instruments

All tree case countries have established incentive schemes designed to encourage investments in forest management and ensure regeneration after harvesting. In Norway, investments in forest management are encouraged through a mechanism referred to as a forest trust fund (*Skogfond*) and through direct public grants in support of certain types of investments. The forest trust fund mechanism aims to secure adequate funding of sustainable forest management practices by obligating forest owners to put a certain share of their gross harvest income into a fund that can be used for future investments (Lovdata, 2021c). Forest owners

can choose to allocate a minimum of 4% and up to a maximum of 40 % of their gross income, depending on their investment needs and economic situation. No interest is gained on the capital in the trust fund and strict rules apply for the type of forest management operations eligible for funding. The advantage for the forest owner is that there is no tax on money deposited into the fund and transfers out of the fund to pay for investments are taxed at a much lower rate than regular forestry income. Additional investment incentives are provided through the availability of forest management grants designed to promote increased economic value creation, preservation of the environment, and development of other ecosystem services (Lovdata, 2021d). Grants are provided for a wide range of activities, with investments in sylviculture and road construction as the most important, covering up to 40% of associated costs.

In Finland, the main forest management policy instrument is the Act on the Financing of Sustainable Forestry, commonly referred to as the Kemera law (Finlex, 2021b). Similar to the Norwegian grant scheme, the Kemera financing system is designed to encourage investments in sylviculture and forest infrastructure projects and thus promote forest growth. Funding is provided as a fixed amount per hectare of forest or as a percentage of costs. It should be noted that the system is currently under review. In January 2021 a government appointed working group submitted its proposals to the government, but these proposals have not been reviewed here as they are not expected to take effect until 2022 or 2023 (Ministry of Agriculture and Forestry of Finland, 2021a).

France provides both tax incentives and grants to encourage forest management investments. One of the main policy instruments is a tax reduction scheme referred to as DEFI (*Dispositif d'encouragement fiscal á l'investissement en forêt*) (French Ministry of Agriculture and Food, 2020a). DEFI allows forest owners to benefit from tax credits of up to 25% for the acquisition of land, management plans and investments in roads or sylviculture, and 75% for insurance purposes. In addition, there are support schemes similar to the ones in Norway and Finland, offering grants for certain types of investments (Cour des Comptes, 2020). These are mainly funded through the Strategic Fund for Forests and Wood, established in 2014, which in 2018 had a total budget of 21.6 million euros.

Additionally, French forest owners have access to matching EU funding through the European Agricultural Fund for Rural Development (French Parliament, 2020). This is not the case for Finnish forest owners, as it is up to each member state to decide on the type of measures qualifying for funding. In Finland, EU funding is administered through the Rural Development Programme for Mainland Finland which does not include any measures related to forestry (Ministry of Agriculture and Forestry of Finland, 2014b).

Although none of these policy instruments are directly climate motivated, they are seen as having a positive impact on carbon sequestration and climate adaptation because they promote growth and regeneration. As noted earlier, "active forest management" is often referred to as a climate mitigation measure in the forest and climate policies of all three case countries.

On the demand side, a common feature of the three countries is the existence of policies such as regulations, tax incentives and support schemes that provide incentives for the use of wood in construction and energy production. These may also include cross-sectoral policies and measures that do not directly target the forest sector and will not be covered here. In the following presentation of results, the focus will be on policy instruments with a clear climate or renewable energy dimension.

Norway

Several of the existing or planned forest policy instruments in Norway are explicitly climate mitigation motivated. In 2016, the government established a new support scheme designed to incentivise forest owners to fertilise more forest stands as a means to stimulate forest growth and enhance carbon sequestration (Norwegian Ministry of Agriculture and Food, 2016). The share of forested land that is fertilized has historically been relatively low in Norway when comparing to for example neighbouring countries Finland and Sweden. In the period 2009 – 2013 only about 800 hectares of forested land were fertilized annually on average in Norway whereas in Sweden it was 59 000 hectares and in Finland 44 700 hectares (Norwegian Environment Agency, 2014). The support scheme, which is referred to as a "climate measure" on the government website (Norwegian Agriculture Agency, 2021) offers grants covering up to 40% of the fertilisation cost. Immediately following the introduction of the scheme, the

fertilised area increased more than ten-fold, to just over 9 000 hectares. In 2019 it had decreased to approximately 3 750 hectares (Statistics Norway, 2021d).

In parallel with the fertilising scheme the government established a support scheme aiming to increase seedling density on regeneration sites in Norwegian forests (Norwegian Ministry of Agriculture and Food, 2016). When this was introduced, planting activity had been in decline for several years. This support scheme is also referred to as a "climate measure" that aims to enhance the carbon storage capacity of forests (Norwegian Agriculture Agency, 2021.) The scheme offers grants covering up to 60% of the cost associated with increasing the number of plants beyond recommended guidelines. In addition, there is also a support scheme providing financial incentives to expand breeding of forest seedlings in Norway. This is mainly economically motivated to increase the growth and quality of trees but is now also referred to as a climate mitigation and adaptation measure. The total budget for these three measures was approximately 45 million NOK in 2019 (4.5 million euros) (Norwegian Ministry of Agriculture and Food, 2020).

In addition to these existing measures, the government proposed in its recent climate plan (Norwegian Ministry on Climate and Environment, 2021) to add a provision in the Norwegian Forestry Act that would impose limits on the minimum harvesting age with a view to enhance carbon storage in forests. The government also proposed to create an incentive programme for pre-commercial thinning, establish a financial support scheme to promote afforestation, and monitor more closely that forest owners comply with regeneration obligations.

Norway has also created some climate related policy instruments targeting the use of wood. Most of these are managed by Innovation Norway (IN), a government agency that supports innovation and development of Norwegian enterprises and industry. The most important instrument in budgetary terms is a government programme encouraging the use of renewable energy and technology in the agricultural sector through grants. The programme provides investment support to small scale bioenergy production, mostly from forest biomass. One of the funding criteria is whether the proposed project will result in a significant reduction in greenhouse gas emissions (Innovation Norway, 2021a). The total budget for the programme in 2020 was 87 million NOK or approximately 8.7 million euros (Innovation Norway, 2021b). IN

also provides support to farmers using wood as a construction material in new buildings. In addition, IN manages a separate bioeconomy programme encouraging the development and use of new technology (Innovation Norway, 2021c). More specifically, the objective is "increased value creation in biobased industries based on market oriented and sustainable exploitation of bio resources, including the innovative use of wood" (Innovation Norway, 2021b). The total budget for the programme in 2020 was some 57 million NOK or 5.7 mill. euros, but only a portion of this goes towards wood-based projects.

Finland

When it comes to Finnish forest policy instruments that are specifically climate motivated, they are quite recent. One important policy instrument in Finland which does not seem to have an exact equivalent in Norway or France, is the Finnish Best Practice Guidelines for Sustainable Forest Management (Tapio, 2019). These guidelines are developed and regularly updated by the government agency Tapio through a nationwide coordination process involving researchers, forest owners, forest industry, relevant organisations, and others. They are supposed to reflect the most recent scientific knowledge as well as main forest policy objectives set by the Finnish government and are widely used by private forest owners. In the latest version, both climate mitigation and adaptation are highlighted as important issues that were considered when updating the recommendations. For the first time the guidelines include recommendations on continuous coverage forestry.

In Finland there are also some climate motivated grants available for forest owners. In 2020, a new measure expanding the availability of grants for ash fertilising of forests was introduced under the Kemera financing system (Ministry of Agriculture and Forestry of Finland, 2021b). This was presented by the government as a climate-motivated measure designed to reduce emissions from peat land and strengthen carbon sinks. Also in 2020, a new law was adopted on temporary support for afforestation that is clearly climate motivated (Ministry of Agriculture and Forestry of Finland, 2021c). The objective of the law, which entered into force on 1 January 2021, is to increase Finland's forested area and carbon sink and reduce emissions of greenhouse gases (Finlex, 2021c). The law allows private forest owners to apply for government funding that will cover some of the costs associated with planting forest on new land. One of

the conditions is that the land has not been forested before and is not being used for cultivation.

Another recent Finnish forest policy initiative which is seen as climate motivated, relates to the governance of Finland's state-owned forests. These forests cover more than 12 million hectares, or 10% of all forested land, and are subject to detailed operational guidelines approved by the Finnish parliament (Ministry of Agriculture and Forestry of Finland, 2020b). In the most recent ownership guidelines, adopted by parliament in April 2020, several changes were made which were linked to Finland's objective of carbon neutrality by 2035. The harvesting target was reduced and the required percentage of continuous coverage forestry after felling was raised from 15 to 25%. By consequence, the annual state revenue is expected to fall by 18 million euros, to an estimated 114 million euros.

Examples of policy interaction was found also in instruments targeting the demand for wood and forest products in Finland. One such policy instrument on the demand side is the wood building programme (Ministry of the Environment of Finland, 2021). The programme aims to increase the use of wood in urban developments, public buildings, and large construction projects such as bridges. It also seeks to diversify and expand the applications for wood with a view to create as much value added as possible, including by promoting exports. The programme is specifically climate motivated as it refers to how increasing the use of wood in construction can have a significant impact on reducing emissions. Actions under the programme include both subsidies for wood construction projects, regulations and support for research and development. For example, it includes an "Aid Scheme for Growth and Development from Wood" designed to promote the use of timber in construction through grants for various projects.

With regard to renewable energy, Finland has until very recently subsidised the production of electricity from wood chips. The support scheme for renewable energy is administered by the Finnish Energy Authority and is part of the energy and climate policy "that aims for sustainable energy production and consumption to curb climate change" (Energy Authority of Finland, 2021). The scheme includes direct investment support as well as production incentives based on a feed-in tariff system for heat and electricity generation from wind, biogas, forest chips and

wood-based fuels. It was recently announced, however, that as of 15 March 2021 electricity production based on wood chips would no longer qualify for subsidies (Ministry of Economic Affairs and Employment of Finland, 2021). The reason given for this change was that using wood chips had become more competitive as the cost of CO_2 emission quotas and taxes on peat had increased.

France

Also in France, several recent forest related policy instruments appear to be specifically climate motivated. In 2018, the Ministry of Agriculture put in place a new national support scheme aiming to improve the quality of forest stands by offering grants that cover up to 40% of the cost of eligible investments (French Ministry of Agriculture and Food, 2018). This scheme is partially climate motivated as one of its objectives is to maximise carbon sequestration. It also aims to encourage investments in sylviculture, ensure adequate supply of forest resources for the industry, and prepare forests for climate change. It is funded by the Strategic Fund for Forests and Wood and had a total budget of 8 million euros in 2019 (French Ministry of Agriculture and Food, 2019).

More recently, in December 2020, as part of a national stimulus plan related to the Covid 19 pandemic, 200 million euros were set aside to support actions to help forests adapt to climate change and promote the use of wood with a view to increase carbon storage in products (French Ministry of Agriculture and Food, 2020b). 150 million euros will be used to fund a new measure called "forest renewal" aiming to encourage forest management related investments in 45 000 hectares of forest by the end of 2024. The investments are expected to result in 150 000 tonnes of additional CO_2 sequestration per year. Approximately 5 million euros will be spent on measures to promote the use of wood, while the remaining funds will, among other things, support research and educational projects.

On the demand side, one of the main climate motivated policy instruments in France is the Heat Fund, which provides investment support for production of heat from renewable energy, including woody biomass (ADEME, 2021). The fund is administered by the French Agency for the Environment (ADEME*)* and is part of the implementation of the law on energy transition for green growth (Légifrance, 2021b). The objective of the law is to contribute to climate

mitigation by increasing the share of renewable energy in total consumption to 32% by 2030. In the period 2009-2018 64% of the energy produced from projects receiving support was based on forest biomass (French Ministries of the Environment and of Agriculture and Food, 2021). In 2020 the total budget for the Heat Fund was 350 million euros and the supported projects generated an estimated 4 TWh of energy.

A related climate motivated instrument administered by ADEME and linked to the Heat Fund is the Dynamic Wood programme (ADEME, 2019). It was established in 2015 for a four-year period to promote the use of forest biomass by supporting projects designed to mobilise additional forest resources through measures such as afforestation, new investments, and more efficient organisation. 43 projects were selected under the programme. The projects received a total of 56 million euros and resulted in an estimated additional 3 – 4 million tonnes of energy wood supply.

Another climate motivated policy instrument on the demand side in France is designed to promote the use of wood for construction. The new building regulation referred to as RE2020 is intended to contribute to France's objective of carbon neutrality by setting strict new climate impact standards for all new buildings (French Ministry of the Environment, 2021a). While the old regulation focused only on energy efficiency, the objective of RE2020 is to reduce all emissions over the lifecycle of a building, from the construction phase to the final disposal of building materials at the end of its life. RE2020 enters into force in 2021 and is expected to lead to greater demand for construction wood.

In addition to these policy instruments, two other French policies seem to stand out in relation to Finland and Norway. The first one is the "low-carbon label". This is an innovative climate motivated instrument unique to France that was quite recently introduced and became operational in April 2019. The low-carbon label is a national carbon certification scheme established by the French Ministry of the Environment as part of its implementation of the National Low Carbon Strategy (French Ministry of the Environment, 2021b). The objective of the scheme is to encourage the development of local projects that will contribute to greenhouse gas emissions reductions or sequestration in agriculture and forestry. Only projects able to demonstrate that their impact is additional, i.e. that the net reduction in

emissions would not have taken place without the establishment of that particular project, will be certified. Certified projects can then sell carbon credits to private buyers who wish to compensate for CO_2 emissions caused by other activities, such as travel. Three forest management methods have so far been approved for certification: reconstitution of forests damaged by storms, fire or pests; transformation of coppice into high forest; and afforestation of areas that have not been forested for the past ten years. As of February 2021, 73 forestry projects had been certified. They covered an area of 460 hectares and were expected to result in annual emissions reductions of 89 000 tonnes of CO_2.

Also unique to France is the way partnerships with the forest industry seem to feature more prominently as a forest policy instrument than in Norway and Finland when it comes to climate change. The private sector in France appears to be more directly involved in policy implementation through the Strategic Committee for the Forest Sector where government and industry representatives come together. The role of the committee is to seek the collaboration of the private sector in implementing forest policy and achieving the objectives of the National Forest and Wood Programme through strategic contracts (Conseil National de l'Industrie, 2014). In the latest such strategic contract climate change mitigation features prominently as one of the top priorities for the forest sector (Conseil National de l'Industrie, 2018b). Mobilizing additional forest resources and increasing the demand for construction wood are identified as key challenges. Also, government and forest representatives have signed a charter on how the funds earmarked for the forest sector under the recent Covid 19-related stimulus plan would be spent (French Ministry of Agriculture and Food, 2020b). Moreover, the industry submitted a road map outlining actions that will be taken to achieve the objectives of the forest and wood programme regarding climate adaptation (French Ministry of Agriculture and Food, 2020c). Both climate mitigation and adaptation are thus key issues in the government's partnership with the private sector.

An overview of the climate related policy instruments described in this section can be found in table 3 below.

Table 3: Examples of Climate Motivated Policy Instruments			
	Norway	Finland	France
Forest management	Support scheme for fertilising forest stands	Support scheme for ash fertilisation of forests	Support scheme for improving the quality of forest stands
	Support scheme to increase seedling density on regeneration sites	Temporary support scheme to promote afforestation.	"Forest renewal" support scheme under the Covid 19 stimulus plan
	Support scheme to promote breeding of forest seedlings	Best Practice Guidelines for Sustainable Forest Management	"Low-carbon label" certification scheme
Production of wood-based bioenergy	Investment support for small scale wood-based bioenergy production	Investment support and feed-in-tariffs for wood-based bioenergy (until 2021)	Heat Fund
Demand for wood and products from wood	Investment support for the development of new technologies for innovative uses of wood.	Wood building programme	RE2020 Building regulation
State forest governance		Guidelines on carbon sequestration and continuous coverage forestry	
Industry Cooperation			Strategic contracts between government and industry on climate related forest policy implementation

4.3.3 Thematic Elements in Implementation

The review of thematic elements focused as described earlier on how forest policies are communicated and presented by key government agencies involved in policymaking and implementation. The objective was to identify whether climate mitigation would appear as a key issue also at this level, i.e. whether there would be coherence across the three policy layers with regard to climate references. Thematic elements in implementation also determine how policies are perceived by forest owners and others directly affected by them.

In Norway, thematic elements showing interlinkages between forest and climate policies are not very visible on the website of the Ministry of Agriculture and Food (https://www.regjeringen.no/en/dep/lmd/id627/). "Forests and climate" is one of the featured topics but it is not linked to specific policies or policy implementation. The main focus is on the

economic value and profitability of the forest sector and on the importance of using wood as a renewable material.

The Norwegian Directorate for Agriculture is responsible for the implementation and oversight of policy instruments relating to forest management. Its website (https://www.landbruksdirektoratet.no/nb) is very factual and does not contain any references to climate related themes. As noted earlier, the support schemes for fertilisation and increased seedling density are referred to as "climate motivated", but no further explanation is given. Local authorities also play a key role in the administration of the support schemes as they are the main points of contact for forest owners. It is possible that more interlinkages can be found at this level where each municipality is in charge of developing its own communication strategy. A review of a few relevant websites did not indicate, however, that this would be the case.

Not surprisingly, given the importance of the forest sector in Finland, the website of the Finnish Ministry of Agriculture and Forestry (www.mmm.fi) has a strong focus on forest-related policies. The website is very informative, but climate change is not among the first highlighted issues. Although "forests and climate" is one of the themes listed under other issues, biodiversity and bioenergy feature more prominently. This is in line with the findings from the review of policy documents, where references to climate mitigation were most often linked to bioenergy and active forest management objectives.

With respect to implementation of forest management policies such as the Kemera support scheme, the state-funded Finnish Forest Centre plays a key role. Its website provides information on "climate sustainable" forestry, covering such topics as the role of fertilisation, afforestation, regulation of the water level in peat land forests, and measures against forest calamities in climate change mitigation and adaptation (https://www.metsakeskus.fi/fi/metsan-kaytto-ja-omistus/metsanhoito-ja-hakkuut/ilmastokestava-metsanhoito).

Also Tapio, the agency responsible for the development of forest management guidelines, highlights climate change adaptation and mitigation as important topics in the development of guidelines and other projects (www.tapio.fi). Likewise, Metsähallitus, the company managing

Finland's state-owned forests, emphasizes its role in achieving the objective of a carbon-neutral Finland by 2035 (www.metsa.fi).

On the website of the French Ministry of Agriculture and Food (www.agriculture.gouv.fr) thematic interlinkages between forest and climate policies are quite visible. At the time of writing, the positive impact on greenhouse gas emissions of the Covid 19-related stimulus plan for the forest sector was a key focus. The plan was presented as a step towards achieving carbon neutrality in 2050. Another highlighted area was the role of the forest sector in implementing the National Low Carbon Strategy.

Outside the central government, implementation of forest policy in France is quite complex and involves a number of institutions. The National Centre for Forest Property (CNPF) is in charge of the development of sustainable management of private forests while the National Office for Forests (ONF) manages state-owned forests. The CNPF carries out its responsibilities through eleven regional offices (www.cnpf.fr). The National Forest and Wood Programme is implemented at the regional level through the adoption of regional forest and wood programmes, focusing mainly on forest management related policies (French Ministry of Agriculture and Food, 2016). Other policy instruments are also administered at the regional level and sometimes differ across regions.

For private forest owners, the website of the CNPF is most likely one of main sources of information when it comes to forest policies. One of the main topics featured on the opening page is "Forests and carbon". Under this heading, the focus is on the low-carbon label and how forest owners can participate (www.cnpf.fr). The CNPF's regional centres all have their own websites with information about available support schemes. The main themes featured on these websites naturally differ across regions, but carbon sequestration and climate mitigation do not seem to receive a lot of attention. By contrast, the importance of climate adaptation is more frequently highlighted, such as on the website of the regional centre for Eastern France (https://grandest.cnpf.fr/), which is one of the regions with the largest forested area.

The regional state administrations are also involved in policy implementation and prepares the regional forest and wood programmes. At this level of implementation, the main themes

related to forests and climate also seem more oriented towards climate adaptation than climate mitigation. Again using Eastern France as an example, the forest and wood programme for this region is very much focused on the risks associated with climate change (Préfet de la region Grand Est, 2018). Climate adaptation is highlighted as a key topic on the website of ONF as well (see www.onf.fr), and there are some references to the importance of forests as a renewable resource and carbon sink.

All in all, the review of thematic elements in forest policy implementation suggests that the importance attached to climate mitigation varies considerably across the three case countries. In Norway, references to climate mitigation seemed much less visible at the level of implementation than in the other two policy layers. In Finland, there were indications of a more coherent approach, for example in the focus on "climate sustainable" forestry. In France, there seemed to be a greater emphasis on climate adaptation than mitigation as a thematic element in implementation when compared to the other two policy layers. The results must be interpreted with caution, however, given that the collection of data was based on a limited number of sources of information as explained earlier. Nevertheless, the analysis serves as a reminder of the importance of considering policy coherence across different policy layers.

4.4 Vertical Interlinkages: EU Policies and National Climate and Forest-related Policies

The analysis of vertical EU interlinkages focused on three different dimensions. In addition to examining direct links between EU and national policies, the analysis explored more indirect ways in which the EU might have influenced policy discussions in the three cases. The third dimension was to investigate to what extent the countries had developed strategies aiming to influence developments in the EU relating to climate and forest related issues. Regarding the first dimension of direct interlinkages the analysis focused on the renewable energy directive and the LULUCF regulation. As a reminder, relevant EU policies and objectives described earlier are summarised in table 1.

4.4.1 Norway

As explained earlier, Norway only recently started to implement all three pillars of EU's climate policy framework. However, Norway has for a long time been politically closely aligned with the

EU in all climate matters and has been implementing those parts of the policy framework that fall within the EEA agreement, such as the ETS directive (since 2008) and the renewable energy directive (since 2011). Preparations for the implementation of the effort-sharing and LULUCF regulations have also been underway for a while.

A natural place to start the analysis was to examine direct vertical interlinkages between the renewable energy directive and Norwegian forest policy. The analysis did not reveal very close interaction. In Norway's bioenergy strategy (Norwegian Ministry of Oil and Energy, 2008) there are no references to the EU or the renewable energy directive. The directive had just been proposed but was not yet formally adopted. In the government's subsequent white paper on climate policies for the agricultural sector (Norwegian Ministry of Agriculture and Food, 2009), there was a section describing the renewable energy directive, but this was not tied to any of the proposed policies to increase the share of renewable energy, including measures to promote the use of forest residues. In the 2016 white paper on forest policy, (Norwegian Ministry of Agriculture and Food, 2016) the renewable energy directive is mentioned as a tool that can provide incentives to use more second-generation biofuel. It is noted that such biofuels can be produced from forest biomass, but no new measures encouraging the use of domestic biomass are proposed.

A possible explanation for Norway's lack of interest in bioenergy is the high share of hydroelectric power in the Norwegian energy mix. This is evident in Norway's 5th progress report to the European Commission regarding implementation of the renewable energy directive (European Commission, 2019b). According to the report, no new policies targeting the use of biomass had been implemented in the preceding two years, and in the list of support schemes for renewable energy there were none concerning the use of forest biomass. Increasing the use of biofuels in the transport sector, especially in road transportation, by gradually raising quota obligations, has been one of Norway's main renewable energy priorities. The sale of such biofuels has therefore increased strongly in recent years. The Norwegian government has pledged to further raise the quota obligation from 24.5% in 2021 to 40 % by 2030 (Norwegian Ministry of Climate and Environment, 2021). Since most of the biofuel consumed in Norway today is imported, the quota obligation has so far not led to more demand for domestically sourced forest biomass. This may change as the production of forest-based

biofuels in Norway is expected to markedly increase over the next few years (Norwegian Environment Agency, 2020b).

The white paper on climate policies in the agricultural sector (Norwegian Ministry of Agriculture and Food, 2009) provides an example of more indirect connections with EU policies. The white paper referred to a declaration by the government that it would "consider good EU initiatives and implement the best of EU legislation relating to the environment, even when it is not part of the EEA agreement" (Norwegian Ministry of Agriculture and Food, 2009, p. 35). More specifically, the government proposed that Norway should have the same ambitions as the EU with regard to emissions reduction targets for the non-ETS sectors, including for the agricultural sector and forests.

Such indirect linkages are also evident in earlier climate policy documents where there were many references to Norway's close cooperation with the EU on climate issues even if these were not formally part of the EEA agreement. It is not clear, however, whether that had any impact on Norwegian forest policy. Norway's cooperation with the EU has now entered a new phase following the 2019 climate agreement. In a 2017 white paper presenting the government's proposal for Norway to enter into the agreement (Norwegian Ministry of Climate and Environment, 2017), the impact of the LULUCF regulation, which at the time had not yet been adopted, was discussed. It was pointed out already then that the proposed forestry accounting rules most likely would result in net emissions from Norway's managed forests.

The LULUCF regulation may already have had an impact on Norway's national policies by bringing more attention to the role of forests in climate mitigation, even if it only took effect this year. Some indications can be found in Norway's National Forestry Accounting Plan (NFAP), which it submitted in November 2020 in accordance with the regulation (Norwegian Ministry of Climate and Environment, 2020) and in the government's latest climate action plan (Norwegian Ministry of Climate and Environment, 2021).

The NFAP presents Norway's FRL for the first commitment period, i.e. 2021-2025. According to the plan, Norway's FRL for the period 2021-2025 is on average -26.09 million tonnes of CO_2-equivalents per year when including carbon stored in harvested wood products and 24.86

million tonnes of CO_2 equivalents per year without. It is noted that the carbon sink of Norwegian forests already has reached a peak and is expected to decline over the next decades due to aging forests and reduced regeneration activity. The harvest volume in the FRL is estimated at approximately 14.6 million m^3 in the period 2021-2025, with a steady increase after that, whereas the "long-term sustainable and realistic harvest level" is expected to vary between 14 and 18 million m^3.

As opposed to Finland and France, Norway's forest policy does not include specific goals for harvest volumes, but the FRL harvest level still seems to be in line with current, more general objectives. As noted in the NFAP, the Norwegian government as well as the parliament see it as a goal to increase harvests, while the Norwegian forest industry has set a specific objective of raising the harvest level to 15 million m^3 annually. This still seems to be within the assumptions of the FRL. The impact of the FRL is further discussed in the government's latest climate plan (Norwegian Ministry of Climate and Environment, 2021). According to updated estimates from the Norwegian Institute of Bioeconomy Research referred to in the plan, Norway will have net emissions of 18 million tonnes of CO_2 equivalents from the LULUCF sector over the ten-year period 2021-2030 if the compensation mechanism in the regulation is applied. Deforestation is the main reason why CO_2 removals from forests are expected to be less than the FRL. It seems clear from this discussion that the EU's LULUCF accounting rules are likely to have a significant impact on future Norwegian policy developments regarding the role of forests in climate mitigation. Although the Norwegian climate plan does not contain many new forest related measures, it emphasises the need to increase carbon sequestration and storage in Norwegian forests.

The third dimension relating to national strategies to influence EU policies on climate and forestry seems nearly absent in the case of Norway. In the government's latest EU strategy (Norwegian Ministry of Foreign Affairs, 2018) and work programme on EU cooperation (Norwegian Ministry of Foreign Affairs, 2020) there is no mention of forest/climate aspects of the LULUCF regulation.

4.4.2 Finland

In Finland's case, direct vertical interlinkages between EU and national policies were found in most of the reviewed documents. Policy interaction with the renewable energy directive was particularly visible, especially when compared to Norway. The Government report on forest policy (Ministry of Agriculture and Forestry of Finland, 2014a) affirms that international and EU agreements obligate Finland to increase the use of renewable energy and that this will also require a targeted increase in the use of wood for energy production. In this case the reference to EU agreements can be interpreted as encompassing the renewable energy directive.

In Finland's forest strategy there are similar references to the EU's climate and energy framework. One such example can be found in the first version of the strategy (Ministry of Agriculture and Forestry of Finland, 2015) which refers to Finland's commitments under EU energy and climate targets to reduce its greenhouse gas emissions and the need to increase the renewable energy share. It argues that Finland must promote the use of wood-based energy as one of the most cost-effective forms of renewable energy and should also create the conditions necessary to increase its production. Furthermore, it affirms that achieving the objectives of the strategy and increasing the use of forest chips from 8.7 million m^3 in 2013 to 15 million m^3 by 2025 would support the EU targets of increasing renewable energy use.

The Government report on the National Energy and Climate Strategy for 2030 (Ministry of Economic Affairs and Employment of Finland, 2017) also demonstrates direct interaction between the renewable energy directive and Finnish forest policy objectives. Referring first to the overall EU climate and energy targets and Finland's obligations in this regard, the report notes that the "climate and energy policy objectives and measures adopted in the EU have an extremely strong steering effect on the preparation and implementation of Finland's climate and energy policy" (Ministry of Economic Affairs and Employment of Finland, 2017, p.19). Finland's goal of reaching a renewable energy share of 38% is set within these EU policies and is expected to be achieved to a large degree by using more forest biomass. The harvesting level is expected to increase to 79 million m^3 per year from an average of just over 60 million m^3 per year in the previous ten-year period. With regard to the LULUCF regulation, which had not yet been adopted, the report states that Finland "is extremely displeased with the accounting rules

proposed by the Commission, as they may lead to a situation where a country such as Finland with the land use sector as an actual net sink, may be imposed an accounted additional burden“ (p. 67).

The LULUCF regulation is also discussed in the revised version of the forest strategy (Ministry of Agriculture and Forestry of Finland, 2019), which refers to the LULUCF sector being part of the EU's 2030 climate policy framework and achieving the EU's target of at least 40% emissions cuts. In this context, the strategy affirms that "climate policy affects legislation that applies to forests, which has a large impact on a forest-dominated country such as Finland" (p. 27). The EU and international objectives are referred to as "the framework in which forests will be linked more closely than before to climate change mitigation and adaptation“ (p. 65). The LULUCF regulation is described in detail, with estimates for Finland's FRL, although implications for the forest sector are not addressed directly.

These results seem to indicate fairly close interaction between EU policies and Finland's national forest policy. Regarding the implications of the LULUCF regulation and the accounting rules for the forest sector, these are described in more detail in Finland's NFAP (Ministry of Agriculture and Forestry of Finland and Natural Resources Institute Finland, 2019). The accounting plan includes Finland's FRL for the first commitment period only, i.e. 2021-2025. The FRL for this period is on average -27.64 million tonnes of CO_2 equivalents per year when including carbon stocks in harvested wood products and -21.16 tonnes of CO_2 equivalents per year without. It should be noted that under the LULUCF regulation, Finland has been allocated a special managed forest land flexibility amount of 10 million tonnes of CO_2 equivalents over the period 2021–2030 due to its status as a richly forested country. This comes in addition to Finland's regular managed forest land flexibility amount of 45 million tonnes of CO_2 equivalents over the same period (EU, 2018a).

In terms of the impact of the FRL on the calculation of Finland's future emissions, the NFAP presents three different scenarios for the future forest carbon sink including harvested wood products. According to these, the sink is expected to decrease by between 5 and 15 million tonnes of CO_2 equivalents in the period up until 2030, depending on the harvesting level, and will then start to increase again. In all of the scenarios, which are built on harvesting levels that

do not deviate significantly from current levels, Finland would be able to achieve carbon neutrality by 2050. Given the high degree of uncertainty in these predictions, it is still unclear how the LULUCF regulation might actually affect forest policies. The new climate programme for the land-use sector expected at the end of 2021 may perhaps provide more clarity.

The third dimension of the EU policy interlinkages seems to feature quite prominently in Finnish forest policy. Given the economic importance of the forest sector in Finland, it is to be expected that Finland would take a strong interest in EU policies affecting its forests. One of the objectives of Finland's updated forest strategy (Ministry of Agriculture and Forestry of Finland, 2019) is that "International forest policy and influencing EU policies promote the attainment of the sustainable development goals and the good operating conditions for forest-based business and activities as well as reinforce international business opportunities". As part of achieving this objective Finland must work to ensure that policy preparation and decision making in the EU with an impact on the forest sector is well coordinated and that special national characteristics are taken into account. The strategy also spells out a set of detailed objectives in areas such as cooperation on forest issues, communication, and bioeconomy. One of the objectives is for example that EU's bioeconomy and circular economy policies should promote wood-based solutions. Another objective is that the significance of EU's forests and the forest sector must be better recognised within EU institutions and by member states.

4.4.3 France

In France, vertical interlinkages between national forest policies and EU policies appear more indirect than in Finland. In the French National Forest and Wood Programme (French Ministry of Agriculture and Food, 2016), there is a general reference to the EU in the introduction, affirming that a number of EU policies affects forests and the forest sector such as environmental protection, biodiversity, climate, energy, rural development, investments, research, commerce, and bioeconomy. EU's climate policy framework is thus seen as one influencing factor among many others and is not mentioned in other parts of the programme.

In the National Biomass Mobilisation Strategy (French Ministry of the Environment, 2018) the linkages are a bit more direct. The objective for the forest sector is to fully contribute to the reduction of greenhouse gas emissions in accordance with the commitments taken by the EU

and France. The strategy also refers to the EU as a pioneer when it comes to the development of renewable energy, including the use of biomass. Interestingly, Scandinavian countries are highlighted as having well-developed forest sectors where the use of biomass for energy production is also well established. Mobilisation of forest biomass is one of the main elements of the strategy and is discussed in relation to the national forest and wood programme. The overall impression is that the focus on forest biomass as a renewable resource is at least partially motivated by EU policies, although the renewable energy directive is not explicitly mentioned.

When it comes to French climate policy, interaction with the EU framework is, not surprisingly, much more direct. The National Low-Carbon Strategy (French Ministry of the Environment, 2020a) is set squarely within a European context and is presented in part as a response to the EU's ambitious climate targets. According to the strategy, the forest sector represents a strategic sector for the achievement of the goal of carbon neutrality by 2050. It can therefore be argued, as in the case of Norway, that there is a strong indirect connection between EU policies and the national forest policy. However, there are no direct references in the strategy to the renewable energy directive or the LULUCF regulation.

As in the other two cases, the impact of the LULUCF regulation is addressed in France's NFAP. France submitted a revised version of its NFAP in June 2020, including an updated FRL for both commitment periods under the regulation, i.e. 2021-2025 and 2026-2030 (French Ministry of the Environment, 2020b). The estimated FRL for the first commitment period is on average -55.40 million tonnes of CO_2 equivalents per year when including carbon stored in harvested wood products and -52.29 million tonnes of CO_2 equivalents per year without. For the second period the FRL is slightly higher, at -57.53 million tonnes of CO_2 equivalents per year when including carbon stored in harvested wood products and -54.14 million tonnes of CO_2 equivalents without.

The FRL calculation is based on a harvesting rate of 48% of the annual increment between 2015 and 2030. Since the objective of the French forest programme is to increase the harvesting rate to 65% by 2026, the projected future harvested volume is expected to be higher than that for the FRL. In the scenario presented in the NFAP, the harvesting intensity is projected to reach

64% in 2030. The plan foresees that in order to maintain the carbon sink in the forest sector and meet the objective of carbon neutrality, the production of wood products with a long lifespan will triple between 2015 and 2050 and more dynamic forest management practices and afforestation measures will be implemented. Here again, it seems clear that the LULUCF regulation will have a significant impact on future forest policies as these assumptions will have to be further developed and implemented.

With regard to the third dimension of vertical policy interaction, France has a similar approach as Finland. One of the objectives of the French forest and wood programme is to strengthen the influence of the forest sector in all EU institutions, including the European Parliament, the European Council, and the European Commission (French Ministry of Agriculture and Food, 2016). The programme calls for the establishment of a specialised committee under the Strategic Committee for the Forest Sector, where government and industry representatives can meet to discuss forest issues relating to the EU and share information about relevant EU policies.

5. Discussion

The results of this study indicate that there are complex and strong interlinkages between national forest policies and climate change mitigation and renewable energy policies. There is also clear evidence that the EU's climate policy framework is having an impact on national forest policies in both direct and indirect ways and that Finland and France, as EU members, see it as important to influence EU decision making in this regard. Overall, the findings are largely compatible with those of earlier studies by Katila (2017) and Sergent (2014) as will be discussed below. The results also suggest that there has been a shift across all three case countries in recent years towards a greater focus on the role of forests in mitigating climate change.

The first step of the horizontal analysis, i.e. the review of national forest policies, showed several common elements in the policies of the three case countries. Although there are variations in overall approach and priorities, there is a common objective of maximising the long-term economic value of forest resources and improving the competitiveness of the forest

sector. Another common theme is the need for structural change at different levels, such as developing more effective property structures and transport solutions in Norway, adapting the French forest sector to better respond to market demand, or creating innovative and diversified structures and improving the functioning of the market in the case of Finland. Promoting sustainable forest management, protecting the environment, and safeguarding biological diversity are other main themes.

The horizontal analysis of interlinkages with policy objectives on climate change and renewable energy revealed more national variation. The analysis showed that both Norway and France have formulated explicit climate related goals as part of their forest policies. Moreover, France has incorporated climate mitigation and adaptation into its forest law and has linked the goal of increased value creation in the forest sector directly to green growth and transition towards a low carbon society. France also distinguishes itself by not only emphasising climate mitigation but focusing also on adaptation and the risks associated with climate change as key forest policy concern. More generally, there appears to be a high degree of coherence between climate and forest policy goals in both Norway and France.

Also in Finland forest policy and climate objectives are closely interlinked, but the focus on climate mitigation seems more recent than in the other two cases. Instead, there is evidence of more direct interaction with renewable energy objectives. One such example is the emphasis in forest policy objectives of expanding Finland's production of wood based renewable energy. These findings are in line with the conclusions of Katila (2017) that using wood as a substitute for non-renewable materials and fossil fuels has traditionally been more of a priority than climate mitigation in Finland's forest policy. However, the focus on forests in the preparation of Finland's new climate plan for the LULUCF sector can be seen as a shift away from the approach described by Katila (2017) and may suggest that climate change mitigation is emerging as a top forest policy priority.

In France there are also fairly strong links between renewable energy and forest policy goals, as evidenced in the National Biomass Mobilisation Strategy (French Ministry of the Environment, 2018). The strategy's objectives seem to suggest that French forest policy is still in a "harvesting stage" as argued by Sergent (2014), where increasing the harvest level to attain

climate benefits through the use of woody biomass is prioritised. At the same time, it appears that instead of being mostly motivated by renewable energy objectives (Sergent, 2014) more weight is now put on increasing the use of wood in long-lived products to promote carbon sequestration.

At the level of policy instruments, the results indicate a considerable degree of similarities in design across the three case countries, with several examples of measures seeking to enhance the role of forests in mitigating climate change. A common feature is that active forest management is considered to be one of the main tools for strengthening carbon sinks, maximising the availability of wood as a renewable resource, and ensuring that forests can adapt to climate change. In addition to general support schemes aiming to encourage investments in sylviculture, all three countries have put in place climate motivated policy instruments to stimulate regeneration and fertilisation or other practices. These instruments are similar in the way they are designed in providing grants to encourage additional investments that will enhance forest growth and carbon sequestration.

The results show that all three countries also have introduced climate motivated policy instruments designed to encourage increased use of wood and wood products, but with some variation. When it comes to instruments targeting energy production, Norway's approach is somewhat different than the other two cases, once again reflecting its unique energy mix. Due to the abundance of hydroelectricity, there has been less need and interest in increasing the use of wood-based energy than in Finland and France. Norwegian policy instruments in this area are primarily geared towards supporting small scale production facilities and technology development. France, with its Heat Fund, appears to have the most generous incentive scheme for the use of forest biomass. The experience of Finland, where subsidies for wood-based electricity production are no longer considered necessary and are being phased out, points to how raising the cost of CO_2 emissions may impact the forest sector in France and other countries as well.

All three case countries have also put in place measures aiming to increase the use of wood for construction. Finland's wood building programme is perhaps the most ambitious as it includes subsidies for wood construction projects, regulations and support for research and

development. In France, by contrast, the main policy instrument, RE2020, appears to be more focused on using regulations to shift demand in favour of wood as a building material. Norway does not seem to have anything quite as visible as Finland and France. It is possible that this is because there is already a strong interest in Norway in using wood as a building material and that existing measures are considered adequate.

The most interesting policy instruments identified in the horizontal analysis are those unique to one country, like the low-carbon label in France. The low-carbon label is an example of a new, innovative policy instrument that could easily be adapted to national circumstances and implemented in other countries. The idea of carbon certification is of course not new, but the way it is being applied in France to domestic forest related projects is fairly unique in a European context. The same type of approach is already being considered in Finland as part of the preparation of the new comprehensive climate plan for the LULUCF sector (Ministry of Agriculture and Forestry of Finland and Natural Resources Institute Finland, 2019).

Another unique aspect of French forest policy worth discussing is the seemingly closer government/private sector cooperation there compared to Norway and Finland and how this cooperation is actively used in policy implementation. It is true that mechanisms exist in the other two countries as well to encourage active private sector participation in achieving forest policy goals, such as the forest industry strategy in Norway (Innovation Norway, 2015) and the climate road map for the forest industry in Finland (Finnish Forest Industries, 2020). Cooperation seems less formalised, however, and not so directly linked to public policy implementation. There are possibly some underlying differences in culture related to political and cultural traditions that explain the apparent closer partnership in France than in the other two countries.

The one policy instrument that stands out in Finland relates to the governance of the state-owned forests and the parliament's revision of the operational guidelines to include carbon sequestration as one of the stated goals. Norway and France do not appear to have implemented similar measures. In Norway, the main governance document for the Norwegian state-owned forest does not refer neither to climate change nor carbon sequestration (Statskog, 2021). In France, governance of state forests seems to be more fragmented and is

mainly managed regionally (Office National des Forêts, 2021). It is possible that some of the regional management plans refer to carbon sequestration but reviewing documents at such a level was beyond the scope of this study.

Compared to the generally close interaction between forest and climate policies with regard to objectives and instruments, policy links seemed less visible at the level of thematic elements in implementation. Although the results should be interpreted with caution, they raise the question of whether climate related forest policy objectives are clearly communicated "in the field". Promoting greater awareness about the role of forests in climate change mitigation among practitioners involved in implementation may lead to better outcomes in terms of achieving objectives. As an example, placing more emphasis in the communication with forest owners on the climate impact of recommended forest management practices might result in greater motivation to take advantage of climate related support schemes.

When it comes to the results of the analysis of vertical interlinkages, three key points are worth highlighting. First off, differences in the vertical interlinkages between national forest policies and the renewable energy directive seem logical. They illustrate how variations in policy choices reflect national situations. In Norway, where increasing the use of forest biomass in energy production is not a top forest policy priority, these interlinkages are weak. In Finland by contrast, where bioenergy goals appear to be fully integrated into forest policy objectives, the impact of the renewable energy directive is more visible. The directive may have contributed to further encourage the use of forest biomass for energy production in Finland. In the case of France, the interaction between national forest policies and EU's renewable energy goals are especially evident in the focus on forest biomass mobilisation.

The second point has to do with implementation of the LULUCF regulation. The results indicate that this regulation, and in particular its emissions accounting rules, is likely to play an important role in future national forest policymaking, for example with respect to setting harvesting objectives. Here again there are national variations, as the impact seems naturally to be more of a concern in Finland than in the other two cases. There is, however, still a lot of uncertainty as to future developments and potential changes in the accounting rules. This is a policy area that national policymakers will likely be following quite closely in the period ahead.

Thirdly, in terms of connections between EU and national policies more generally, the results seem to confirm the initial hypothesis that links to forest related policies would be weaker in the case of Norway. These weaker links are also evident in the findings with respect to national strategies designed to influence EU policymaking on forest related issues. The findings suggest that both Finland and France place a high priority on this dimension. Given the economic importance of its forest sector, Finland is naturally concerned about the potential impact of EU policies at national level and wants to ensure that national characteristics are taken into account, whereas France wants to strengthen the influence of its forests sector in all EU institutions. By comparison, the absence of any references to forest related issues in Norway's latest EU cooperation strategy is noticeable, although hardly surprising given the modest economic importance of the Norwegian forest sector. Going forward, it is possible that priorities will change as a result of Norway's closer cooperation with the EU on climate policy implementation and the importance attached to the LULUCF sector in meeting emissions targets.

It is evident that policy variations across the three case countries reflect differences in forest resources, industry structure, political traditions, and other national characteristics. As Lindstad et al. (2015) put it, such variations confirm the importance of fit between national situations and policy choices. When it comes to renewable energy for example, Finland has a long tradition of using biomass and residues from the forest and wood industry for energy production. Considering the available infrastructure related to the production and use of heat and power and techno-economical options for renewable energy in Finland, there have been few alternatives to wood in cutting the emissions from the ETS sector and fulfilling the EU targets for renewable energy. By contrast, Norway's access to large reservoirs of renewable hydroelectricity makes bioenergy much less attractive. In the case of France, it is possible that the higher share in French forests than in Finland and Norway of deciduous trees producing hardwood can to some degree explain the more ambitious French policy goal of tripling the amount of carbon stored in harvested wood products.

Although differences in national characteristics can be seen as a key factor explaining policy variances, the comparative approach in this study can serve as a useful framework for

policymakers when reflecting on future policy choices and considering alternative options. It raises some interesting questions about policy outcomes, for example regarding the higher importance of wood-based bioenergy in Finland and Norway's failure to reach its objective of doubling the production of bioenergy by 2020. Furthermore, the different approaches chosen by the three case countries in how policies are structured to ensure cross-sectoral policy coherence and coordination may offer some useful perspectives for policymakers when it comes to alternative policy framework designs.

Looking ahead the results suggest that the impact on the forest sector of climate related objectives and policies will most likely only keep growing in importance. As countries continue to raise their emissions reduction targets, the focus on how forests can help mitigate climate change seems to be intensifying as there is heightened recognition of the crucial importance of carbon sinks in meeting these targets. In Finland, this is evident in the government's decision that the climate plan for the LULUCF sector should aim to reduce greenhouse gas emissions by 3 million tonnes of CO_2 equivalents annually. It is an ambitious goal which is likely to result in several new forest related policy proposals. In Norway, as noted earlier, the government announced in the new climate plan presented in 2021 that it will introduce several new forest management related measures to increase carbon sequestration. In France, the funding for climate adaptation and mitigation in the forest sector allocated under the Covid 19-related stimulus plan can be seen as further evidence of this heightened focus on forests and climate change.

The ongoing discussions within the EU about further action needed to achieve the new target of at least 55% emissions reductions by 2030 also suggest that forest related policies will continue to grow in importance in the context of climate change mitigation. The European Commission is currently reviewing all EU climate-related policy instruments and will by June 2021 propose revisions designed to achieve the additional emissions reductions. Included in the review are the ETS directive, the effort sharing regulation, the LULUCF regulation and the renewable energy directive. In its 2030 Climate Target Plan presented in September 2020 the Commission outlined some of the actions that will be considered (European Commission, 2020a). This plan is built on the premise that action will be required in all sectors to reduce emissions, and that the LULUCF sector will be of particular importance given its role as a source

of net removals of CO_2. In fact, the plan states that "restoring and growing our land carbon sink […] is crucial to our climate goals." In this context, there is much focus on the role of forests as a carbon sink, its recent decline and the risk of further decline as a result of climate change and increases in harvesting volumes due to rising demand for forest biomass. The aim of the proposed revision of the LULUCF regulation is to reverse this trend and do more to enhance and protect the sink. This is therefore likely to be a determining factor in relation to what kind of new measures to expect.

The Commission has already provided some indications of the direction in which the review is being conducted (European Commission, 2020a). For example, it is foreseen that greater flexibility between the LULUCF and effort sharing sectors may encourage increased LULUCF removals. Both the EU's forest and biodiversity strategies are referred to as important drivers of additional actions to reduce emissions. One proposal that stands out is the creation of a carbon certification scheme which is based on the same idea as the French low-carbon label. It is foreseen that "carbon farming and certification of carbon removals should increasingly be deployed in the run up to 2030" (European Commission, 2020b). In the long term, the expectation is that the LULUCF sector will generate enough carbon removals to off-set emissions from the other two sectors. The importance of strengthening the sink is emphasised also when it comes to bioenergy, and only a limited increase in such energy use is expected. It is noteworthy that, according to the plan, "any unjustifiable intensification of forest harvesting for bioenergy purposes should be avoided", the use of whole trees should be minimised and instead, bioenergy production should be based on better use of biomass residues.

All in all, the plans presented by the Commission so far seem to be pointing towards quite far-reaching revisions to EU's climate policy framework in the near future with a potentially significant impact on the forest sector. It is already clear that there is a very strong focus on the need to strengthen the carbon sink of forests. The question for national forest policymakers then becomes what this will mean in terms of revisions to the LULUCF regulation and not least the accounting rules for forest emissions and removals.

Also part of the equation is EU's new forest strategy, which at the time of writing was expected to be finalised in the summer of 2021. Although not a legally binding document, it does carry

some political weight. In a roadmap published in October 2020, the European Commission outlined key objectives and main elements that are being considered in the preparation of the new strategy (European Commission, 2020c). Building on the European Green Deal and the EU Biodiversity Strategy, the aim is to develop a comprehensive strategy ensuring that forests are treated in a consistent manner across all relevant EU policies. Key objectives include among other things to enhance forest protection, afforestation and restoration to meet the EU biodiversity and climate objectives; increase carbon sinks in forests and harvested wood products; prevent damage from and promote forest resilience to natural hazards, changing climatic conditions and environmental degradation; and ensure that all EU forests are sustainable managed. When compared to the old forest strategy, these objectives do indeed seem to indicate a greater focus on climate mitigation and adaptation. Moreover, by emphasizing the need for a consistent approach, the roadmap responds to the kind of concerns referred to in European forest governance studies about lack of coordination and inconsistency in European policy goals affecting the forest sector (European Forest Institute 2013 & 2020).

EU member states also emphasized climate change mitigation and policy coherence as key forest policy issues in conclusions adopted in November 2020 on "Perspectives for the EU forest-related policies and EU forest strategy post 2020" (Council of the European Union, 2020). As did the Commission, they stressed the importance of ensuring consistency and coherence of EU forest-related policies after 2020 and also highlighted the need for "a new balanced and strengthened post 2020 EU Forest Strategy". Three priorities were identified as urgent: enhancing the resilience and adaptation to climate change of European forests while increasing their contribution to climate change mitigation; promoting and enhancing the forests and the forest sector's contribution to the EU-wide bio and circular economy; and maintaining and enhancing forest biodiversity and ecosystem services.

Looking beyond the EU, it is worth considering other international efforts which may have implications for both EU and national policymaking, such as Forest Europe. Forest Europe is a pan-European voluntary high-level political process established in 1990 to promote cooperation on forest policies in Europe and develop common strategies on how to protect and sustainably manage forests (Forest Europe, 2021a). Formally referred to as the Ministerial

Conference on the Protection of Forests in Europe, it has 46 participating countries plus the EU, and notably includes Russia, with its vast forest resources.

Forest Europe plays a significant role in setting the agenda for policymaking in Europe through the various declarations, decisions and resolutions that are adopted. It regularly discusses issues related to forests and climate and recently issued recommendations concerning climate change adaptation (Forest Europe, 2020). The ministerial declaration from the most recent conference, held in April 2021, addressed adaptation as well as different aspects of the role of forests in mitigating climate change (Forest Europe, 2021b). Going forward, Forest Europe could play an important role in further developing strategies to deal with climate change and discussing concepts such as climate smart forestry described earlier (Nabuurs et al., 2017).

6. Conclusion

The results of this study suggest that the interaction between national forest and climate policy objectives has intensified in all three case countries during the period considered. Although there are some national differences, priorities seem to converge around the importance of enhancing forests' capacity to serve as carbon sinks through active forest management aiming to increase growth and promoting the use of wood as a substitute for more carbon-intensive materials. In Finland and France there are also close links between renewable energy and forest policies, but less so in the case of Norway. These various policy interactions are also reflected in the design of policy instruments, where there are more national variations and some interesting examples of innovative new approaches. Further, the findings suggest that EU policies interact with national forest policies in important and complex ways, both directly and indirectly.

Based on the results from both the horizontal and vertical analysis it can reasonably be concluded that the interaction between climate and forest policies will likely continue to grow in importance over the coming years. The results of the European Commission's review of all climate-related policy instruments, including the LULUCF regulation and the accounting rules for emissions from the forests, expected in June 2021, may have significant implications for forest policymaking. It will be increasingly important to ensure policy coherence at all levels

and consider new and innovative policy instruments. In such a context, the kind of comparative analysis presented here could be helpful in preparing for the next phase of forest policymaking.

The results of the present study also point towards some areas for future research. To begin with, conducting a comparative analysis with a larger number of countries and a more in-depth review of existing and proposed forest related policy instruments could offer a more comprehensive picture of available policy options, national variation, and different policy designs. Also, one important limitation of the present study is that the policy interaction analysis is based on a fairly narrow selection of relevant forest, climate and renewable energy policies, in particular as regards policy instruments. In reality, other climate policies may also have a significant impact on the forest sector, for example related to taxation or wider bioeconomy and circular economy strategies. Mapping this increasing complexity could be a subject for further study.

Finally, the implications for national forest policymaking of EU policies affecting the LULUCF sector clearly merit more in-depth study. This is an issue that has already received some attention but will continue to be even more important in the future. The current LULUCF regulation (EU, 2018a) can be expected to have considerably more impact on national forest policies than the previous regulation (EU, 2013). The lower reference levels for the forest carbon sinks in the latter were less likely to create incentives for increasing these sinks (Laturi et al, 2016). It remains to be seen whether the European Commission's expected proposals for revisions to the LULUCF regulation will further strengthen the incentives to enhance forest carbon sinks. Once EU's revised climate policy framework is adopted, it will be important to assess future implications for the forest sector at national level and explore available policy options.

7. Literature

ADEME (2019). *Note d'information relative au programme DYNAMIC BOIS*. Available at https://www.ademe.fr/sites/default/files/assets/documents/20190520_dynamic_bois_compilation_retours_partenaires_vf.pdf (accessed 31.03.2021).

ADEME (2021). *Le Fonds Chaleur en bref.* Available at https://www.ademe.fr/expertises/energies-renouvelables-enr-production-reseaux-stockage/passer-a-laction/produire-chaleur/fonds-chaleur-bref (accessed 31.03.2021).

Agostini, A., Giuntoli, J., Boulamanti, A., Marelli, L. (2013). *Carbon accounting of forest bioenergy. Conclusions and recommendations from a critical literature review.* European Commission, Joint Research Centre Technical Reports.

Berndes, G., Abt, B., Asikainen, A., Cowie, A., Dale, V., Egnell, G., Lindner, M., Marelli, L., Paré, D., Pingoud, K. & Yeh, S. (2016). *Forest biomass, carbon neutrality and climate change mitigation*. From Science to Policy 3. European Forest Institute.

Bonin, F., Kleinschmit von Lengefeld, A. (2019). *Mapping of Public Policies Related to the Forest-based Sector*. Internship report 2019. Université Paris-Nanterre.

Böttcher, H., Verkerj, P.J., Gusti, M., Havlík, P., Garssi, G. (2012). *Projection of the future EU forest CO_2 sink as affected by recent bioenergy policies using two advanced forest management models*. GCB Bioenergy (2012) 4, p.773-783.

Conseil National de l'Industrie (2014). *Communiqué de presse*. Available at https://www.conseil-national-industrie.gouv.fr/files_cni/files/csf/bois/2014-03-10-cp-csf-bois.pdf (accessed 18.05.2021).

Conseil National de l'Industrie (2018a). *Plan d'action interministériel forêt-bois.* Available at https://www.conseil-national-industrie.gouv.fr/files_cni/files/csf/bois/plan-d-action-foret-bois-nov2018.pdf (accessed 10.02.2021).

Conseil National de l'Industrie (2018b). *Contrat stratégique de filière bois.* Available at https://www.conseil-national-industrie.gouv.fr/files_cni/files/csf/bois/csf-bois-contrat-de-filiere-signe.pdf (accessed 31.03.2021).

Council of the European Union (2020). *Council Conclusions on Perspectives for the EU forest-related policies and EU forest strategy post 2020*. Available at https://data.consilium.europa.eu/doc/document/ST-12695-2020-REV-1/en/pdf (accessed 04.05.2021).

Cour des Comptes (2020). *La structuration de la filière forêt-bois*. Available at https://www.ccomptes.fr/system/files/2020-05/20200525-rapport-58-2-structuration-filiere-foret-bois.pdf (accessed 04.02.2021).

Ellison, D., Petersson, H., Lundblad, M., Wikberg, P. (2013). *The incentive gap: LULUCF and the Kyoto mechanism before and after Durban.* CGB Bioenergy (2013) 5, p. 599-622, doi: 10.1111/gcbb.12034.

Energy Authority of Finland (2021). *Renewable Energy.* Available at https://energiavirasto.fi/en/renewable-energy (accessed 02.04.2021).

EU (2009). *Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.* Available at https://eur-lex.europa.eu/eli/dir/2009/28/oj (accessed 22.02.2021).

EU (2013). *Decision No 529/2013/EU of the European Parliament and of the Council of 21 May 2013 on accounting rules on greenhouse gas emissions and removals resulting from activities relating to land use, land-use change and forestry and on information concerning actions relating to those activities.* Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32013D0529 (accessed 22.02.2021).

EU (2014). *2030 Climate & Energy Framework.* Available at https://ec.europa.eu/clima/policies/strategies/2030_en#tab-0-0 (accessed 22.04.2021).

EU (2018a). *Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU*. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.156.01.0001.01.ENG (accessed 22.02.2021).

EU (2018b). *Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013*. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.156.01.0026.01.ENG (accessed 22.02.2021).

EU (2018c). *Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources*. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC (accessed 22.02.2021).

EU (2020). *Update of the NDC of the European Union and its member states*. Available at https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/European%20Union%20First/EU_NDC_Submission_December%202020.pdf (accessed 22.04.2021).

European Commission (2013). *A new EU Forest Strategy: for forests and the forest-based sector.* Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52013DC0659 (accessed 22.02.2021).

European Commission (2019a). *The European Green Deal*. COM/2019/640 final. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588580774040&uri=CELEX:52019DC0640 (accessed 02.02.2021).

European Commission (2019b). *Norway's 5th progress report under Directive 2009/28/EC.* Available at https://ec.europa.eu/energy/sites/default/files/documents/no_-_tr_into_eng_-_5th_progress_report_red_for_2017_and_2018.pdf (accessed 24.03.2021).

European Commission (2020a). *The 2030 Climate target plan*. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0562 (accessed 16.04.2021).

European Commission (2020b). *Impact Assessment***.** Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020SC0176 (accessed 16.04.2021).

European Commission (2020c). *Roadmap. EU Forest Strategy*. Available at https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12674-Forests-new-EU-strategy (accessed 04.05.2021).

European Commission (2021). *Effort sharing 2021-2030: targets and flexibilities*. Available at https://ec.europa.eu/clima/policies/effort/regulation_en (accessed 02.02.2021).

European Forest Institute (2013). *European Forest Governance: Issues at stake and the Way Forward*. What Science Can Tell Us 2, 2013. Available at https://efi.int/sites/default/files/files/publication-bank/2018/efi_wsctu2_2013.pdf (accessed 12.04.2021).

European Forest Institute (2020). *European forest governance post-2020*. From Science to Policy 10. Available at https://doi.org/10.36333/fs10 (accessed 12.04.2021).

FAO (2021). *Carbon Storage and Climate Change Mitigation Potential of Harvested Wood Products*. Available at http://www.fao.org/forestry/49800-0e38ca10d38e2365e0080ebe00dd3a41d.pdf (accessed 29.03.2021).

Finlex (2021a). *Finland's Forest Act.* Available at https://www.finlex.fi/en/laki/kaannokset/1996/en19961093_20140567.pdf (accessed 08.04.2021).

Finlex (2021b). *Temporary Act on the Financing of Sustainable Forestry.* Available at https://www.finlex.fi/en/laki/kaannokset/2015/en20150034.pdf (accessed 01.04.2021).

Finlex (2021c). *Lag om temporärt stöd för beskogning.* Available at https://www.finlex.fi/sv/laki/alkup/2020/20201114 (accessed 26.04.2021).

Forest Europe (2020). *Adaptation to Climate Change in Sustainable Forest Management in Europe*. Available at https://foresteurope.org/wp-content/uploads/2016/08/Adaptation_to_Climate_Change_in_SFM_in_Europe_compressed.pdf (accessed 09.05.2021).

Forest Europe (2021a). *What is Forest Europe?* Available at https://foresteurope.org/foresteurope/ (accessed 22.04.2021).

Forest Europe (2021b). *Bratislava Ministerial Declaration - ''The Future We Want: The Forests We Need''.* Available at https://foresteurope.org/wp-content/uploads/2017/08/Bratislava-Ministerial-Declaration.pdf (accessed 22.04.2021).

Finnish Forest Industries (2020). *Green and Vibrant Economy. The Climate Roadmap for the Forest Industry.* Available at https://global-uploads.webflow.com/5f44f62ce4d302179b465b3a/5fae9b201811d817517ac8af_Esite_En_Final_V4_Compressed.pdf (accessed 19.04.2021).

French Ministry of Agriculture and Food (2016). *Programme national de la forêt et du bois.* Available at https://agriculture.gouv.fr/le-programme-national-de-la-foret-et-du-bois-2016-2026 (accessed 04.02.2021).

French Ministry of Agriculture and Food (2018). *Mise en place d'une nouvelle aide à l'amélioration des peuplements forestiers.* Available at https://agriculture.gouv.fr/mise-en-place-dune-nouvelle-aide-lamelioration-des-peuplements-forestiers (accessed 11.03.2021).

French Ministry of Agriculture and Food (2019). *L'aide à l'amélioration des peuplements forestiers évolue en 2019.* Available at https://draaf.centre-val-de-loire.agriculture.gouv.fr/IMG/pdf/CP_lancement_AMELIO_national_cle85c1eb.pdf (accessed 30.03.2021).

French Ministry of Agriculture and Food (2020a). *Mesures fiscales DEFI forêt – Évaluation et proposition d'évolution.* Rapport du CGAAER no 19100. Available at *https://agriculture.gouv.fr/evaluation-des-mesures-fiscales-defi-foret* (accessed 30.03.2021).

French Ministry of Agriculture and Food (2020b). *France Relance: les acteurs de la filière s'engagent pour l'adaptation des forêts au changement climatique.* Available at https://agriculture.gouv.fr/francerelance-adapter-les-forets-au-changement-climatique (accessed 31.03.2021).

French Ministry of Agriculture and Food (2020c). *Plan France Relance : une feuille de route au service de la filière forêt bois face au défi du changement climatique*. Available at https://agriculture.gouv.fr/plan-france-relance-une-feuille-de-route-au-service-de-la-filiere-foret-bois-face-au-defi-du (accessed 31.03.2021).

French Ministry of the Environment (2018). *Stratégie nationale de la mobilisation de la biomasse*. Available at https://www.ecologie.gouv.fr/biomasse-energie#e4 (accessed 02.02.2021).

French Ministry of the Environment. (2020a). *National Low-Carbon Strategy*. Available at https://www.ecologie.gouv.fr/strategie-nationale-bas-carbone-snbc (accessed 10.02.2021).

French Ministry of the Environment (2020b). *National Forestry Accounting Plan of France including the Forest Reference Level (FRL) for the 2021-2025 and 2026-2030 periods.* Available at https://www.ecologie.gouv.fr/sites/default/files/National%20Forest%20Accounting%2

0Plan%20France%202019%20with%20explanary%20note%20VEN.pdf (accessed 23.02.2021).

French Ministry of the Environment (2021a). *Réglementation environnementale RE2020*. Available at https://www.ecologie.gouv.fr/reglementation-environnementale-re2020 (accessed 31.03.2021).

French Ministry of the Environment (2021b). *Label bas-carbone: récompenser les acteurs de la lutte contre le changement climatique*. Available at https://www.ecologie.gouv.fr/label-bas-carbone#scroll-nav__1 (accessed 19.03.2021).

French Ministries of the Environment and of Agriculture and Food (2021). *Rapport d'état d'avancement des actions du secteur des terres pour la période 2013-2020.* Available athttps://www.ecologie.gouv.fr/sites/default/files/Rapport_etat_avancement_actions_secteur_terres_periode_2013-2020.pdf (accessed 19.03.2021).

French Parliament (2020). *La forêt et la filière bois à la croisée des chemins: l'arbre des possibles par Anne-Laure Cattelot, Députée du Nord.* Available at https://www.actu-environnement.com/media/pdf/news-36125-rapport-foret-cattelot.pdf (accessed 29.03.2020).

Innovation Norway (2015). *SKOG22 – Nasjonal strategi for skog- og trenæringen*. Available at https://www.innovasjonnorge.no/globalassets/0-innovasjonnorge.no/verktoy-og-temasider/mulighetsomrader/biookonomi-mat-materialer-og-bioenergi/skog22-nasjonal-strategi-for-skog--og-trenaringen.pdf (accessed 08.04.2021).

Innovation Norway (2021a). *Fornybar energi i landbruket*. Available at https://www.innovasjonnorge.no/no/tjenester/landbruk/finansiering-for-landbruket/fornybar-energi-i-landbruket/ (accessed 07.04.2021).

Innovation Norway (2021b). *Oppdragsbrev.* Available at https://www.innovasjonnorge.no/no/om/oppdrag-og-resultater/om-oppdragene/vare-opdragsbrev/ (accessed 07.04.2021).

Innovation Norway (2021c). *Tilskudd til bioøkonomiprosjekter*. Available at https://www.innovasjonnorge.no/no/tjenester/innovasjon-og-utvikling/finansiering-for-innovasjon-og-utvikling/tilskudd-til-biookonomiprosjekter/ (accessed 07.04.2021).

Institut National de l'Information Géographique et Forestiere (2020). *Le mémento de l'inventaire forestier.* Edition 2019. Available at https://inventaire-forestier.ign.fr/spip.php?rubrique219 (accessed 11.02.2021).

IPCC (2014). *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.* Available at https://www.ipcc.ch/report/ar5/syr/ (accessed 17.11.2020).

Iversen, P., Lee, D. & Rocha M. (2014). *Understanding Land Use in the UNFCCC.* Available at https://ghginstitute.org/wp-content/uploads/2015/04/Understanding_Land_Use_in_the_UNFCCC.pdf (accessed 29.03.2021).

Kallio, A.M., Solberg, B., Käär, L., Päivinen, R. (2018). *Economic impacts of setting reference levels for the forest carbon sinks in the EU on the European forest sector*. Forest Policy and Economics, Volume 92, July 2018, p. 193-201.

Katila, P. (2017). *Forestry development priorities in Finnish national forest programmes.* International Forestry Review Vol. 19(S1), 2017. Available at https://www.ingentaconnect.com/contentone/cfa/ifr/2017/00000019/a00101s1/art00010?crawler=true (accessed 29.03.2021).

Kröger, M., Raitio, K. (2016). *Finnish forest policy in the era of bioeconomy: A pathway to sustainability?* Forest Policy and Economics (2016). Available at https://www.sciencedirect.com/science/article/abs/pii/S1389934116304555 (accessed 10.02.2021).

Laturi, J., Lintunen, J., Uusivuori, J. (2016). *Modeling the economics of the reference levels for forest management emissions in the EU.* Climate Change Economics, Vol. 7 (3), p. 1-22.

Légifrance (2021a). *LOI n° 2014-1170 du 13 octobre 2014 d'avenir pour l'agriculture, l'alimentation et la forêt.* Available at https://www.legifrance.gouv.fr/codes/id/LEGIARTI000029580168/2014-10-15 (Accessed 29.03.2021).

Légifrance (2021b). *LOI n° 2015-992 du 17 août 2015 relative à la transition énergétique pour la croissance verte*. Available at https://www.legifrance.gouv.fr/loda/id/JORFTEXT000031044385/2021-03-31/ (accessed 31.03.2021).

Lindstad, B.H. (2015). *Changes in Norwegian forest policies: what are the effects of the international forest regime complex?* Scandinavian journal of forest research, 2015-04-03, Vol.30 (3), p.246-254.

Lindstad, B.H., Pistorius, T., Ferranti, F., Dominguez, G., Gorriz-Mifsud, E., Kurttila, M., Leban, V., Navarro, P., Peters, D.M., Pezdevsek Malovrh, S., Prokofieva, I., Schuck, A., Solberg, B., Viiri, H., Zadnik Stirn & L., Krc, J. (2015). *Forest-based bioenergy policies in five European countries: An explorative study of interactions with national and EU policies.* Biomass and Bioenergy, June 2015, p. 102-113.

Lovdata (2021a). *Lov om skogbruk (skogbrukslova).* Available at https://lovdata.no/dokument/NL/lov/2005-05-27-31?q=skogbruksloven (accessed 23.04.2021).

Lovdata (2021b). *Forskrift om berekraftig skogbruk.* Available at https://lovdata.no/dokument/SF/forskrift/2006-06-07-593 (accessed 03.05.2021).

Lovdata (2021c). *Forskrift om Skogfond o.a.* Available at https://lovdata.no/dokument/SF/forskrift/2006-07-03-881#KAPITTEL_4 (accessed 03.05.2021).

Lovdata (2021d). *Forskrift om tilskudd til nærings- og miljøtiltak i skogbruket.* Available at https://lovdata.no/dokument/SF/forskrift/2004-02-04-447 (accessed 07.04.2021)

Ministry of Agriculture and Forestry of Finland (2014a). *Statsrådets skogspolitiska redogörelse 2050.* Available at https://mmm.fi/sv/skogar/strategier-och-program/nationell-skogsstrategi/skogspolitiska-redogorelse-2050 (accessed 04.02.2021).

Ministry of Agriculture and Forestry of Finland (2014b). *Rural Development Programme for Mainland Finland 2014-2020*. Available at https://mmm.fi/en/rural-areas/rural-development-programme (accessed 02.04.2021).

Ministry of Agriculture and Forestry of Finland (2015). *National Forest Strategy 2025.* Available at http://extwprlegs1.fao.org/docs/pdf/fin148202.pdf (accessed 04.03.2021).

Ministry of Agriculture and Forestry of Finland (2019). *National Forest Strategy 2025 – an updated version.* Available at https://julkaisut.valtioneuvosto.fi/handle/10024/161739 (accessed 01.02.2021).

Ministry of Agriculture and Forestry of Finland (2020a). *Project on climate solutions in the land use sector aims to considerably strengthen the net carbon sink.* Available at https://mmm.fi/en/-/project-on-climate-solutions-in-the-land-use-sector-aims-to-considerably-strengthen-the-net-carbon-sink (accessed 02.04.2021).

Ministry of Agriculture and Forestry of Finland (2020b). *New ownership policy decisions concerning Metsähallitus*. Available at https://mmm.fi/-/10616/metsahallitukselle-uudet-omistajapoliittiset-linjaukset?languageId=en_US (accessed 02.04.2021).

Ministry of Agriculture and Forestry of Finland (2021a). *Preparation of the climate plan for the land use sector started – working group appointed.* Available at https://mmm.fi/en/-/preparation-of-the-climate-plan-for-the-land-use-sector-started-working-group-appointed (accessed 02.04.2021).

Ministry of Agriculture and Forestry of Finland (2021b). *Stödsystemet för skogsbruk (KEMERA)*. Available at https://mmm.fi/sv/forandringar-av-kemera-lagen (accessed 01.04.2021).

Ministry of Agriculture and Forestry of Finland (2021c). *Beredning av stöd för beskogning av impedimentmark.* Available at https://mmm.fi/sv/skogar-och-klimatforandring/skogar-och-klimatforandring/beskogning-av-impediment (accessed 11.03.2021).

Ministry of Agriculture and Forestry of Finland and Natural Resources Institute Finland (2019). *National Forestry Accounting Plan for Finland. Submission of updated National Forestry Accounting Plan including forest reference level (2021 – 2025) for Finland.* Available at *https://www.luke.fi/wp-content/uploads/2019/12/NFAP-for-Finland-20-December-2019.pdf* (accessed 23.02.2021).

Ministry of Economic Affairs and Employment of Finland (2017). *Government Report on the National Energy and Climate Strategy for 2030*. Available at https://julkaisut.valtioneuvosto.fi/handle/10024/79247 (accessed 08.02.2021).

Ministry of Economic Affairs and Employment of Finland (2021). *Systemet med produktionsstöd för skogsflisbaserad el stängs för nya sökande den 15 mars.* Available at https://tem.fi/-/metsahakesahkon-tuotantotukijarjestelma-suljetaan-uusilta-hakijoilta-15.3?languageId=sv_SE (accessed 13.04.2021).

Ministry of the Environment of Finland (2017). *Government Report on Medium-term Climate Change Policy Plan for 2030 Towards Climate-Smart Day-to-Day Living*. Available at https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/80769/YMre_21en_2017.pdf?sequence=1&isAllowed=y (accessed 02.02.2021).

Ministry of the Environment of Finland (2020). *Annual Climate Report 2020*. Available at https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/162359/YM_2020_19.pdf?sequence=1&isAllowed=y (accessed 01.02.2021).

Ministry of the Environment of Finland (2021). *Wood Building Programme*. Available at https://ym.fi/en/wood-building (Accessed 19.03.2021).

Nabuurs, G.-J., Delacote, O., Ellison, D., Hanewinkel, M., Hetemäki, L., Lindner, M. (2017). *By 2050 the Mitigation Effects of EU Forests Could Nearly Double through Climate Smart Forestry.* Available at https://www.researchgate.net/publication/321624884_By_2050_the_Mitigation_Effects_of_EU_Forests_Could_Nearly_Double_through_Climate_Smart_Forestry (accessed 18.02.2021).

Natural Resources Institute Finland (2020). *Finland's Forests 2019.* Available at https://jukuri.luke.fi/bitstream/handle/10024/544612/finlands-forests-facts-2019-EN-netti.pdf?sequence=3&isAllowed=y (accessed 01.04.2021).

Natural Resources Institute Finland (2021). *Forest ownership*. Available at https://www.luke.fi/en/natural-resources/forest/forest-resources-and-forest-planning/forest-ownership/ (accessed 23.04.2021).

Nilsson, M., Zamparutti, T., Petersen, J.E., Nykvist, B., Rudberg, P., McGuinn, J. (2012). *Understanding policy coherence: analytical framework and examples of sector-environment policy interactions in the EU*. Environ Pol Gov 2012;22(6):395-423.

Norwegian Agriculture Agency (2021). *Ordninger for skogbruk*. Available at https://www.landbruksdirektoratet.no/nb/skogbruk/ordninger-for-skogbruk (accessed 07.04.2021).

Norwegian Environment Agency (2014). *Målrettet gjødsling av skog som klimatiltak.* Rapport M174-2014. Available at https://www.miljodirektoratet.no/globalassets/publikasjoner/M174/M174.pdf (accessed 02.03.2021).

Norwegian Environment Agency (2016). *Vern eller bruk av skog som klimatiltak.* Rapport M-519. Available at: https://www.miljodirektoratet.no/globalassets/publikasjoner/m519/m519.pdf (accessed 06.11.20).

Norwegian Environment Agency (2020a). *Greenhouse Gas Emissions 1990- 2018, National Inventory Report.* Rapport M-1643. Available at: https://www.miljodirektoratet.no/globalassets/publikasjoner/m1643/m1643.pdf (accessed 15.04.2021).

Norwegian Environment Agency (2020b). *Klimakur 2030.* Available at https://www.miljodirektoratet.no/klimakur (accessed 06.05.2021).

Norwegian Environment Agency (2021). *Utslipp og opptak fra skog og arealbruk*. Available at https://miljostatus.miljodirektoratet.no/tema/klima/norske-utslipp-av-klimagasser/utslipp-og-opptak-fra-skog-og-arealbruk/ (accessed 06.04.2021).

Norwegian Ministry of Agriculture and Food (1998). *Meld. St. 17 (1998-1999) Verdiskaping og miljø – muligheter i skogsektoren*. Available at https://www.regjeringen.no/no/dokumenter/stmeld-nr-17-1998-/id192088/?ch=1 (accessed 10.01.2021).

Norwegian Ministry of Agriculture and Food (2009). *Meld. St. 39 (2008-2009) Klimautfordringene – landbruket en del av løsningen.* Available at https://www.regjeringen.no/no/dokumenter/stmeld-nr-39-2008-2009-/id563671/ (accessed 01.02.2021).

Norwegian Ministry of Agriculture and Food (2016). *Meld. St. 6 (2016-2017) Verdier i vekst – konkurransedyktig skog- og trenæring*. Available at https://www.regjeringen.no/no/dokumenter/meld.-st.-6-20162017/id2515774/ (accessed 10.01.2021).

Norwegian Ministry of Agriculture and Food (2020). *Prop. 1 S (2020–2021).* Available at https://www.regjeringen.no/no/dokumenter/prop.-1-s-20202021/id2768374/ (accessed 26.04.2021).

Norwegian Ministry of Climate and Environment (2017). *Meld. St. 41 (2016-2017) Klimastrategi for 2030 – norsk omstilling i europeisk sammenheng.* Available at https://www.regjeringen.no/no/dokumenter/meld.-st.-41-20162017/id2557401/ (accessed 26.04.2021).

Norwegian Ministry of Climate and Environment (2019). *Norges klimaavtale med EU vedtatt.* Available at https://www.regjeringen.no/no/aktuelt/norges-klimaavtale-med-eu-vedtatt/id2675266/ (accessed 19.05.2021).

Norwegian Ministry of Climate and Environment (2020). *National Forestry Accounting Plan for Norway, including forest reference level for the first commitment period 2021- 2025.* (Revised version 9 November 2020.) Available at https://www.regjeringen.no/contentassets/cd6543b5e7f947cd9a086c3528adc654/norways-national-forestry-accounting-plan_2021-2025.pdf (accessed 21.02.2021).

Norwegian Ministry of Climate and Environment (2021). *Meld. St. 13 (2020-2021) Klimaplan for 2021-2030.* Available at https://www.regjeringen.no/no/dokumenter/meld.-st.-13-20202021/id2827405/ (accessed 15.11.2020).

Norwegian Ministry of Foreign Affairs (2018). *Norge i Europa. Regjeringens strategi for samarbeidet med EU 2018-2021.* Available at https://www.regjeringen.no/no/dokumenter/eustrategi_2018/id2600561/ (accessed 25.03.2021).

Norwegian Ministry of Foreign Affairs (2020). *Norge i Europa. Regjeringens arbeidsprogram for samarbeidet med EU 2021.* Available at https://www.regjeringen.no/contentassets/4e6e1f63cd86411e80a2633b3e11549e/ud_eu_arbeidsprogram_2021ny.pdf (accessed 25.03.2021).

Norwegian Ministry of Oil and Energy (2008). *Strategi for økt utbygging av bioenergi.* Available at https://www.regjeringen.no/globalassets/upload/oed/bioenergistrategien2008w.pdf (accessed 24.02.2021).

Oberthür, S., Gehring, T. (editors) (2006). *Institutional interaction in global environmental governance - synergy and conflict among international and EU policies*. Cambridge, Massachusetts; London, England: MIT Press; 2006. 405 pp.

Office National des Forêts (2021). *Aménagements Forestiers*. Available at http://www1.onf.fr/lire_voir_ecouter/sommaire/amenagements/@@index.html (accessed 19.04.2021.

Préfet de la Région Grand Est (2018). *Programme régional de la forêt et du bois de la région Grand Est 2018-2027*. Available at https://draaf.grand-est.agriculture.gouv.fr/IMG/pdf/2019_10_30_PRFB_Grand_Est_vF1_cle8b9f81.pdf (accessed 31.03.2021).

Sergent, A. (2014). *Sector-based political analysis of energy transition: Green shift in the forest policy regime in France*. Energy Policy, Volume 73, October 2014, p. 491-500.

Statistics Norway (2021a). *Fakta om skogbruk.* Available at https://www.ssb.no/jord-skog-jakt-og-fiskeri/faktaside/skogbruk (accessed 06.04.2021).

Statistics Norway (2021b). *External trade in goods*. Available at https://www.ssb.no/en/statbank/table/09297/tableViewLayout1/ (accessed 28.04.2021).

Statistics Norway (2021c). *Production and consumption of energy, energy balance and energy account.* Available at https://www.ssb.no/en/energi-og-industri/statistikker/energibalanse (accessed 23.02.2021).

Statistics Norway (2021d). *Silviculture. Fertilising of Forest. Area and expenditure*. Available at: https://www.ssb.no/en/statbank/table/05543 (accessed 02.03.2021).

Statsrådets publikationer 2019:32. *Regeringsprogrammet för statsminister Sanna Marins regering 10.12.2019 Ett inkluderande och kunnigt Finland – ett socialt, ekonomiskt och ekologiskt hållbart samhälle.* Available at https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/161932/VN_2019_32.pdf?sequence=4&isAllowed=y (accessed 09.02.2021).

Statskog (2021). *Vedtekter for Statskog.* Available at https://www.statskog.no/om-statskog/rammer-for-statskogs-virksomhet (accessed 19.04.2021).

Söderberg, C., Eckerberg, K. (2013). *Rising policy conflicts in Europe over bioenergy and forestry*. Forest Policy and Economics, Volume 33, August 2013, p. 112-119.

Tapio (2019). *Råd i god skogsvård.* Available at https://tapio.fi/wp-content/uploads/2020/09/Rad_i_god_skogsvard_TAPIO_2019.pdf (accessed 01.04.2021).

UN Climate Change (2021). *What is the Kyoto protocol?* Available at https://unfccc.int/kyoto_protocol (accessed 22.02.2021).

UN (1992). *United Nations Framework Convention on Climate Change*. Available at https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf (accessed 29.03.2021).

UN (1997). *Kyoto Protocol to the United Nations Framework Convention on Climate Change.* Available at https://unfccc.int/sites/default/files/resource/docs/cop3/l07a01.pdf (accessed 18.11.2020)

UN (2015). *Paris Agreement.* Available at https://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf (accessed 19.11.2020).

8. Annexes

ANNEX I: EXAMPLE OF FOREST POLICY DOCUMENT ANALYSIS

Document	Finland's National Forest Strategy 2025– Updated version 2019
Type of reference	*Quotes from text, with reference to section and page in document. Key words/sentences are in bold.*
Main policy goals linked to climate mitigation	**Summary, p. 10-11** The National Forest Strategy is linked in certain sections to other central government strategies. […] Implementation of the bioeconomy, energy, **climate** and biodiversity strategies are closely linked to the attainment of the National Forest Strategy's objectives. Some of the projects listed in the version of the strategy approved in 2015 have been completed. New, current projects have been prepared in their place. The completely new projects added to the Forest Strategy apply to **climate sustainable forestry**, international forest policy and **influencing EU policies** as well as to products made from wood.
General references to climate change mitigation	**2.7 Climate change mitigation and adaptation to be emphasised in forest-based business and activities, p. 30** Forests play an integral role in the **mitigation of climate change**. The Paris Climate Treaty requires that emissions and sinks are balanced by the latter half of this century. If we want to proceed in accordance with the 1.5 degree temperature rise development path outlined in the IPCC report, emissions and sinks must be balanced by the middle of this century. The land use sector is part of the **EU's 2030 climate policy** and the EU's minimum target of 40 per cent for emissions cuts. **Climate policy** affects legislation that applies to forests, which has a large impact on a forest-dominated country such as Finland. Carbon sinks will continue to play an important role in climate policy, which will be evident in national reviews concerning sustainable logging opportunities. Active forest management can strengthen the forests' capacity to bind carbon and promote the replacement of fossil raw materials with wood-based products. Wood construction and wood products store carbon for long periods of time. Energy produced from the side streams of forestry and forest management will replace fossil energy sources.
Objectives linked to climate change mitigation	**3.3.2 Forest biodiversity and ecological, social and cultural sustainability are reinforced, p. 67** Finland's forests play an important role in **climate change mitigation** and adaptation. Finland has committed to the objectives indicated in the Paris Climate Treaty. The land use sector is part of the **EU's climate and energy policy** that will continue until 2030 which dictates that the minimum target for emissions cuts is 40 per cent. These objectives form the framework in which forests will be linked more closely than before to **climate change mitigation** and adaptation (see Chapter 2.7). Active forest management will also maintain the forests' health and ability to grow, which is also the basic precondition for a commercial forest's capacity to bind carbon. According to estimates, the **forests' carbon sink** will shrink from its current level over the coming decade due to increasing wood use, but will grow after this, strengthening the forests' carbon sink in the long term. However, the **carbon storage** will not shrink even when its growth slows. The growing use of forests will somewhat increase the amount of carbon stored in products and this will be taken into account in the overall examination of carbon sinks. According to estimates, the increment of forests in Finland will speed up as climate conditions change. […] **Climate change mitigation** and adaptation are supported by diversifying forest management. Forest management methods must be adapted to new and changing climate conditions including the climate's impacts on soil. This will allow us to exploit the predicted positive impacts of climate change while minimising the risks associated with it. The impacts of forest management methods on greenhouse gas emissions must be determined and taken into account when deciding on a management method. Domestic forest trees can adapt to the changing climate slowly over time. Objectives, p. 69: • Increasingly diverse sustainable forest management will support **climate change mitigation** and adaptation.
Policies/measures linked to climate change mitigation	**4.1. Forest Strategy project portfolio, p.73** **C. Resource-efficient and sustainable forest management** Objective: Forest management will be developed with the help of R&D activities, education and of the new geographical information tools developed as part of the project, which will increase forest growth and **strengthen carbon sinks**. At the same time, sustainable harvesting potential will also increase. The project will implement key research and development activities that can help increase timber production in commercial forests and improve the quality of forest management in a sustainable manner ensuring that the measures do not endanger the forest biodiversity or other forest-related ecosystem services and do not needlessly restrict other ways of using forests. The project's implementation will utilise the roadmap for more effective sustainable wood production prepared by Natural Resources Institute Finland. This will include measures that will sustainably and cost-efficiently increase tree growth, the maturity of trees, and the quality of trees in commercial forests. These measures include correctly timed forest management activities, improving the nutrient

	economy and tree breeding. The measures take into account the perspectives and cross-effects of nature management and **climate sustainable forestry**, which are examined in relation to the attainment of objectives for resource-efficient forestry. Additionally, this will involve the development of research-based growth and output models for forests with varying age structures and mixed tree species. **E. Climate Sustainable Forestry,** Objective: The project aims to increase knowledge on the development of **carbon storage and sequestration in forests** as well as on the impacts of forests and forest management on climate change adaptation. New information will improve risk management by forestry and forest owners and create the foundation for the **more effective consideration of the climate in management and use of forests**. The project will improve awareness on the development of **forest carbon sequestration and carbon storage** and on how forests adapt to climate change. […] The forest management recommendations will be updated and the effectiveness of communication concerning climate change adaptation, **carbon binding by forests and carbon storage** will be improved. […] The project is linked to the implementation of **the LULUCF Regulation**, where one of the focus areas are the measures needed by the land use sector such as the opportunities related to and suitability of an increase in afforestation and the decrease of forest loss. The possibility for developing, the impacts and the feasibility of a **carbon sink compensation system** will be assessed within the scope of the forest strategy. The project will also determine the combined and cross-impacts of climate policy and measures that aim to preserve biodiversity as well as the possibilities for improving the impact of favourable measures.
References to renewable energy in policy objectives	**3.1.1 Forest sector grows, enterprises and business are renewed, and new and growth enterprises are developed, p. 46-47** To fully exploit the potential of the **bioeconomy and circular economy**, political decisions must support the creation of new enterprises and innovations, and the legislation or its interpretations must not create unnecessary barriers to the sustainable exploitation of forests and wood. […] Unnecessary bottlenecks caused by current provisions that block bioeconomy and forest sector development should be addressed in various branches of administration. Increasing **the share of renewable energy** is one of the key objectives for Finland's Energy and Climate Policy. **Wood fuels as a source of renewable energy are crucial to Finland.** By creating preconditions for wood processing industry investments, we also encourage wood-based energy production, as renewable energy is typically produced as part of the manufacturing process. Active forestry maintained by the wood processing industry will bring more wood chips suitable for energy use to the market. It is possible to increase the use of wood-based energy by implementing long-term and predictable energy policy. The objective is that the majority of wood-based energy will continue to be produced on market terms from the side streams of other wood use. Objectives, p. 48: • The production of domestic wood-based energy will increase. **Wood-based raw materials will replace fossil-based raw materials and energy.**
References to EU cooperation and policies	**1. Forests offer solutions for human and societal needs, p. 18** **National, EU and international policies relevant to forests and forest-based business and activities are linked to one another seamlessly** and the implementation of policies will require consistency and coordination. Global sustainable development goals and the objectives contained in international agreements influence our national actions. National objectives and actions in turn influence the formation of international objectives and agreements. **3.1.3 International forest policy and influencing EU policies promote the attainment of the sustainable development goals and the good operating conditions for forestbased business and activities as well as reinforce international business opportunities, p. 54-55** Cooperation with countries that will hold the EU Presidency in the near future is important. **Cooperation makes it possible to find the most effective approaches from the forest sector's perspective at all levels of the Council both with the Commission and the EU Parliament**. Additionally, it is easier to enter into long-term planning of initiatives for coming years with countries that hold the EU Presidency, which is especially important for Finland as it prepares for its own EU Presidency during the second half of 2019. […] With regard to international and EU forest issues, Finland's general objective until 2025 is to promote the attainment of sustainable development objectives and the operating conditions for forest-based business and activities, and to improve our international business opportunities. The operating areas are international forest policy and development policy, the EU's forest-related matters and the promotion of business opportunities. The operational priorities related to these are information and communication, cooperation and coordination. Substance priorities include the bioeconomy, **climate change** and bioenergy, legality and good administration as well as biodiversity and ecosystem services.

ANNEX II: HORIZONTAL ANALYSIS OF MAIN FOREST AND CLIMATE POLICY OBJECTIVES

	Norway	Finland	France
Documents	White Paper on Forest Policy - *Meld. St. 6 (2016-2017)*/ White Papers on Climate Policy/Bioenergy strategy	Finland's National Forest Strategy 2025– Updated version 2019/ National Energy and Climate Strategy 2030	National Forest and Wood Programme/National Low-Carbon Strategy/ National Biomass Mobilisation Strategy
Strategic forest policy goals	• Increased value creation • Sustainable forest management • Competitive forest and wood-based value chains	• Finland is a competitive environment for forest-based industries and businesses. • The forest sector and its structures are innovative and diversified. • The forest is used in an active, sustainable, and diversified way.	• Promote value creation in France through sustainable forest management in the context of green growth and transition towards a low carbon society. • Meet the expectations of the general public and take into account regional projects. • Combine climate change mitigation and forest adaptation. • Develop synergies between forests and industry and better respond to market demand.
Forest policy objectives referring to climate or renewable energy	• Strengthen the focus on climate policy goals in the management of Norwegian forests. • Increase the use of forest resources and products as part of efforts to achieve a low-carbon society. • Enhance carbon sequestration in forests and secure the supply of sustainable wood-based raw materials. • Support the development of new knowledge concerning the use of wood as a substitute for fossil fuels and non-renewable materials and stimulate the production of forest-based bioenergy.	• Increasingly diverse sustainable forest management will support climate change mitigation and adaptation. • The production of domestic wood-based energy will increase. Wood-based raw materials will replace fossil-based raw materials and energy.	• Strengthen the role of forests and wood in climate change mitigation through measures that will enhance carbon sequestration, prolong carbon stocks in products and develop the use of wood as a substitute for fossil energy and more energy intensive materials. • Adapt forest management practices to better respond to the combined objectives of climate adaptation and mitigation.
Climate policy objectives referring to forests	• Develop an ambitious and comprehensive approach to forest related issues on the international agenda and work to ensure	• The sustainable management and use of forests, including forest conservation, will be ensured by	• Ensuring the long-term preservation and strengthening of forest sector carbon sinks and stocks and their

	more focus on forests in future international climate agreements. • Promote sustainable forest management in Norway that includes measures with a positive climate impact. • Strengthen the use of forest policy measures aimed at increasing removals of CO_2 on the basis of sustainable, active forest. management, and consider new measures such as afforestation and stricter rules on minimum harvesting age. • Promote the use of wood as a substitute for other, less climate friendly materials. • Ensure that increasing the harvest of biomass will not negatively affect biological diversity.	implementing the measures of the National Forest Strategy, maintaining a good forest health, and reinforcing the growth and carbon capture capacity of the forests over the long term. • The possibilities for afforestation in treeless areas will be investigated • Measures for reducing deforestation will be specified and implemented. (A new comprehensive climate plan for the LULUCF sector including new forest-related measures will be completed by the end of 2021. The plan will link land use sector actions to the planning of the climate and energy policy.)	resistance to climatic stress through improved forest management, afforestation and prevention of deforestation. • Maximising the effects of substitution and carbon storage in wood products through measures targeting uses of wood with a long life-span and high substitution potential such as expanding the use of wood in construction and improving the energy efficiency for wood-based renewable energy production.
Renewable energy/bioenergy policy strategic goals and references to forests and woody biomass	• Reduce greenhouse gas emissions, promote economic activity at regional and local level, and strengthen energy supply security. (Strategic objectives.) • Double the domestic production of bioenergy by 2020 compared to 2008 and mobilise production of wood-based raw materials by increasing harvesting levels, using more forest residues, and taking out more low-quality roundwood and raw material from pre-commercial thinning. • Increase the mandatory share of biofuels in road transportation from 24.5% in 2021 to 40% by 2030.	• Increase the share of renewable energy to more than 50% during the 2020s and the self-sufficiency in renewable energy to more than 55%. Raise the share of renewable transport fuels to 40% by 2030. (Strategic objectives.) • Forest biomass will be crucial for Finland as a raw material for renewable energy, including in the production of advanced transport biofuels. The objective is that the majority of forest-based energy will be produced from the side streams of other wood use. Forest biomass will be channeled to replace imported fossil fuels in heating, CHP production and transport.	• Achieving a renewable energy share of at least 33% in gross final energy consumption by 2030 with sectoral targets of 40% in electricity generation, 38% in heating, 15% in fuel consumption, and 10% in gas consumption. (Strategic objectives.) • As part of renewable energy strategy, “pursue intense development of the use of biomass resources“ favouring waste-to-energy processes - particularly from the forestry sector.

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