Builders of the Green Future: Exploring the Background of Finland's Contemporary Climate Policy

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1. ABSTRACT

This thesis aims to explore the trajectory of Finland's climate policy from 2011 to 2021, delving into the nuanced interaction between the governing coalitions and the constituent political parties. It seeks to discover the influences shaping the evolution of Finland's governmental approach towards climate policy during this period. Doing this allows us to formulate assumptions about the future of Finnish climate policy by comparing current assessments of its state with the results of the thesis. The study is carried out using a mixed method consisting of quantitative research and interpretation for a small set of variables. This set is separated from a larger set, which is grouped according to what is relevant to the topic of Finnish climate policy. In short, the thesis introduces the reader to some of the most important events in the recent history of Finnish climate politics.

Of the many things found out about the nature of Finland’s climate policy, the most and fundamentally significant aspect was its relationship to everyday politics and, in particular, the economy. For although all three observed governments recognized the importance of climate policy and carbon neutrality, the needs of climate policy was repeatedly questioned, or at least had to be reconciled with, the needs of the national economy. This was due to a variety of reasons depending on the government. The government led by the National Coalition Party saw climate change as an opportunity to promote sustainable products for the future in order to lift Finland out of economic recession. The Centre Party government took this idea further by promoting expertise in bioeconomy products. The Social Democratic Party-led government focused on climate and environmental issues of sustainable development more than its predecessors but was soon caught up in the international crises of its time.

Key words: Climate change, climate policy, emissions, Finland, government, greenhouse gas, political parties, politics

ABSTRA**K**T**I**

Tämän tutkielman tavoitteena on tutkia Suomen ilmastopolitiikan kehityskulkua vuosina 2011–2021 ja perehtyä hallituskoalitioiden ja poliittisten puolueiden väliseen vuorovaikutukseen. Tutkielmassa selvitetään, mitkä tekijät ovat vaikuttaneet Suomen hallituksen ilmastopoliittisen lähestymistavan kehitykseen tänä aikajaksona. Näin voidaan muodostaa oletuksia Suomen ilmastopolitiikan tulevaisuudesta vertaamalla nykyisiä arvioita sen tilasta tutkielman tuloksiin. Tutkimus toteutetaan monimenetelmällisesti pieneen muuttujajoukkoon, koostuen määrällisestä tutkimuksesta ja tulkinnasta. Tämä joukko on erotettu suuremmasta ryhmästä muuttujia, joka on ryhmitelty sen mukaan, mikä on olennaista Suomen ilmastopolitiikan aiheen kannalta. Lyhyesti sanottuna tutkielma tutustuttaa lukijan lähimenneisyyden tapahtumiin, jotka ovat eräitä suomalaisen ilmastopolitiikan tärkeimmistä.

Monista Suomen ilmastopolitiikan luonteesta selvinneistä asioista tärkein ja perustavanlaatuisin oli sen suhde arkipäivän politiikkaan ja erityisesti talouteen. Sillä vaikka kaikki kolme tutkimuksen kohteena ollutta hallitusta tunnustivat ilmastopolitiikan ja hiilineutraaliuden merkityksen, johtivat kansantalouden tarpeet toistuvasti ilmastopolitiikan tarpeiden kyseenalaistamiseen, tai ainakin yhteensovittamiseen taloudellisten tarpeiden kanssa. Tämä johtui, hallituksesta riippuen, monista eri syistä. Kansallisen Kokoomuksen johtama hallitus näki ilmastonmuutoksen mahdollisuutena edistää tulevaisuuden kestäviä tuotteita, jotta Suomi saataisiin nostettua taloudellisesta taantumasta. Keskustapuolueen hallitus vei tätä ajatusta pidemmälle edistämällä biotalouden tuotteiden osaamista. Sosiaalidemokraattisen puolueen johtama hallitus keskittyi edeltäjiään enemmän kestävän kehityksen ilmasto- ja ympäristökysymyksiin, mutta joutui pian aikansa kansainvälisten kriisien koettelemaksi.

Avainsanat: Ilmastonmuutos, ilmastopolitiikka, päästöt, Suomi, hallitus, kasvihuonekaasu, poliittiset puolueet, politiikka

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3. JUURTA JAKSAIN*: UNEARTHING THE ROOTS OF THE RESEARCH

3.1. About the Thesis

Year by year, climate change has become an increasingly central subject in everyday politics. It is portrayed as a threat caused or accelerated by human activity. If not stopped, it will ruin the lives of the world's most vulnerable people and bring hardship to the economies on a scale hardly seen before. So far, the task of doing something about this is mostly given to the political entities called nation states or countries. Led by a variety of forms of government and possessing individual goals, the nation states are in time forced to react to the worldwide phenomenon to protect themselves. Many have claimed to choose a pre-emptive approach, to stop the advance of global warming so that its worst effects would never come to be. Not all countries are equally determined to turn their pledges into actions, nor are they equally capable of doing so in the short period of time after which entire cities or even countries may become uninhabitable. At the international Paris Climate Summit in 2015, it was agreed that states should adopt 2050 as the deadline, before which they should give up their ways that have so far fueled climate change.

But even if everyone wished to stop global warming today, countries are like ships: they change their political course at different speeds depending on their size, and smaller countries are more agile than those with tens or hundreds of millions of people. This means that smaller, industrialized countries like the ones in Northern Europe are likelier to quickly implement nationwide climate policies in comparison to larger ones like Germany or the United States. A country called the Republic of Finland could be one of them.

The three past governments of Finland are the research objects for this thesis. As obliged by international agreements, the country is determined to reach a state where its greenhouse gas (GHG) emissions, the substance to commit to the progression of the climate change, will decline to a point where the capacity to remove GHG from the atmosphere is greater than that which produces it. This state of being for a country is called "carbon neutrality" (UNFCCC, 2021). Currently, Finland is expected to reach it by 2035 as was decided by its 2019–2023 government (Gatehouse, 2020 & Finnish Government, 2022). This would make Finland one of the earliest countries in the world to achieve this goal.

* A Finnish saying for when something is examined very carefully, "down to the roots" or in other words, to the last detail.

With this information, something still remains unclear, and that something is at the center of this thesis. Apart from the small size, there must be a reason for why Finland hopes to reach an early carbon neutrality. After all, it is not mandated by the Paris Agreement to any earlier date than 2050. There are likely many reasons for why this would happen. A country may want to combat climate change because it wants to preserve its environment from its destructive effects, like damage caused by changing temperature or invasive species migrating from warmer regions. It might wish to prevent some negative effects, economic or otherwise, brought by a large number of low-income immigrants leaving their homes to escape increasingly inhospitable environments. Some countries might even see an opportunity in the changing climate e.g., in the form of rising demand for goods turned popular by increasing climate change awareness.

So, to understand more in detail why a country like Finland would want to heavily invest in mitigating climate change, a particular analysis is needed. In this analysis, the emphasis is on the Finnish government's previous decisions to promote its climate policy.

Analyzing past deeds and their meaning may help reveal patterns with which assumptions can be made about how a political entity is going to act in the future in a similar situation. This is possible because political parties, even in smaller countries, take a relatively long time to change their fundamental values. This may be e.g., due to aspirations to reflect the attitudes of their voter base and maintain a well-known brand. Parties are also restrained by the complexity of their internal structures and the need to respond to the challenges posed by political competitors.

These changes are especially rare for the parties in the government because they need to act according to a shared program agreed on with the government coalition partners. In Finland, this program acts as a framework which dictates future activities of the government for the course of its four-year term. The government's performance in delivering on its promises is constantly measured by the scientific community and reported in e.g., scientific, and mainstream media articles for everyone to see. This provides the thesis its method of research discussed further in the section below.

The research question thus is: **What factors have accounted for continuity and change in the climate policies of the three successive cabinets of Finland from 2011 to 2021 according to contemporary reports and articles?**

3.2. During The Course of the Thesis

Before the actual analysis, questions of what climate policy is, why it is implemented, where it is applied and who implements it are answered in the theory section of the thesis. This is done to inform the reader about the basics of the topic and for further use in the final interpretative analysis. After this, the reader is introduced to the methodology and the material in the section of the same name.

These two sections form the Theory and Methodology chapter.

The second half of the thesis consists of the Analysis chapter. It begins with a quantitative section, which aims to justify the factors influencing Finnish climate policy discussed in the interpretative section. It does this by using a mathematical ranking formula that separately compares 15 independent variables or factors with the national greenhouse gas emission trend. The aim is to identify the five most significant factors for the cause of emissions from a wider group of 15 factors.

The thesis concludes with an interpretative analysis. It analyses reports and articles written on the performance of the previous governments and draws conclusions to answer the thesis' research question. The analysis assesses the relationship between five separate variables and Finland's greenhouse gas emissions, to see how one led to another and how the government reacted and influenced this development.

3.3. Limitations Set for the Thesis

Below, certain measures are set out to limit the scope of the thesis in order to avoid over-extension.

- The main focus of the thesis is on the factors and causes behind Finland's national greenhouse gas emissions, as emissions are the single largest cause of climate change. Related issues may not always be avoidable, as the achievement of climate targets is also highly dependent on the attainment of other forms of sustainability, often linked to societal problems at the grassroots level. This topic is discussed in more detail in the thesis on page 7.
- Discussing outsourced production capacity would involve foreign legislation in the analyses which would excessively expand the research topic, thus it is not discussed.
- In this thesis, the unit used for greenhouse gas (GHG) emissions is the carbon dioxide equivalent (CO_2e). Simplifying the definition of the International Panel on Climate Change,

CO_2e makes different types of GHGs, such as carbon dioxide, nitrous oxide, and methane, which have different GHG effects, comparable with each other by expressing their global warming potential in terms of the equivalent amount of carbon dioxide that would have the same impact over a certain time period. However, this does not mean that individual types of greenhouse gases do not still require their own countermeasures (IPCC, 2018).

- The quantitative analysis looks at change at the level of a year. As a result, no single year can be split between governments. Instead, election years, when power is transferred from one government to the next, are examined from the perspective of the next government. Therefore, the period over which this coalition is analyzed does not fully reflect its actual term of office.
- 2022 is excluded from the thesis, despite the fact that the last government under observation was still in power at that time. This is firstly because not all the necessary data for 2022 were available at the time of writing. Secondly, the average of some of the variables used in the quantitative analysis are strongly altered by the events that took place that year.
    - Interpretative analysis #2 is excepted from this limitation, as the events of the year are of interest to the thesis and do not significantly affect the broader analysis.
- Fields regulated by the European Union's Emissions Trading System (EU ETS) are excluded from the analysis. The system was created to put a price on GHG emissions of energy generation, energy intensive industries, and air and ocean shipping. The EU ETS is an EU-wide program. Therefore, it is more appropriate to analyze the emission sources it regulates from an EU-wide perspective.
    - Energy generation, meaning electricity, district heating, and ground transportation, is excepted due to its special societal importance and high volume of emissions.

4. LAYING THE THEORETICAL FOUNDATION

4.1. Introducing Climate Policies

To understand what climate policies are in the first place, it is necessary to begin by defining the most central term of the thesis. A climate policy is a decision that helps mitigate and adapt to the negative effects of climate change (Newell, 2021). In a country, they are targeted at the different sectors of society which in their own way put a strain on the global climate. An older, less streamlined classification system of the International Panel for Climate Change (IPCC) divides the main emissions sources into nine sectors: Energy, transport, industry, residential and commerce, agriculture, waste management, international aviation, international navigation and other (European Environment Agency, 2016).

Richard G. Newell, in his article Federal Climate Policy 101: Reducing Emissions (2021), stresses the importance of applying the policies in a way that meets the individual needs and standards of the different sectors and communities, and that businesses as well as individuals should also adopt climate change policies of their own. If a policy leads either to no change or to an increase in GHG emissions, it is not an effective climate policy.

This is different from the concept of sustainability as will be clarified later in the thesis. Sustainability is a vague term which refers more to the goal than the process of achieving it. Its definition depends greatly on who is asked. This thesis uses its own interpretation discussed in detail in the literature section (see p. 7).

Newell describes different climate policies to meet different needs. *Carbon pricing policies*, for example, set a price for a single ton of carbon released into the atmosphere. The price both increases over time and changes according to the market value of the commodity. The aim is to make people change their consumption habits to a more sustainable direction. Second, *performance standards* set time-limited benchmarks for the private sector. For example, a performance standard is the number of emissions a factory is allowed to emit. This is effective at raising the cost of unsustainable and low performance products and has little effect on consumer prices. This works well together with carbon pricing policies. Third, *technology deployment subsidies* encourage companies to act in a certain way by using incentives. These incentives e.g., tax credits and loan guarantees, can lower the cost and ease the deployment of new technologies. The effect of this on long-term GHG emissions is, however, not very great, and has proven to be very costly for the public sector. Instead, to bring new products to

the market, the state may consider the fourth option: *public funding of innovation* in scientific research. The government can invest money in new and financially promising innovations while also meeting its climate goals. Fifth, the government can mandate its agencies to conduct their purchases in a way that contributes to achieving national climate targets. These are called *procurement policies,* or "green procurements" and they can enable the state to stimulate innovation and encourage investment in new and more efficient technologies and products, according to the state's financial capabilities.

Lastly, Newell discusses *international agreements*. Climate change is a global problem that requires international cooperation to be solved. A common pact allows individual countries to set shared long-term goals, but at the same time gives them the flexibility to achieve these goals through measures tailored to local needs (Newell, 2021).

Most Western countries, including Finland, have joined the Paris Climate Agreement, ratified in total by 194 parties (193 countries and the EU) representing around 98.6% of global carbon emissions. The goal of the agreement is to limit the global temperature rise to below 2 degrees and desirably below 1.5 degrees Celsius above pre-industrial levels (UNFCCC, 2023).

As a member state of the European Union (EU), Finland is involved in planning and implementing the Union's common climate policy. The EU sets the underlying goals and standards which the Finnish government is committed to meet or even exceed. The Union-wide climate policy is based on the United Nation's Convention on Climate Change, the supplementary Kyoto protocol, and the Paris Agreement. Union's climate policy focuses mainly on *emissions trading*, *national targets for sectors not subject to emissions trading*, and the *EU Adaption Strategy* (Ministry of Environment, 2023).

Out of these three, the EU Emissions Trading System (ETS) is aimed towards large industrial plants, energy producers, and emissions caused by aircraft. It is expected to also cover maritime transport in 2024. The ETS is meant as a cost-effective way to make operators reduce their emissions in a way that gives them enough freedom to transform themselves in a comfortable way. It is based on "system caps" that increase the costs of emissions over time, functioning in a way that works internationally and predictably. This means that the amount of GHG the operators are permitted to emit is decreased over time with higher prices (European Commission, 2023).

Non-emissions trading sector, or the companies and organizations that are not included in the EU ETS, although are still affected by it, concerns the fields of "transportation, agriculture, waste, industrial emissions outside the EU ETS, and the municipal and housing sector with buildings, small

sources, households, services, etc." and are responsible for over a half of EU's GHG emissions. The responsibility of taking care of the emissions in this field falls under the jurisdiction of the national governments (Kobize, 2023).

Lastly, the goal of the EU Adaption strategy is to make the EU member states prepared for the effects of climate change and "make the EU completely climate resistant by 2050." These strategies to prevent damage to the people and their property will likely need to be developed even after the member states reach carbon neutrality. This is because even if the EU were to successfully shift to carbon neutral industries and energy production in time, it does not mean that the same rate of progress will be maintained by the rest of the world (European Commission, 2023).

4.2. Theoretical Literature on Climate Governance

This section describes three works on climate policy or "climate governance." The term refers to the use of diplomacy, mechanisms, and response measures "aimed at steering social systems towards preventing, mitigating or adapting to the risks posed by climate change" (Jagers & Stripple, 2003). The books were chosen to help define the concepts of climate policy and sustainable development.

4.2.1. Climate Governance and the Role of the Non-State Actors

In the first book, Governing Climate Change by Harriet Bulkeley and Peter Newell (2015), the authors argue that climate governance is not something that only state led organizations can solve. There are groups at all levels of society and outside society that can have climate policies, such as multinational organizations. The latter provide especially useful leverage like funding, technical assistance, and knowledge to climate related projects that the authors suggest governments should use more often.

Quentin Gausset, Jens Hoff, and Simon Lex in The Role of Non-State Actors in the Green Transition - Building a Sustainable Future (2019), go even further by stating that non-state actors are irreplaceable as partners against climate change. According to them, environmental sustainability cannot be achieved without solving the social one. To define sustainability, the authors refer to the 1987 UN Brundtland Commission, according to which sustainability is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

The authors argue that governments and companies negotiating agreements that facilitate the achievement of their climate goals is not enough to make climate governance sustainable. For that, they must be held accountable to the local groups and individuals affected by their decisions. Indeed, climate governance also has an unsustainable side, a reason of which is that its management has often been left in the hands of market mechanisms. While international free trade promotes innovation in the industrialized world, it has also become a means of protecting private companies from social accountability.

Bulkeley and Newell worry that using market-based methods such as carbon trading will lead to politicians ignoring vulnerable groups and focusing only on the net emissions outcome. For example, companies can enter into agreements disastrous for the production sites without local consent.

In the third book Why Do We Disagree About Climate Change: Understanding Controversy, Inaction, And Opportunity (2009), Mike Hulme argues that one's social and cultural backgrounds create meanings for climate change which cannot be defined by empirical research alone. This is presumably because final decisions on climate change depend on one's values. Contrary to popular belief, values, rather than scientific knowledge, determine how knowledge is applied in practice. Hulme argues that the difference in people's values is why it is often difficult for groups to agree who should pay for climate change mitigation and how much, despite the real cost being relatively low in comparison to the shared benefits.

4.2.2. Approaches to Solving Climate Governance

Bulkeley and Newell argue that ignoring non-state actors when formulating climate policy will lead to unsatisfactory results, as local groups are often the ones who put policies into practice. Harnessing the expertise of local organizations and businesses is thus vital to the success of climate policies.

Gausset, Hoff and Lex think the same way and argue that local groups should have more influence over their environments. By planning their own goals and setting standards for the technologies they use, local communities can apply policies more efficiently and gain influence on a larger scale through trade and example. Leading by example is about committing to changes in one's life that contribute to a valued goal. By doing so, communities are created where groups of like-minded individuals can live according to their shared values without disturbance.

However, the authors warn that the environmental community should not make its rules too strict. This is because it would restrict individual freedoms in ways that its members might find objectionable. Indeed, environmental groups or groups that seek to act in an environmentally friendly way must constantly renegotiate their activities and relationships in order to adapt to changing conditions and to be attractive to new members. Those who do not wish to participate in community life are best reached through different media platforms, such as entertainment or social media.

Gausset, Hoff and Lex argue that public spaces both physical and digital such as eco-villages in rural areas and universities in cities are vital for spreading awareness of climate change. In places like private businesses, where such messages often do not reach people, awareness can be raised by becoming 'proactive'. Being a proactivist means applying pressure on an organization as its member to change it from within. This helps in developing new practices within an organization which then can spread to other institutions through organizational networks. By encouraging proactive behavior, policy makers can make their objectives better understood and accepted at grassroots level.

Finally, Hulme suggests that climate policy should be explored more from social, cultural, and religious perspectives to address the challenges of applying global goals locally. According to Hulme, there is a recurring belief that climate change mitigation is done at the expense of humanitarian issues. He argues that this is not the case. Instead, the two issues can support each other when applied on the basis of appropriate knowledge of local needs, especially when the locals are given the right tools for maintaining their own environments. The difficulty of steering and financing such a historic task shows that there is much work to do, but by encouraging constructive and creative thinking, Hulme believes that countries can turn climate change from a challenge into an opportunity.

4.3. The Finnish Climate Policy

The agenda of the 2019–2023 Finnish government was based on the findings of the international environmental organization Intergovernmental Panel on Climate Change (IPCC). The Finnish government has expressed its willingness to prevent and adapt its country to the negative effects of climate change. It has stated its concerns towards these effects, including the ongoing global extinction event threatening many of the world's species, water security, food production, and the existence of many eco systems. Letting climate change develop further and make the average global temperature exceed the limit of 1.5 degrees Celsius would accelerate the extinction of fauna and flora, damage people's livelihoods worldwide, trigger conflicts, and force mass migration. The government

stated that stopping global warming and the deterioration of the world's biodiversity can only be achieved by stepping up measures of sustainable development as soon as possible. The Finnish government is allegedly invested in the matter because it believes that the Finnish "societal structure, educated population and plentiful availability of technological expertise" make it possible for the country to achieve its climate goals in time (Finnish Government, 2019 p. 33).

The climate policy pursued by the Finnish government aims to make Finland carbon neutral by the year 2035 and carbon negative soon after. The country is supposed to have phased out 80–93% of all its GHG emissions by 2050 (Mänty, 2019).

In 2019, Finland had managed to decrease its GHG emissions by 21% from the 1990 level and achieve the EU 2020 emissions goal ahead of time. The state of the country's natural biodiversity, on the other hand, was in a state of degradation. Half of Finland's habitat types and more than a tenth of the species were classified as endangered (Finnish Government, 2019 p. 33).

4.4. Emission Sources

The GHG emissions, the focus of the thesis: what are they and where do they come from? This section describes the several emissions categories or sectors that Finland can be divided into to facilitate the monitoring of GHG emissions.

In accordance with the goals of the 2015 Paris Climate Agreement, the national statistics organization Statistics Finland / OSF (2023) identifies 6 domestic sectors responsible for GHG emission in Finland: Energy production, industrial processes and product usage, agriculture, LULUCF (short for land use, land use change and forest), waste management and indirect CO_2 emissions. Using Statistics Finland's framework makes it possible to observe the emission sources from a local perspective and in accordance with local standards.

- Energy production

In 2020, the energy sector produced the most GHG emissions: 34.4 million tons (MT) CO_2e or 72% of gross national output (OSF, 2023). Most of these emissions were generated from fuel combustion to power industry and heating, as well as vehicles of which importance was pronounced due to Finland's long geographic distances. The emissions related to the sector varied yearly according to

the economic trend, the structure of the energy supply and climatic conditions. Changes in electricity imports and in the amount of fossil fuel-based condensate power generation, as well as an increase in the consumption of renewable energy sources, have been significant factors in the sector's emissions.

All of these things were affected in the past by the availability of hydropower in the Nordic electricity market. During the years of low availability, Finland has had to replace the missing supply of energy with GHG intensive sources such as coal and peat, increasing emissions. The increased replacement of fossil fuel-based power with renewable energy sources has been the main reason for the energy sector's decreased emissions since the 1990s despite the growth in energy consumption (Ministry of the Environment & Statistics Finland, 2022 p. 8–11).

- Transportation

Transportation is an emissions source sub-category and a part of the energy sector. It produced 22% of national GHG emissions in 2020, or 10.4 MT CO_2e. The greatest emissions within the transportation category were those of road transport with 9.9 MT of CO_2e, which was 95% of transport emissions and 21% of total emissions (OSF, 2023). Transport emissions have been the most affected by various social and legislative factors: Restrictions on movement triggered by the Covid-19 pandemic, tax reforms on emissions intensive fuel types, and mandates to increase the share of biofuels in car fuels. At EU level, regulations for car manufacturers have improved the fuel efficiency of vehicles (Ministry of the Environment & Statistics Finland, 2022 p. 11–12).

Fuels are also of interest from a political point of view. Much of society is dependent on transportation and thus affordable fuel costs. This means that hikes in the fuel prices may negatively affect ordinary people's ability to travel, but also businesses which rely on logistics and global transportation chains. This can further harm consumer spendings as well as other economic activity, and at worst slow down national economic growth (Catalano, Folger & Perez, 2021).

Because of its rate of emissions comparable to the sectors proper and its central role in the maintenance of the national economy, the transportation sub-sector is introduced separately from its parent sector.

- Agriculture

The agricultural sector released 13% of Finland's gross GHG emissions in 2020, or 6.4 MT CO_2e. The most emissions caused by the sector were released by the management of agricultural soils (49% of the sector's emissions in 2020), the enteric fermentation of domestic animals (36%) and manure management (12%) (OSF, 2023).

Most of enteric fermenting emissions were caused by cattle, but emissions generated by horses, pigs, sheep, goats, fur animals and reindeer were also reported. The sector's emissions were affected by the number of domestic animals which was dependent on agricultural policy and subsidies as well as the animal species. Additionally, increasing synthetic fertilizers use, animal numbers and crop yields increased nitrous oxide emissions (Ministry of the Environment & Statistics Finland, 2022 p. 14–16).

Machines used for working in the sector were counted as energy sector emissions. Soil produced emissions were reported as land use, land use change, and forest sector emissions (Ministry of Agriculture and Forestry, 2023).

- Industrial Processes and Product Usage

The emissions of this sector accounted for 5 MT CO_2e or 11% of gross GHG emissions in 2020. The most important sources of emissions within the sector were those of the metal, chemical and mineral industries covering 35%, 25% and 19% of the sector's respectively (OSF, 2023). Their emissions mostly consisted of CO_2, but also of small amounts of methane and nitrous oxide. Additionally, fluorinated greenhouse gases (F-gases) were reported under industrial processes. They were used to replace ozone depleting substances in refrigeration and cooling devices as well as in air conditioning devices and aerosols (Ministry of the Environment & Statistics Finland, 2022 p. 12).

F-gases, of which only producer the industrial processes and product usage sector is, accounted for 2% of gross emissions, meaning the emissions excluding the LULUCF sector's emission removals, and 18% of industrial and product use emissions in 2020 (OSF, 2023). The sector's emissions varied according to changes in production output and implementation of new technological solutions (Ministry of the Environment & Statistics Finland, 2022 p. 13).

- Waste

In 2020, 1.9 MT CO_2e or 4% of gross emissions were produced by the operators of the waste sector. Most of it was produced as methane by waste disposal (81% of the sector's emissions), while a smaller portion was caused by wastewater treatment (13%) as well as discharge and biological treatment of waste (6%) in the form of methane and nitrous oxide emissions (OSF, 2023).

Emissions caused by burning waste were reported in the energy sector because waste incineration only took place in the context of energy production (Ministry of the Environment & Statistics Finland, 2022 p. 17–19 & OSF, 2023).

- Land Use, Land Use Change, and Forest (LULUCF)

The LULUCF sector is unique among the emissions sectors because it both releases emissions and reduces them with what is called GHG removals. Removals refer to the capability of plant biomass and soil to absorb CO_2 from the atmosphere (Ministry of the Environment & Statistics Finland, 2022 p. 16). Ecosystems where the absorption takes place, such as forests, are called carbon sinks (European Environment Agency, 2023).

In 2020, the LULUCF sector removed 9.1 MT of CO_2e which decreased net emissions by 19%. The sub-categories with the most GHG removed were forest land (-20.5 MT CO_2e or 94% of the sector's total removals) and harvested wood products (-1.3 MT CO_2e or 6%). Cropland (8.8 MT CO_2e or 70% of the sector's total emissions) and wetlands (2.1 MT CO_2e or 17%) accounted for the most emissions (OSF, 2023 & see p. 75).

Logging and tree growth, together with changes in carbon storage capacity of the soils, determined the sum of emissions and removals from forest land, i.e., the net sink. It varied yearly, depending especially on the amount of logging (Statistics Finland, 2020). Logging rates, in turn, were influenced by the international demand for forest industry products.

Another factor in increasing the forest land carbon sink was the yearly expansion of forest growth volume. It has increased since the 1990s due to the large proportion of young forests being at a strong growth phase (Ministry of the Environment & Statistics Finland, 2022 p. 16).

LULUCF sector became a vital part of the national climate policy under the 2019–2023 government. The government coalition wanted to reverse the long-term shrinkage of the carbon sink so that it

could be used to implement the new government's 2035 carbon neutrality plan (Finnish Government: Marin’s cabinet, 2019 p. 39–40 & Rinne’s cabinet, 2019 p. 37–38).

The history of the importance of the sector for Finland’s climate policy dates back to 2013 when the EU approved a regulation to include agriculture and forestry in the Union wide climate change mitigation process. The regulation stated that the EU and its member states perceive forests, agricultural land, and wetlands to have a key role in the fight against climate change. It also obliged the member states to keep records of their cropland and grassland management. In addition to maintaining the carbon sink, the new rules were implemented to improve the recognition of the climate efforts of farmers and forest owners.

In 2018, the regulations were amended to require the member states to ensure that emissions from the LULUCF sector do not exceed removals for the periods of 2021–25 and 2026–2030 (Climate Change Laws of the World, 2023).

In 2015, the Finnish Climate Change Panel published a paper on which its members evaluated the effects of the regulation on Finland’s climate policy. They concluded that the regulation would benefit climate goals only for a limited time due to there being no EU wide system in place which would encourage countries to grow their carbon sinks (Kalliokoski, Kanninen, Korhonen et al., 2015 p. 34).

Activities that reduce the carbon sink, such as forestry, were not considered to conflict with climate policy if logging was stabilized with the national decarbonization target. The removal capacity goal was the same as the goal for produced emissions: 21 Mt CO_2e (Ekroos, Juhola, Kivimaa et al., 2019 p. 2 & Lång, Ollikainen, Peltola et al., 2021 p. 2).

The LULUCF sector is generally excluded from the emissions calculations if the intension is to measure only the produced GHG. This thesis is interested in Finland’s total contribution to tackling climate change within the limits set on section 3.3. Because of this, the thesis takes into account the net GHG reduction impact of the removals when observing the national emissions.

4.5. Introducing the Parties

The question that follows is: Who are those responsible of executing, promoting, and opposing climate policies in the Finnish parliamentary system? This is a brief description of the political parties that make an appearance in this thesis.

- **The National Coalition Party**

The National Coalition (NCP) is a liberal-conservative party positioned on the center-right on the political spectrum. Founded in 1918, it is one of the traditional "big three" parties in Finland alongside the Centre Party and the SDP. The NCP led the government in 2011–2014. It is also the Prime Minister party of the currently ruling 2023–2026 government (Wikipedia, 2023).

In its election program for the 2019 parliamentary elections, popularly known as the "climate elections" for climate change being its central theme, the party promised to promote economic growth, entrepreneurship, and job creation by implementing structural reforms and reforms to improve the functioning of the labor market, as well as encourage business of new technologies and innovation. The party proposed using regulations that reduce emissions, advocated for increasing the use of renewable energy, and promoted practices of circular economy. The NCP advocated for fighting social exclusion and providing employment opportunities for the elderly (National Coalition Party, 2019 #1, 3, 15–16, 37–53, 75, 79–80, 82, 84–85, 87).

- **The Centre Party of Finland**

The Centre (CP) is an agrarian, sometimes also described as a liberal-conservative party positioned on the center on the political spectrum. It was founded in 1906 and it is one of the big three parties in Finland. The CP led the government in 2015–2018 (Wikipedia, 2023).

In its 2019 election program, the party promised to continue promoting balanced regional development, referring to a decreasing social and economic inequality between rural and urban areas. This involved supporting rural industries like forestry and agriculture as well as decentralizing local decision-making. The CP also pledged to support economic growth and entrepreneurship by reducing bureaucracy and streamlining regulation. This would have happened simultaneously with promoting clean energy sources, increasing investments in renewable energy, and supporting sustainable practices in agriculture and forestry (Centre Party, 2019 p. 4–7, 16–20).

- **The Social Democratic Party of Finland**

The Social Democrats (SDP) are a party positioned on the center-left on the political spectrum. Founded in 1899, it is Finland's oldest party and one of the big three. It works closely with the Central Organization of Finnish Trade Unions. The SDP lead the government in 2019–2022 (Wikipedia, 2023).

In its 2019 election program, the party pledged to reduce income disparity and promote social equality. The party promoted full employment and improved working conditions including training, workers' rights, and fair wages. In climate questions, it emphasized ambitious actions and the need for international cooperation. The SDP proposed measures to reduce greenhouse gas emissions, transition to clean energy sources, and promoted environmentally friendly practices. It also called for better measures to care for vulnerable age groups in society and for reforms to better integrate immigrants into Finnish society (SDP, 2019 p. 4–7, 9, 14–15, 19).

- **The Green League**

The Greens are a green liberal party positioned on the center-left on the political spectrum. Founded in 1988, the party was founded by a popular movement of environmental and gender equality activists and politicians (Wikipedia, 2023).

In the 2019 elections program, the party promised to reduce greenhouse gas emissions, increase investments in renewable energy sources, and to promote environmentally sustainable practices in various sectors. They also advocated for protecting biodiversity and the preservation of the natural environment. The party highlighted the importance of sustainable transportation options and reducing dependence on fossil fuels. They proposed investments in public transportation, cycling infrastructure, and pedestrian-friendly urban planning. The party emphasized social justice and equality as integral to their agenda. They pledged to promote equal opportunities, combat discrimination, and address socio-economic inequalities (Green League, 2019 # 3–4, 14, 20).

- **The Finns Party**

The Finns are a national conservative party positioned on the right or the far-right on the political spectrum. Officially founded in 1995, the party has its roots in the Finnish Rural Party which separated from the Agrarian League (later the Centre Party) in 1959 (Wikipedia, 2023).

In its 2019 election program, the party pledged to reduce the number of asylum seekers and refugees entering the country due to deeming immigration costly to the Finnish economy and a threat to public security. It emphasized the need to prioritize the interests and welfare of Finnish citizens. It pledged to prioritize Finnish workers in employment opportunities, promote domestic industries, and support policies that safeguard national economic interests. The Finns Party emphasized being the only party to advocated for the preservation of the Finnish societal values. It deemed that climate policies should not come with a cost to ordinary citizens or encourage industries to move out of the country (Finns Party, 2019 p. 3–7).

- A full list of the political parties partaking in the three observed governments can be seen below.

National Coalition Party's Government (2011–2015)			
Party Name	Party Leader	Number of Seats in the Parliament out of 200	Additional information
National Coalition Party (PM)	Jyrki Katainen (2004–2014) Alexander Stubb (2014–2016)	44	
Social Democratic Party	Jutta Urpilainen (2008–2014) Antti Rinne (2014–2020)	42	
Left Alliance	Paavo Arhinmäki (2009–2016)	14	Left the government in April 2014 due to disagreement on the plan for national spending limits (kehysriihiesitys) (YLE News, 2014).
Green League	Ville Niinistö (2011–2017)	10	Left the government in September 2014 due to the government passing a construction permit for a nuclear power plant by energy companies Fennovoima and Rosatom (Reuters, 2014).
Swedish People's Party	Stefan Wallin (2006–2012) Carl Haglund (2012–2016)	9	

Centre Party's Government (2015–2019)			
Party Name	Party Leader	Number of Seats in the Parliament out of 200	Additional information
Centre Party (PM)	Juha Sipilä (2012–2019)	49	
Finns Party	Timo Soini (1997–2017) Jussi Halla-aho (2017–2021)	37–38 (before June 13th, 2017, none after)	Left the government in June 2017 due to disagreement on the immigration policy (Euronews, 2017).
National Coalition Party	Alexander Stubb (2014–2016) Petteri Orpo (2016–)	37	
New Alternative/ Blue Reform/ Finnish Reform Movement	Simon Elo (2017–2019)	20 (after June 13th, 2017)	Broke off from the Finns Party into its own parliamentary group and continued in its place as the government party from June 2017 on until the end of the term (Euronews, 2017).

Social Democratic Party's Government (2019–2023)		
Party Name	Party Leader	Number of Seats in the Parliament out of 200
Social Democratic Party (PM)	Antti Rinne (2014–2020) Sanna Marin (2020–)	40
Centre Party	Juha Sipilä (2012–2019) Katri Kulmuni (2019–2020) Annika Saarikko (2020–)	31
Green League	Pekka Haavisto (2018–2019) Maria Ohisalo (2019–2023)	20
Left Alliance	Li Andersson (2016–)	16
Swedish People's Party	Anna-Maja Henriksson (2016–)	9

Seat count (excluding New Alternative) retrieved from Vaalit.fi (2019): https://vaalit.fi/documents/5430845/7878801/Taulukko+Puolueiden+voimasuhteet+eduskuntavaaleissa+2011-%2C+28.7.2014.pdf/01e59f24-f690-446a-82e2-11c7fb717470

4.6. The Phenomena Affecting the Finnish Climate Policy

Why is climate change so topical in Finland? Its effects may not be as dramatic as elsewhere, but they can still make people think about the seriousness of the situation. Some may experience global warming e.g., as shortages of essential commodities or as changes in the environment. So, what are some of the reasons that may have led Finns to become interested in global warming?

- Health and Wellbeing

The temperature in the Nordic countries rises faster than elsewhere in the world. It is predicted that autumns and winters in the middle and southern regions will become warmer, with less snow, more rain, and darker days. Storms, floods, and unstable weather will become increasingly more common. Heat waves will become warmer, and they will last for longer. This will pose a health risk for the people who are vulnerable to high temperatures, namely the elderly and the chronically ill. Emergency healthcare units will get obstructed more often due to increased frequency of slippery weather.

Climate change will likely also have a negative effect on people's mental health especially in winter, as more days will lack enough sunlight. This is likely to put a heavy strain on the mental health of many people, especially the younger generations (Finnish institute for health and welfare, 2023).

In nature, the increase in rainfall and the steady rise in temperature will make water- and animal-borne diseases more common. Insect-borne diseases will also become more widespread as the natural environment for tics expands (Finnish Climate Change Panel, 2021 p. 19).

- Environment and the Bodies of Water

The sea water is predicted to become less salty, and its rate of eutrophication will increase. Extreme events will also increase the occurrence of accidents, disruptions, and runoff water related problems. Effects like decreased oxygen levels can change the marine circulation of nutrients and the other seas' internal processes, slowing down healing processes initiated by humans to cancel the harmful effects of their past activities on the Baltic Sea (Finnish Climate Change Panel, 2021 p, 21–22).

Northern plant and animal species typical to the region are increasingly threatened by species migrating from the south. Finnish nature is deemed to become more homogenized with the rest of Europe which would harm the existing ecosystem (Finnish Climate Change Panel, 2021 p. 22).

As well as improving forest growth, climate change has also increased the number of wood-eating pests and diseases in forests. These have been noted to cause serious economic damage to forestry companies, even worse than natural disasters. This unintended loss of trees weakens Finland's ability to use forests to remove carbon from the atmosphere (Finnish Climate Change Panel, 2021 p. 20).

- Agriculture

In agriculture, while surrounding conditions will become more favorable to growing a greater variation of crops, global warming is also expected to increase the number of pests and disease epidemics. The most negative effects for farming will be drought, excessive moisture, and the lack of frost (Finnish Climate Change Panel, 2021 p. 19–20).

- Buildings and Critical Infrastructure

Environmental damage to infrastructure will increase. The life span of structures and buildings will shorten, and damage caused by moisture and mold will rise. Warmer winters will make heating cheaper. On the other hand, the use of air conditioning in summer will increase. Natural phenomena will pose increasing challenges to the electricity supply (Finnish Climate Change Panel, 2021 p. 20).

At international level, supply chain disruptions due to sea-level rise are considered the most serious threat to security of supply. Around 90% of maritime transport is currently carried by ships to seaports, most of which are at risk of being submerged by 2100. Supply chains can also be disrupted by storms, fires, and floods. Increased disruptions are expected to increase product scarcity, shortages, and prices, and weaken public safety in the world (Leslie, 2022).

- Tourism

As the climate in southern Finland warms and becomes more central European, the warming is likely to have an even more severe impact on winter tourism in the north. Total snowfall is expected to decrease in the future and the start of the snow season is expected to be further delayed. It is possible that the reduced snowfall abroad will make Finland more attractive to tourists. However, the country's tourism sector could also be negatively affected by the deterioration of the international visitors' skiing skills (Finnish Climate Change Panel, 2021 p. 21).

- Commercial opportunities

Companies have become increasingly aware of climate change, not only because it affects their reputation, but also because they see in it an opportunity to take on an emerging market. This was caused by an increasing demand for renewable products, which often involve using wood.

Finland's forest sector has been criticized for damaging forest biodiversity. This has put pressure on companies to adopt effective circular economy (CE) and bioeconomy (BE) policies. CE stands for using and recycling raw materials for as long as possible, while BE means developing wood-based products. The EU and Finland have expressed a strong interest in BE. The latter has even adopted a BE strategy in which the Finnish government states to expect BE to create new growth and jobs.

Finland is seen to be in a unique position to benefit from BE due to the country’s extensive forest resources and long history of forest management. The importance of the forest industry as a driver of the Finnish economy is expected to grow significantly in time (Näyhä, 2018).

Climate change is also creating demand for other kinds of sustainable products. One of them are the hydrogen economy products. Hydrogen is a clean energy source with a high energy intensity. It is uncommon in nature but can be extracted from compounds such as water and hydrocarbons. This easy availability, together with non-existent emissions, made hydrogen attractive as a climate friendly energy solution (Vetylaitos, 2023).

In February 2023, the Finnish government adopted a goal to make Finland a European leader in the hydrogen economy, primarily to facilitate the achievement of carbon neutrality, but also to use it as a profitable export. According to the government, Finland has the potential to meet at least 10% of the EU's hydrogen demand by 2030 (Ministry of Economic Affairs and Employment, 2023).

- Climate Change Skepticism

Climate change skepticism, according to Willem Van Rensburg (2015), refers to “arguments and individuals that reject, dispute, or question the orthodox view of the climate issue.” A climate skeptic and a person trying to give constructive feedback about climate policies are often hard to distinguish, because the term to identify them is used liberally in everyday life. According to Von Rensburg, due to the nature of scientific information, it is easy to categorize opinions about climate change as right or wrong. This causes polarization and makes helpful discussion about climate change more difficult.

Strong public support does not always lead to ambitious climate policies. Using an online panel, researchers Beiser-McGrath and Bernauer (2021) found that more people do not believe in climate change than is generally thought. The survey was conducted among Americans, among whom 40% of the wealthiest 20% turned out to be sceptics, and Germans, among whom the sceptics were mostly in the lowest income bracket. Under normal conditions, these people tended to exaggerate their stance because they did not want to go against the mainstream narrative of their surrounding community.

In 2020, research at the University of Helsinki found that Finland had not made much progress in climate change mitigation despite it lacking a loud minority downplaying climate policy comparable to those in the anglophone countries. It was found that 26% of Finland's private and public organizations belonging to the Finnish climate policy network secretly prioritized economy and energy concerns over climate targets. Many of their representatives were influential, with connections to the government whom they lobby as a method to affect policy making. This is made possible by Finland's nature as a "corporatist country," meaning that economic interest groups and trade unions are kept closely in contact with public authorities. This gives an opportunity for these interest groups to interact with the decision-makers in private, free of attention from the media (Gronow, Vesa & Ylä-Anttila, 2020).

- Popular Terminology

Understanding common objectives is key to climate policy, minimizing the potential for confusion and ineffective implementation. Finland and the EU have been found to lack such an understanding at times, particularly in the area of sustainable forest management. Finnish companies thought this was due to a lack of awareness on the part of the EU, but a study found the issue to be more complex.

Research found that the central terms promoted by the forestry companies, such as circular economy, bioeconomy, and sustainability lacked a common definition. Some companies used them to describe old practices, and most ignored biodiversity in their definition of sustainability (Näyhä, 2018). This contradicts the EU's view that biodiversity is the "backbone of life," providing people with "food, fresh water and clean air" and helps "fight climate change and prevent the spread of infectious diseases." Citing the World Trade Organization, the EU claims on its website that half of the world's GDP is at risk because of increased man-made damage to the natural environment and its resources (European Council/Council of the European Union, 2023).

Professor of ecology Janne Kotiaho (2017) argues in his study that Finnish forest management was not sustainable even without future increases because it had a negative impact on biodiversity. He mentions that “radical changes in forest age structures, rapid and continuous loss of old-growth forests and a sharp decline in the amount of dead wood” have led to a decline in the number of forest species in the country. Kotiaho criticizes both private and public sector organizations, such as forestry companies and the Ministry of Agriculture and Forestry, for failing to inform the public sufficiently about the negative effects of current forest management on Finland's nature.

Disagreement also occurred between large and small forestry companies, particularly on sustainable bioeconomy practices. While the former emphasized “traditional bulk products and biofuels,” the latter stressed “new, innovative, higher value-added products,” going so far as to criticize larger companies for using greater quantities of wood than them to create products of lesser value.

In short, the vague definition of popular words tempts interest groups to use them arbitrarily, leading to words taking on different and even overlapping meanings. Without a common definition, it is likely that disagreements and confusion between Finland and the EU will recur (Näyhä, 2018).

5. MATERIAL AND METHOD: A GLIMPSE INTO THE TOOLBOX

5.1. The Criteria for the Research Material

The thesis uses the CRAAP test (Currency, Relevance, Authority, Accuracy, and Purpose) to assess the reliability of the research data. This means that the material must be recent or recently updated, it must be sufficiently relevant and factual for its audience, its author must be an authority on the topic, its content must be persuasive, it must provide evidence for its claims, and it is important to know what the source is trying to achieve e.g., is it meant to inform, persuade, entertain etc. (Kurpiel, 2023).

CRAAP has been criticized for not being practical for detecting mis- and disinformation (Fielding, 2019). That is why this thesis places a strong emphasis on the authority of its sources. The ones used are mainly domestic, from both nationally and internationally significant bodies such as the EU and the Finnish Government, national organizations such as Statistics Finland, and large public and private media companies like Helsingin Sanomat and the Finnish Broadcasting Company (YLE).

Much of the thesis is reliant on the reliability of these public sources and mainstream news. Data published by Reuters Institute for the Study of Journalism, a research center belonging to the University of Oxford, gave YLE News a brand trust score of 85%, the most trusted in the country, while the corresponding number for HS was 81%, making it the second most trusted tied with the undefined “local newspaper” (Reuters Institute for the Study of Journalism, 2023). The international NGO Reporters Without Borders ranks Finland's press freedom as the fifth freest among 180 countries in 2023 (Reporters Without Borders, 2023).

Media Bias/Fact Check (MBFS), an American website used widely in studies of mainstream media, social media, and disinformation, rates YLE News as Least Biased (0–2/10) with High Credibility (6–10/10) but only Mostly Factual (3/5) due to “rarely using hyperlinked sourcing when referencing information from other sources.” HS was rated as Highly Factual (4/5) reporting with High Credibility (6–10/10) but with a Left-Center bias (2–5/10) due to “editorial positions that favor environmentalism and left-leaning social justice policy” (Media Bias / Fact Check, 2023).

5.2. The Research Material

The following section introduces the written material used for the analysis portion of the thesis. The research material includes books, research articles, websites, indices, and government reports. Each subsection is titled according to the name of the source.

- Statistics Finland / OSF (The Parliamentary Elections Results & The Emissions Sources)

Most statistical information in this thesis is provided by Statistics Finland and is retrieved from their website stat.fi. The website holds official, numerical information about Finland. Data published by Statistics Finland is free to access for anyone, while protecting the privacy of the individuals who take part in its surveys (Statistics Finland, 2023).

- Natural Resources Institute Finland (Luke)

The Natural Resources Institute Finland is a research institute under the Ministry of Agriculture and Forestry. The main task of the institute is to promote sustainable use of renewable natural resources for competitive economic activity and wellbeing of the countryside. Luke also publishes statistical information on the use of natural resources and food in Finland (Luke, 2023).

- Parties' Parliamentary Elections Platforms

The parliamentary elections platforms are online catalogs in which the political parties make promises about their performance as government parties during the nearest upcoming elections to persuade the citizens to elect them. Each elections platform can be found on the website of the respective participating political party, usually both in Finnish and English as well as in other languages. The platforms can be compared to the actual performance and reception to evaluate the parties' past ability and intent to fulfill their promises.

- The Ministry of Finance / Budjetti.vm.fi (The National GDP & the Environmental Budget)

The state budget is managed by the Ministry of Finance and its details are published on their website *budjetti.vm.fi* (2023). The website provides an estimate of the state's total income and expenses. By

comparing the environmental budget with the actual performance, it is possible to paint a picture of the actual effectiveness of the funds spent. Similarly, it is possible to compare the effectiveness of the funds over time while comparing them with the other factors.

- The News Sources: Helsingin Sanomat and YLE News

Helsingin Sanomat (HS) is a Finnish independent subscription newspaper. It is the largest such newspaper in Finland and the Nordic countries. It is usually published daily and has an average number of 688,000 readers every day. It is owned by the Finnish learning and media company Sanoma Corporation which is the largest media group in the country. It receives its income from advertisement and subscription fees (Sanoma, 2023 & Wikipedia, 2023).

YLE News is a news production unit ran by the Finnish Broadcasting Company (YLE), a national publicly owned broadcasting company. The company produces news in many different formats. In the case of this thesis, the web articles are the primary point of interest (Wíkipedia, 2023 & YLE, 2023). Since 2013, YLE was funded by revenue obtained from a public broadcasting tax collected annually from private individuals and corporations (YLE, 2023 & Ministry of Transport and Communications, 2012).

Helsingin Sanomat and YLE (Elävä arkisto) archives are used in the interpretative analysis section of the thesis to identify major events that may be connected to the deviations found in the quantitative Analysis Section. Due to their high level of trustworthiness at reporting major events happening in Finland and the high level of press freedom in the country, Helsingin Sanomat and YLE News are a suitable source of information for this task.

- Other Sources

The interpretative portion of the analysis chapter uses contemporary written material: articles, reports, statistics etc., the need for which cannot be anticipated before the start of each interpretation analysis. Their trustworthiness is confirmed by using the methods mentioned in the Criteria for the Research Material chapter, including the CRAAP test.

5.3. The Quantitative Analysis

The quantitative research method portion of the analysis chapter compares 15 different factors with the volume of the annual Finnish GHG emissions which they may be a partial cause to. The analysis covers a period of 11 years, starting from 2011 and ending after 2021. As defined in the introduction, this is done to give legitimacy to the chosen factors which influenced the Finnish climate policy during this period, and which are later discussed further in the Interpretation Section.

The analysis is performed by using a method called regression analysis. It is used to determine the extent of a relationship between two or more variables by using statistical data. It is useful for recognizing patterns and trends, and the changes in them. It is not, however, very useful at explaining why and how the correlation between different variables takes place. That is why additional information is needed later to draw conclusions from the analysis, either to support its findings or to prove them irrelevant. This is the task of the interpretative analysis (see pages 32 & 56).

In the regression analysis an independent variable, in other words the factor or more ambitiously, the cause depending on the variable, is compared with the dependent variable, the effect. The 15 factors discussed earlier are those independent variables. The annual volume of the Finnish GHG emissions is the single dependent variable which the independent variables are compared with.

The timeline of observations, as mentioned, is 11 years. Each variable receives an average value for each year to describe the variable’s development over time.

The independent variables are as follows:

- Annual Change in GDP Volume
- Average of the Consumer Price of Diesel
- Average of the Consumer Price of E10 Gasoline
- Budget of the Ministry of the Environment
- Citizens' Opinion on Climate Change
- Nord Pool (North-European power exchange) Day-Ahead Prices of Electricity
- Price of Coal in Electricity Production
- Price of Milled Peat in Electricity Production
- Price of Natural Gas in Electricity Production
- Price of Wood-Biofuel in Electricity Production
- Producer Price Index for Beef and Veal

- Volume Index of Chemical Industry Output
- Volume Index of Forest Industry Output
- Volume Index of Metal Industry Output
- Volume Index of New Housing Construction

The independent variables are chosen according to their assumed importance to the Finnish climate policy. Including this wide range of variables means they cannot be picked very systematically. To add scientific credibility to the analysis, a regression analysis is used to rank the arbitrarily chosen variables in a mathematical fashion with the intention of reducing the negative effects of bias. The aim is not to discuss Finland's climate policy in its broad entirety, but to focus on the most relevant parts that are most useful for describing the climate policies of the previous governments.

Additionally, to persuade the reader about the importance of the chosen independent variables, each one is given a half-page long introduction which explains why the chosen variable is relevant to the Finnish GHG emissions and the national climate policy. It exists to clarify why the variable is chosen apart from separate reasons such as the general availability of data.

In addition to the description, the introduction page of the independent variable includes a visual regression graph which presents the relation between the independent and the dependent variable in an alternative manner. A description is written at the end of each introduction page to explain to the reader the past development of the independent variable and thus to clarify the content of the graph.

5.3.1. The Regression Analysis

The regression analysis is used to measure the quality of correlation between variables, in other words, strength and probability. The strength of a correlation refers to the effectiveness with which one variable can affect another. Probability refers to the likelihood that the correlation between two variables is due to a causal link and not just chance.

After discovering their respective values, the 15 independent variables are ranked according to the quality of their correlation with the dependent variable.

In addition to finding out and comparing the values, the regression between the independent and the dependent variables can also be presented in the form of a visual graph. It shows the correlation between the variables in the form of a line. This line is called the regression line. If a correlation is positive, meaning that an increase in one variable leads to an increase in another, the line takes an

ascending angle from left to right. If the correlation is negative, it means that an increase in one variable causes a decreases in the other, causing the regression line to be in a descending angle.

The graph on which the regression line is drawn is usually read from **left to right** meaning that the line ascends or descends in that direction. The angle, as described, is determined by the correlation between two variables, the independent and the dependent. The 15 independent variables are all represented on their individual graphs by the **horizontal** axis "x" against the dependent variable, the Finnish GHG emissions, which is represented by the **vertical** axis "y." As mentioned earlier, each variable gets a descriptive value for each year that is included in the observed timespan, in this case 11 years between 2011 and 2021. These values meet on the horizontal and vertical axes and form the two-dimensional coordinate: x, y.

For example, in 2011, the value for the independent variable "annual change in GDP volume (%)" is 2.5 and for the dependent variable, the Finnish GHG ($ktCO_2e$) emissions, 42,581. The coordinate, on this basis, is 2.5, 42,581. If there is a reasonably strong correlation, the coordinates for all of the years should organize into a visible pattern which marks the angle of the regression line (see image 1) (Statistics How To, 2023).

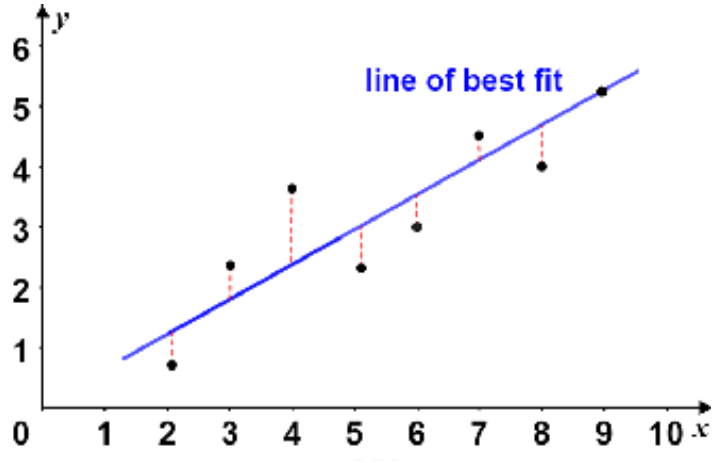


Image 1: A regression graph, in which the regression is positive. The image also presents the regression line, in this case named the "line of best fit." Retrieved from MATH.net (2023).

5.3.2. The Regression Coefficient

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[\, n\Sigma x^2 - (\Sigma x)^2 \,][\, n\Sigma y^2 - (\Sigma y)^2 \,]}}$$

Image 2: the Pearson's coefficient correlation formula. Retrieved from Statistics How To (2023).

It is one of the **two** numerical values generated by the regression analysis, the other being the p-value. If the regression is positive, then the number of the coefficient is also positive, and vice versa. The regression coefficient tells how much the explanatory variable changes when the explaining variable increases by a single unit. A regression coefficient can be calculated with the above Pearson's coefficient correlation formula. It generates an r value ranging from -1 to 1. Visually, the value is represented with the regression line either ascending or descending depending on whether the r value is either above or below the value zero (Statistics How To, 2023). The closer the coefficient is to zero, the likelier it is that the two variables have no significant effect on each other, or in other words, are irrelevant (Mansa, Munichiello, & Nicholas, 2021). The closer the value is to either of the extremes, 1 or -1, the stronger the correlation is either in a positive or a negative sense (Statistics How To, 2023).

During the making of this thesis, the coefficient was generated with the CORREL(array1, array2) function on Microsoft Excel Spreadsheet Software. Array1 represents all the values of the independent variable (x) given to each observed unit of time while array2 represents the values of the dependent variable (y) (Microsoft, 2021).

5.3.3. The P-Value

The p-value (standing for probability value) is a number that tells how likely it is that there is a correlation between two compared variables. It is expressed in hundredths. The smaller the p-value is, the greater is the chance that the observed correlation occurs due to a concrete causal connection and not sheer luck. In other words, it tells if the analysis produces valid, usable information. Usually, the acceptable p-value must be limited to a certain top value, typically 0.05. If the value is greater than that, the hypothesis on there being a correlation between the variables should be discarded (Anderson, Beers & Perez, 2023). This process in which the p-value is used in addition to a t-value and the t-table to test a hypothesis is called a Student's t-test (Glen, 2023).

But in the case of this thesis, an individual handpicked variable like the output of the forest industry cannot be expected to be the sole cause for all the Finland's GHG emissions. Because of this, the conventional use of the p-value to prove that A affects B cannot be useful. Instead, the value is used to rank the independent variables according to the smallness of their p-values to find those with the correlations closest to a credible causal connection.

Through calculation, the p-value is found by using the standardized t-table (ttable.org, 2023) and something called the t-value. The t-value is found by calculating the **difference** between the observed groups' **means** and by dividing each with the **variability** of the group. The variability is the squared result of the sum of the two variables' **variances** (s^2) each first divided by the **sample size** (n). The variance is found by squaring the **standard deviation** which is how much individual data points deviate from the observed group's mean (Statistics How To, 2023).

In the case of the thesis, Microsoft Office's Excel program and its t-test function (T.TEST, array1, array2, tails, type) are used to calculate the p-value. The first and the second arrays require the sample sets (the values) of the independent and dependent variables. There are two additional spaces, tails and type. These are filled with numbers 2 and 3 to tell the program that the test is two tailed and it is conducted on two **independent samples** with **unequal variances**.

A two tailed test estimates the probability in two directions, positive and negative, as the correlation can form in any of those two directions. A one tailed test is only appropriate when it can be proved that a regression can only develop in a single direction (University of California, Los Angeles, 2021).

The unequal variance or heteroscedasticity was chosen as the t-test type. It is used on Excel when the error variance between two variables is not the same, is unknown, or is otherwise uncertain. Due to this, it has an element of flexibility which is useful for testing 15 different variables in an analysis that covers a lengthy period of time (Indeed #4, 2022, Kumar & Vaidya, 2023).

5.3.4. Ranking

The final step in the quantitative analysis is the ranking of the 15 chosen independent variables according to their regression coefficients and p-values. This is done to separate 5 of the most relevant variables for the following interpretation analysis. The ranking happens in the following order:

First, the regression coefficients of the independent variables are lined up in order of magnitude, the biggest being the so called “best.” The variables receive a corresponding ranking number starting from the best variable which receives the first rank (#1).

Next, the p-values are arranged in a way opposite to the regression coefficient: the smallest in this case is the best and receives the first rank. This is because of how the p-value is used in this thesis: The more probable the correlation is, the lower the p-value.

Finally, the ranks given to the regression coefficient and the p-value are summed for each independent variable. The sums of these two ranks are then ranked in a descending order.

This way it can be found which 5 variables have the best combination of regression and probability. Any variables with low ranks are likely to receive a mediocre final score meaning that an independent variable with a very low probability cannot advance to the next analysis even if it had a high regression coefficient.

5.4. Interpreting the Findings

Interpretation means giving an opinion or an explanation for what something means (Collins Dictionary, 2023). It is a process which requires much prior experience of the discussed subject, and in which the opinion of the researcher will likely influence the results. Because of this, interpretation as a method does not necessarily hold much scientific value, unless it comes from an authoritative person who possesses expertise and a reputation on the fields relevant to the case chosen for interpretation. This is what will happen in the Interpretation Section, using previous interpretations of events gathered from trustworthy sources to understand past events.

The analysis takes a step-by-step approach, starting from examining the reasons behind the development of the independent variable (x), in this case the development of the GDP volume, price of electricity or something else. It is important to understand how and why the independent variable changed over time to see its connection to changes in net national GHG emissions (y).

After this, the intention is to clarify how the events were presented by the mainstream media and how they were received by the government parties. For example, did a change in the independent variable result in any new laws or regulations? Was the view on the issue and how it should be approached unanimous throughout the government? How were the decisions made by the politicians received by

the citizens and third parties? The number of questions that could be asked is overwhelming for the scope of this thesis, which is why picking them is not left to choice.

The local mass media both public and private, specialized in national and international news publishes articles on the most pressing political issues of each day. These articles are collected in online archives. The total quantity of political news from various reporters from different organizations narrows down the number of relevant factors and stories to create a mainstream narrative from which conclusions can be drawn by comparing these stories with e.g., relevant authoritative articles and reports. Most analyses are expected to be carried out like this. However, painting a big picture on some independent variables by using media sources may cause issues. For example, there may not be enough material from which to form even a basic understanding. In this case, an alternative source is used that best corresponds to the needs of the analysis.

After the shared history of the independent and the dependent variables is mapped out to a sufficient degree, conclusions or "interpretations" are made about the politics practiced by the Finnish government and the government parties. This is the last part of the interpretative analysis, and it contains the actual results of the thesis. In addition to reports and articles, this section uses all of the information discussed in the previous chapters to explain as holistically as possible why the events under observation took place and what was the role of the parties involved. The end goal is to find out on what basis the three previous governments and their political parties have acted. With the understanding of what the governments did and why, it is possible to outline the big picture of their climate policy and its effectiveness.

6. CONDUCTING THE QUANTITATIVE ANALYSIS

This chapter presents the results of the quantitative analysis. The fifteen independent variables chosen for it are listed below on the table of variables. The analysis of each variable is observed by reading the table from left to right, starting from the chosen variable. The variables are set in a vertical order, starting from the top with the variable scoring the best final result. The top five variables chosen for the interpretation analysis are visually separated from the other ten variables for better clarity.

After the table of variables, each variable is individually introduced. As a part of the introduction, the importance of the independent variable to the national GHG emissions is briefly explained. This is done, as described on page 28, by asking how the independent variable is relevant as a factor for the Finnish GHG emissions.

This is followed by a written explanation of the development occurring between the dots on the given variable's regression graph to help the reader understand its content.

On the graphs, the government led by the National Coalition Party (2011–2014) is marked with blue squares, the Centre Party (2015–2018) with green circles, and the Social Democratic Party (2019–2021) with red triangles.

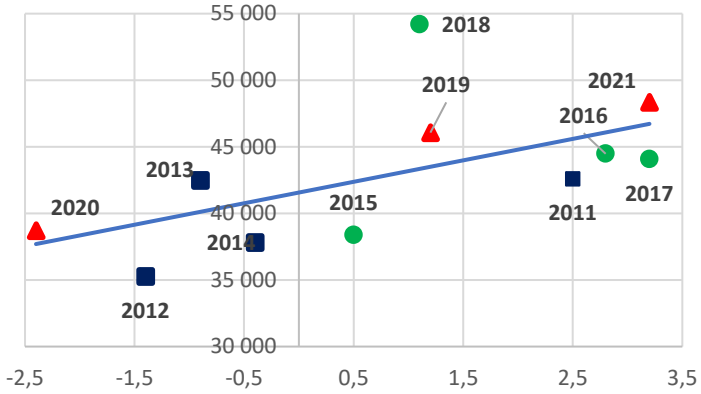
- The development of each variable, the one dependent and the 15 independent ones, is individually presented in the form of a series of line graphs on page 51 in the ranking order.
- Variables representing the price of a resource used for electricity production is relevant for other kinds of energy uses as well. The energy sources in question are consumed by burning, which means that the purpose of their use does not affect their consumer price. The reason for this arrangement is that a data set dedicated to general energy use was not available during the making of this thesis.
- To measure the development in output of Finland's three biggest industries, chemical, forest and metal, volume index is used as the form of measurement. According to OECD's definition, volume index "summarizes the proportionate changes in the quantities of a specified set of goods or services between two periods of time" (OECD, 2017 p. 303). The year which the others are compared to receives the reference value of 100.
- Quantitative research sources last checked at the end of November 2023.

- The variables No. 1–5 proceed to the interpretative analysis.

No.	Name of the Variable	Reg. Coef.	Reg Coef. Rank (A)	P-Value	P-Value Rank (B)	Ranks (A+B) Summed	Final Result
1	Annual change in GDP volume (%)	0.581	4	1.466	1	5	1
2	Volume Index of Forest Industry Output (#, 2015=100)	0.642	1	1.500	8	9	2
3	Citizens' Opinion on the Concern of Climate Change (%, Very Major + Major vs. Cannot Say + Minor + Very Minor)	0.618	2	1.489	7	9	2
4	Price of Coal for Electricity Production (EUR/MWh)	0.435	8	1.469	2	10	3
5	Nord Pool Day-Ahead Prices of Electric. (FI) (EUR/MWh)	0.567	5	1.479	6	11	4

No.	Name of Variable	Reg. Coef.	Coef. Rank (A)	P-Value	P-Value Rank (B)	(A+B) Summed	Final Result
6	Average of the Consumer Price for E10 Gasoline (EUR/l)	-0.055	12	1.466	1	13	5
7	Average of the Consumer Price for Diesel (EUR/l)	-0.046	13	1.466	1	14	6
8	Volume Index of New Housing Construction (#, 2015=100)	0.612	3	1.507	11	14	6
9	Price of Wood-Biofuels for Elec. Production (EUR/MWh)	0.164	11	1.472	4	15	7
10	Volume Index of the Chemical Industry (#, 2015=100)	0.544	6	1.501	9	15	7
11	Volume Index of the Metal Industry (#, 2015=100)	0.515	7	1.504	10	17	8
12	Price of Milled Peat in Electricity Production (EUR/MWh)	0.043	14	1.470	3	17	8
13	Price of Natural Gas in Electricity Production (EUR/MWh)	-0.046	13	1.476	5	18	9
14	Producer Price Index for Beef and Veal (#, 2010=100)	0.357	9	1.508	12	21	10
15	Budget of the Ministry of the Environment (1000€)	-0.314	10	1.913	13	23	11

1) X: Annual change in GDP volume (%)



Y: Finnish GHG emissions incl. LULUCF (ktCO2e)

	x	y		x	y
2011	2.5	42 581	2017	3.2	44 061
2012	-1.4	35 271	2018	1.1	54 204
2013	-0.9	42 488	2019	1.2	46 063
2014	-0.4	37 815	2020	-2.4	38 709
2015	0.5	38 365	2021	3.2	48 343
2016	2.8	44 475			

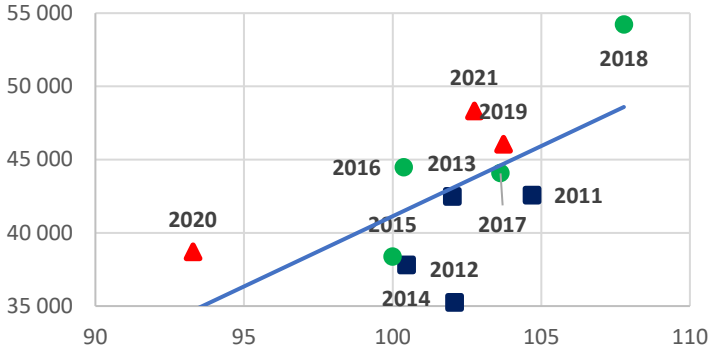
Regression Coefficient: 0.581 | P-Value: 1.466

The success of a state is closely tied to its wealth, the gross domestic product. When the state's economy expands or contracts, it likely has an effect on its industrial production and how much GHG the country emits. How the state reacts to changes in emissions and the emissions themselves depends on what kind of government has been elected to lead, as well as the dominant attitudes within society on possible future events. The effect of GDP on national emissions is a broad topic which allows the observer to compare yearly GHG emissions with major events relevant from the perspective of the national economy.

Unlike with the other graphs, in this one the zero point of the X-axis is positioned in the relative center so that both positive and negative GDP developments can be observed. The distribution on the graph shows that the Finnish economy has seen growth for seven years out of eleven with the strongest increase achieved during the SDP's government's term in 2021 (5.6%) while the weakest, or the greatest contraction, took place during the NCP's government's term in 2012 (-3,9%). In total, the Finnish GDP growth increased by 10.1% and decreased by 9.8% between 2011 and 2021.

The first and the third governments, those of the National Coalition (NCP) and the Social Democratic Party (SDP) have their observations (dots) distributed widely across the graph while those of the Centre Party's (CP) government are more focused on the upper right quarter, indicating both greater GDP growth and emissions during the party's term of office. During the NCP's government, the GDP mostly subtracted. The emissions subtracted together with the GDP but increased temporarily in 2013 when the economy started to improve. The CP's coalition's term saw more significant growth especially at the beginning of the term till 2016. This growth quickly stagnated the next year and in 2018 fell by about as much as it grew in 2016. Emissions increased sharply on both occasions. At the beginning of the SDP's coalition's term in 2019, the GDP was the same as last year, but the emissions decreased. The economy then suddenly fell into recession in 2020, changing back into growth the next year. Emissions similarly first fell, and then grew to digits only surpassed before by the CP's government in 2017.

2) X: Volume Index of Forest Industry Output (#, 2015=100)



Y: Finnish GHG emissions incl. LULUCF ($ktCO_2e$)

	x	y		x	y
2011	104.68	42 581	2017	103.63	44 061
2012	102.08	35 271	2018	107.78	54 204
2013	102	42 488	2019	103.73	46 063
2014	100.46	37 815	2020	93.28	38 709
2015	100	38 365	2021	102.75	48 343
2016	100.38	44 475			

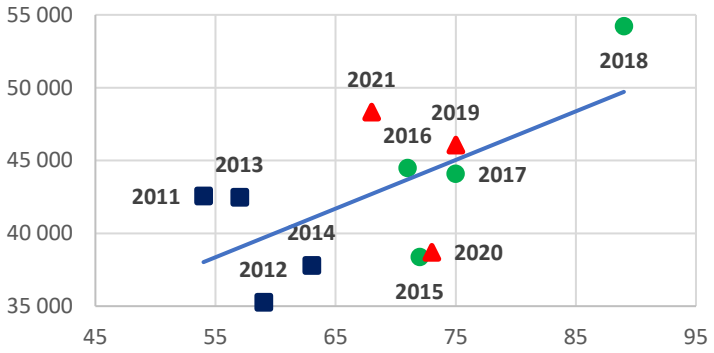
Regression Coefficient: 0.642 | P-Value: 1.500

The Finnish forest industry consists of 62 member companies which specialize in producing paper, wood pulp, cardboard, and other wooden products (Finnish Forest Industry, 2023). The industry was the second biggest in Finland in 2021 with 21% share of net sold production value (OSF, 2023). It harvested 66 million cubic meters of wood the same year and planted around 150 million tree saplings annually. The forest industry deems its business practices environmentally sustainable because e.g., they help Finland reach its climate goals, and because the total volume of forests in the country has increased by 70% in the past 50 years (Finnish Forest Industry, 2022). The forest industry was never a net producer of emissions. On the contrary, it plays a central role in the government's climate policy as a part of the LULUCF sector due to the forests' ability to store carbon. However, the emissions sector as a whole, the LULUCF, became a net emitter for the first time in 2021. A major factor in this was seen to be in the forests' weakened ability to store carbon caused by changes in the climate and forest management. This raised questions about the forest management's ability to cope with its task. For more information about using wood as a biofuel for energy in Finland, see the introduction to the price of wood-biofuels for electricity production (page 44).

During the observed time period, the volume index of the output of the forest industry increased in total by 17.25 units and decreased by 19.18 units. The most notable increase was that of 9.47 units in 2021 and decrease of 10.45 units in 2020.

During the NCP's government, the forest industry output was in a state of slow decline. This continued all the way to 2015, the start of the CP's coalition's term. During the course of 5 years, the volume of output shrank by 4.68 units. The output grew moderately to 103.63 in 2017 by 3.63 units. In 2018, the growth was greater with about as much progress made in one year as was made in the last two. As the SDP's term began, the volume of output shifted into a decline reaching 93.28 units in 2020, a record low in the observed time period. In 2021 the volume grew again to 102.75, close to the 2019 volume.

3) X: Citizens' Opinion on the Concern of Climate Change (%, Very Major + Major vs. Cannot Say + Minor + Very Minor)



Y: Finnish GHG emissions incl. LULUCF ($ktCO_2e$)

	x	y		x	y
2011	18+36	42 581	2017	31+44	44 061
2012	21+38	35 271	2018	55+34	54 204
2013	21+36	42 488	2019	41+34	46 063
2014	25+38	37 815	2020	40+33	38 709
2015	30+42	38 365	2021	34+34	48 343
2016	26+45	44 475			

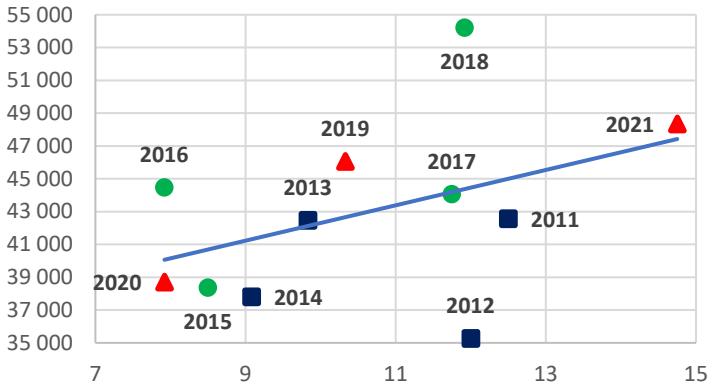
Regression Coefficient: 0.618 | P-Value: 1.489

Each year, the National Defense Communication Planning Board working under Finland's Ministry of Defense publishes results of a poll which aims to measure the prevalent general attitude of the Finnish citizens concerning the possible and topical future risk to their safety including climate change. As the most central unit of a liberal democracy, the opinion of an average citizen is of great importance to the parties in the governing coalition who wish to get re-elected into the government. The poll makes it possible to compare climate change as a perceived threat with other generally worry inducing phenomena, such as epidemics, migration crises, and terrorism. A citizen can be concerned about multiple things simultaneously, which is why this method is effective mainly in certain situations. For example, in parliamentary elections parties rally support by offering to bring relief to issues which they specialize in. The priorities of the candidates with the most votes can give an indication of the changes that the majority of people want to see in their surroundings.

During the observed time period, the citizens' concern on the implications of climate change increased in total by 38% and decreased by 22%. The strongest increase and the greatest decrease were of an equal amount: 14%. They occurred in consecutive years, the increase in 2018 from 75% to 89% and the similar decrease in 2019.

The graph shows that people's concerns on the risks of climate change have increased relatively steadily from 2011 to 2018 with the portion of the citizens being concerned or very concerned changing from 54% to 89%. After this the rate began to slowly decline to 68% in 2021. The biggest changes happened in and right after 2018, the former being an increase and the latter a decrease of 14%, an equal amount. This means that the concern on climate change surged before the 2019 parliamentary elections and likely calmed down after.

4) X: Price of Coal for Electricity Production (EUR/MWh)



Y: Finnish GHG emissions incl. LULUCF (ktCO2e)

	x	y		x	y
2011	12.5	42 581	2017	11.75	44 061
2012	12	35 271	2018	11.92	54 204
2013	9.83	42 488	2019	10.33	46 063
2014	9.08	37 815	2020	7.92	38 709
2015	8.5	38 365	2021	14.92	48 343
2016	7.92	44 475			

Regression Coefficient: 0.435 | P-Value: 1.469

Coal is one of the most emissions intensive resources in energy production (Ritchie, Rosado & Roser, 2022). Coal power plants emit around a kilogram of CO^2e for each MWh generated (Andresen, Corradi, Gibon, Lajoie, Staffel, & Tranberg, 2019). The Finnish government codified the phase out of coal from energy generation into law in 2019. It was the earliest phase out date for any fossil fuel use in the country (Finnish Government, 2019). The time scale used in this thesis, 2011–2021, makes it possible to observe the fall of coal starting from the time when the resource was still relatively popular. In 2011, the use of coal accounted for 10.4% of Finland's energy consumption while in 2021 the number was 6.2% (OSF, 2023).

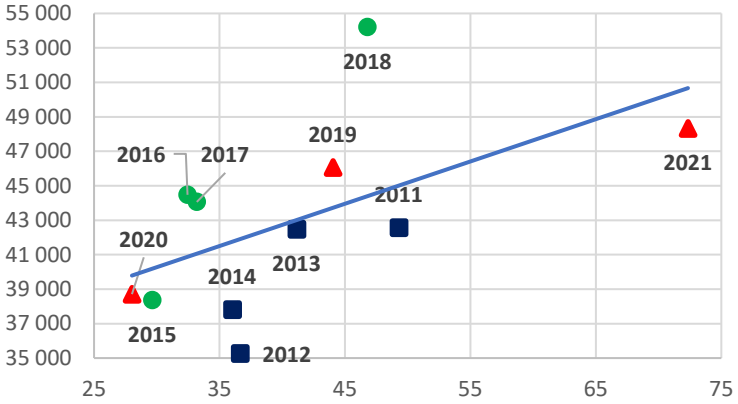
The advantage of coal-fired power is in its affordability and the ability to function when needed. This poses a challenge to its alternatives such as wind power and biofuels. In pre-pandemic times of 2019, the price of coal was €10.33 while that of wood-biofuels was around €21 (see variable 9, page 44).

Most of the cost of coal is formed by the excise tax and the added value tax. On average, the excise tax comprised 59% of the price excluding VAT in 2011, 76% in 2016 and 68% in 2021 (OSF, 2023).

During the observed period, the price of coal increased in total by €10.83 per MWh and decreased by €8.58 per MWh. The most significant increase was €6.83 per MWh in 2021, accounting for most of the growth while the fall was much steadier with the greatest decrease being €2.41 per MWh in 2020.

During the NCP's government, the price of coal fell from €12.63 to €9.01 per MWh with the most notable fall happening in 2013. This trend continued under the CP's government. In 2017, the price of coal increased from €7.86 to €11.84 per MWh and stayed nearly unchanged in 2018. After the SDP's coalition was elected to power, the price fell to €7.88 per MWh by 2020, sharply increasing next year to €14.66 or by €6.78 per MWh, the greatest individual amount during the observed time period.

5) X: Nord Pool Day-Ahead Prices of Electric. (FI) (EUR/MWh)



Y: Finnish GHG emissions incl. LULUCF (ktCO2e)

	x	y		x	y
2011	49.30	42 581	2017	33.19	44 061
2012	36.64	35 271	2018	46.80	54 204
2013	41.16	42 488	2019	44.04	46 063
2014	36.02	37 815	2020	28.02	38 709
2015	29.66	38 365	2021	72.34	48 343
2016	32.45	44 475			

Regression Coefficient: 0.567 | P-Value: 1.479

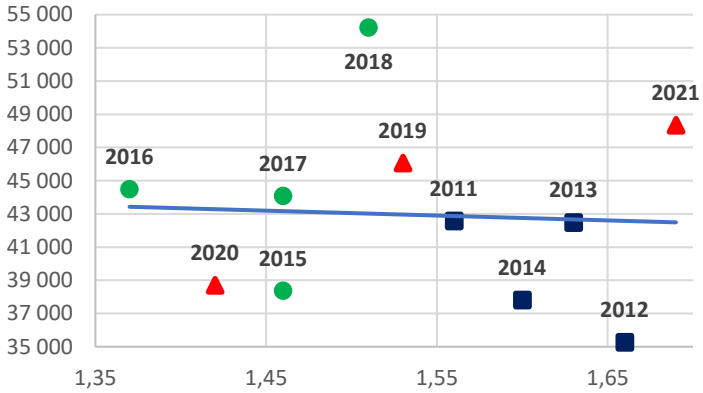
Electricity based solutions are not only a vital part of keeping a nation operational but have additionally become more popular in Finland with the nation shifting away from the use of fossil fuels (Raski, 2023). This is not entirely unproblematic, as the strong increase in demand has also raised dependency, posing a risk to the security of supply. A strong surge in demand or an unexpected drop in availability can threaten the increasingly electrified societal functions (IEA, 2023). A wider range of users may experience energy shortages than before due to production not being able to keep up with demand (IEA, 2022). Freezing temperatures in winter as well as natural disasters and cyber-attacks may also pose a challenge to the energy providers (Korhonen, 2016). In an unexpected situation, fossil fuels may need to be used to fulfill an otherwise overwhelming demand, undermining climate goals (European Environment Agency, 2022).

Electricity prices are important to the government because they affect the wellbeing of the private sector and the citizens as well as set conditions for the state's climate ambitions. Energy independence and security of supply are also affected, as a low market price can incentivize a country to increase dependency on imported electricity.

The Nord Pool day-ahead prices for electricity in Finland increased in total by €65.98 per MWh and decreased by €42.94 per MWh in the observed time period. The strongest increase occurred in 2021 and was €44.32. The steepest decrease, €16.02 per MWh, took place only a year before in 2020.

During the NCP's coalition's term, the day-ahead price of electricity mostly decreased, twitching towards positive development every second year forming a zigzag pattern. The negative development continued to the CP's term in 2015. The following year the trend changed, and the price started to slowly grow until the end of the term in 2018. In 2019 and 2020, the price fell again. In 2021, the price took an exceptional turn and sprung up to a record high number of €72.34.

6) X: Average of the Consumer Price for E10 Gasoline (EUR/l)



Y: Finnish GHG emissions incl. LULUCF ($ktCO_2e$)

	x	y		x	y
2011	1.56	42 581	2017	1.46	44 061
2012	1.66	35 271	2018	1.51	54 204
2013	1.63	42 488	2019	1.53	46 063
2014	1.60	37 815	2020	1.42	38 709
2015	1.46	38 365	2021	1.69	48 363
2016	1.37	44 475			

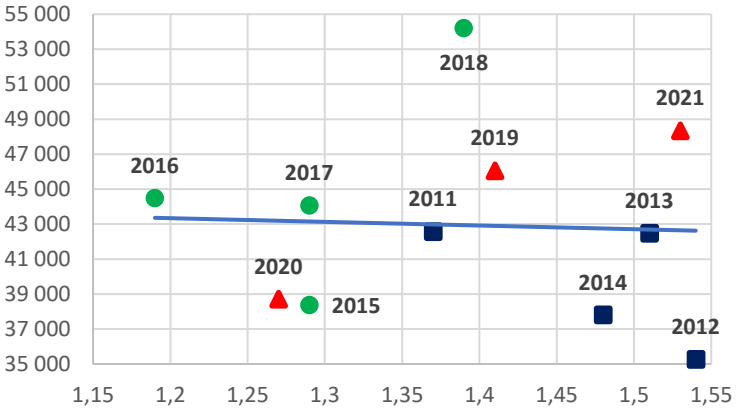
Regression Coefficient: -0.055 | P-Value: 1.466

Gasoline, a fuel mainly used in vehicle engines, is the most popular form of fossil fuel for cars in Finland. In 2011, 68% of all cars in the country used it, whereas in 2021, the number was 60%. Of passenger cars only, 79% ran on gasoline in 2011, compared to 71% in 2021 (OSF, 2023). Its availability is crucial for most of society, as cars are responsible for most of the work and leisure commutes as well as much of the land transportation of various goods. Road traffic is the greatest single source of GHG in Finland (Finnish Environment Institute, 2023). Oil based fuels are ideal for transportation due to being twice as energy dense as coal and can be compactly stored within the tank of an internal combustion engine (ICE) thanks to their liquid form (Gross, 2020).

The average consumer price of E10 gasoline increased in total by €0.53 per liter since 2011, much of which was a result of development in 2021 when the price rose by 27 cents. The price decreased in total by €0.40 per liter, the steepest decline being 14 cents in 2015. Unlike the strongest increase, the strongest decrease took place during a four-year lasting period of decline from €1.66 per liter in 2012 to €1.37 per liter in 2016.

After a brief increase from €1.56 to €1.66 in 2012, the price of the E10 began to fall for four years until reaching €1.37 in 2016. In 2017 and 2018, the price rose briefly to €1.51 just to fall again to €1.42 in 2020. The most dramatic change happened after this, as the price suddenly rose by €0.27 to €1.69 in 2021.

7) X: Average of the Consumer Price for Diesel (EUR/l)



Y: Finnish GHG emissions incl. LULUCF (ktCO₂e)

	x	y		x	y
2011	1.37	42 581	2017	1.29	44 061
2012	1.54	35 271	2018	1.39	54 204
2013	1.51	42 488	2019	1.41	46 063
2014	1.48	37 815	2020	1.27	38 709
2015	1.29	38 365	2021	1.53	48 343
2016	1.19	44 475			

Regression Coefficient: -0.046 | P-Value: 1.466

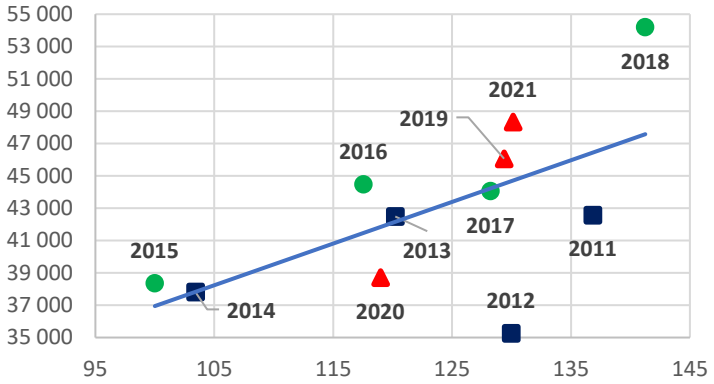
Also applying to the use of gasoline, most emissions in Finland were produced by road traffic, 26.8% in 2021, during the observed time period (Finnish Environment Institute, 2023). In 2021, only around fourth of all passenger cars ran on diesel in Finland. Instead, most vans, trucks, and buses, 97%, used diesel, making it an important fuel for vehicles specialized in transporting a large number of people or goods at a time (OSF, 2023). Diesel engines have proven to be difficult to phase out from freight transport. The most prolific rival, the electric engine, struggles to compete. This is because the weight of its battery scales significantly upwards with the size of the vehicle. This means that e.g., electric trucks are currently not able to carry as much cargo as ones running on fossil fuels (Gross, 2020 p. 6).

In 2021, 98% of the world's sea traffic was propelled by diesel engines, and the rest mostly on liquid natural gas. The Finnish company Wärtsilä is a global exporter of diesel ship engines (Lassila, 2021). According to the company, their market share on medium-speed main engines for ships in 2022 was 44% and for auxiliary vessels 12% (Wärtsilä, 2023). Because of this, the price of diesel is not only a cost of an important fuel, but it also influences the future of a major domestic enterprise.

The average consumer price for diesel grew in total by €0.65 per liter and decreased by €0.49 per liter during the observed period. Following a stark decrease of 14 cents in 2020, the highest price increase of 26 cents occurred in 2021. The greatest decrease took place in 2015 and was a part of a four-year negative development from €1.54 per liter in 2012 to €1.19 per liter in 2016.

The annual average price of diesel was €1.37 in 2011. The following year, it rose to the highest point seen in the analysis, €1.54. It then started to decline in 2013 being €1.48 at the end of NCP's coalition's term. The decline continued to the CP's coalition's term until 2016, when the price was €1.19. After this, the price increased until reaching the average value of €1.41 in 2019. In 2020, the average price fell to €1.27 and then increased in 2021 to €1.53, almost reaching the 2012 record value.

8) X: Volume Index of New Housing Construction (#, 2015=100)



Y: Finnish GHG emissions incl. LULUCF ($ktCO_2e$)

	x	y		x	y
2011	136.83	42 581	2017	128.25	44 061
2012	129.96	35 271	2018	141.25	54 204
2013	120.22	42 488	2019	129.37	46 063
2014	103.41	37 815	2020	118.97	38 709
2015	100	38 365	2021	130.13	48 343
2016	117.56	44 475			

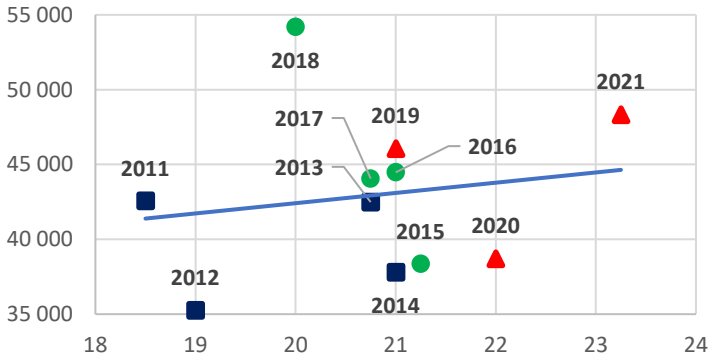
Regression Coefficient: 0.612 | P-Value: 1.507

According to the Ministry of the Environment (2019 p. 5), around 30% of Finland's emissions are produced by construction, heating, and electrification of buildings. A diploma thesis published at the University of Tampere lists the main sources of GHG emitted by group housing by using the "index building" (indeksitalo) as an example (Tikkanen, 2020 p. 50–51). Indeksitalo is classified as an apartment building with a floor area of 10,000m^2 and 40 apartments, in addition to other features (Kiinteistöliitto, 2023). 57.6% of the emissions from such a building are produced by water management and energy consumption. The rest are produced during construction. 47.2% of those are caused using concrete as a building material (Tikkanen, 2020 p. 50–51) of which the main component is cement. Cement is used in most buildings making it a significant source of emissions in a country where the share of apartment buildings in total housing stock was 47% in 2021 (OSF, 2023). As one of its 9 climate goals, the government pledged to reduce emissions of construction by encouraging the use of more sustainable materials and the adoption of more energy efficient designs (Finnish government, 2019 p. 41).

The volume index of new housing construction increased in total by 52.41 units and decreased by 59.11. The strongest increase was 17.56 units in 2016 and the strongest decrease 16.81 units in 2014.

The housing construction developed in four waves in 2011–2021: two rising and two descending. At first, in 2011, the development was descending. With the 2011 index of 136.83, the volume of construction was higher than it would be in the following six years. The decline stopped on the parliamentary elections year at 100, the lowest observed value. The next year in 2016, housing construction started to quickly recover. This first incline peaked in 2018, at the index of 141.25, as did also the GHG emissions. This was followed by a second decline. It was more moderate in comparison to the first one, stopping at 118.97 in 2020. After this, the second incline was cut short by the ending of the observation at 130.13. While looking at the linear development of the index one can observe that especially during the terms of CP's and SDP's coalitions the changes in GHG emissions followed closely alongside the rises and falls of the housing construction.

9) X: Price of Wood-Biofuels for Elec. Production (EUR/MWh)



Y: Finnish GHG emissions incl. LULUCF ($ktCO_2e$)

	x	y		x	y
2011	18.5	42 581	2017	20.75	44 061
2012	19	35 271	2018	20	54 204
2013	20.75	42 488	2019	21	46 063
2014	21	37 815	2020	22	38 709
2015	21.25	38 365	2021	23.25	48 343
2016	21	44 475			

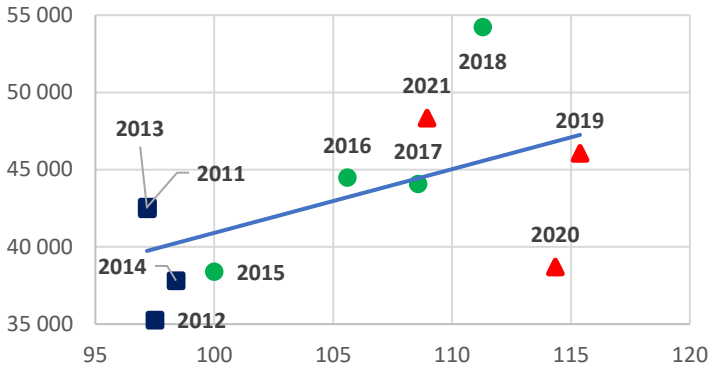
Regression Coefficient: 0.164 | P-Value: 1.472

Wood-based biofuels are the most used energy source in Finland. In 2011, 22.7% of energy consumption was covered by the resource. At this time, wood fuels were still overshadowed by oil (23.8%). In 2021, biofuels took the lead with 29.6% usage share (OSF, 2023). In 2019, 74% of renewable energy was wood based, covering more than half of all trees harvested that year. Trees are not grown separately for energy use but are instead a by-product of logging, forest management and forest industry processes (Bioenergia, 2023). Biofuels have had a major role in reducing the country's GHG emissions since the signing of the Paris Agreement. Due to forestry being a major actor in Finland's economy, the expertise to develop the sector towards fuel production has existed early. Biofuels had a central role especially during the 2015–2018 Centre Party's government during which they were seen as the key to both achieving carbon neutrality, as well as to stronger economic growth (Finnish Government, 2018).

The price of wooden fuels for electricity production mostly grew during the observed period of time. It grew in total by €6 per MWh and decreased by €1.25 per MWh. The most notable increase was that of €1.75 in 2013. The greatest decrease of €0.75 took place in 2018, accounting for 60% of the total decline over the entire period.

The price of wooden fuels was at its lowest in the analysis in 2011, €18.5 per MWh. Starting from 2012, the price rose for four years until 2015 when it was 21.25. From there, it decreased at a relatively slow pace getting only as low as €20 per MWh in 2018. The trend turned around and stayed unchanged until the last year of 2021 when the price of wooden fuels was €23.25 per MWh.

10) X: Volume Index of the Chemical Industry (#, 2015=100)



Y: Finnish GHG emissions incl. LULUCF (ktCO₂e)

	x	y		x	y
2011	97.18	42 581	2017	108.58	44 061
2012	97.5	35 271	2018	111.29	54 204
2013	97.17	42 488	2019	115.38	46 063
2014	98.39	37 815	2020	114.34	38 709
2015	100	38 365	2021	108.94	48 343
2016	105.6	44 475			

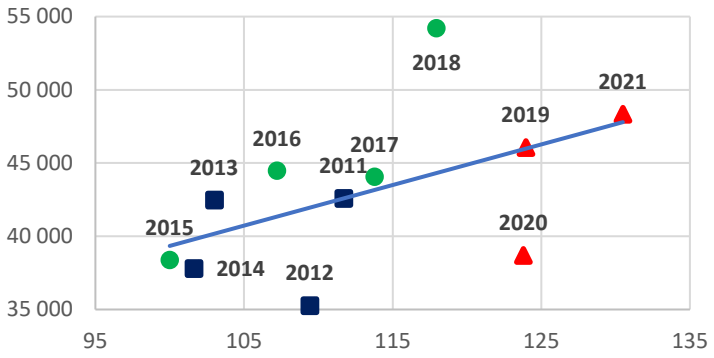
Regression Coefficient: 0.544 | P-Value: 1.501

The chemical industry comprises of a portion of private companies which work with chemical compounds to provide other industries with raw materials and refined products in the form of these compounds (Cefic, 2020). As the third largest industry in 2021, it covered around 18% of Finland's net value of sold production (OSF, 2023). Industry is contributing to climate change mitigation by developing its skills, products, and solutions in a more sustainable direction. It does this by e.g., switching the raw materials it uses to low-emission alternatives. Some ways of doing this include making more efficient use of bioeconomy side products, improving the circular economy practices, and developing products and solutions based on hydrogen economy (Ministry of Economic Affairs and Employment, 2020 p. 53–54). According to Statistics Finland (OSF, 2023), the chemical industry produced 1.2 million tons of CO_2e in 2021, or around 2.5% of gross emissions. The Chemical Industry Federation of Finland (2023) claimed the emissions to be 4.7 million tons of CO_2e.

The volume index of the output of the chemical industry increased in total by 23.93 units and decreased by 1.37 units. The strongest increase was 5.6 units in 2016 and the strongest decrease 1.04 units in 2020.

During the NCP's government, there was not much change in the volume of output in the chemical industry. The volume index at this time was barely over 97 units. This changed when the CP's coalition took office: The volume index of output rose during the course of five years from 2015 to 2019 to 115.38 by 16.99 units. After this, the trend turned negative, first with a slight nudge backwards to 114.34 units in 2020 and then to 108.94 units in 2021.

11) X: Volume Index of the Metal Industry (#, 2015=100)



Y: Finnish GHG emissions incl. LULUCF (ktCO2e)

	x	y		x	y
2011	111.71	42 581	2017	113.79	44 061
2012	109.43	35 271	2018	117.95	54 204
2013	103	42 488	2019	123.95	46 063
2014	101.63	37 815	2020	123.79	38 709
2015	100	38 365	2021	130.49	48 343
2016	107.22	44 475			

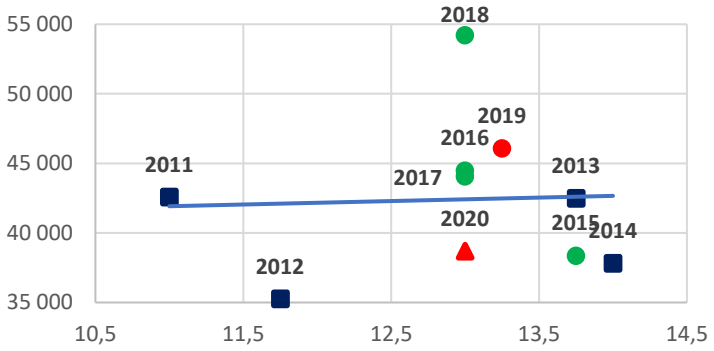
Regression Coefficient: 0.515 | P-Value: 1.504

The metal industry is the largest of the industries in Finland with a 42% share of the value of sold production (OSF, 2023). The companies belonging to the industry provide their customers with machinery, metals, and vehicles (Takoma, 2022). The metal industry emitted 2,094 kt of CO_2e in 2021. These are the most emissions emitted by any of the three biggest Finnish industries (OSF, 2023). According to the business and labor market policy influencing organization Technology Industries of Finland, green transition on fields such as the metal industry is performed by electrifying existing processes and machinery, improving energy and material efficiency, and adopting new circular economy as well as digital solutions. This would ultimately increase the need for more power generation capacity in the future (Soimakallio & Teknologiateollisuus ry, 2020 p. 5, 11).

The volume index of the output of the metal industry increased in total by 30.61 units and decreased by 11.87 units. The most notable increase was that of 7.22 units in 2016 and decrease of 6.43 units in 2013.

The Finnish metal industry has both suffered from a long-lasting decline and enjoyed a long-lasting growth. First, the decline, from the perspective of the 2011–2021 timeframe, took place between 2011 and 2015. The production volume fell by 11.7 units from 111.71 to 100. After this, there was only growth with a momentary stagnation in 2020. By 2021, the volume had increased by 30.49 units, almost triple the amount it had declined between 2011 and 2015. The changes in GHG emissions visibly correlate with this development, with some individual outlier cases in 2012, 2018, and 2020, one for each government. Even in this case, the outliers locate somewhat in parallel with and in close proximity to the general trend and the regression line.

12) X: Price of Milled Peat in Electricity Production (EUR/MWh)



Y: Finnish GHG emissions incl. LULUCF (ktCO₂e)

	x	y		x	y
2011	11	42 581	2017	13	44 061
2012	11.75	35 271	2018	13	54 204
2013	13.75	42 488	2019	13.25	46 063
2014	14	37 815	2020	13	38 709
2015	13.75	38 365	2021	-	48 343
2016	13	44 475			

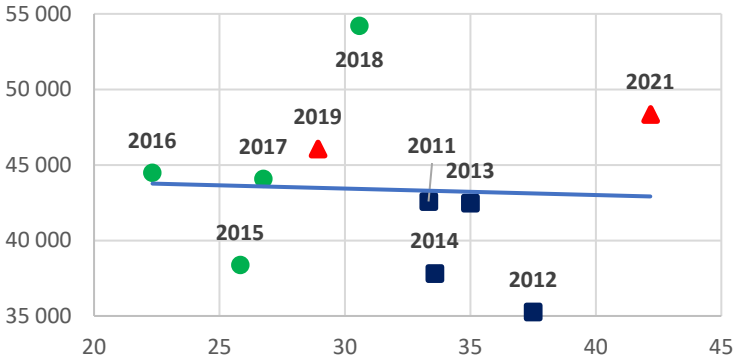
Regression Coefficient: 0.043 | P-Value: 1.470

Around half of peat's global consumption consists of its use as an energy source. Around half of this energy use takes place in Finland. In 2017, 10% of Finnish GHG emissions was produced by peat burning. The district heating of the northern regions is especially dependent on the resource. Despite emitting a similar amount of GHG per unit as coal, the Finnish government maintains a constant reserve of peat to maintain the country's resistance against energy shortages. This domesticity makes peat special to Finland in comparison to other fossil fuels. Due to Finland's most recent climate goals, there is demand to almost, if not fully, phase out peat by replacing it with other, similarly domestic energy sources such as renewables like biomass, wind, solar, and geothermal energy (Auvinen, Heinonen, Johansson, et al., 2020).

The price of milled peat used for electricity production increased in total by €3.25 per MWh and decreased by €1.25 per MWh. The strongest increase in the price, 75 cents, took place in 2012 while the greatest decrease of an equal amount happened in 2016. In 2017, 2018, and 2020 there was no change in the price, which during all these years was €13 per MWh. Data for 2021 not available from Statistics Finland.

The price of milled peat was on the rise for the entirety of NCP's coalition's term in office, from €11 to €14 per MWh. During the CP's government, the price declined first to €13.75 in 2015 and then to €13 per MWh in 2016. This became the established price for the rest of the 2011–2020 time period with the exception of 2019 when the average price was momentarily €.25 higher.

13) X: Price of Natural Gas in Electricity Production (EUR/MWh)



Y: Finnish GHG emissions incl. LULUCF (ktCO2e)

	x	y		x	y
2011	33.33	42 581	2017	26.75	44 061
2012	37.50	35 271	2018	30.58	54 204
2013	35	42 488	2019	28.92	46 063
2014	33.58	37 815	2020	(35.55) *	38 709
2015	25.83	38 365	2021	42.17	48 343
2016	22.33	44 475			

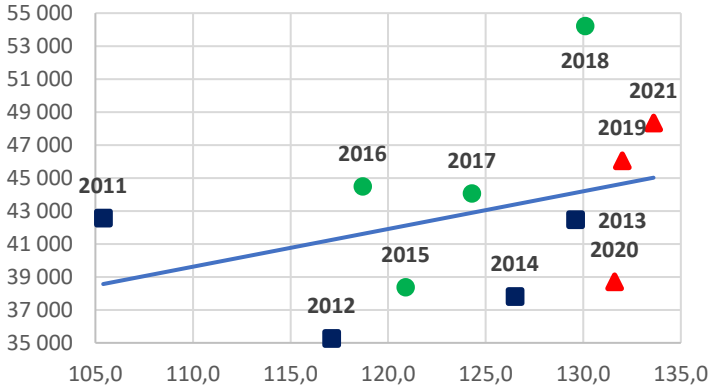
Regression Coefficient: -0.046 (-0.097) | P-Value: 1.476 (1.476) *

Natural gas, a fossil fuel, mostly consists of methane. It is used for energy production and sometimes as a fuel for vehicles (Britannica, 2023). On average, burning natural gas emits around 440 kg of CO_2 per MWh, less than half when compared to coal (EIA, 2022). It is imported to Finland by ships in a liquid form (LNG) (Energy Authority, 2023). In 2021, 92% of natural gas in Finland was imported from Russia (OSF, 2021). Russia stopped exporting gas to Finland at the time of the intensification of its war of aggression against Ukraine in 2022 (Guardian staff with agencies, 2022). Major companies have announced to replace their natural gas use in the future with renewable alternatives (Pesu, 2022). In 2021, 5.5% of Finland's energy consumption was covered by the resource (OSF, 2023). In 2022, there were no plans to expand the existing gas grid. Instead, the state-owned company operating the Finnish grid Gasgrid Finland Oy joined three co-operation projects with the goal to create a nation-wide hydrogen network to transmit the ideally emissions free future energy source domestically and abroad (Gasgrid, 2022 p. 16, 20).

The price of natural gas in electricity production increased in total by €25.67 per MWh and decreased by €16.83 per MWh. The strongest increase was €13.25 per MWh in 2021 and the strongest decrease €7.75 per MWh in 2015.

From 2011 to 2013, the price of natural gas rose by €4.17 per MWh. After this, the price began a long-lasting decline that ended in 2016. The price changed from €37.50 in 2012 to €22.33 in 2016, a decline of €15.17. After this, the price increased for the rest of the CP's coalition's term to €30.58. When the SDP's coalition took office, the price declined by a small amount of €1.66. In 2021, the price rose to its highest point in the analysis, €42.17 per MWh. (* Stat.fi lacks data from the year 2020. The space is filled with the average of the data from 2019 and 2021 to present a likely value. The regression coefficient and the p-value written in brackets show the results in which the estimated 2020 value is included. They are not used in the analysis.)

14) X: Producer Price Index for Beef and Veal (#, 2010=100)



Y: Finnish GHG emissions incl. LULUCF ($ktCO_2e$)

	x	y		x	y
2011	105.4	42 581	2017	124.3	44 061
2012	117.1	35 271	2018	130.1	54 204
2013	129.6	42 488	2019	132	46 063
2014	126.5	37 815	2020	131.6	38 709
2015	120.9	38 365	2021	133.6	48 343
2016	118.7	44 475			

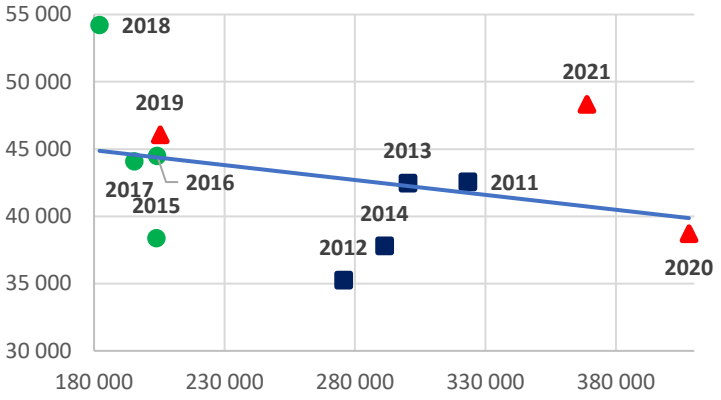
Regression Coefficient: 0.357 | P-Value: 1.508

Livestock farming is the greatest single source of methane emissions. It made up around 48% of Finland's methane emitted into the atmosphere in 2021. Methane emission comprised 8.6% of Finland's GHG emissions in 2011, and 10% in 2021 (OSF, 2023). The emissions caused by cattle are produced in the form of gases which are biogenic. This means that the animals do not release any new emissions into circulation, unlike fossil fuels, which is extracted from the earth (CLEAR Center, 2020). The emissions from livestock, however, increase the amount of GHG simultaneously existing in the atmosphere. Farmers search for ways to reduce emissions through technical means, for example by researching diets for the cows which would make them release less GHG (University of Helsinki, 2019).

The producer price index of beef and veal increased in total by 39.5 units and decreased by 11.3 units. The strongest increase occurred in 2013 when it was 12.5 units. The change in growth from 2011 to 2012 was already quite high, 11.7 units. The strongest decrease happened in 2015 with the price index decreasing by 5.6 units. This was in the middle of a three-year period of decline from 129.6 units in 2013 to 118.7 units in 2016.

The volume of production for meat and veal started out at its lowest rate between 2011–2021, 105.4. It grew to 129.6 by 2013, after which the trend changed into negative for three years. In 2017, the volume of production started to grow again until 2019. The change from 2016 to 2019 was from 118.7 to 132. After this, the growth stagnated with little change in 2020, and a modest increase in 2021 to 133.6.

15) X: Budget of the Ministry of the Environment (€1000)



Y: Finnish GHG emissions incl. LULUCF (ktCO₂e)

	x	y		x	y
2011	323 228	42 581	2017	195 441	44 061
2012	275 638	35 271	2018	182 080	54 204
2013	300 213	42 488	2019	205 263	46 063
2014	291 300	37 815	2020	407 947	38 709
2015	203 964	38 365	2021	368 825	48 343
2016	204 240	44 475			

Regression Coefficient: -0.314 | P-Value: 1.913

This is the budget given by the government to the Ministry of the Environment from the year's state budget. These funds are aimed towards e.g., reducing GHG emissions, protecting wildlife and biodiversity and finding new, more environmentally compatible solutions for construction and maintaining the general quality of living. The Ministry of the Environment deems as its tasks to make Finland carbon neutral, stop biodiversity loss in the country, create economic growth through the green transition, make everyday life sustainable in a way that maintains the high quality of living, and maintain Finland's active role as an advocate of the green transition internationally and within the EU (Ministry of Environment, 2023). The budget not only shows how much the government wishes to invest in the maintenance of the environment and the climate, but also gives an indication about the ministry's quality of performance.

The Ministry's budget increased in total by €250.72 mil. and decreased by €205.12 mil. The strongest increase was €202.68 mil. in 2020 and the strongest decrease €87.336 mil. in 2015.

Apart from the SDP's coalition, each government refrained from altering the budget much once it was established during the first year in the office. During the NCP's government, the budget stayed within the threshold of €291 and €323 million. The CP's coalition started out significantly smaller, €204 million, and at the end of the term was even less, €182 million.

From the graph, it can be observed that the trend of the NCP's government is different from that of the others. Unlike those of the CP and the SDP, the NCP's x and y coordinates suggest a strong positive correlation between the emissions and the ministry's budget. The budget was increased while the emissions grew. During the CP's government, the emissions mostly increased, while the budget was mostly the same. At the beginning of the SDP's coalition's term, the budget was increased only slightly in comparison to the last year but was as much as doubled from €200 to €400 million in the following year of 2020. In 2021, the budget was reduced by around €30 million.

6.1. THE VARIABLES AS LINE GRAPHS

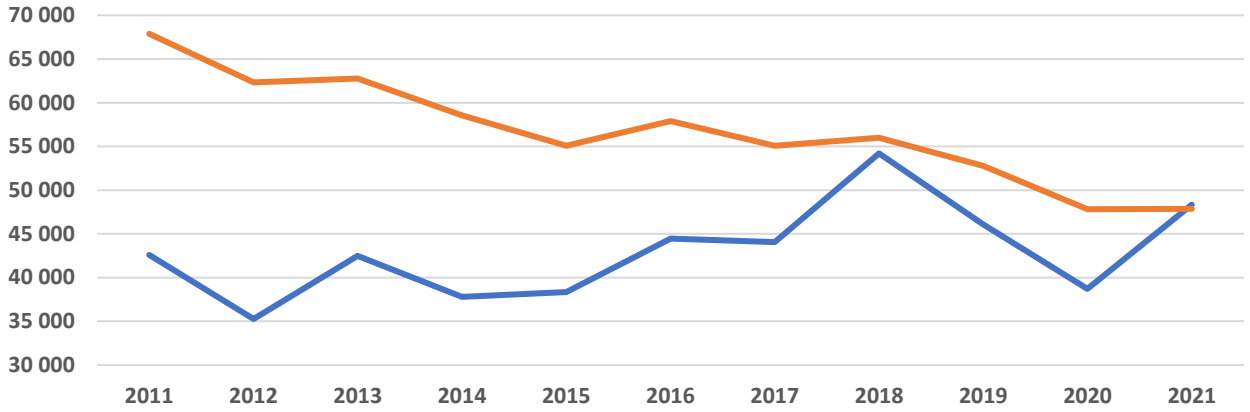


Image 3 (above) – The dependent variable, the Finnish GHG emissions ($ktCO_2e$) from 2 perspectives.

- Upper line (orange): Finnish GHG emissions EXCLUDING emissions and removals of the LULUCF sector ($ktCO_2e$)
- Lower line (blue): Finnish GHG emissions INCLUDING emissions and removals of the LULUCF sector ($ktCO_2e$)

NOTE: To help compare the changes in the dependent and the independent variables, a dashed line is presented in the background of each graph (images 4–18). It represents the dependent variable; the development of the emissions including the contribution of the LULUCF sector. The values of the independent variable are presented on the left side of the graph, while those of the dependent variable are presented on the right side.

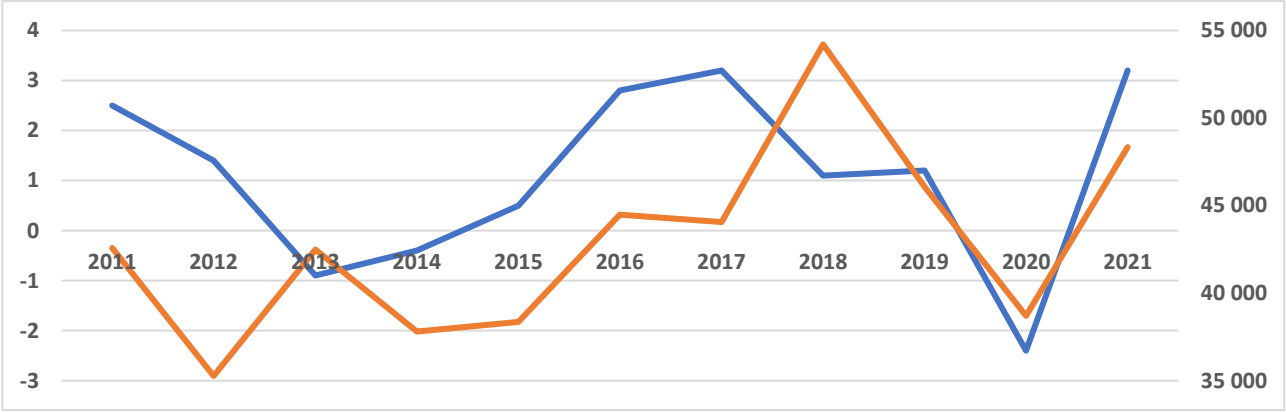


Image 4 – Independent variable #1: Annual Change in GDP Volume (%)

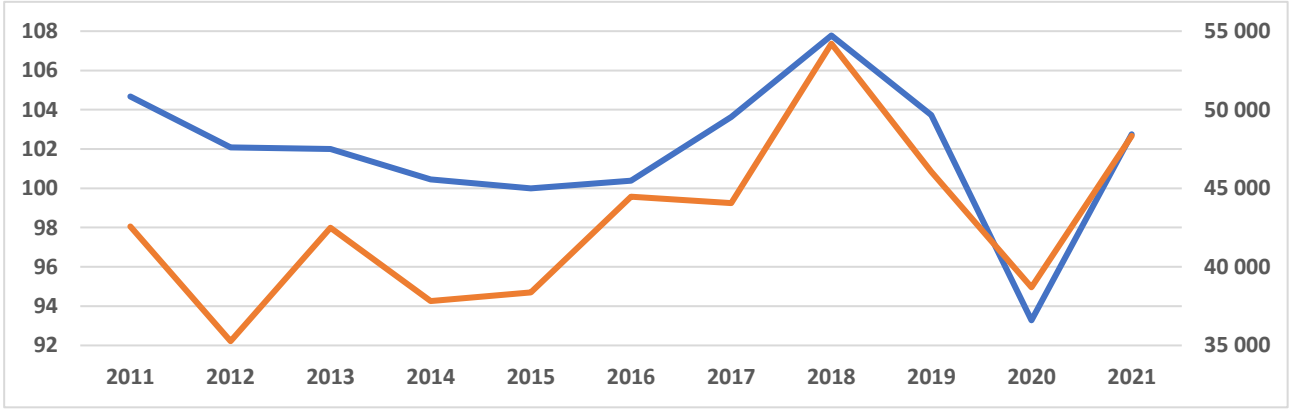


Image 5 – Independent variable #2: Volume Index of Forest Industry Output (#, 2015=100)

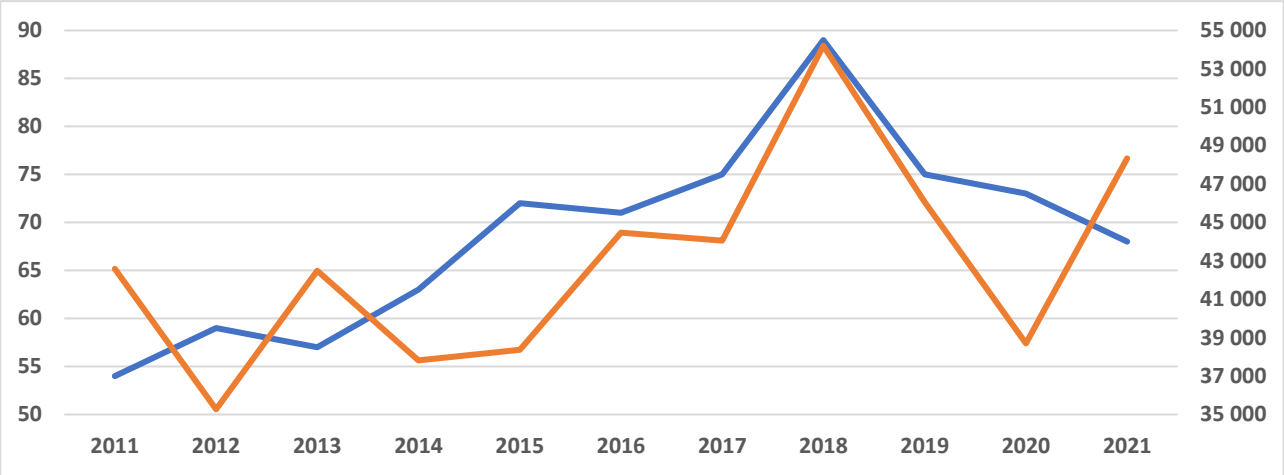


Image 6 (above) – Independent variable #3: Citizens' Opinion on the Concern of Climate Change Image (%)

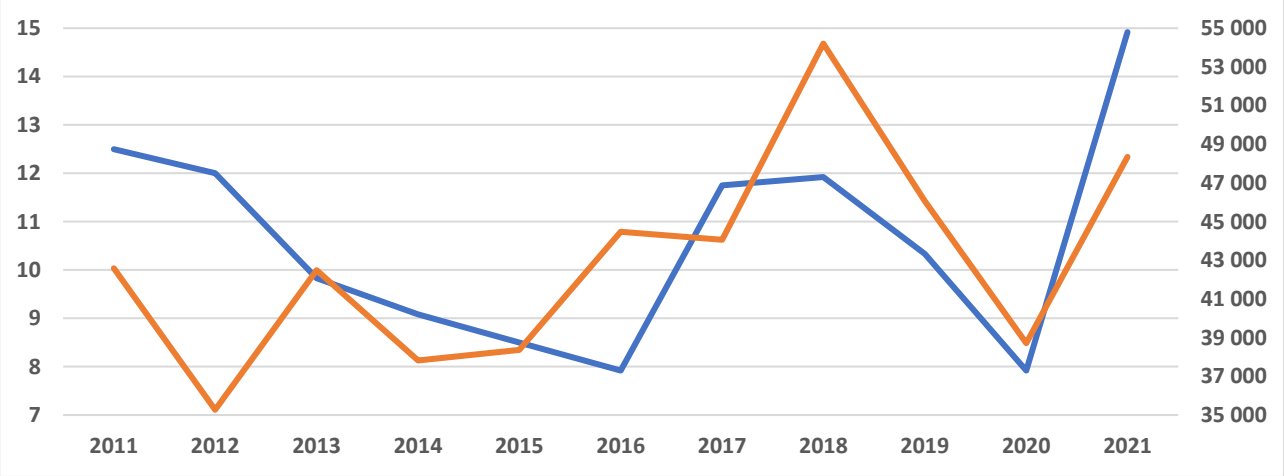


Image 7 – Independent variable #4: Price of Coal for Electricity Production (EUR/MWh)

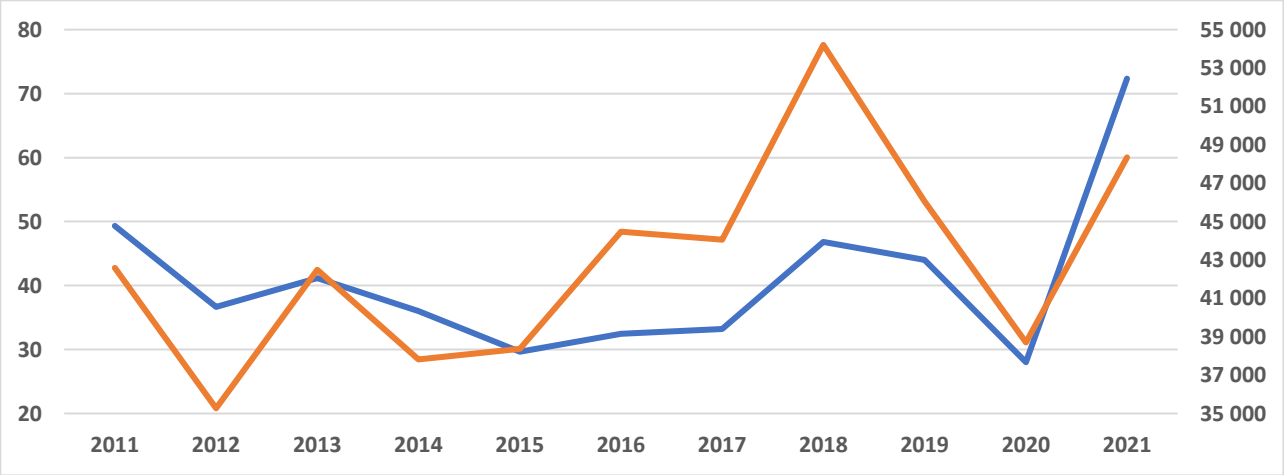


Image 8 – Independent variable #5: Nord Pool Day-Ahead Prices of Electric. (FI) (EUR/MWh)

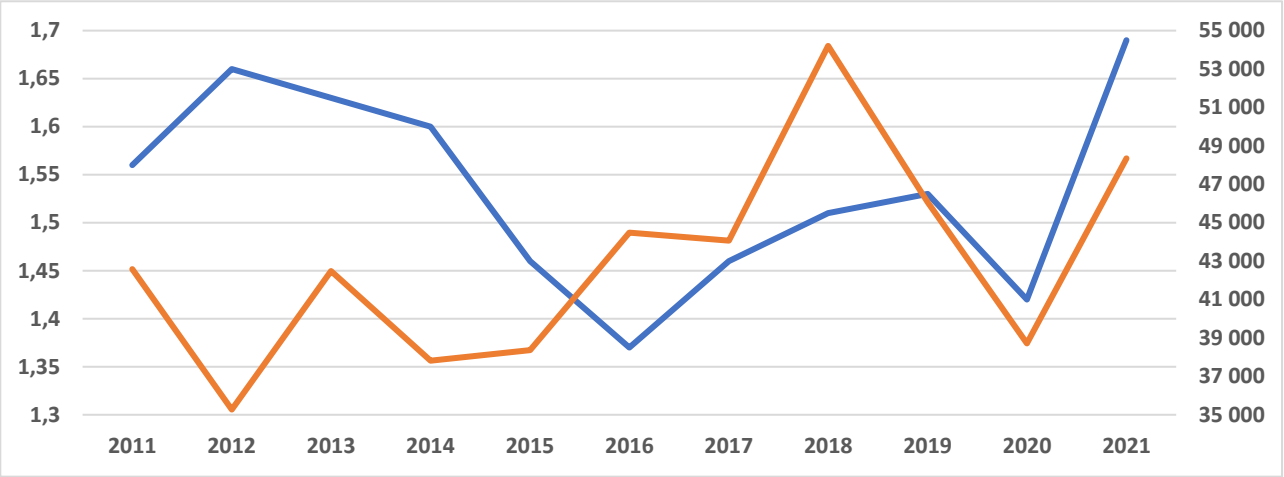


Image 9 (above) – Independent variable #6: Average of the Consumer Price for E10 Gasoline (EUR/l)

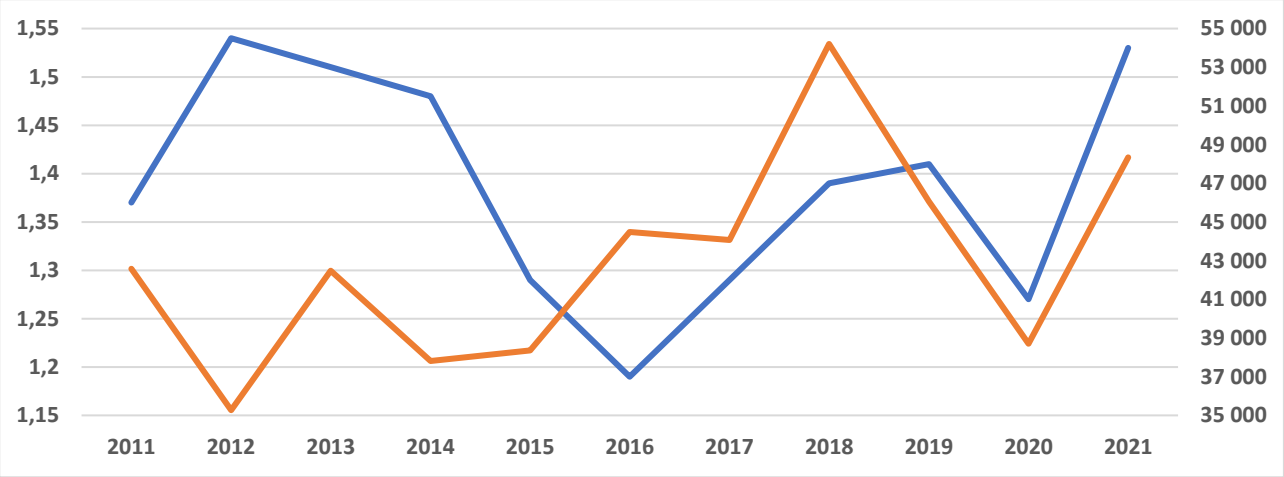


Image 10 – Independent variable #7: Average of the Consumer Price for Diesel (EUR/l)

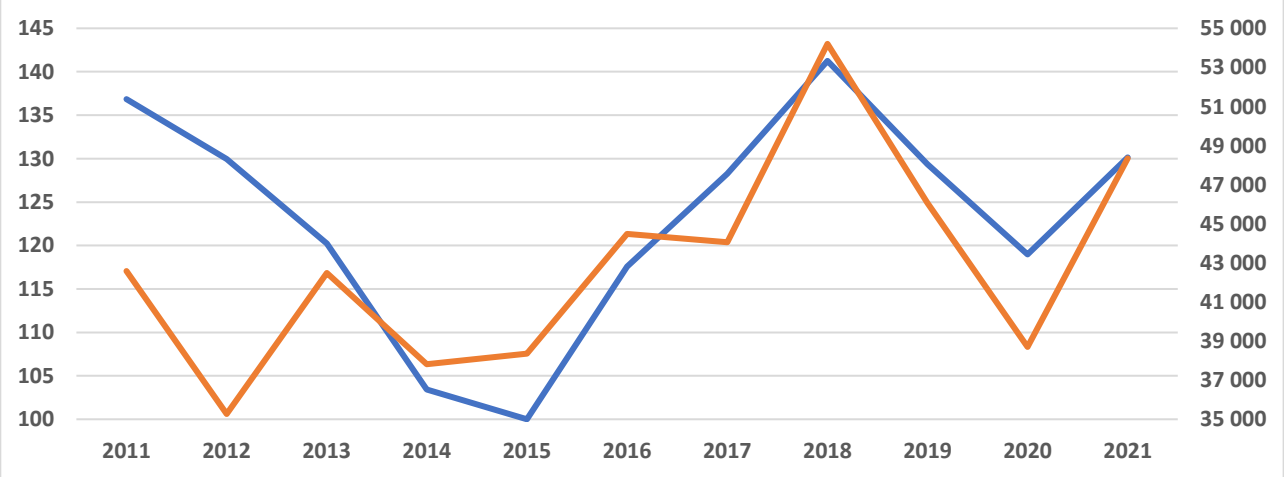


Image 11 – Independent variable #8: Volume Index of New Housing Construction (#, 2015=100)

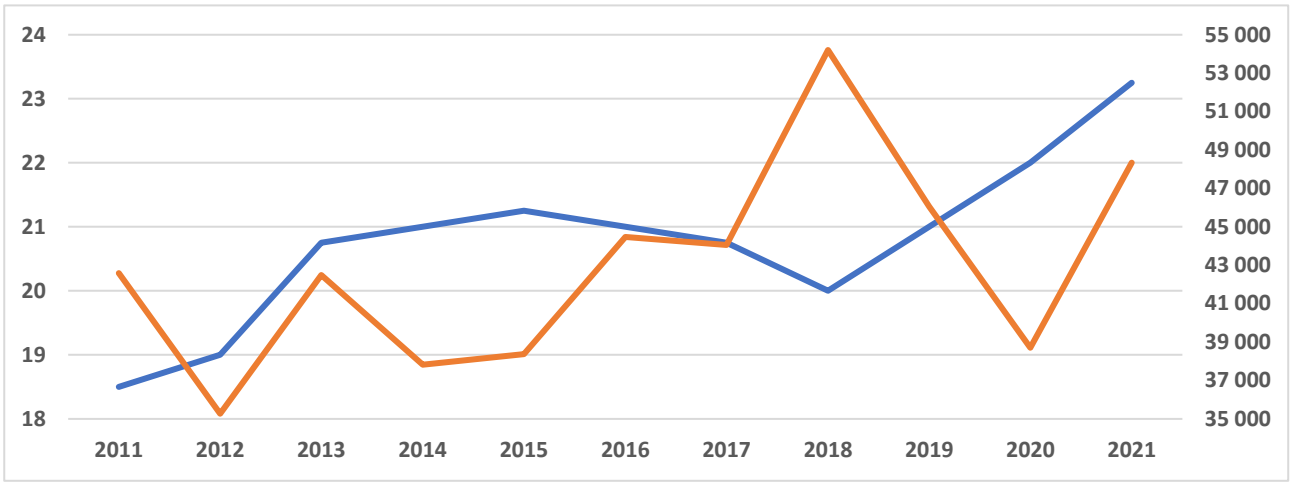


Image 12 (above) – Independent variable #9: Price of Wooden Fuels for Electricity Production (EUR/MWh)

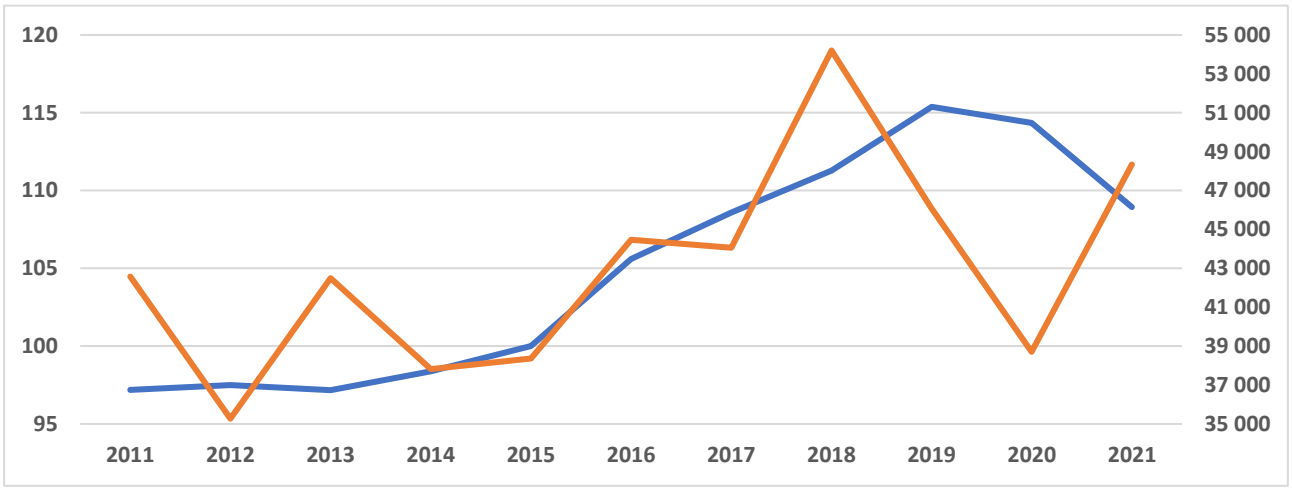


Image 13 – Independent variable #10: Volume Index of the Chemical Industry (#, 2015=100)

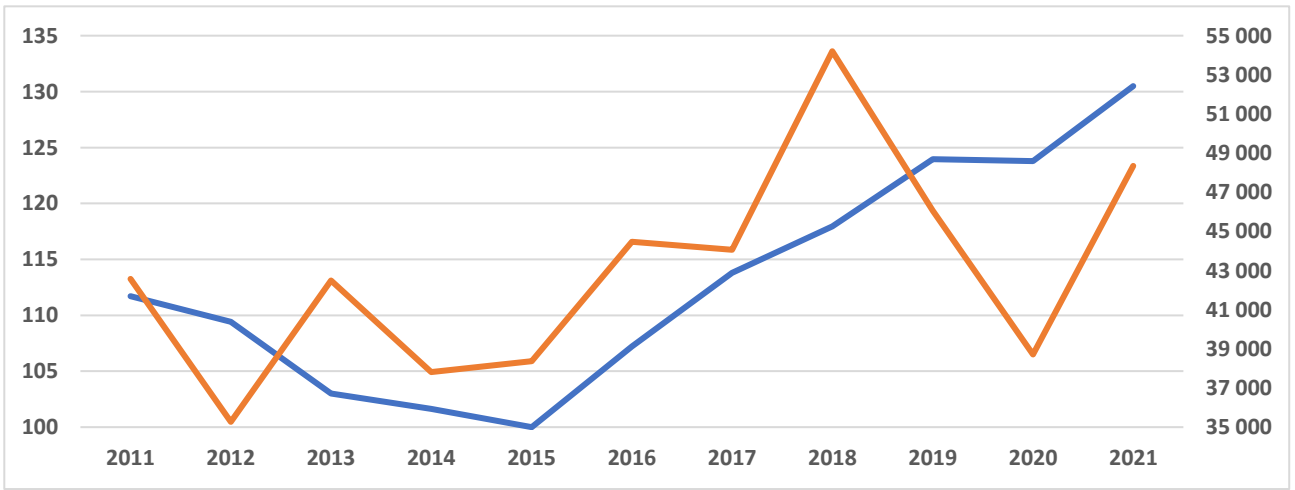


Image 14 – Independent variable #11: Volume Index of the Metal Industry (#, 2015=100)

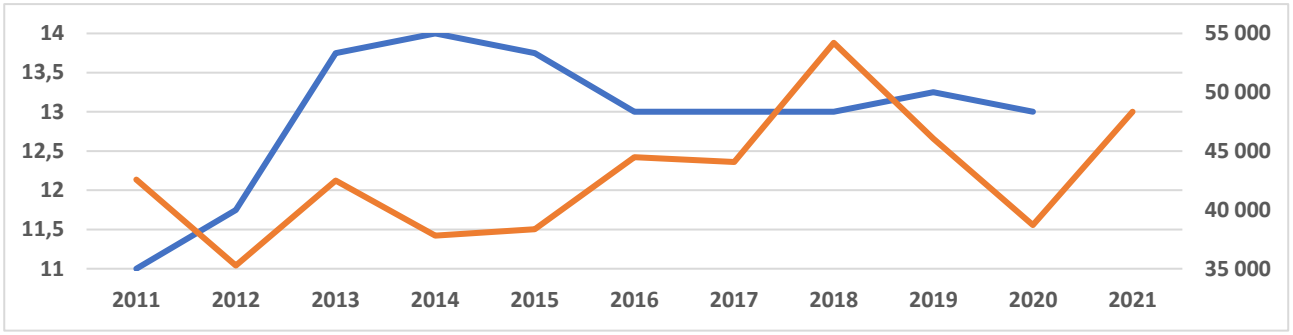


Image 15 (above) – Independent variable #12: Price of Milled Peat in Electricity Production (EUR/MWh)

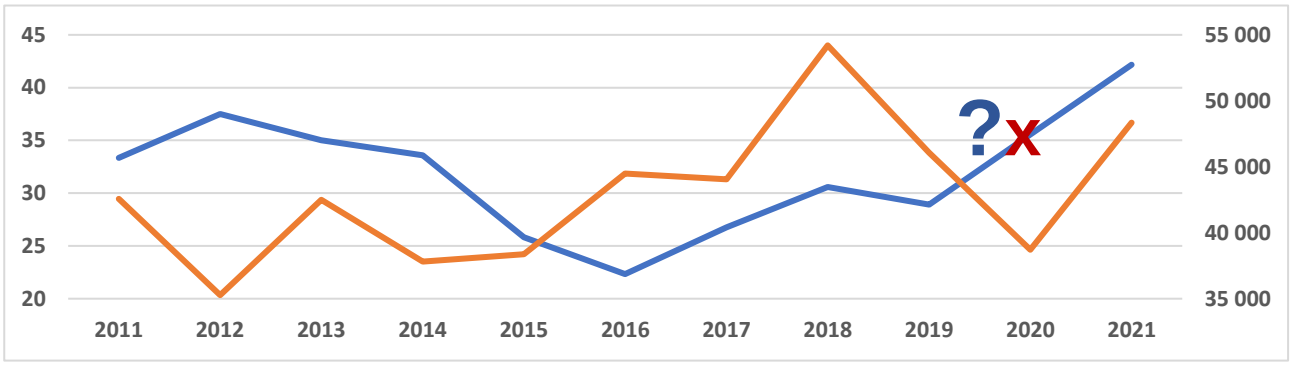


Image 16 – Independent variable #13: Price of Natural Gas in Electricity Production (EUR/MWh)

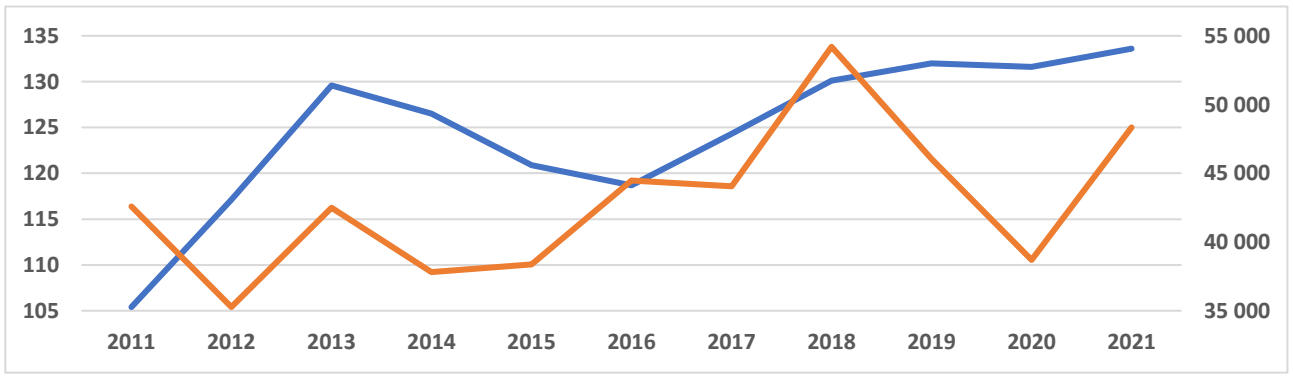


Image 17 – Independent variable #14: Volume Index of Beef and Veal (#, 2010=100)

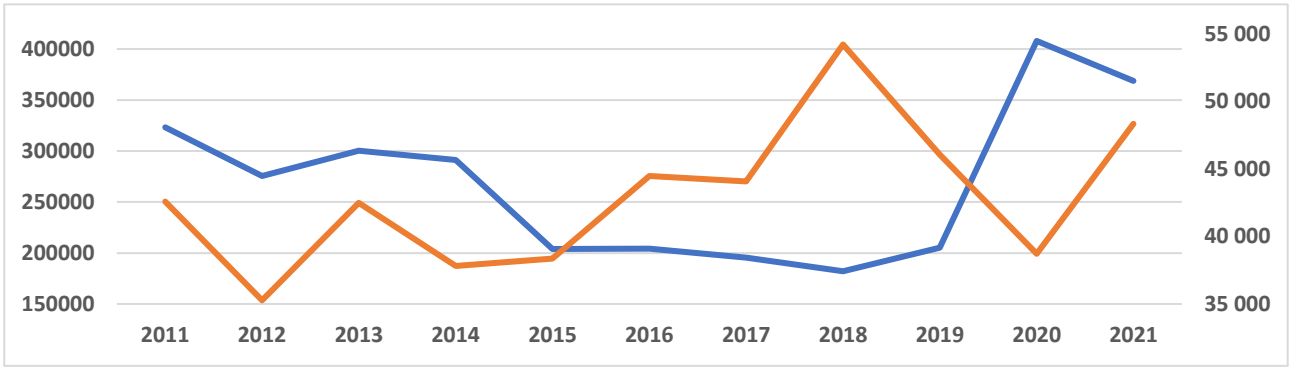


Image 18 –Independent variable #15: Budget of the Ministry of the Environment (€1000)

7. INTERPRETATIVE ANALYSIS: BUILDING A NARRATIVE

7.1. ANNUAL CHANGE IN GDP VOLUME

NOTE: As shown on page 51, the statistical net quantity of Finnish GHG emissions is formed by a combination of actual emission and changes in the carbon sink. During the course of this analysis, a calculation is performed for each year to determine the contribution of these two factors in the increase or decrease of the emissions.
For a more accurate evaluation, the number of emissions is not compared with the previous year's equivalent. Instead, it is compared with a number which is located on the same year as the current one and is determined by the past two years' development trend. The results of the study are presented graphically on page 67. Apart from the year 2015, the emissions and the changes in the carbon sink followed a similar trend on the increase-decrease spectrum throughout the observed period. The source for the used values is Statistics Finland (2023).

- *The National Coalition Party's Government (2011–2014)*

- In 2011, the GDP growth was slightly lesser than previous year, but significantly more than the negative spike of -8.5% in 2009. In the industrial sector, most of the growth was boosted by the chemical industry and some fields of the metal industry, while the growth of the electronics industry was significantly reduced. The service sector's growth was improved by business activities, human health and social work activities, and real estate activities (OSF, 2012).
    - The GHG produced was 15,604 $ktCO_2e$ *more* than what would have been produced with last year's trend. The shrinking of the carbon sink *increased* these emissions by 10,797 $ktCO_2e$ being responsible for 41% of the change in emissions from last year.

- In 2012, growth was hindered and turned negative by a decrease in exports and investments. Both private and public consumption expenditures grew slightly (OSF, 2014).
    - The GHG produced was 2,178 $ktCO_2e$ *less* than what would have been produced with last year's trend. The shrinking of the carbon sink *increased* these emissions by 1,886 $ktCO_2e$ being responsible for 87% of the change in emissions from last year.

- In 2013, the GDP growth improved slightly but maintained the decreasing trend. The growth of exports and investments, as well as the volume of consumption expenditures, all decreased (OSF, 2015).
    - The GHG produced was 6,008 $ktCO_2e$ *more* than what would have been produced with last year's trend. The shrinking of the carbon sink *increased* these emissions by 8,519 $ktCO_2e$ being responsible for 59% of the change in emissions from last year.

- In 2014, the negative trend of exports and investments continued, except that exports fell further while investments kept their last year's rate. The total GDP still improved from last year. Volume of consumption expenditure increased slightly (OSF, 2016).
    - The GHG produced was 4,628 $ktCO_2e$ *less* than what would have been produced with last year's trend. The growth of the carbon sink *decreased* these emissions by 7,262 $ktCO_2e$ being responsible for 61% of the change in emissions from last year.

During the NCP's government's term in office, the national economy was in recession from 2012 onwards. This development was largely a result of a longer-term phenomenon, the 2008 global economic crisis according to the economists of the Bank of Finland. The crisis had an especially negative effect on the Finnish economy in comparison to other small European countries. The weak volume of exports by companies central to the national economic growth, mainly specializing in wood based and ICT products, as well as a lack of internal competition and a high cost of labor were cited as the reasons for this development (Sullström, 2016).

The performance of the Finnish economy was in central focus during the NCP's coalition's term of office. There was a plan to increase the competitiveness of domestic firms as well as to reduce the expenses of the public sector. The government approved cutting public spendings (Reuters, 2014), raising the retirement age (Finnish Centre for Pensions, 2023), reducing the number of municipalities (YLE News, 2014), and improving the effectiveness of the healthcare system (Ministry of Social Affairs and Health, 2013 p. 7) among other decisions. With the economic crisis underway, the coalition was motivated to take on the challenge of the climate crisis through methods that were thought to help recover the shrinking national economy and create more jobs (Finnish Government, 2011, p. 7–8). The current Prime Minister, Jyrki Katainen, saw a chance in the looming global problem for Finland to fulfill likely future demand for goods and know-how of which availability was yet scarce. These included bio economy, efficient use of resources, emissions free processes and clean tech (Finnish Government, 2011, p. 40–41).

In 2012, little after the beginning of its term, the government established the Finnish Climate Change Panel. It was an independent advisory body consisting of 15 experts in the field tasked with guiding the governmental climate policy. The panel has continued its work to this day (The Finnish Climate Change Panel, 2023). The government also adopted Finland's first Climate Act, which ensured the execution of international agreements as well as the duties determined by EU legislation to decrease and monitor national GHG emissions. The Act also stated that Finland needed to adapt its society to the future effects of climate change (Finlex, 2015). It was to be implemented after the coalition's term of office in 2015 (Finnish government, 2015 p. 24).

Before its election as the prime minister party, the NCP had promoted its own flavor of climate strategy as an alternative to that of their main competitor on the field, the Green League. These two were later coalition partners in the NCP's government (YLE News, 2009). The NCP's "rationally green" (järkivihreä) policy advocated for economically efficient solutions including one disapproved of by their coalition partner: nuclear energy (Vesikallio STT, 2009). There was much demand for such an energy source especially on the behest of the metal industry, the most important of the export industries in Finland. At the time, the industry was seen to be too dependent on imported energy (Mainio, 2012). The Greens found nuclear energy undesirable because of its harmful byproduct, its high construction cost and time (vihreät.fi, 2011), as well as the possible geopolitical risks attached to it which in worst scenario could threaten security of supply (Pohjanpalo, 2014).

In 2014, the Greens left the government due to discontent towards the decision of the latter to give the Finnish energy company Fennovoima a building permit for a nuclear power plant. The company had ordered the plant from Rosatom, the Russian state-owned energy company (Tapiola, 2014). The profitability of the metal industry was at the time greatly hindered by an insufficient supply of electricity. The facility alone was seen as greatly beneficial for the industry (Mainio, 2012). According to Antti Koskelainen (2012), president of the energy transfer company of Fennovoima Outokumpu Oyj Voimaosakeyhtiö SF, the major shareholders of the Fennovoima company consisted of, besides municipally owned energy companies, representatives of the metal industry.

In 2013, government drafted a climate strategy of which aim was to replace the energy use of coal with renewable biomass, replace 10% of natural gas with wood made biogas, raise wind power generation by 9 TWh, phase out a third of peat burning without replacing it with coal, and decrease the use of mineral oil by 17% in total energy production by 2025. According to the strategy, Finland was intended to become carbon neutral by 2050 (Ministry of Economic Affairs and Employment, 2013, p. 19, 28, 30, 51, 55). In the end, the government did not manage to improve the employment

rate, which had long been in an undesirable state (Pohjanpalo, 2014). At the start of the coalition's term in 2011, the employment rate among 15–64-year-olds was 67.7%. In 2015, it was 67.1% (OSF, 2023).

- *The Centre Party's Government (2015–2018)*

- In 2015, the state of the economy improved with the GDP growth trend turning positive. Production was improved by an increase in private consumption and investments. Exports and imports also increased (OSF, 2017).
    - The GHG produced was 673 $ktCO_2e$ *less* than what would have been produced with last year's trend. The shrinking of the carbon sink *increased* these emissions by 5,896 $ktCO_2e$ being responsible for 89% of the change in emissions from last year.

- The rate of growth improved further in 2016. Private consumption and investments increased, as did exports and imports (OSF, 2018).
    - The GHG produced was 6,336 $ktCO_2e$ *more* than what would have been produced with last year's trend. The growth of the carbon sink *decreased* these emissions by 776 $ktCO_2e$ being responsible for 12% of the change in emissions from last year.

- In 2017, exports and investments, as well as the households' consumption expenditure, increased. Only the volume of public consumption decreased by 0.4% (OSF, 2019).
    - The GHG produced was 5,628 $ktCO_2e$ *less* than what would have been produced with last year's trend. The growth of the carbon sink *decreased* these emissions by 896 $ktCO_2e$ being responsible for 14% of the change in emissions from last year.

- In 2018, total growth began to slow down. The value of investments and exports still kept increasing. Imports also increased. The value of both private and public consumption expenditures increased (OSF, 2020). Growth was expected to keep slowing down in 2019 due to an increasing number of barriers to international trade (Ministry of Finance, 2018).
    - The GHG produced was 3,723 $ktCO_2e$ *more* than what would have been produced with last year's trend. The shrinking of the carbon sink *increased* these emissions by 6,834 $ktCO_2e$ being responsible for 65% of the change in emissions from last year.

The CP's government strengthened economic growth during the beginning of its term in office, which then stagnated and began to decline at the end of the term. The coalition received praise for being able to improve Finland's economic situation especially during its first year (Bios, 2019). The coalition managed to increase the employment rate to 71% for 15–64-year-olds by the end of 2018 (OSF, 2023), slow down the accumulation of state debt, decrease the number of youths left outside of work and academic life while maintaining stable tax rates (Luukka & Nalbantoglu, 2018). The government was, however, seen to not have managed to fulfill its pledge to sufficiently decrease Finland's GHG emissions (Bios, 2019). CP's coalition strongly promoted biofuels as a solution to many climate-related problems, not only for fueling energy production, but also to power vehicles. The strategy aimed to increase the portion of renewable fuels in transportation to 40% by 2030 (Ministry of Economic Affairs and Employment, 2017, p. 25–26). According to 2017 independent research commissioned by the government, this greatly weakened Finland's carbon sinks in the long term, hindering the process of reducing emissions, and that even at the current state the level of logging was unsustainable. The researchers requested the government to base its policies more on scientific information in the future (Järvensivu, 2019).

A plan to halve road traffic emissions by 2030 was enacted in 2017, to subsidize electric vehicles and biofuels, encourage biking, and concentrate jobs and services closer to traffic hubs (Eduskunta, 2017, p. 8–9). The coalition supported peat production in energy use as it was a domestically available source with a potential to create new jobs and improve the balance of trade (Ministry of Economic Affairs and Employment, 2014, p. 71). The government mandated the use of imported oil products such as gasoline, diesel, fuel oil and jet fuel to be halved during the course of the 2020s from the 2005 level (Ministry of Economic Affairs and Employment, 2016, p. 18). This excluded oil refinement and exports further abroad (Järvensivu, 2019). The coalition also wanted to merge the Ministries of the Environment and Agriculture and Forestry, though this did not happen due to fears of it leading to the weakening of the environmental regulations. The proposal was opposed by a plea from citizens with 60,000 signatures (Elonen & Saarinen, 2015).

In October 2017, the government agreed to change the way it shared energy subsidies, choosing the most efficient providers through a "technology neutral" competition. Unlike conventional practice where each production method is compared separately, all the energy forms deemed renewable, wind, solar, biogas and wood, were set to compete against each other with cost efficiency in mind. Wind power was expected to be the biggest winner, which is what happened (Pohjanpalo, 2017). The coalition member, the Finns Party, criticized giving any support for wind power because it considered wind turbines a disturbance and a health risk to the residents living in their vicinity (Liski, 2016).

- *The Social Democratic Party's Government (2019–2022, examined up to 2021)*

- In 2019, the economy grew akin to a similar rate to the previous year. As notable events, the growth of the construction industry slowed down and the volume of the industry output made a downturn, while the electronics industry experienced growth both in output and intermediate consumption in connection to growth in international trade of services (OSF, 2021).
    - The GHG produced was 4,143 $ktCO_2e$ *less* than what would have been produced with last year's trend. The growth of the carbon sink *decreased* these emissions by 14,141 $ktCO_2e$ being responsible for 77% of the change in emissions from last year.

- In 2020, the growth turned negative as the Covid-19 pandemic took an economic toll on Finland. Consumption decreased noticeably despite an improving employment rate. The pandemic caused the added value and volume of transport, accommodation, and food service activities to decrease to an exceptionally low level (OSF, 2022).
    - The GHG produced was 1,733 $ktCO_2e$ *less* than what would have been produced with last year's trend. The shrinking of the carbon sink *increased* these emissions by 946 $ktCO_2e$ being responsible for 55% of the change in emissions from last year.

- In 2021, the economy started to recover from the pandemic as the exports of goods surpassed the pre-pandemic rates and the national GDP growth changed back to positive. The volume of output increased in many industries. Recovery was especially visible in the service industries, although the pandemic still had a negative effect on their demand. The growth trend of the private consumption expenditure also returned to positive, which showed especially in the recovery of demand for clothing, accommodation, and food service activities (OSF, 2023).
    - The GHG produced was 4,991 $ktCO_2e$ *less* than what would have been produced with last year's trend. The shrinking of the carbon sink *increased* these emissions by 11,997 $ktCO_2e$ being responsible for 71% of the change in emissions from last year.

The SDP had the most variation with the GDP growth. The economy first shrank into negative digits in 2020 and then improved past the previous 2019 numbers in 2021 with the emissions following a similar trend. Both events were affected by the pandemic. The most noticeable effect of the pandemic on the emissions was in the reduction of traffic. Warm weather and changes in industrial production were also factors, but their role was harder to estimate reliably (Harjumaa, 2021).

The coalition increased the state's yearly spendings and adopted a more ambitious climate policy (Henley, 2019). The former was done partially to fund the government's various investments, the tightened climate measures included. However, the government also borrowed more to take its country through some economically challenging times: At the time Finland, like many other countries, was struck by several international events: The Covid-19 pandemic in 2020 and 2021 and the intensifications of the Russian war of aggression against Ukraine in 2022. The government was generally seen as successful at steering Finland out of these crises. However, it did not manage to avoid having the budget and debt increases it deemed necessary for protecting the country from being put to question. The increased debt and its implications to the future of the economy were a major talking point for the parliamentary opposition for much of the term (Toivonen, 2023).

Measures used to protect the society from the pandemic included temporary restrictions on movement and an easily accessible pandemic support fund to aid the enterprises suffering from the pandemic and the restrictions. The restrictions especially posed a challenge to the everyday operations for restaurants and cultural activities (Cansel, Johanson, Leponiemi et al., 2023 p. 10, 59–62, 257–258).

The coalition struggled with disagreements concerning climate policy and nature conservation. Especially the CP had a critical opinion on the tightening of national environmental targets, arguing that this should be done on the shared EU level (Hartikainen, 2019). Similarly, at the beginning of their term, the leaders of their respective parties, the Minister of Economic Affairs Katri Kulmuni (CP) and the Minister of the Environment Krista Mikkonen (Greens) did not manage to agree on any limits or lack thereof to tree cutting. The leader of the Greens warned in an interview that there would not be enough wood in the forests to enable turning all the currently anticipated pulp mill investments into concrete projects. The leader of the CP replied to this by claiming the opposite. Mikkonen later defended her claim by adding that comments similar to hers about the sufficiency of forests have been given before by some representatives of the forest industry (Rinta-Jouppi, 2019).

According to the Executive Director of the Finnish League for Nature Conservation Tapani Veistola, the SDP's government was the best coalition in the 21st century for the preservation of nature and the climate. He especially praised the improved climate legislation and the doubling of the state's nature conservation budget. Only the state of forest protection received insufficient attention due to political pressure from the coalition party CP and the parliamentary opposition. Veistola argued that the government was too slow to react to the report on the LULUCF sector becoming an emission source in 2021, leaving the responsibility of fixing the issue to the next term. Additionally, the government failed to pass reforms on sustainable construction (Pelli, 2023).

The SDP's government aimed to reduce emission from the energy sector by promoting the adoption of bio- and electric fuels, and vehicles running on electricity (Sutinen, 2021) It also wanted the burning of peat for energy production to be phased out in the 2030s (YLE News, 2021). This caused discontent among the CP, whose members, citing the previous government's arguments, complained that abandoning peat would damage national energy independence and the livelihoods of peat farmers (Saarikko, 2021).

7.1.1. Interpretations (Annual Change in GDP Volume)

Under the NCP's government, both the GDP and the emissions fell. A series of annual reports by Helsingin Sanomat, using data published by Statistics Finland during this period, suggests that the ongoing economic recession was a major cause of the decline in emissions (Arola, Saavalainen, Savolainen & Suominen, 2012–2016). This view is also supported by the government's own assessment, according to which the emissions decreased largely due to a slowdown in economic growth (Finnish Government, 2015). Increased use of wood in energy production as well as imported, emission-free electricity also appear to have contributed to the decline, in addition to the occasional warm weather (Arola, Saavalainen, Savolainen & Suominen, 2012–2016).

The NCP's coalition, led by a party that deemed itself an advocate of entrepreneurship and free market economy practices (National Coalition Party, 2019), was determined to lift the national economy from recession and create jobs by promoting promising future business models (Finnish Government, 2011, p. 40–41). Taking on an emerging market early probably had several benefits, one of which was the ability to advance goals set by existing international agreements e.g., Kyoto Protocol, in a way that was useful and voluntary for both the national economy and the citizens. Early action was likely to reduce potential future challenges to achieving the agreed objectives.

In the end, the government failed to meet its main programme-specific targets (Pohjanpalo, 2014). However, by adopting the first Climate Change Act and establishing a climate policy advisory body, the former of which was not updated until 2022 (Ministry of Environment, 2023), it laid the groundwork for subsequent governments to implement climate policy more effectively. It should be added that by the end of the NCP's coalition's term, gross emissions had decreased by 23% from 2010 levels, or 17,050 kt CO2e (OSF, 2023).

At the same time, the prime minister party NCP managed to gain political territory in the field of environmental matters by promoting nuclear energy (Vesikallio STT, 2009). This area was before

largely dominated by the Greens. This was a sign of other parties adopting their own visions of climate governance and of climate change, strengthening its status as a mainstream topic of political discussion. In the short term, however, this caused instability in the government as the Greens left the NCP's coalition due to a nuclear power plant project (Tapiola, 2014). In the eyes of the government, the future implications on e.g., national security did not override the needs of the green transition and the economy, likely because industrial companies responsible of a major portion of Finland's exports were acutely in need of a stable energy source (Mainio, 2012).

The Prime Minister party's "rationally green" policy (Vesikallio STT, 2009) was also likely a sign of climate change becoming a point of interest to groups other than just those motivated by environmental protection, as the economy was the government's main source of concern.

The course of events between the Greens and the rest of the coalition parallels what the authors Bulkeley and Newell stated about climate governance: A need for climate policies would increasingly often create situations where people needed to negotiate and compromise climate measures to maintain functional relations with their co-negotiators (p. 9). In this case, the disagreement over nuclear power divided the government.

During the CP's government's term, the economic situation improved as the employment rate and the rate of production increased. According to Statistics Finland's Development Manager Riitta Pipatti, this led to an increased use of coal in energy production, which was the most important reason to the momentary increase of gross emissions in 2016. Another reason was that the share of biofuels used in transportation decreased (Kempas, 2017). Most of the economic growth happened during the first year of the term after which it began to slow down. The relative stagnation turned into a decline in 2018. Despite this, the graph on image 3 (p. 51) shows that the emissions including the LULUCF sector increased noticeably in 2018. The data on image 19 (p. 65) suggests that the main reason for the LULUCF sector's development was the forests' reduced ability to remove emissions. This might have to do with the exceptional but momentary growth in logging activity in 2018, as is discovered in the interpretative analysis #2: Volume Index of Forest Industry Output (p. 72–73).

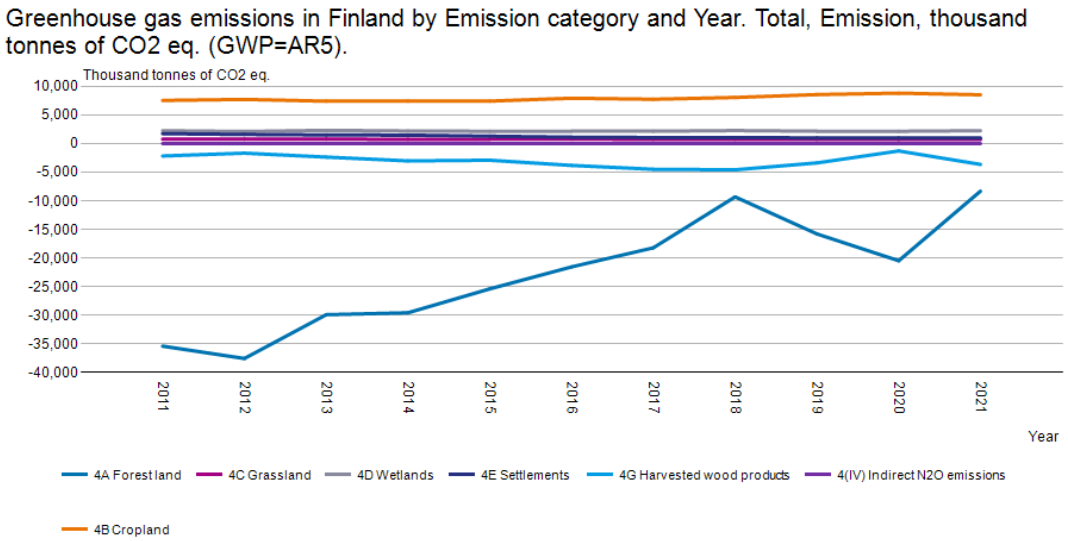


Image 19 (above) presents the past development of each individual variable included in the LULUCF sector. The variables are set in the following order in year 2018 starting with the uppermost one: Cropland, Wetlands, Settlements, Grassland, Indirect N2O emissions, Harvested wood products, Forest land. Retrieved from Statistics Finland (2023).

The CP's Coalition took some notable steps to reduce Finland's emissions as required by the recently ratified Paris Climate Agreement. Among other things, it adjusted energy subsidies in favor of wind power, albeit on economic grounds. Despite this, Finland's gross emissions decreased from 2014 level only by 4% or 2,573 kt CO_2e during the coalition's term, a reduction 85% smaller than that of the last government (OSF, 2023).

While the economic importance of bioeconomy was already recognized by the NCP's government, it was the CP's coalition that took steps to implement it to the point where the rate of forestry growth began to worry the scientific community. There was a fear that the government's strategy was based on unscientific conclusions and that increasing logging by the planned amount would lead to the weakening of the carbon sinks, harming the national climate goals (Järvensivu, 2019). Similarly, the intended merger of the Ministry of the Environment with the Ministry of Agriculture and Forestry was questioned by many due to fears that it would endanger the long-term climate policy (Elonen & Saarinen, 2015).

As the CP's government did not face similar internal conflict as those of the preceding NCP and the succeeding SDP did, it could implement reforms without much friction. This inevitably benefited the shared goals of the coalition, such as those related to the economy and the climate. This time the critique concerning climate policy had to be given from outside the government. This is because no coalition member party was interested in endangering the stability of the government for the cause that raised concerns among researchers. The initiative of the researchers was active in nature instead

of proactive, as it was not promoted within the CP's government. Unlike in a group that has to constantly negotiate its values, the interests of the members of the governing coalition were compatible enough to favor certain policy objectives at the expense of climate policy.

During the SDP's government's term, both the economy and the emissions went down as a result of the Covid-19 pandemic in 2020. This was largely caused by a reduction in traffic volume and exports (OSF, 2022). The economic situation improved in 2021, during which emissions and GDP growth surpassed their 2019 levels. This was a result of pent up domestic and foreign demand left over from the last year (Bank of Finland, 2021 & OSF, 2023).

The SDP's coalition faced two global crises and ended its term with moderate popular support (YLE News, 2021). Most of the criticism of the coalition stemmed from the increase in public debt, which the political opposition described as excessive. It is up to debate whether this was the case as tackling the crises was not the only reason for the increased borrowing (Toivonen, 2023).

Climate policy wise, the government was described as exceptionally progressive in comparison to its predecessors. It fell short mainly on reforms aimed at construction and forestry, the latter of which was heavily influenced by the moderating actions of the CP (Pelli, 2022).

The coalition faced much internal disagreement caused by topics such as tightening climate targets, setting limits to logging, and phasing out peat from energy production (Hartikainen, 2019, Rinta-Jouppi, 2019 & Saarikko, 2021). This resulted in arguments especially between two parties of the SDP's coalition: The Greens often took a stand against the plans of the CP and vice versa. The two sides had a common program, but the way in which its objectives were to be achieved was a constant source of disagreement. The situation was the opposite to how things were with the CP's government: The participating parties were too different in certain aspects to seamlessly work with each other.

The fractious relationship between the disagreeing government parties could have also been a result of a broader development, as is found in the analysis #4: Citizens' Opinion on the Concern of Climate Change (see p. 89). Professor Eva Heiskanen at the Centre for Consumer Research, University of Helsinki, argued that after the 2019 elections, climate measures became an increasingly divisive topic in the Finnish society because more people were aware of their implications on their everyday lives. This influenced citizens to take action to make sure that their interests and wellbeing were not weakened by the structural changes brought about by the national climate policy. Having to reconcile their own interests with those of other interest groups, while taking into account wider climate policy objectives, made climate change increasingly an integral part of everyday politics (Elonen, 2019).

Despite internal friction, the government successfully contributed to the climate policy in notable ways, like setting the most ambitious carbon neutrality deadline yet, bringing it closer by an entire decade, and advanced the phase out of fossil fuels. This reduction decreased gross emissions by 15% or 8,147 kt CO2e by 2021, and by 18% or 10,187 kt CO2e by 2022 (preliminary data) from 2018 level. The total reduction of gross emissions was 75% greater than that of the CP's government and 40% smaller compared to the NCP's coalition's figure (OSF, 2023).

Related Graphs (Annual Change in GDP Volume)

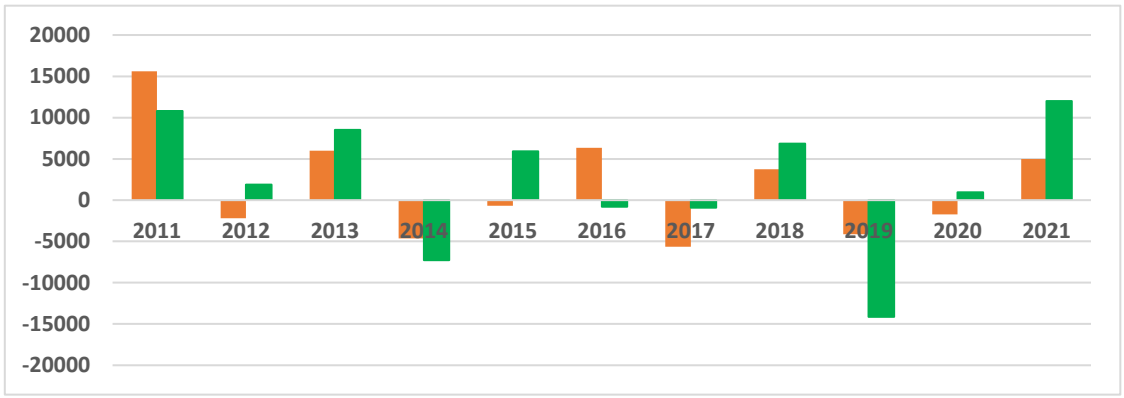


Image 20 – Evolution of the impact of the emissions (left bar) and removals (right bar) on net emissions ($ktCO_2e$) per year in comparison to last year's trend. Retrieved from Statistics Finland (2023).

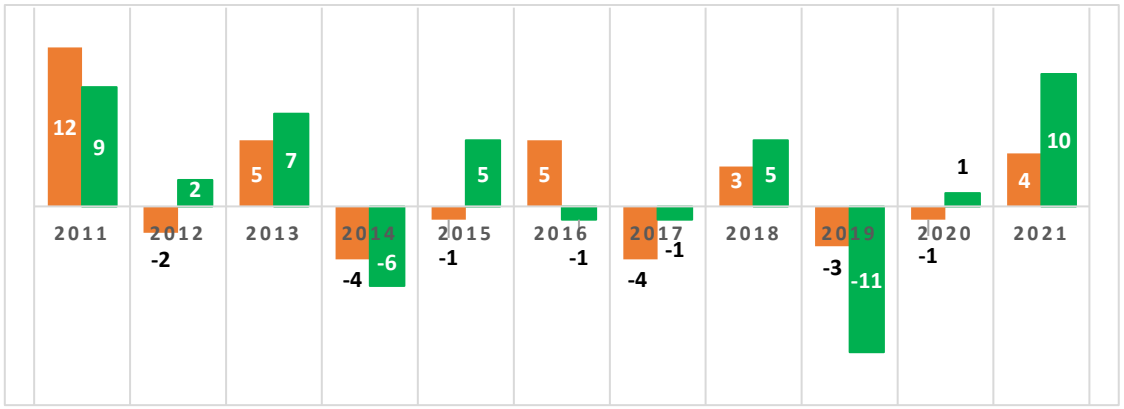


Image 21 – The share of the emissions (left) and removals (right) of the 2011–2021 GHG development (%). Retrieved from Statistics Finland (2023).

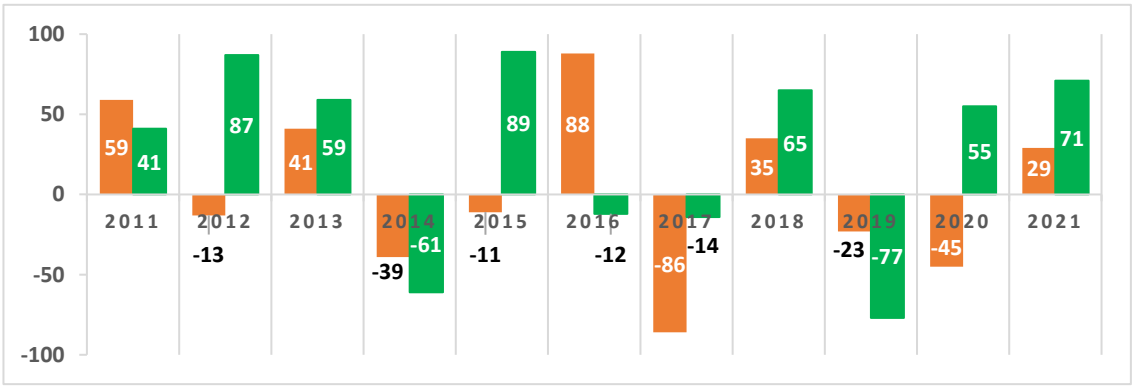


Image 22 – Contribution of emissions (left) and removals (right) to the change in emissions in individual years (%). Retrieved from Statistics Finland (2023).

7.2. VOLUME INDEX OF FOREST INDUSTRY OUTPUT

- *The National Coalition Party's Government (2011–2014)*

- 2011 -

In 2011, the forest industry was growing despite the long-lasting effects of the 2008 ongoing economic crisis and the slowing down of world trade. At the end of the year, the demand for certain paper products decreased, as the dawning 2011 economic crisis started to affect the industry. The demand for the industry's products was expected to be low the next year due to the apparent problems in the global economy (Hänninen, Leppänen, Mutanen et al., 2011 p. 4). Logging in Finland increased by 0.8%. 23.47 mil. cubic meters of wooden materials were used in energy generation accounting for 25.3% of all use of wooden materials (OSF: Natural Resources Institute Finland, 2023). Wooden fuels accounted for 22.7% of national energy consumption (OSF, 2023).

The forest industry was under pressure to restructure following the economic crises in the euro zone after 2008 and 2011 (Urpilainen & Ziabari, 2014). 16,000 workers lost their jobs between the years 2007–2013. The government reacted by initiating a support program for municipalities most affected by the events. The desired effect was to support local businesses struggling with economic hardships and to restrain increasing unemployment (Hakala, 2013).

25,302 kt of CO2e was removed by the LULUCF sector. This was 3% less than last year. It decreased total emissions by 37% (OSF, 2023).

Most of the development in market logging took place in privately owned forests. Corporate and state-owned forests were steadily harvested at an annual rate of over 10 million cubic meters throughout the observation period, while that of private forests ranged from over 40 to over 60 million cubic meters (Natural Resources Institute Finland, 2023).

- 2012 -

In 2012, the production of sawn wood and plywood decreased due to decreasing domestic and European demand. However, exports to the Middle East and Asia increased, as these regions were not seriously affected by the economic crisis in the West (Hänninen, Leppänen, Mutanen et al., 2012 p. 4). Logging decreased by 1.8%. 24.53 mil. cubic meters of wooden materials were used in energy

generation accounting for 26.4% of all use of wooden materials (OSF: Natural Resources Institute Finland, 2023). Wooden fuels accounted for 24% of national energy consumption (OSF, 2023).

Until 2014, the government sold state owned forestry lands to private buyers (Leisti, 2014). This was meet with discontent from the representatives of the CP, who wished the state's resources to be arranged in a form of a public fund, similarly to how the government of Norway manages its oil reserves. Minister of Agriculture and Forestry Jari Koskinen (NCP) responded by stating that selling land was necessary to curb government indebtedness. He added that the state had bought a lot of forest in the past years, and that now was the right time to sell it (HS & STT, 2012).

There was a concern that the state would sell forests to foreign customers, but no deals were made in the end (Leisti, 2014). These land areas in Lapland, Ostrobothnia and Kainuu were so large and had such a high price attached to them that the government was unlikely to find a wealthy enough customer from within Finland to buy them (Rönty, 2014).

27,047 kt of CO2e was removed by the LULUCF sector, 6% more than last year. It decreased total emissions by 43% (OSF, 2023).

- 2013 -

In 2013, the exports and production of the forest industry grew especially at the start of the year with the exception of paper production thanks to strengthened trade in the Middle East and Asia. The industry was expected to slowly grow next year due to the rest of the European economies showing signs of recovery (Hänninen, Härkönen, Ikonen et al., 2014 p. 3). Logging increased by 8.2%. 25.41 mil. cubic meters of wooden materials were used in energy generation accounting for 26% of all use of wooden materials (OSF: Natural Resources Institute Finland, 2023). Wooden fuels accounted for 24.6% of national energy consumption (OSF, 2023).

In 2013, on a government proposal, the Finnish parliament passed a new national forestry law (Eduskunta, 2014). It allowed forest owners to decide when and how to fell their own trees (Jokiniemi & Puurunen, 2014). The NCP expected the law to activate private forest owners to profit more off their properties. Ville Niinistö, the leader of the Greens, estimated on his blog that it would raise people's interest in the general wellbeing of their woodlands (Keskisuomalainen, 2013). The law came into force in 2014. It was criticized by the environmental groups for not sufficiently accounting for biodiversity and praised it for enabling mixed growth of trees of different ages (Jokiniemi & Puurunen, 2014). Critics of the law included the conservation expert of the Finnish Association of Nature Conservation Risto Mustonen and 30 others belonging to the Finnish Environment Institute

(Syke), Finnish Forest Research Institute (Metla) and the Forestry Development Center Tapio (HS & Mustonen, 2013). The Department head of the Ministry of Agriculture and Forestry hoped that the new law would increase logging enough to enable the construction of a new wood pulp factory (Iivonen, 2013).

20,273 kt of CO2e was removed by the LULUCF sector, 25% less than last year. It decreased total emissions by 32% (OSF, 2023).

- 2014 -

In 2014, the forest industry, excluding paper production, was still growing. The growth was slower than last year due to decreased demand. Political turmoil in Ukraine and the Middle East evoked uncertainty over the future of economic development (Hänninen, Härkönen, Ikonen et al., 2014 p. 3). Logging decreased by 0.3%. 25.39 mil. cubic meters of wooden materials were used in energy generation accounting for 25.8% of all use of wooden materials (OSF: Natural Resources Institute Finland, 2023). Wooden fuels accounted for 25.1% of national energy consumption (OSF, 2023).

In 2014, much attention was paid by the government to the recently discovered possibilities of bioeconomy. The politicians hoped that advancing technology would create new possibilities for the forest industry. Research found that the new field could yield both short- and long-term benefits, mainly in the form of energy, but later also as more sophisticated products, such as textiles and medicine (Roppola, 2014). In the past, paper production and the mobile phone company Nokia were the main engines of the Finnish economy. After the economic crisis and the accelerating digitalization heavily influenced by the American Apple Corporation and its new IT products such as the iPhone (McCormack, 2013), both began to wither with little hope of recovery.

20,761 kt of CO2e was removed by the LULUCF sector, 2% more than last year. It decreased total emissions by 35% (OSF, 2023).

- *The Centre Party's Government (2015–2018)*

- 2015 -

After several years of decent growth, the demand for the forest industry's products began to decrease again. This happened for two reasons: The weakening of the global economy and the increased stocks in the market for wood products. As a result, the companies of the industry decided to postpone any

decisions on increasing productions and exports and instead set their focus on investments (Hänninen, Härkönen, Ikonen et al., 2015 p. 4). Logging increased by 4.4%. 25.1 mil. cubic meters of wooden materials were used in energy generation accounting for 25.4% of all use of wooden materials (OSF: Natural Resources Institute Finland, 2023). Wooden fuels accounted for 25.2% of national energy consumption (OSF, 2023).

The Finnish forest industry company Metsä Group announced its plans to invest in a new kind of pulp factory which would produce different kinds of bio commodities as a byproduct. The governing coalition, and the Prime Minister party, the CP, in particular, were enthusiastic about the project, announcing that the bioeconomy will create 100,000 new jobs by 2025 (Iivonen, 2015).

The forestry business section of the public forest management organization Metsähallitus was decided to be turned into a state-owned enterprise by the end of 2016 due to requirements set by the European Commission against public organizations simultaneously making profit and receiving state subsidies. The project was controversial because it was seen to shift the organization's focus from nature conservation more towards its other function, that of making monetary profit from supplying wood to the industry (Iivonen, 2015). With this "corporatization" of the organization, its forest management related parts could also be sold (Nykänen, 2016).

16,700 kt of CO2e was removed by the LULUCF sector, 20% less than last year. It decreased total emissions by 30% (OSF, 2023).

- 2016 -

In 2016, the exports of the forest industry grew per unit but the unit price for most products decreased. The production and exports of paper were expected to decrease as the consumption of paper was declining in the export markets (Hänninen, Härkönen, Kalliovirta et al., 2016 p. 4). Logging increased by 5.3%. 26.18 mil. cubic meters of wooden materials were used in energy generation accounting for 25.4% of all use of wooden materials (OSF: Natural Resources Institute Finland, 2023). Wooden fuels accounted for 25.7% of national energy consumption (OSF, 2023).

The Finnish forest industry was visibly recovering. This was largely due to decreasingly profitable paper production being widely replaced by wood pulp to make cardboard for the needs of online commerce (Luukka, 2016). The CP's coalition believed that Finland would have a sufficient reservoir of wood to meet the demand and that the legislation would encourages the maintenance of biodiversity (Pohjanpalo, 2016).

13,414 kt of CO2e was removed by the LULUCF sector, 20% less than last year. It decreased total emissions by 23% (OSF, 2023).

- 2017 -

In 2017, the production and exports of wooden products, wood pulp, and cardboard increased. The rates of production and exports were predicted to slow down slightly the following year (Hänninen, Härkönen, Kalliovirta et al., 2017 p. 4). Logging increased by 1.8%. 26.94 mil. cubic meters of wooden materials were used in energy generation accounting for 25.3% of all use of wooden materials (OSF: Natural Resources Institute Finland, 2023). Wooden fuels accounted for 26.8% of national energy consumption (OSF, 2023).

The European Commissions, the European Parliament, and the Council of the European Union agreed on changes to the EU's LULUCF laws, which determine how forest resources should be used in the Union. The Finnish government feared that the law would restrict forestry in Finland, but through negotiations and lobbying the opposite happened: the EU determined that Finland could increase logging as long as it kept meeting the Union's climate targets (Kähkönen, Mykkänen, Pohjanpalo, & Teittinen, 2017).

Research was carried out by the government to clear out the implications of Finland's forest policy on the future of the environment. The research determined that the forests would keep existing as a carbon sink in the future. However, if the logging rates were to be increased to 80 million cubic meters per year, the carbon sink would be halved during the 2021–2030 period. At the time, the annual volume was around 68 mil. cubic meters of wood and was expected to reach 80 mil. in 2025 (Sutinen, 2018).

11,023 kt of CO2e was removed by the LULUCF sector, 18% less than last year. It decreased total emissions by 20% (OSF, 2023).

- 2018 -

In 2018, the rising global demand for wood, wooden mass, and paper products stimulated by global economic growth increased the volume of wood harvests. Another reason were the political decisions in China to limit paper recycling and to close emissions intensive factories. The rate of production and growth was expected to slow down and stabilize together with the global growth rate in 2019 (Anttila, Härkönen, Kalliovirta et al., 2018 p. 4). Logging increased by 8.7%. 27.03 mil. cubic meters of wooden materials were used in energy generation accounting for 24.5% of all use of wooden

materials (OSF: Natural Resources Institute Finland, 2023). Wooden fuels accounted for 27.2% of national energy consumption (OSF, 2023).

A report published by IPCC declared that all the countries should urgently tighten their efforts so that global warming would to be limited to 1.5°C (Sutinen, 2018). The government requested a report identifying the measures needed to achieve the new targets and their costs (Hartikainen, 2018).

In addition to this, Prime Minister Juha Sipilä (CP) invited all the parliamentary parties into a conference to evaluate the measures needed for Finland to do its part in reaching the global 1.5°C temperature goal. During the conference, it was found that while there were differences of opinion on the concrete measures to achieve the IPCC's target, most participants agreed on the importance of achieving it (Hara, 2018). As the parliamentary elections approached, the methods of achieving the climate target became a central talking point for most parties (Harris, 2019).

1,799 kt of CO2e was removed by the LULUCF sector, 84% less than last year. It decreased total emissions by 3% (OSF, 2023).

- *The Social Democratic Party's Government (2019–2022, examined up to 2021)*

- 2019 -

In 2019, production and exports decreased due to the weakening of the global economy resulting in decreased logging rates and a slight deterioration in employment in the forestry sector. Only positive development occurred in the sales of wooden pulp of which exports were expected to rise to a record level (Härkönen, Kalliovirta, Kniivilä et al., 2019 p. 3). Logging decreased by 8%. 27.51 mil. cubic meters of wooden materials were used in energy generation accounting for 25.4% of all use of wooden materials (OSF: Natural Resources Institute Finland, 2023). Wooden fuels accounted for 27.9% of national energy consumption (OSF, 2023).

Before the coalition began its work in office its future members, the Greens and the Left Alliance had an internal dilemma concerning a new pulp mill in the town of Kemi which was to replace an older factory and be the largest of its kind in Europe. The parties got elected to the next government and as its members ended up giving their approval to the factory. Allegedly, it was a difficult decision for the two parties which had promised to reduce logging (Hartikainen, 2019).

Later that year, the Natural Resources Institute (Luke) published a report which stated that Finland's carbon sinks were a half smaller than what was estimated the previous year. The research stated that

the government would need to reduce emissions with a tighter pace if it wanted Finland to reach carbon neutrality by 2035 (Elonen, 2019). Minister of the Environment Krista Mikkonen commented on the report by stating that the government would not compromise its climate goals. She stated that the government would start thinking about measures for the forest sector if the industry's volume of orders did not change in the short term. These measures were to be applied as soon as possible even if they were to take effect only during the following government's term (Sutinen, 2019).

6,716 kt of CO2e was removed by the LULUCF sector, 73% more than last year. It decreased total emissions by 13% (OSF, 2023).

- 2020 -

In 2020, the collapse in global demand caused by the Covid-19 pandemic as well as local labor struggles shook the forest sector, decreasing profitability and employment. The growth was expected to return next year, as the forest industry slowly made a recovery throughout the year (Härkönen, Kalliovirta, Kniivilä et al., 2020 p. 3). Logging decreased by 8.1%. 26.23 mil. cubic meters of wooden materials were used in energy generation accounting for 25.7% of all use of wooden materials (OSF: Natural Resources Institute Finland, 2023). Wooden fuels accounted for 27.8% of national energy consumption (OSF, 2023).

During the Covid-19 pandemic, the major forestry company UPM (Kervinen, 2020) closed Finland's last newspaper factory in the town of Jämsä which employed 450 people. The factory was competitive, but the company saw that it could profit more from having the production capacity located in another country. As soon as the decision went public, Prime Minister Sanna Marin stepped forward to criticize it as an unpatriotic act at a critical time (Niskakangas & Loula, 2020). The CEO of UPM Jussi Pesonen replied by stating that the government did not maintain a competitive enough business environment in Finland, citing high taxation, expensive energy, and planned measures to decrease logging. Marin replied by stating that her coalition was working to support the forest industry by lowering the electricity tax to the EU minimum, supporting electrification of the industries and leading projects to improve transportation relevant to the industry. Politics, however, was not going to change much as, apart from international competition, there was also another factor at play. Widespread digitalization and the use of the internet had reduced the need for paper, forcing UPM to close mills not only in Finland, but around the world (Viljanen HS & STT, 2020).

Marin later met with the CEO and the president of Metsähallitus ry, the association of companies that belong to the forest industry sector. The meeting was held to confirm good relations between the

government and the forest industry and to ensure that the government was concerned of the industry's competitiveness (Keski-Heikkilä, 2020).

The pandemic and a widespread labor struggle accelerated structural changes in the forest industry. This was highlighted by the fact that there were strong differences in results when comparing companies: The stock value of the cardboard producer Metsä Board increased by 17% from its 2019 rate, while that of UPM, a company largely based on producing paper, dropped by 14% (Autio STT & HS, 2020).

9,113 kt of CO2e was removed by the LULUCF sector, 26% more than last year. It decreased total emissions by 19% (OSF, 2023).

- 2021 -

The rate of production and exports of the forest industry increased as the measures against the pandemic and to revitalize global trade started to take effect. In Finland, the growing demand for wood from industry increased felling volumes, raised stumpage prices, and improved employment and profitability. The trend was expected to turn negative in 2022. The rate of production and the export volume of wooden products as well as the production and export of paper and pulp were predicted to decrease. The 2022 industrial logging rate was expected to remain close to the 2021 rate of 65 million cubic meters (Härkönen, Kallioniemi, Kniivilä et al., 2021 p. 3). Logging increased by 11.4%. 30.99 mil. cubic meters of wooden materials were used in energy generation accounting for 27.4% of all use of wooden materials (OSF: Natural Resources Institute Finland, 2023). Wooden fuels accounted for 29.6% of national energy consumption (OSF, 2023).

In 2021, multiple disagreements took place between Finland and the European Commission which tested the integrity of the SDP's government. The first case had to do with the leaking of the European Commission's strategy on forest management. The strategy was created to inform the EU's member states about the Commission's plans for the future. In it, the Commission suggested that clear cutting and the removal of stumps and roots should be reduced in the future as the state of forest management in the Union was seen as unsustainable, and that the short-term use of wood should be minimized. The strategy was first leaked unfinished in mid-2021 and was immediately criticized by Minister of Agriculture and Forestry Jari Leppä (CP), MEP Elsi Katainen (CP) and Karoliina Niemi, head of the forest sector at the Finnish Forest Industries Federation, for overstepping its remit by interfering in member states' forest management (Keski-Heikkilä, 2021).

The final version of the strategy was changed to be more moderate towards clear cutting. It was no longer to be avoided, but instead only to be practiced with caution. The Commission gave a statement that it would not interfere in the sole responsibilities of the member states when it came to forest management and emphasized the importance of individual landowners as the primary agents of change. Minister Leppä admitted that he was satisfied with the corrective measures and thanked Prime Minister Sanna Marin (SDP) and Minister of European Affairs and Ownership Steering Tytti Tuppurainen (SDP) for convincing the Commission to take action (Koivistoinen & STT-YLE, 2021). The leader of the Greens Maria Ohisalo announced that her party was unhappy with the coalition's reaction, stating that it did not reflect its shared policy. Leppä replied that this was not the case, which Ohisalo disagreed with (Kervinen, 2021).

The second case was about a new classification system to improve sustainable finance in Europe called the EU taxonomy for sustainable activities (European Commission, 2023). Its goal was to inform investors about what kind of investment opportunities were officially considered sustainable. Finland, which usually sided with the Commission's initiatives, criticized the EU in a letter signed together with the Prime Minister of Sweden for overstepping its authority by getting directly involved in its member states' forest management. They argued that the measures proposed were too administratively cumbersome and difficult to implement by local forest owners, and that the Commission used legally vague terminology like "environmentally friendly forest management" to describe its goals. Instead, they argued that the measures should lean more on existing legislation which clearly defined the limits of the Commission's powers (Sutinen, 2021).

The Greens' MEP Ville Niinistö expressed his discontent towards Prime Minister Marin and several CP ministers for allegedly acting against the government's shared environmental goals. Minister of the Environment Krista Mikkonen (Greens) gave a statement of which content was the opposite to that presented in the government's letter: that the existing EU legislation in its current state was practically insufficient for safeguarding carbon sinks and the biodiversity, and that the effectiveness of the classification system could be extended beyond the limits set by the legislation. According to Mikkonen the government's letter did not represent the SDP's coalition equally (Sutinen, 2021).

The vote on the taxonomy caused a confrontation in the government. The Greens and the Left Alliance felt that the Commission's proposal was not ambitious enough but still supported its approval (Welling, 2021). Despite the friction in relations, the Greens announced that they would not leave the government if it decided to oppose the taxonomy (Huhtanen, 2021). Meanwhile, the leader of the CP and the Minister of Finance Annika Saarikko stated that her party, the second largest in the coalition,

would vote against the proposal regardless of the stance of its government partners. The SDP worked to find a compromise between the two sides, ending up siding with the opponents. The explanation for this was that the Swedish government also had a negative opinion of the proposal and that the current statutes presented by the Commission were not sufficiently clear (Welling, 2021). In the end, the taxonomy was voted into force with 13 countries opposing it out of 20 required (Muilu, 2021).

487 kt of CO2e was emitted by the LULUCF sector, 105% less than last year. It increased total emissions by a percent and making 2021 the year the sector was a net emitter for the first time (OSF, 2023).

7.2.1. Interpretations (Volume Index of Forest Industry Output)

During the making of this analysis, it was found that:

- The production of Finnish wood increased and decreased according to foreign demand (Natural Resources Institute Finland, 2011–2021).
- The use of wood-based biofuels as a portion of national energy consumption increased throughout the observed period of time with temporary exceptions during the end of the NCP's government's term and the pandemic year of 2020.
- The portion of wood-biofuels, out of all used wood resources, started to gradually fall in 2012, increasing only after 2018, and unusually strongly in 2021.
- The yearly rate of industrial tree cutting changed regularly by over 5%. Changes greater than 10% only occurred in the beginning of the SDP's government's term in 2019 and when the Finnish economy began to recover from the effects of the pandemic in 2021.
- The removal capacity of carbon sinks declined, transforming the LULUCF sector from one that absorbs 40% of gross emissions to a net emitter (OSF, 2023).

During the NCP's term, the demand for wood in the Western countries decreased, shrinking the forest industry exports and logging. Both the output and the rate of industrial wood harvests increased at least partially in 2012 due to replacement demand from the Middle East and Asia. In 2014, production was again slowed down by the decreased demand (Natural Resources Institute Finland, 2011–2014).

As international trade was slowing down and traditional export methods were losing their effectiveness, there was a need to create new ways of accumulating revenue and rethinking old ones. Unlike the other major exports industry, mobile phone manufacturing (McCormack, 2013), the

forestry-based businesses were able to adapt to the changing conditions and provide jobs for much of the existing workforce (Roppola, 2014). The events that took place were called “structural change,” a process where obsolete forms of production get replaced with new, more profitable ones (Urpilainen & Ziabari, 2014). The hope for a successful transition may have been a factor in the government’s decision to cease its sale of publicly owned land to private customers in 2014 (Leisti, 2014).

Another decision was the creation of the 2013 forest law which gave forest owners more liberties to sell and manage their own woodlands (Jokiniemi & Puurunen, 2014). On one hand, this was a decision close to what was advocated by Gausset, Hoff, and Lex (2019): It took decision making closer to the grassroots level to the hands of people who had the most potential at taking care of it, unlocking the economic and the environmental potential of local proactiveness. However, it became clear that the law was primarily created with economic needs in mind, as many environmental organizations criticized it for not sufficiently accounting for the needs of biodiversity (Jokiniemi & Puurunen, 2014).

The CP’s coalition was determined to have Finland take advantage of the growing importance of bioeconomy which was visible in their expression of optimism about the availability of wood (Pohjanpalo, 2016). This view was challenged by environmental organizations and researchers, as was also found in the interpretative analysis #1: Annual Change in GDP Volume (Järvensivu, 2019 & see p. 60), and later by the Green League when it and the CP were simultaneously members of the government under the SDP as the Prime Minister party (Rinta-Jouppi, 2019). In the short term, structural changes favored the production of wood pulp which strengthened the forest industry’s profitability and the volume of investments (Luukka, 2016). It arguably also benefited the citizens by maintaining a historical tie to a familiar form of industry.

The CP’s government was unwilling to compromise its bio-economy policy due to its significant economic benefits. Even the EU was prepared to accept this development, presumably on these grounds, if Finland could meet its environmental targets in other ways (Kähkönen, Mykkänen, Pohjanpalo, & Teittinen, 2017).

The IPCC’s breaking report (Sutinen, 2018), while having a major effect on the following elections, did not have a notable effect on the ending CP’s government. The ruling Prime Minister party lost the elections, a common occurrence in Finnish politics, and the winner was the party most efficient at taking advantage of the current trends, as is further discussed in the analysis #4: Citizen’s Opinion on the Concern of Climate Change (see p. 84–85).

The forest industry was only marginally affected by the Covid-19 pandemic, as the industry was mainly hit by the decline in global demand for its products in 2020 (Härkönen, Kalliovirta, Kniivilä et al., 2020 p. 3). In 2021, the demand had already surpassed the pre-pandemic volume (OSF, 2023). Not all wood-based manufacturing sales fared as well, despite the easy availability of government support: demand for paper and its production continued its long decline (Autio STT & HS, 2020). The recovery of demand in 2021 triggered a strong increase in logging which had a major role in increasing the emissions. It accounted for 71% of the incline in emissions compared to last year's trend, discussed more in the interpretative analysis #1 (p. 61).

Although the SDP's government pursued a more ambitious climate policy compared to the Paris Agreement, it struggled to comply with the EU climate measures. The government was seemingly ready to achieve its climate goals in other ways than limiting the forest industry (Keski-Heikkilä, 2021, Kähkönen, Mykkänen, Pohjanpalo et al., 2017 & Sutinen, 2021). This created a conflict of interests within the SDP coalition, pitting environmentalists against defenders of the economy and the prosperous countryside. It ended up favoring the economic perspective, or otherwise did not appeal to the environmentalist side of the debate. The decisive role of the SDP, a party that did not possess as strong an opinion on these matters as the Greens or the CP, decided to side with the latter (Kervinen, 2021 & Welling, 2021). To do otherwise could have possibly threatened the survival of the coalition, as the CP had stated to not be flexible with its policy on letting the EU influence local forestry (Welling, 2021).

As logging has only increased in the long term, and the sinks decreased, it has become increasingly more difficult to reach the climate goals by limiting logging (OSF, 2023). As was found in the analysis #1: Annual Change in GDP Volume, the SDP's government, which took the most serious action on protecting the environment and the climate, was held back by the efforts of the CP when it came to limiting forestry (Pelli, 2023 & see page 62). The latter opposed the reduction in the profitability of the forest industry, citing the supposedly sufficient availability of wood (Rinta-Jouppi, 2019 & see page 62). This stance resulted in constant disagreements with the rest of the SDP's coalition, especially with the parties the Green League and the Left Alliance. This pressured the government to negotiate the impact of its climate policies to satisfy the needs of an individual major coalition partner.

The yearly Finnish climate report judged the SDP's government's efforts to do climate politics as ambitious but insufficient. The measures to reduce emissions were kept at a bare minimum. Meeting the targets was made more difficult by the collapse of the carbon sinks which the national climate policy was dependent on (Saavalainen, 2023).

It is evident that the Finnish forest industry has a special role in the Finnish politics, and that this makes it challenging for the politicians to regulate it. This is demonstrated by the fact that in 2021, the industry was responsible for as much as a fifth of the country's sold industrial production and a third of energy supply (OSF, 2023). It employed 100,000 directly and indirectly in a country of more than 5 million people (Forest industry, 2022). As shown by past crises, the industry has been prone to almost continuous structural changes which have created new jobs but have also threatened to lead to mass unemployment. Even if the changes were to occur less in the future, the decisions of the past three governments have shown that, due to its importance to the society, setting limits to the forest industry and forestry itself, even in the name of climate action, is not an easy feat in Finland.

Related Graphs (Volume Index of Forest Industry Output)

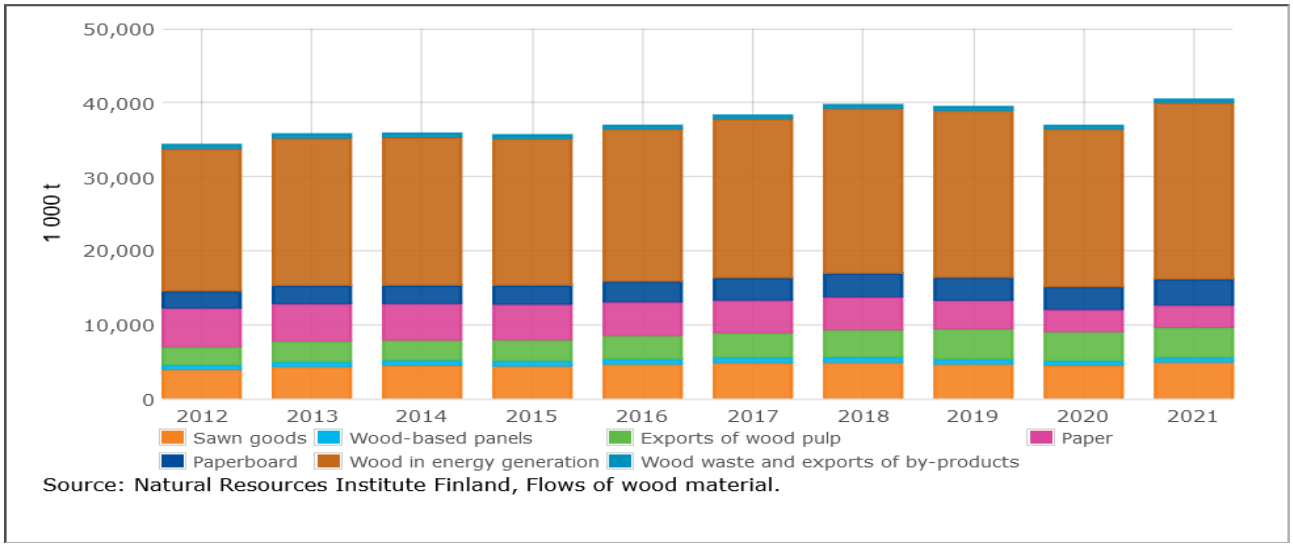


Image 23 – Flow of wood material 2021, or how harvested wood is used in Finland. The variables are included in each pillar starting from the top: 1) Wood waste and exports of by-products, 2) Wood in energy generation, 3) Paperboard, 4) Paper, 5) Exports of wood pulp, 6) Wood-based panels, 7) Sawn goods. Retrieved from: Natural Resources Institute Finland (2022).

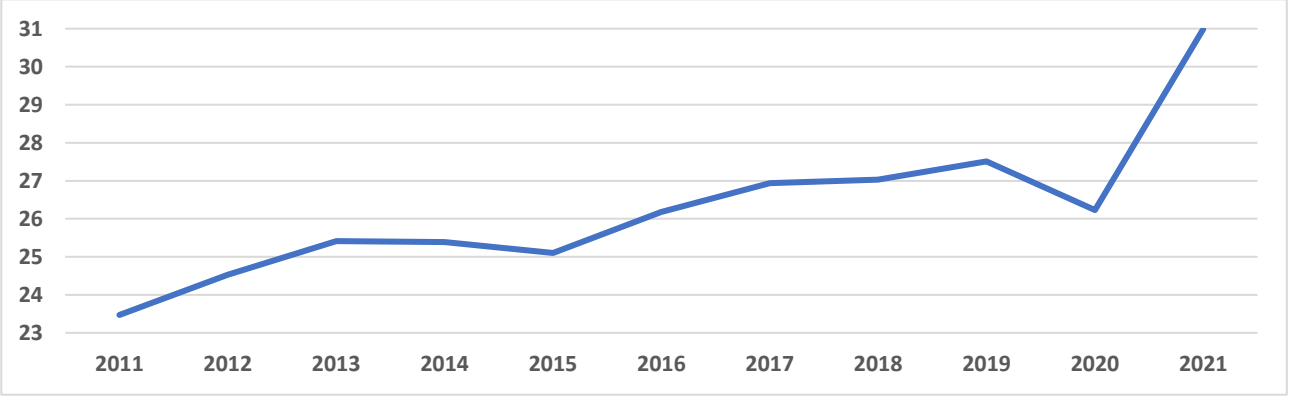


Image 24 – The quantity of wood in energy production in million cubic meters (1,000,000 m^3). Retrieved from OSF: Natural Resources Institute Finland (2023).

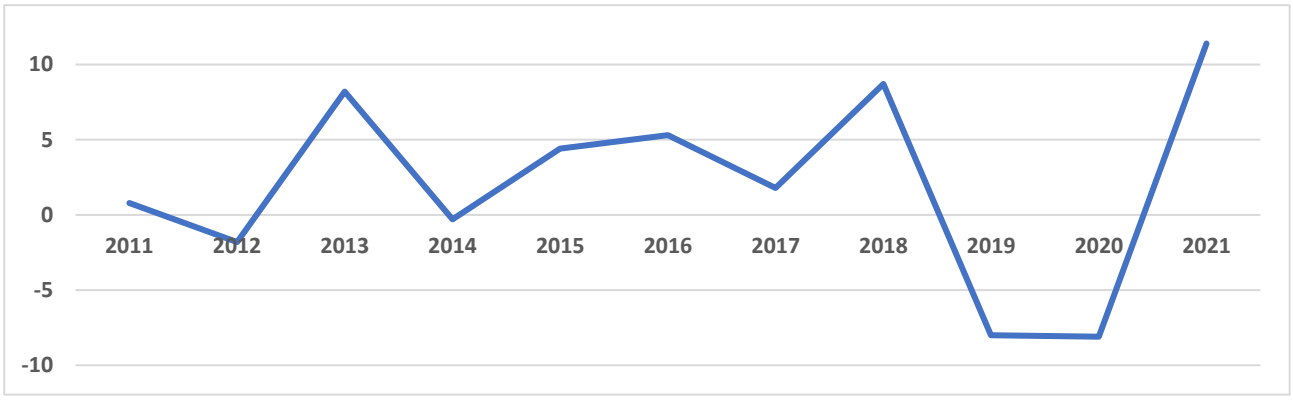


Image 25 – Annual change in industrial roundwood removals (%). Retrieved from OSF: Natural Resources Institute Finland (2023).

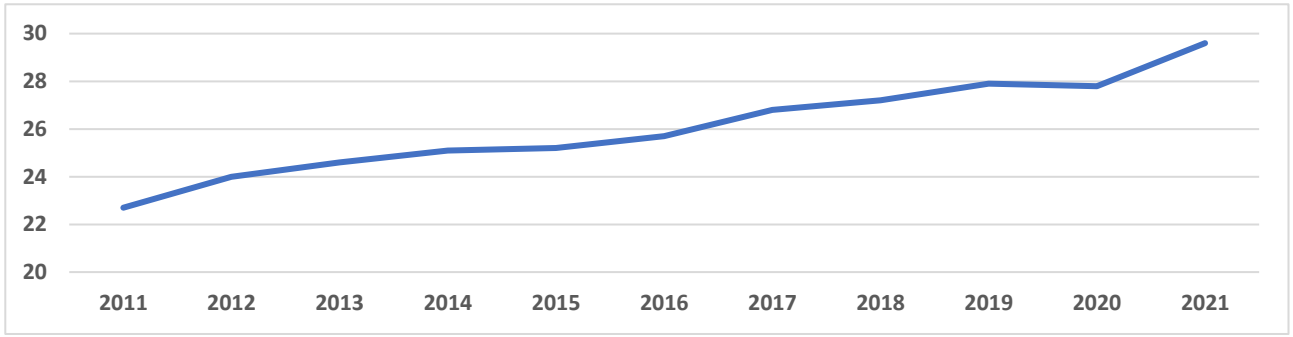


Image 26 – Wood's share of total energy consumption (%). Retrieved from OSF (2023).

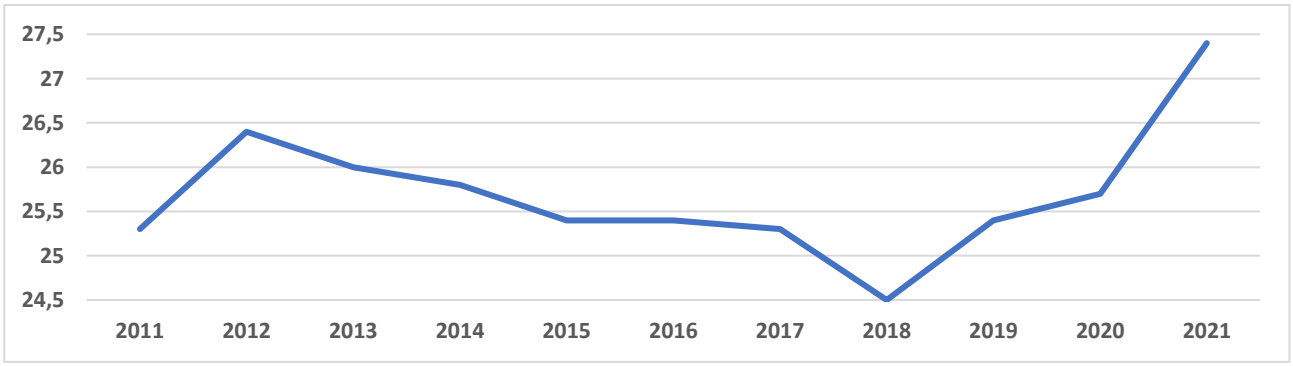


Image 27 – The share of wood-biofuel in the total use of wood (including by-products and wood residues) (%). Retrieved from OSF (2023).

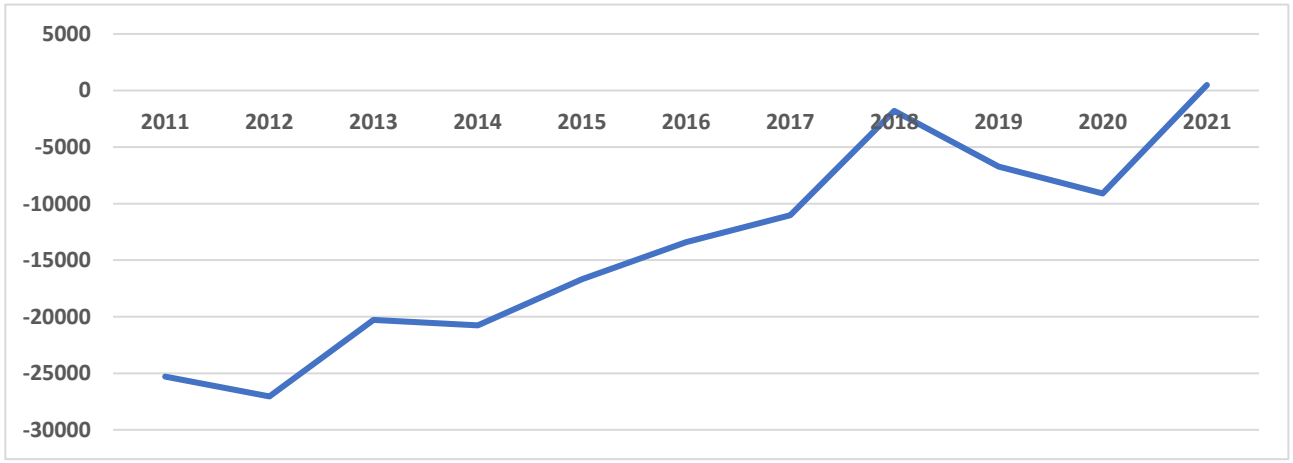


Image 28 – Emissions and removals of the LULUCF sectors (kt CO_2e). Retrieved from OSF (2023).

7.3. CITIZENS' OPINION ON THE CONCERN OF CLIMATE CHANGE

- *The National Coalition Party's Government (2011–2014)*

- In 2011, climate change was the 4th most concerning threat to the Finnish citizens (54%) out of 6 in total. It ranked higher than the ongoing events in Russia (47%) and the Middle East (49%). It ranked lower than cyber threats (59%), international terrorism (67%), and the spread of weapons of mass destruction (WMD, 69%).
- In 2012, climate change (59%) climbed up a rank to be the 3rd most concerning threat out of 6. It ranked above cyber threats (54%) and the situation in the Middle East (58%) and below the spread of WMDs (62%) and international terrorism (66%).
- In 2013, climate change (57%) came again in 3rd with similar results to those of the last year against 5 other variables. Cyber threats (50%) and the situation in the Middle East (56%) ranked below while the spread of WMDs (61%) and international terrorism (62%) ranked above climate change.
- In 2014, climate change (63%) ranked 4th out of 5 variables and was tied last with cyber threats. It ranked below the spread of WMDs (68%), international terrorism (74%), and the situation in Russia (75%). The recording of the situation in the Middle East stopped and would continue in 2018 (MTS, 2021 p. 75–79).

As the 2015 parliamentary elections drew near, the most pressing topic for the voters ended up being the state of the economy. The officials at the Ministry of Finance gave a recommendation to cut the national budget by €4 billion. The NCP, the previous prime minister party, agreed to this, while the SDP and the Greens were ready to cut only half as much. The Left Alliance rejected the idea altogether. Due to a request from the President of the Republic, Sauli Niinistö, the running parties agreed on a shared foreign policy and did not use it as a talking point during the elections. The winning party, the CP, was by far the most popular candidate, with a 5.3% increase in support from the previous election, while the Finns, the NCP and the SDP competed for second place (Hämäläinen, 2015).

The CP (21.1%) promised to stabilize the economy and reduce the use of fossil fuels from energy production. It pledged to do this by encouraging growth in new forms of industry such as creative industries and those of bioeconomy, creating 200,000 jobs in the process. According to the CP, bioeconomy had the potential of becoming a "billion-euro success story for all of Finland" (Centre Party, 2015 p. 3–6). The party coming in second was the NCP (18.2%). It pledged similarly to fix the weakened economy by loosening restrictions and taxation for enterprises with sustainable practices

and using renewable resources. The NCP also wanted to expand bioeconomy related activities and was ready to support more nuclear power (National Coalition, 2015 p. 3–4, 11). In third, the Finns Party (17.7%) were determined to improve the economy by reducing taxes and cutting spendings from immigration and foreign aid which it saw as redundant. It also pledged to increase defense spendings and improve internal security (Finns Party, 2015 p. 1).

- Relevant surveys (NCP's government's term)

According to the EU-wide survey called the Eurobarometer, conducted and published in 2011, **54%** of the Finnish citizens considered climate change a very serious problem (7–10/10), whereas for the EU average, the percentage was **68%**. **29%** of Europeans 'totally agreed' and **49%** 'tended to agree' that the measures to combat climate change would create new jobs and strengthen the economy. Among the Finnish respondents, the corresponding numbers were **24%** and **57%**. When it came to determining who is responsible for tackling climate change within the EU with the possibility of choosing multiple answers, the Finnish respondents answered that the businesses and industries (**46%**), the national governments (**40%**) and the EU (**33%**) were the most responsible while **39%** answered that the citizens themselves were responsible. For the EU average, the corresponding numbers were **31%**, **45%**, **31%** and **21%**. According to the Finnish respondents, poverty, hunger, and lack of drinking water were the most serious global issues followed by climate change and international terrorism (European Commission, 2011).

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According to a survey conducted by the market research company Taloustutkimus for the television channel Nelonen in 2012, the concern about climate change had decreased in the past four years. Previously, 40% of the respondents thought of global warming as a very serious threat. At the time of the survey, that number was 23%. One of the reasons given was that climate change was not discussed as much as in the past, as the public shock of the phenomenon in the early 2000s had subsided. Director of research of Taloustutkimus Jukka Rahkonen speculated that people's interest in climate change may also have declined due to the economic crises that took place in the past few years.

Over 1,000 people participated in the survey (STT-HS, 2012).

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The later 2014 Eurobarometer revealed that Finnish people were less concerned about climate change than citizens of the EU on average. Around **56%** of Finnish people deemed climate change a very

serious problem (7–10/10), while the same number was **69%** for the EU. **31%** of Europeans totally agreed and **49%** tended to agree that it was possible to improve the economy and employment by mitigating climate change. For Finland, these number were **21%** and **61%**. In Finland, business and industry (**51%**), national governments (**48%**) and the EU (**32%**) were deemed the most responsible for mitigating climate change within the EU, with the possibility of choosing multiple answers, while **32%** believed that the responsibility belonged to the ordinary people. For the EU as a whole, the numbers were **41%**, **48%**, **39%** and **25%**. In 2014, poverty, hunger and lack of drinking water were again seen as the most serious global problem by the Finnish people followed by climate change and the economic situation (European Commission, 2014).

- *The Centre Party's Government (2015–2018)*

- In 2015, climate change (72%) came in 2nd out of 5 variables, being only beaten by international terrorism (83%). Below it ranked the situation in Russia (69%) and the spread of WMDs (71%).
- In 2016, climate change (71%) came in 5th place out of 10 variables. It ranked above social inequality in Finland (69%) and racism (70%), and below the situation in Russia (72%), political extremism (74%), and international terrorism (75%). "The global refugee situation" (85%) was the biggest cause of concern for the Finnish people.
- In 2017, climate change (75%) was ranked the 3rd greatest threat out of 11, with racism (69%) and political extremism (72%) ranking below, and international terrorism (81%) and the global refugee situation (83%) ranking above it.
- In 2018, climate change was the greatest source of concern for the Finnish citizens out of 13 different threats. Below it, as the third and the second, ranked the global refugee situation (87%) and international terrorism (88%) (MTS, 2021 p. 75–79).

The environment and the climate ended up being central themes of the 2019 elections. The climate related discussions were divided into two talking points. First was the general stance on climate change which was agreed on by all the running parties with the exception of the Finns Party. It represented the concerns of the citizens who feared that new climate policies would affect their lives negatively. The second talking point was forestry, on which the biggest contrast was seen between the CP and the Greens. The former advocated for securing a sufficient supply of wood for the industry,

while the latter demanded reduced logging. The SDP had to act more moderately both in the interest of the labor unions and its environmentalist supporters (Lappalainen, 2019).

The SDP (17.7%), the winner of the elections, pledged to tighten national climate ambitions in a way that takes into account the vulnerable members of society. The plan was to achieve carbon neutrality by 2035 by e.g., protecting biodiversity and making Finland one of the first developed countries to phase out coal (SDP, 2019 p. 4, 14–16). The Finns (17.5%) climbed up a rank from the last elections and came in second. To them, tighter climate policies meant unnecessary costs for the public and private sectors as well as losing jobs to foreign countries. They advocated for loosening climate ambitions so that Finland would not do more than the minimum set by the EU regulations to achieve carbon neutrality by 2050 (Finns Party, 2019 p. 7). Immigration did not become as major of a theme during the elections as was expected. The Finns saw most success with their anti-immigration stance in the city of Oulu, where several high-profile sexual offences took place in autumn of 2018 (Lappalainen, 2019). The NCP (17%) came in third. Their plan was to implement a tax reform that would make it easier to practice entrepreneurship and business of e.g., new technology, as well as reduce emissions by increasing the use of renewable energy sources and nuclear power (National Coalition, 2019 # 1, 15, 82). The biggest reasons for why the party ranked only third were healthcare related. Before the elections, the media reported a scandal of mismanagement and negligence in some private nursing homes. As the matter was serious in a country with a rapidly aging population, it inflicted some reputational damage to the NCP, a party known for being an advocate of privatized healthcare (Lappalainen, 2019).

- Relevant surveys (CP's government's term)

A climate barometer conducted by the market research company TNS Gallup found in its survey, published in April 2015, that most Finnish citizens, 77% of respondents, thought of the climate change as a major global threat. However, this was not visible in their willingness to change their everyday habits. There was, however, interest in increasing the use of renewable energy even if it resulted in increasing energy prices. There was also demand for technological solutions to help make personal energy consumption more efficient. People hoped for more active participation from political decision makers as well as the private sector. Climate change was seen by 80% of the respondents as a way to improve national competitiveness and create new jobs. Large countries like China, India and USA were seen as having a key role in combating climate change, while that of Finland and the EU was perceived as much lesser. Four out of five respondents hoped that the upcoming international climate

negotiations, the Paris Climate Summit, would produce a functional agreement that could help reduce emissions on a global scale.

The most divisive topic was the support to the developing countries. Under a half though that wealthier countries should give development aid to other countries to help them adapt to climate change. In a separate survey, a half of the respondents though that a greater portion of support should be directed towards climate change mitigation and adaptation. 22% of the supporters of the Finns Party thought that wealthy countries should give aid to those who are most vulnerable to the effects of climate change. The corresponding number of the Left Alliance was 65%. The supporters of the NCP and the SDP were more diverse in their opinions about the matter.

1,005 respondents with 15–74 years of age took part in the survey (Saavalainen, 2015).

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A survey conducted by Taloustutkimus for YLE in 2018 found that the Finnish people had become more concerned about climate change since the years of economic crisis and recession. According to it, 59% of Finnish citizens saw climate change as a very serious problem. When the same question was last posed in 2012, only 23% of Finns held this view. During the economic crisis of 2008, the corresponding number was 43%. Jyri Seppälä, Professor and Director of the Finnish Environment Institute's Consumption and Production Centre, believed that in addition to the improved economic situation, people's opinions have been influenced by the fact that more scientific information on the effects of climate change has been published in recent years. Seppälä argued that in the future, the economy will have less influence on people's attitudes towards global warming. This is because Finnish attitudes were seen as being driven by a high level of education and confidence in society and science.

Climate change has also had a concrete effect on the everyday lives of the Finnish people in the form of the 2015 refugee crisis. Most Finns came to understand that climate change was a result of human activity with only 2% disagreeing. According to the postdoctoral researcher Dr. Panu Pihkala, another reason for the current opinions was the Finns' strong attachment to nature, which, while weakened in recent decades, was still greater than that of the EU citizens on average. Pihkala believed that people who are affected by the increasing destabilization of winter weather perceive climate change more easily as a whole instead of just as individual weather phenomena. This has caused mental stress for parents who are concerned about the future of their children and grandchildren in the form of feelings of guilt and shame. Pihkala speculated this to be a partial explanation for why, according to the survey,

most Finnish citizens, especially women, think that their country should act to tackle climate change despite of what other countries decide to do.

The survey was conducted on 1,117 respondents. The margin of error was 2.5% (Hallamaa, 2018).

- *The Social Democratic Party's Government (2019–2022)*

- In 2019, climate change (75%) moved to 3rd place out of 15 and was tied with organized crime, political extremism, and the spread of the WMDs. They all ranked above the termination of arms control agreements (69%) and the tied cyber threats and the situation in the Middle East (71%). On the other hand, they ranked below international terrorism (81%) and the global refugee situation (82%).
- In 2020, climate change (73%) came in 6th against 16 variables and was tied with cyber threats and political extremism. Above it ranked the spread of WMDs (75%), organized crime (76%), international terrorism (77%), the global refugee situation (78%), and epidemics (81%).
- In 2021, climate change (68%) ranked 7th out of 17, tied with the situation in Russia. Above climate change came political extremism (70%), the spread of WMDs (72%), epidemics (74%), the tied global refugee situation and international terrorism (75%), organized crime (76%), and cyber threats (78%).
- In 2022, climate change (66%) came in 8th when compared to 21 variables and was tied with organized crime and the threat of war. Above climate change ranked the tied cyber threats and political extremism (69%), the security situation around the Baltic Sea region (70%), the spread of WMDs (71%), the global refugee situation (75%), economic inflation (82%), Russia's invasion of Ukraine (84%), and the tied availability of energy and situation in Russia (85%) (MTS, 2021 p. 75–79).

The state of the economy was once again the central topic during the 2023 parliamentary elections. By the end of the SDP's coalition's term, the national economy was estimated to be in deficit by €146 billion (HS-STT, 2022). Parliamentary opposition, especially the NCP and the Finns Party, criticized the government for careless borrowing (Muhonen, 2022).

This ended up being an important political tool for the NCP which got itself elected for the following term by promising to correct the "living on debt" of the previous government (Hakahuhta & Pelli, 2023). Other major topics included inflation, energy prices, and the funding of the new wellbeing

services counties established under the SDP's government (Nalbantoglu & Niemi, 2022). National security was relatively absent as an electoral theme. This was because its most pressing topic at the time, joining the Western defensive alliance NATO as a reaction to Russia's war of aggression against Ukraine, was decided earlier by the SDP's government. The parties in the government decided to lead Finland into the alliance preventing their political rivals, especially the NCP, a long-time NATO advocate, from politicizing the membership (Duxbury, 2022).

The elections program of the winning NCP (20.8%) had a major influence on the general theme of the elections: cutting state debt and improving competitiveness. The NCP pledged to do this by improving the possibilities of private entrepreneurship and cutting public spending (National Coalition, 2023 # 1.1–1.2, 2.3). The party decided to not back down on the 2035 carbon neutrality goal set by the SDP's coalition (Aaltonen, 2023 & Pennanen, 2023). The party coming in second was the Finns (20.1%). This year, instead of having an elections program, it had multiple case-specific programs describing the party's general goals. The topics were climate, education, economy, and immigration (Finns Party, 2023). The Finns advocated for cutting private spendings and opposed raising taxes (Hyytinen, 2022). They supported tightening immigration rules as a way to increase state savings and to improve everyday security (Piirainen, 2022 & Kinnunen, 2023). Climate wise, the party held on to last year's policy of postponing carbon neutrality to 2050 (Finns Party, 2023 p. 3). In third place was the winning party of the last election, the SDP (19.9%). It also suggested cutting spending by €3.5–6 billion (SDP, 2023). However, the party was more willing to achieve the demanded economic improvements by increasing the employment rate rather than by cutting spendings (Sundman, 2023).

At the time of the elections, a division was perceived by the voters between "left" (SDP, Greens, Left A.) and "right" (NCP, Finns) wing parties (Hallonblad, 2023). This categorization was popular among voters even if it did not truthfully represent the nature of Finnish politics. The supporters of the left side mostly rallied around the SDP and its internationally popular leader Sanna Marin**.** The left supporters believed that tactically voting for the SDP would prevent an undesirable party from getting elected (Lakka, 2023). The right faction, with the NCP as its most visible party, claimed that the current economic challenges were a result of misguided policies of the "left-wing" parties currently in the government (vasemmistohallitus) (National Coalition & Paananen, 2022).

To the economist Sixten Korkman, the discussion around the state debt seemed to spread unjustified fears about the state of the public economy among the voters. To him, "the right" exaggerated the topic while "the left" did not give it enough value. This difference ultimately favored the former

group, as citizens had bad experiences of previous economic crises and had a traditionally negative view of debt (Saarinen, 2023).

- Relevant surveys (SDP's government's term)

According to the 2019 survey conducted by Kantar TNS for Helsingin Sanomat, a 65% majority of nationals thought that stopping global warming should be the primary goal of the government. Additionally, as a forerunner, Finland should reduce its emissions quicker than before according to 63%. However, many of the respondents thought that the measures should not affect them personally. The most favored measure was to reduce emissions somewhere outside of Finland and the EU.

According to Professor Eva Heiskanen at the Centre for Consumer Research, University of Helsinki, the contradicting opinions were a result of the whole population shifting from the voting phase of the "climate elections" to debating how promises made during the elections should be applied in practice. This was a positive thing, Heiskanen added, because it showed that the citizens are taking climate change and its implications on everyday life seriously. It also showed that climate change was becoming a normal political matter for which people needed to negotiate a fair distribution of costs and benefits. The leading expert of the Finnish Innovation Fund (Sitra) Anu Mänty believed that more people would adopt climate measures if they saw others do the same.

The survey also asked about the respondents' opinion on giving up the promotion of biofuels. They were seen as a solution to traffic emissions. However, their supply has been determined to be unsustainable, as they require much land area, might compete with food production, and endanger the forests' ability to effectively remove carbon. Over half of respondents were against stopping the promotion of biofuels. A third of respondents gave a neutral answer to the question.

Despite broad support for state level climate policies, 44% of Finnish people believed that stopping global warming was not a realistic goal. Heiskanen mentions that uncertainty had increased globally as a result of political polarization and the rise of populist movements. As an example, the leaderships of some countries, namely the United States, Brazil and Russia had backed down on some of their past climate measures. In Finland, the supporters of the CP were the most optimistic about the provisions of achieving the climate goals, while the most pessimistic were those of the Finns Party.

The results of the survey showed, according to Heiskanen, that the newly elected SDP's government should prepare such a broad climate policy that it would apply to as many people as possible. That way it would be the easiest for the voters to accept. Additionally, it would be necessary to correct any

existing measures which cause an unreasonable amount of inconvenience to some groups in comparison to others. Politicians should also be willing to discuss and explain the implementation of these measures to maintain public trust.

The survey was conducted on 1,103 respondents 15–74 years old. The residents of the autonomous region of Åland were not included in the survey. The margin of error was around 3% (Elonen, 2019).

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The Finnish Business and Policy Forum (EVA) conducted a survey in 2020 which found that 77% of Finnish citizens regarded the new economic crisis caused by the Covid-19 pandemic as the greatest threat to themselves or to Finland. Infectious diseases and the pandemic itself were seen as the second greatest threat. According to the survey, 54% of men, 15% less than two years ago, were concerned about climate change. For women, the number was 78% and had not changed significantly from earlier. The situation was different from 2018 during which climate change was the greatest threat. Now it was fourth. It was beaten for third place by the concern about immigration. The people concerned about migrants were mostly Finns Party supporters. This worry had also increased among the supporters of the Left Alliance, the CP, and the Greens.

The survey was conducted on 2,060 people between the age of 18–70 years. The margin of error was 2–3% (Kukkonen, 2020).

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Kantar TNS conducted a survey for Helsingin Sanomat in 2021, published in July, according to which the attitudes of the citizens did not change much since 2019. The survey divided the people into two groups. Every second respondent agreed that Finland is a pioneer in climate change mitigation work. 48% was ready to give up some of their current habits to combat climate change. 48% did not believe that the effects of climate change were exaggerated in public speech. 53% believed that effective climate change mitigation also requires forceful means while the rest believed that sufficient action would be taken out of people's own free will. The Director of Research Sakari Nurmela of Kantar TNS believed that a major reason for this can be found in the citizens' political identities. The Assistant Professor Annukka Vainio at the University of Helsinki added that climate change as an issue had a polarizing effect on the population. Supporters of the Greens and the Left Alliance were found to be the most passionate about climate change while those of the Finns Party were the least enthusiastic.

Kantar TNS Surveyed 1,027 people. The margin of error was 3% (Kervinen, 2021).

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According to a report published by the EVA in August 2021, the attitudes of the Finnish people towards the threat of climate change changed in the past 15 years. The opinion of the citizens had noticeably polarized compared to before. The report was about a survey which asked its respondents to express their opinion to a claim that climate change is the greatest current environmental threat against which effective measures are needed all around the world. Supporter groups of some parties had a strong shared opinion about the matter, while some were more divided. Especially the opinion of the supporters of the Finns Party had changed. In 2006, 87% agreed with the statement, while the latest result was 31%. The worry among the supporters of the CP, the NCP and the Swedish People's Party had also waned down in 15 years by around 10% but was still more than 70%. 97% of the supporters of the Greens and 92% of the Left Alliance agreed with EVA's statement. 15 years ago, 86% of all respondents agreed, now it was 71%. In 2020, the number was 69%. The answers divided the respondent group into young and old, those highly educated and those with basic education, women and men, city and countryside dwellers, the former being more concerned about climate change than the latter. The respondents were also asked if the government's climate targets should be softened, and more emphasis should be placed on improving employment after the Covid-19 pandemic. 43% agreed while 43% disagreed. According to the economist of EVA Sanna Kurronen, the question divided the respondents into opposing groups according to political left-right orientation.

The survey was conducted on 2,059 respondents representing the 18–79-year-old citizens. The statistical analysis was conducted by Yhdyskuntatutkimus oy (Keski-Heikkilä, 2021).

7.3.1. Interpretations (Citizens' Opinion on the Concern of Climate Change)

The status of climate change as a perceived threat to society slowly strengthened during the NCP's government's term of office. It was consistently overtaken by international terrorism and the spread of weapons of mass destruction. In 2014, the situation in Russia took the first place as a result of sudden changes in geopolitics (MTS, 2021 p. 75–79). This year, Russia illegally occupied the Ukrainian region of Crimea by using military force (Britannica, 2023). This worsened Russia's relations with many Western countries, including Finland (YLE News, 2015). The occupation also affected Finland economically, as it was committed to the shared policy of the EU to impose economic sanctions on Russia, a major trading partner, together with the rest of the member states (YLE News, 2014).

The state of the national economy was the main talking point of the 2015 parliamentary elections (Hämäläinen, 2015). The economy was in recession already during the previous NCP's government's term which negatively affected exports and employment (OSF, 2012 & 2014–2016), the latter of which the NCP's coalition failed to improve (Pohjanpalo, 2014 & see p. 63). It could have also contributed to people's decreased interest towards climate change (STT-HS, 2012). During the NCP's term in office, people's confidence that climate change mitigation can improve the economy and create jobs only declined. In 2011, 24% of the respondents strongly believed that tackling climate change would bring economic benefits, while in 2014, the number was 21%. Meanwhile, the corresponding numbers for the EU citizens as a whole grew from 29% to 31%. The state of the economy emerged as a significant source of concern for both groups during this period (European Commission, 2011 & 2014).

In 2015, all three of the most popular political parties agreed to form the government. This meant that a small number of parties represented a clear majority of the interest of the citizens. As opposed to the previous coalition, where all kinds of ideological orientations where represented, the CP's government was noticeably more homogenous by not having any parties from the left or center-left side of the left-right ideological axis. The parties shared mostly similar policies: To improve the economy and the employment rate, to advance climate goals by using more renewable sources in energy production while employing the many uses of biomass, and to strengthen Finland's internal and external security (Centre Party, 2015 p. 3–5, National Coalition, 2015 p. 3–4, 11 & Finns Party, 2015 p. 1).

According to the Eurobarometer, the Finnish people emphasized industries and businesses, the national government and the ordinary citizens as being primarily responsible for climate change mitigation in 2011. The role of the EU was seen as slightly lesser. In 2014, the perception of the importance of industries and businesses, as well as the national government strengthened, while the views on the EU stayed about the same. What was new was that fewer people believed that individual citizens should hold responsibility for climate change (European Commission, 2011 & 2014). This might suggest that in 2014, more people believed climate goals to be a matter of structural corrections through political decision making rather than individual lifestyle changes.

During the CP's government's term, climate change climbed from being a secondary concern to becoming the greatest generally perceived threat in 2019. The rising trend was momentarily obstructed in 2016 when several variables pushed past climate change, led by international terrorism and the global refugee crisis (MTS, 2021 p. 75–79). The latter was a result of a strong sudden surge

in migration of refugees from North Africa and the Middle East to Europe in 2015. Around a million people arrived in the continent in search of security and a better life. This put a considerable strain on European economies, raising concern over future immigration waves of similar scale (Aiyar, Barkbu, Batini et al., 2015 p. 4–5, 7). Concerns about terrorism also peaked in 2018 during the CP's government (MTS, 2021 p. 75–79). The research director at the University of Helsinki's Centre for European Studies Juhana Aunesluoma speculated that this happened because of a terrorist attack that took place in the city of Turku in 2017 (Stenger, 2018).

Despite the concerns over excessive immigration and terrorism, topics related to immigration or radicalism did not influence the 2019 elections as much as one could have possibly expected (Lappalainen, 2019). Foreign aid, on the other hand, sparked debate among citizens. In the related survey the respondents were divided into two equally large, opposing groups. The fact that the supporters of the Left Alliance and the right-wing Finns Party were the least scattered between the two groups and opposing each other suggests that the division was ideologically motivated (Saavalainen, 2015). Similar polarization can be detected from surveys conducted during the SDP's government's term in office (Kervinen, 2021 & Keski-Heikkilä, 2021).

Climate change and environmental protection were both central talking points during the 2019 parliamentary elections. All the participating parties, with the exception of the Finns, had a shared understanding of the positive importance of getting Finland to reach carbon neutrality in time (Hara, 2018). There was also a disagreement about the ideal method of conducting forestry among two parties which in the end made it into the government: the Greens and the CP (Lappalainen, 2019). Only one party made it into the government from the three of the most popular parties, the Prime Minister party SDP, which was a striking change from the previous elections. The party's bold promises about a more tightened climate policy at a time when such a promise was in high demand seemed to be a factor in this (MTS, 2021 p. 75–79 & SDP, 2019 p. 4, 14–16).

Professor Jyri Seppälä mentioned the improvement of the national economy and a more plentiful availability of information on climate change as the main reasons for why there was such high demand for tackling climate change. Seppälä also speculated the high level of education and trust in society for being potential factors, while Dr. Panu Pihkala suggested traditional relation to nature (Hallamaa, 2018). Data used in the first interpretative analysis: Annual Change in GDP Growth, supports the

economic explanation. Unlike under the previous NCP's government, the CP's coalition's term saw significant GDP growth which began to slow down only in the last year of its term (image 4, p. 51).

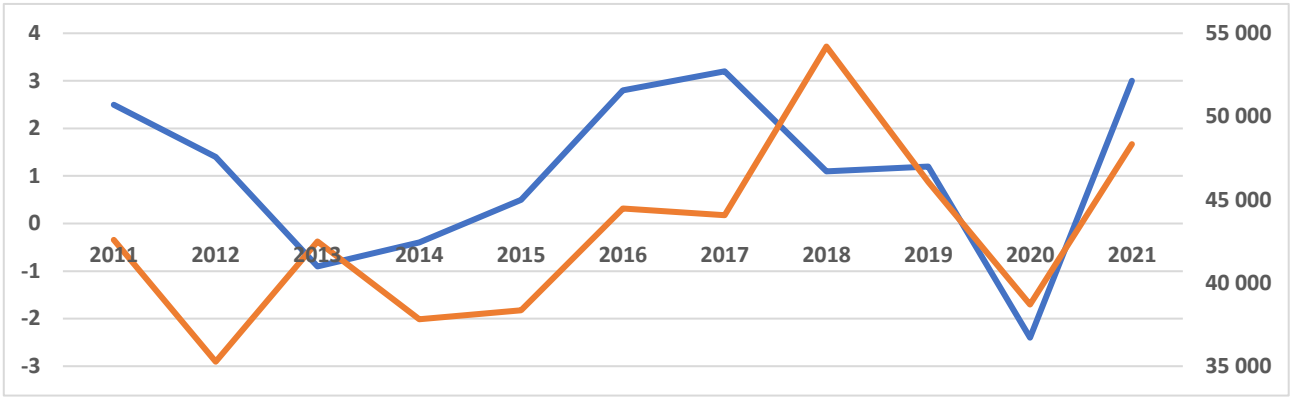

Image 4 – The independent variable **#1**: Annual Change in GDP Volume (%) (from p. 51)

However, this does not mean that the interest towards climate change was nonexistent before the end of the CP's government's term, as already in 2015, people hoped that the Paris Climate Agreement would make a difference at reducing global emissions (Saavalainen, 2015). The citizens were still not eager to significantly change their own lifestyles for the climate, instead demanding the politicians to find a solution to the problem. Finnish people also largely believed that Finland and the EU were not key actors in fighting climate change; this role was seen to belong to more major emitters: China, India, and the USA (Saavalainen, 2015).

Climate measures still received plenty of attention from the public after the end of the 2019 elections. In a 2019 survey, a majority thought that fighting climate change should be a high priority for the SDP's government. The surveyed group was divided in many ways according to what they thought was the most convenient way of achieving climate goals. These conveniences usually benefitted the respondent themselves at someone else's expense e.g., the measures which involved removing emissions from outside Finland and the EU were the most popular. According to Professor Eva Heiskanen this was normal, as it showed that people took climate change mitigation and its possible effects on their lives seriously (Elonen, 2019 & see p. 89).

Peoples' concern over climate change began to soon fall to the pre-elections level after the start of the SDP's government's term. It began its last decline in 2020, when the Covid-19 pandemic fully emerged in Finland. Even more than the pandemic, the people were worried of its effects on the economy (Kukkonen, 2020 & MTS, 2021 p. 75–79). After the pandemic, the state of the economy once again dominated political discussion as the political opposition drew attention to the SDP's government's increased debt taking, raising concerns (HS-STT, 2022).

Public debt was a decisive talking point for the NCP who won the parliamentary elections in 2023 by promising to correct the “living on debt” of the previous government (Hakahuhta & Pelli, 2023). Economist Sixten Korkman commented the events, stating that even though the issue concerning the increased debt was real, its effects on the economy were greatly exaggerated. Finnish citizens having generally a negative opinion on debt and taking on debt was seen as beneficial for the NCP during the elections (Saarinen, 2023).

The discussions surrounding the elections divided the nation into two groups, the left and the right, according to their general ideological beliefs. This was also true for the climate change discourse. Around half of the respondents thought that Finland should ambitiously combat climate change and that the country is a forerunner in the field of climate politics. This division was visible throughout the SDP’s government’s term and was likely rooted in the respondents’ personal political values (Kervinen, 2021). The division related to climate change, however, likely did not have as much of an impact on the elections since the state of the economy was the main point of focus and since the participating political parties, largely excluding the Finns, agreed that meeting climate goals was a high priority (Hara, 2018).

This polarization was the result of a decade-long change in the political climate. In total, people’s interest towards climate change had declined during the past 15 years. The fact that this decline in interest occurred particularly among the right-wing and center supporters of the Finns Party, the CP, the NCP, and the Swedish People's Party, rather than the more left-wing Greens and the Left Alliance, supports the argument that the split was ideological (Keski-Heikkilä, 2021). The most curious detail about this was that, according to a 2019 survey, the supporters of the CP were the most optimistic about Finland’s ability to reach carbon neutrality by 2035 (Elonen, 2019).

7.4. PRICE OF COAL FOR ELECTRICITY PRODUCTION

- *The National Coalition Party's Government (2011–2014)*

- 2011 -

In 2011, the price of coal increased from the last year's level. During the first quarter of the year, the increase in price was 100%, and for the rest of the year 70% when compared to the same quarter the previous year. The cost of coal was slightly lower than for other fuels due to changes in excise tax (OSF, 2022). This year, 40,329 GWh of coal was consumed accounting for around 10.4% of Finland's energy consumption (OSF, 2023).

The consumption of coal increased from the previous year's level. This was due to the economy recovering from the effects of the 2008 economic crisis, which had previously kept energy use low (Arola, 2011).

- 2012 -

In 2012, the cost of coal began to decline. In the first quarter, it was 6% lower than the year before. The percentage grew by each quarter, reaching 10% in the last quarter of the year (OSF, 2022). 34,070 GWh of coal was consumed, accounting for around 8.9% of energy consumption (OSF, 2023). The same year, the oil company BP published a report which stated that the global consumption of coal increased significantly, by 30% in 2011, the same amount as there was renewable energy production not including hydro power (Helsingin Sanomat, 2012).

In July, the Minister of Economic Affairs Jyri Häkämies informed Helsingin Sanomat (Perttu, 2012) about a clean energy program he was about to present to the government in autumn. The aim was to promote sustainable solutions and the phase out of oil and coal in energy production by 2025. This raised concerns among energy companies, as alternative energy sources to burning coal were not available. Bioenergy and peat were considered the best options, but their availability was low at the time throughout Europe (Juuti, 2012).

Later that year, Häkämies became a director of the Confederation of Finnish Industries. At this point, his stance on coal was more moderate. This became apparent in one of Häkämies' statements,

according to which the government's goal should be to replace foreign energy sources with domestic ones, and to promote the creation of new jobs for the citizens in the process. He also stated that "this will require the implementation of nuclear power projects, progress in wind power development and new innovations in bioenergy." (Saavalainen, 2012).

- 2013 -

In 2013, the decline of the coal price continued, being 3%–6% lower around the year in comparison to the previous year. Due to rising prices in the Nordic electricity market and low EU emission allowance prices, the use of coal in electricity production quadrupled (OSF, 2022). This year, 42,031 GWh of coal was consumed accounting for around 11% of energy consumption (OSF, 2023).

The lack of peat put pressure on energy companies to use the more affordable coal instead, increasing consumer price of energy. This made the government's pledge to reduce the use of peat without replacing it with coal, discussed in the interpretative analysis #1: Annual Change in GDP Volume (p. 58), more difficult. Another factor was the reduction in electricity supplied by Scandinavian hydropower plants to the regional energy market and the slow economic growth in the rest of Europe. A lowered need for energy led to smaller prices for emissions allowances (Saarinen, 2013).

A decision was made by the government to raise taxes for peat and to cut subsidies for wood chips used as biofuel. The intension was to strengthen renewable energy, but the result was the opposite. According to the consulting company Pöyry, due to this decision, foreign coal gained an upper hand in the energy market over domestic sources. The company recommended that the mentioned taxes and subsidies be restored to last year's level (Seppälä, 2013).

The Minister of Economic Affairs Jan Vapaavuori replied to Pöyry by promising that the government would react to the mishap. He explained that the wood chip subsidies were lowered because of the alteration in the taxation of peat. Not doing so would have been against the rules of the EU, as the two fuel types are each other's economic competitors. The solution to the problem would not be easy nor quick, Vapaavuori added: The applied measures were already agreed on at the beginning of the term during the planning of the government program. Any act to influence the fuel prices now would cost at least €50 million to the national economy (Arola, 2013).

- 2014 -

In 2014, in the first quarter, the consumption of coal decreased due to an unusually warm winter, lowering prices. The cost of coal decreased by 6% in the first quarter in comparison to the previous year, while in the third, it declined by only 1% (OSF, 2022). 35,047 GWh of coal was consumed accounting for 9.3% of energy consumption (OSF, 2023).

The parliamentary opposition criticized the government's climate policy as ineffective. The major talking point was the last years' displacement of domestic energy sources by coal. Jussi Niinistö, the leader of the Green League, a government party, admitted that the climate policy had room for improvement but added that the accusations towards it were exaggerated. Niinistö pointed out that the use of coal in energy production had decreased during the government's term (Sutinen, 2014).

The Finnish Member of the European Parliament (MEP) and the newly out of office European Commissioner for Economic and Monetary Affairs and the Euro Olli Rehn (CP) deemed the costliness of Finland's energy transition as natural, stating that influencing energy production and traffic by legislation and subsidies is a meaningful way to encourage sustainable behavior. This meant that the government should encourage citizens to consume in a way that meets the objectives of the national climate policy despite its momentary high cost. The Finnish member of the European Parliament Miapetra Kumpula-Natri also defended the NCP's government by stating that the locally imposed taxation and subsidy changes did not significantly affect the competitiveness of peat and biomass against coal as the value of coal was plummeting everywhere in the world (Elonen, 2014).

Since the start of the 2011 economic crisis, the demand for electricity fell and lowered the price of production. The decreased profitability of electricity production forced energy companies to close thermal power plants burning fuels such as coal, natural gas, and oil. This and the Russian invasion of Ukraine in 2014 raised a concern over security of supply. Most of the coal in Finland was imported from Russia. The CEO of the Security of Supply Center Ilkka Kananen urged that no more plants should be closed. He thought that the existing energy generation capacity should be preserved as a backup. Additionally, Kananen called for increased use of nuclear power, peat burning and hydropower, and improved natural gas transmission links to Central Europe to reduce Finland's dependence on coal and Russian energy (Kinnunen, 2014).

- *The Centre Party's Government (2015–2018)*

- 2015 -

In 2015, an increase in taxation made the price of coal rise, making it 9% higher in the first quarter of the year compared to previous year. In the second quarter, the increase was 11%, 9% during the third, and 6% at the end of the year (OSF, 2022). 28,288 GWh of coal was consumed accounting for around 7.8% of Finland's energy consumption (OSF, 2023).

The talks about coal's taxation and dependency on Russian energy continued. Professor of Russian energy policy from the University of Helsinki Veli-Pekka Tynkkynen estimated that Finland had diversified its energy supplies well, and that the country should buy fuels such as oil and coal from elsewhere than Russia in the future (Nissinen, 2015).

As the parliamentary elections came to a close, the politicians began to debate the future of energy in Finland. A majority of MPs, with the exception of the majority of the Prime Minister party, the CP, agreed that nuclear power production should be increased. Most politicians also argued that Finland should keep using fossil fuels for the next decade, or at least that phasing them out completely in that time frame would be unrealistic (Salomaa, 2015). The finished government program stated that Finland would increase the use of nuclear and hydro power as well as peat and wooden mass in energy production. Coal would be phased out by 2030 (Arola, 2015).

- 2016 -

In 2016, the price of coal was influenced by an excise tax increase. During the first quarter, the price was 6% higher than last year, in the second quarter 4%, and in the third 11% in comparison to previous year. During the last quarter of the year, the price was affected both by the tax increase and by an increase in the world market price. The increase then was 25% (OSF, 2022). 35,223 GWh of coal was consumed accounting for 9.3% of energy consumption (OSF, 2023).

In November, the government announced its plan to codify the 2030 coal phase out into law. The government explained its decision with the declining global popularity and the emissions intensity of coal use. This would make Finland the first country to ratify such a law (Hartikainen, 2016). The Minister of Development Cooperation and Foreign Trade Kai Mykkänen stated that prohibiting coal will encourage companies to accelerate the adoption of biofuels (Savolainen, 2016). The decision

raised concerns about the supply of energy because coal could be replaced only by wood chips and peat in a reasonable amount of time. Each of these resources had their problems: Wood chips are used in some power plants together with coal. If used alone, a whole new solution for sufficiently storing the fuel type would be needed as the energy intensity of wood chips is lower than that of coal. Burning peat generates more emissions than coal, and some plants were not compatible with it. The Administrative advisor to the Supreme Administrative Court Alice Guimaraes-Purokoski warned that the EU legislation could see the coal ban as an unfair subsidy to domestic industry. She suggested that the government could explain it as a measure to ensure energy security (Hartikainen, 2016).

- 2017 -

In the beginning of 2017, the price increased due to the tax and the market price increases of the previous year, being 24% higher in the first quarter, 15% in the second, 14% in the third, and 5% in the fourth than the previous year (OSF, 2022). 31,632 GWh of coal was consumed accounting for around 8.4% of Finland's energy consumption (OSF, 2023).

According to a report made by the Finnish Energy Agency, the use of coal surged in 2016 by a third in comparison to the last year. This was mainly due to low consumption in 2015 and a cold winter and low prices in 2016 (Raeste, 2017). According to the Development Manager of Statistics Finland Riitta Pipatti, the phenomenon is also explained by the economy recovering from past setbacks (Kempas, 2017). A regional energy company EPV Energia Oy explained the partial use of coal in its plants with the uncertainty of future availability of peat. According to the CEO Mats Söderlund, the industry was sensitive to political decision making which could turn against peat production in the future (Puikkonen, 2017).

Despite the momentary surge in coal use, the long-term trend was negative. Countries around the world strongly increased their use of renewable energy, including Finland, where wood-based biofuels were used to replace coal. Peat burning was still common in inland municipalities. During the past few years, 4 out of 13 coal plants in Finland were shut down and more were expected to follow, as there was no interest in the readoption of coal (Toivonen, 2017).

- 2018 -

In 2018, the tax for coal increased due to a 12% decrease in the tax-free price. The final price was 1% higher in the first quarter in comparison to previous year. In the second and the third quarters, the total price was higher by 7%. In the third quarter, the growth of the tax-free price slowed down. In the last quarter, the price was 6% higher due to an increase in taxation (OSF, 2022). 31,623 GWh of coal was consumed accounting for 8.3% of energy consumption (OSF, 2023).

The government investigated the possibility of phasing out coal by 2025 to combat the recent surge in use. The plan received critique from energy companies for being weakly justified, arguing that the companies' own strategies would eventually marginalize coal as an energy source. Instead, the government's plan would infringe the companies' property rights and significantly increase the cost of energy for the citizens (Hartikainen, 2018). The government agreed to set the phase out date to 2029 and started preparing a €90 million encouragement package for the energy companies willing to reach the earlier 2025 deadline (Pietiläinen, 2018). The government also introduced a tightened tax on coal to speed up its phase out, taking effect in early 2019 (Ministry of Finance, 2018).

The price for CO2e in the European Emissions Trading System grew to a record high, guaranteeing an advantage for non-fossil fuel-based energy sources according to Finnish Energy Association expert Anna-Maija Sinnemaa. This was mainly due to a reform of the emissions trading scheme, which reduced the number of surplus allowances accumulated in years of low demand. The slowdown in the market price was also due to lower global demand. The stagnation happened because of improved energy efficiency and a decreased need for coal in industry and heating (Hartikainen, 2018).

- *The Social Democratic Party's Government (2019–2022, examined up to 2021)*

- 2019 -

In 2019, during the first quarter, the price of coal was 1% lower compared to the previous year. The taxation of coal in joint production increased. In the third quarter, the total price of coal was 11% lower and in the fourth quarter 9% (OSF, 2022). 25,272 GWh of coal was consumed accounting for 6.7% of Finland's energy consumption (OSF, 2023).

The new SDP's government continued with the previous coalition's plan to prohibit the energy use of coal by law by 2029 (Elonen & STT, 2019). The EU Emissions Trading System had managed to

make coal unattractive to energy companies on a greater scale leading to the improved competitiveness of renewable or otherwise less GHG intensive energy sources like natural gas (Hartikainen, 2019). There was also a plan to halve the use of peat during the government's term. As practical measures, such as tax changes, were still work in progress, the government postponed their implementation until the following year (Elonen, 2019). During the elections, the Greens strongly advocated a faster phase-out of peat by 2025, while the CP argued that the process should be left to the mechanisms of the EU Emissions Trading System so that the use of the resource would eventually exit the market of its own accord in the 2030s (Hartikainen, 2019).

- 2020 -

In the first quarter of 2020, the tax-free price of coal was 30% lower than previous year. During the second quarter, the tax-free price was about a fifth lower than last year, while in the third quarter the number was 25%. At the end of the year, the tax-free price began to grow but was still a fifth lower than previous year (OSF, 2022). 19,504 GWh of coal was consumed accounting for 5.5% of total energy consumption (OSF, 2023).

The ongoing Covid-19 pandemic reduced energy demand in the EU countries, boosting the share of renewables in total energy production (Kukkonen, 2020). In March, the government granted €7.7 million to four projects aiming to replace coal in energy use by 2025 with non-fossil fuel solutions. The grants were received from the €90 million fund established in 2018 (Ministry of Economic Affairs and Employment, 2020). Thanks to it, most of the major Finnish energy companies, which owned seven out of nine coal-fired power plants in continuous operation, committed to phase out coal by 2025 (Koistinen, 2020). According to the Minister of the Environment Krista Mikkonen (Greens), the government was dedicated to halving peat use by 2030 (Sutinen, 2020).

- 2021 -

In 2021, the import price of coal kept climbing. The excise tax was tightened at the turn of the year and the total price was 27% higher in comparison to previous year. In the second quarter, the price was higher by 12%. The strong increase in prices is explained by the increase in taxation and the recovery of the global economy from the effects of the Covid pandemic in 2020. The 2021 development was more in line with the average long-term trend. During the latter half of the year, the

price of coal was double that of the last year (OSF, 2022). 23,357 GWh of coal was consumed accounting for 6.2% of Finland's energy consumption (OSF, 2023).

The government granted its second support package to the companies working on their 2025 coal phase out renovation for the worth of €22.8 million. The funds were granted to three projects in various coastal cities (Ministry of Economic Affairs and Employment, 2021).

That same year, the 2021 United Nations Climate Change Conference (UNCCC) took place, during which national representatives discussed solutions for the phase out of coal as an energy source. According to climate policy expert Petteri Haveri from the Finnish Energy Industry Association, these discussions would not result in additional requirements for Finland as it had already agreed to phase out coal by May 2029. On the basis of long-term development, Finland will not have an issue with reaching this goal, he believed (Saavalainen, 2021).

7.4.1. Interpretations (Price of Coal for Electricity Production)

Under the NCP's government, the price of coal decreased for the whole term due to its plentiful availability on the global market (HS, 2012 & Saarinen, 2013). As is shown in the image 29, the use of coal-fired energy production did not change much during the course of the government's term meaning that the government was not very successful at delivering its promise of reduced coal use (OSF, 2023). The causes to this were both internal and external as the price of coal was low in comparison to other energy sources, but also due to the government weakening the competitiveness of domestic sources (Seppälä, 2013). The use of coal fell slightly in 2012 after the beginning of the 2011 economic crisis but after that, it returned to hover around 10% of total consumption (OSF, 2022).

The NCP's government's climate policy faced challenges when it came to phasing out this GHG intensive and foreign energy resource. This happened because the industry was unable to find alternative sources at a time when the volume of imported electricity was low (Saarinen, 2013). Additionally, with Russia's sudden war of aggression on Ukraine, the topic of security of supply became a competing priority (Kinnunen, 2014). Reasons for this are discussed below:

First, the shortage of domestic resources capable of replacing coal in the short term meant that the use of coal would not be easy to reduce (Saarinen, 2013). Secondly, the government's own actions worsened the problem by giving foreign supplied coal a competitive advantage on the Finnish market by raising the cost of the mentioned domestic alternatives (Seppälä, 2013).

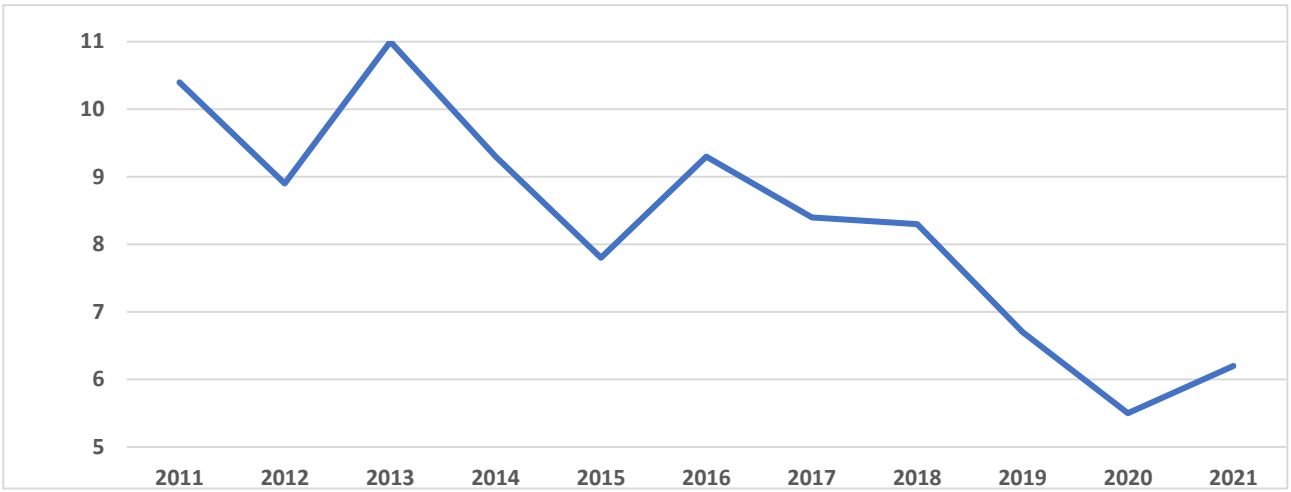

Image 29 – Portion of coal-fired power from total energy consumption (%). Retrieved from OSF (2023).

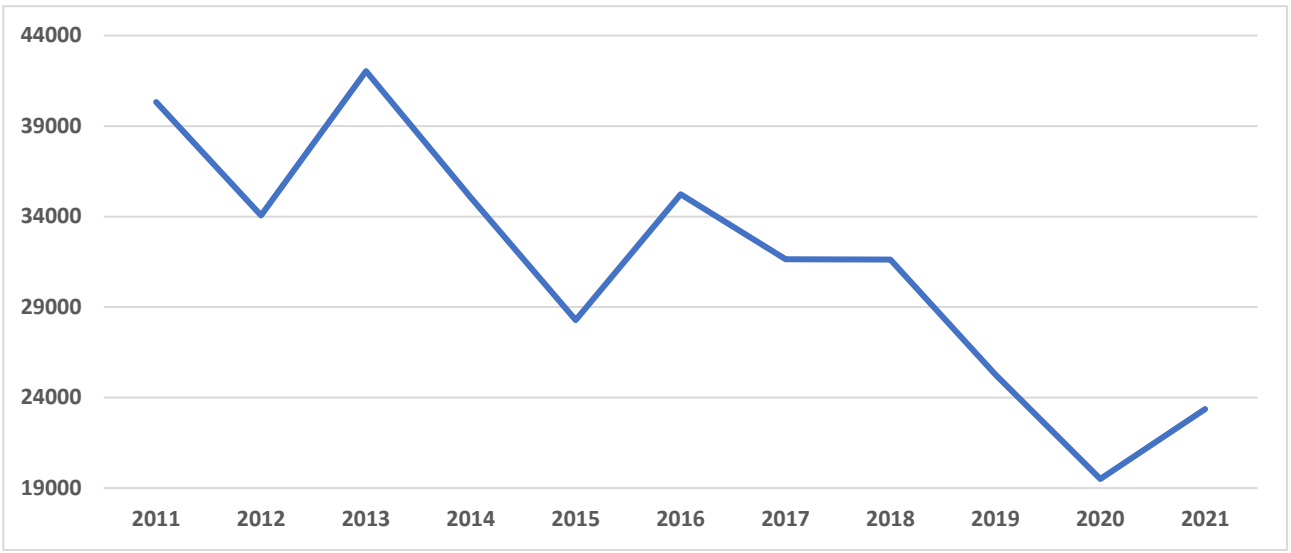

Image 30 – Coal-fired energy consumption (GWh). Retrieved from OSF (2023).

During the CP's government's term, the energy use of coal began a negative trend as the fossil fuel progressively gave way to other, largely domestically obtained energy sources. These included renewables like wind power and biomass as well as the non-renewable peat (Toivonen, 2017). This was due to the increase in the world price of coal and the 2016 excise tax increase introduced by the government. As a result, the cost of coal for energy use rose sharply from €33 per MWh in 2016 to almost €39 per MWh in 2017 (OSF, 2022 & OSF, 2023). Coinciding with the price hike, a sharp increase in 2017 coal use was explained by e.g., the recovery of the economy from the weak performance of the previous year (Kempas, 2017).

The question of energy security still dominated the discussion about the future of coal at the beginning of CP's coalition's term (Nissinen, 2015). The government's decision to phase out coal by increasing the use of nuclear, renewable, and domestic energy sources was over time met with skepticism as those capacities would not be put in place in a reasonable amount of time to serve the needs of both the climate goals and the nation (Nissinen, 2015, Hartikainen, 2016 & Puikkonen, 2017). The only

possible replacement for coal in the short term seemed to be renewable biomass and peat, the resources strongly promoted by the Prime Minister party and the government (Hartikainen, 2016). This seems to be what happened, since wood biomass had been an increasingly popular source for heat production for a long time according to Statistics Finland (image 31 in comparison to 32). At the same time, coal was becoming less popular, which was reflected in a sharp decline in coal use under the SDP's government (Koistinen, 2020).

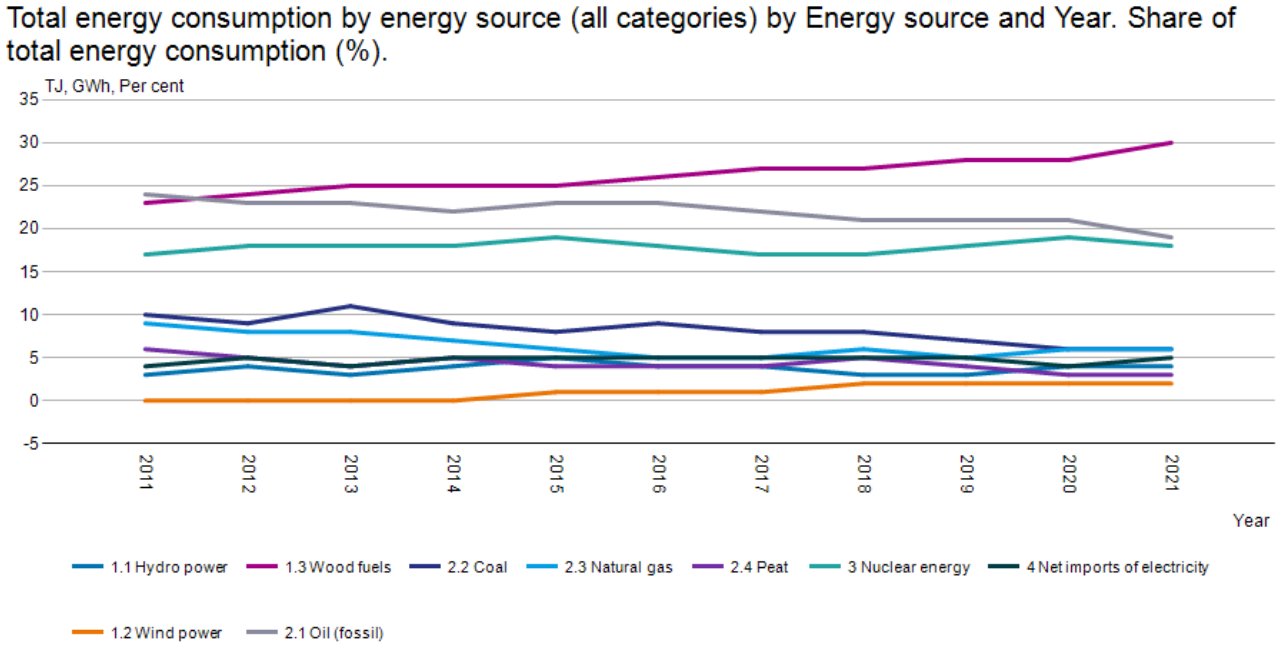

Image 31 – Annual development of the major sources of energy in energy production. The variables are set in the following order in 2018 starting with the uppermost one: 1) Wood fuels, 2) Oil (fossil), 3) Nuclear power, 4) Coal, also natural gas, 5) Net imports of electricity, 6) Hydro power, 7) Peat 8) Wind power. Retrieved from OSF (2023).

The same was not the case for electricity production, the main sources of which, according to Statistics Finland (2023), were nuclear and hydroelectric power and energy imports. The use of fossil fuels comprising of coal, natural gas, oil, and peat decreased steadily over time throughout the observed time period with a 28.2% share of total electricity consumption in 2011 and 9.6% in 2021, while corresponding numbers for total energy production were 49.6% in 2011 and 33.3% in 2021. Wind power generation, however, became noticeably more popular in electricity production in comparison to other sources as its share increased from 1% in 2014 to 9% in 2021 (OSF, 2023 & image 32).

The CP's government's decision to reward companies for accelerating coal phase-out seemed to be an effective decision, as it encouraged the majority of energy companies to phase out coal in their

processes, and the results were already visible in the next government's term. This was certainly made easier with the increasing negative attitudes towards coal and the increased market price of coal for energy use (Toivonen, 2017 & Koistinen, 2020). The companies had criticized the earlier phase out date, giving the impression that the reward fund was effective at changing their opinion, justified or not from the standpoint of the companies' finances (Hartikainen, 2018).

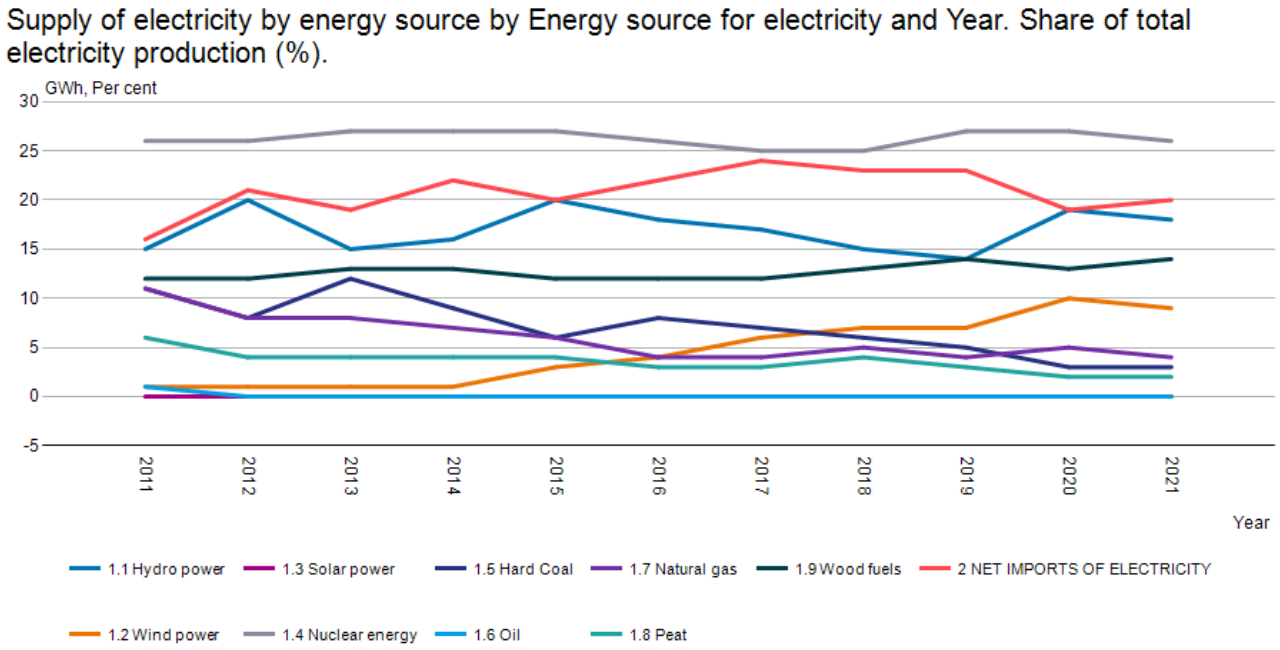

Image 32 – Each major source of energy for electricity production and their development over time. Starting from the top, the variables are arranged in the following order above 2021: 1) Nuclear energy, 2) Net imports of electricity, 3) Hydro power, 4) Wood fuels, 5) Wind power, 6) Natural gas, 7) Hard coal, 8) Peat, 9) Oil. Retrieved from OSF (2023).

The SDP's coalition, inheriting the CP's government's coal phase out fund was left with the responsibility of handing out rewards to the companies that deserved them. The only remaining discussions on the use of coal were mainly about its replacement (Koistinen, 2020). The role of peat was again on the table, as the government parties agreed that its use would be reduced as well. Disagreements arose between the Greens and the CP over the deadline date. In the end, this remained a minor discussion, as a compromise date of around 2030 was found (Hartikainen, 2019).

The government raised the taxation level for coal in 2021 due to its low global market price. This assumedly prevented it from being reintroduced into energy production (OSF, 2022).

7.5. NORD POOL DAY-AHEAD PRICES FOR ELECTRICITY

Nord Pool is a power exchange that operates in Northern Europe. Electricity bought from it is counted as imported energy. The price of market electricity is determined by its spot price. The spot price is "the current price in the marketplace at which a given asset – can be bought or sold for immediate delivery" (Chen & Mansa, 2021). The "day ahead price" refers to the price of electricity sold in a closed auction for the next 24 hours (Nord Pool, 2023).

Tampereen sähkölaitos (2016 p. 16), an energy company owned by the Finnish city of Tampere, explains in its report that there are roughly three factors that affect the market price of electricity: weather in the short term (need for heating, windiness), hydro power in medium term, and the global fuel prices in the long term. The imported energy from Scandinavia was mostly dependent on hydro power generation. In the later years, wind and nuclear power grew to be important sources of power in Sweden (Fingrid, 2020 p. 35).

- *The National Coalition Party's Government (2011–2014)*

- 2011 -

In the beginning of 2011, the price of electricity was affected by cold and dry winter weather, as well as high expectations for economic growth, as the 2011 economic crisis had not yet begun. The former weakened Scandinavian hydro power generation produced in Sweden and Norway, strongly raising demand and through it, the Nordic spot-price of electricity. The warm and rainy latter half of the year improved the hydro power situation, helping it surpass the long-term average power fill rate (Tampereen sähkölaitos, 2011 p. 23). The decreasing demand and the improving supply for power lowered the spot price. The fall in demand for fuels as a result of the economic downturn further reduced the price (Vantaan energia, 2016).

The imports from Scandinavia, mostly through Sweden, was limited due to construction work of a new cross border energy transfer line, Fenno-Skan 2, to increase transfer capacity. Its construction was finished in the same year, making Fenno-Skan 2 the second such connection between Finland and Sweden. Simultaneously, a transfer line was being built to Estonia, called EstLink 2 (Fingrid, 2011 p. 6, 16, 21).

13.9 GWh of electricity was imported to Finland, covering 16.4 % of total consumption in the country (OSF, 2023).

- 2012 -

In 2012, the spot price followed the descending trend of the last year's end due to a plentiful Scandinavian hydro power capacity. Because of the decreasing spot price, the conventional power generation methods were increasingly run down (Tampereen sähkölaitos, 2012 p. 25). The electricity price was also affected by the decreasing imports from Russia. This was the result of a capacity fee implemented by the Russian market in 2011. Increasing prices in the Russian market encouraged Finnish companies to buy their energy from the Nordic countries as their prices were lower and still decreasing. Fingrid worked together with Russian energy companies to make two-way transmission of electricity between the two countries more market oriented. There was a plan to start a two-way trade in 2014 (Fingrid, 2012 p. 30–31).

The ongoing integration of the Baltic States into the Nordic energy market progressed as Estonia and Lithuania became new co-owners of Nord Pool. Latvia was expected to join the market in 2013, completing the Baltic integration (Fingrid, 2012 p. 30–31). The market price for electricity in Finland was lower than the average Nord Pool system price throughout the year (Tampereen sähkölaitos, 2012 p. 25).

The completion of Fenno-Skan 2 significantly increased the import capacity from Scandinavia, by 40%. However, it was soon noted that the built capacity was still not enough. More bottlenecks occurred in power imports than ever before. Additionally, out of the two existing power lines, one was regularly out of order (Fingrid 2012 p. 8–9, 30).

17.4 GWh of electricity was imported to Finland, covering 20.5 % of total consumption in the country (OSF, 2023).

- 2013 -

In 2013, the Spot price of electricity increased due to a decrease in Scandinavian hydro power. This happened despite cheapened cost of coal-fired power caused by a fall in coal prices (Vantaan energia, 2016). This changed in December as mild weather and improved hydro power generation made electricity the cheapest that year (Tampereen sähkölaitos, 2013 p. 6). The integration of the Baltic States to the Nordic energy market was completed when Latvia and Lithuania became bidding areas in the Nord Pool electricity market (Fingrid, 2013 p. 25).

Imports from Sweden were reduced by the malfunction of the Fenno-Skan 1 transmission cable, and the investigation period launched after the repair to determine the cause of the fault (Fingrid, 2013 p. 21).

15.7 GWh of electricity was imported to Finland, covering 18.7 % of total consumption in the country (OSF, 2023).

- 2014 -

In 2014, a good availability of Scandinavian hydro power and a long-term decrease in demand due to the current economic situation caused the spot price of electricity to decrease. Another cause was the increase in production of subsidized renewable energy (Fingrid, 2014 p. 40). Additionally, uncertainty about the security of supply arose due to disagreements concerning the delivery of gas between Ukraine and Russia. This collapsed the price of oil which was indexed to the price of gas (Tampereen sähkölaitos, 2014 p. 6). The same year, a long-term integration of a shared power market between the Baltic States, the Iberian Peninsula, the Nordic Countries, the United Kingdom, and the western Central Europe was completed creating the North-Western Europe (NWE) Price Coupling (ENTSO-E, 2023), the largest electricity market in the world, accounting for 75% of the European electricity consumption (Fingrid, 2014 p. 41). This “market coupling” enabled electricity trading on the power exchange, which took into account cross-border capacity to minimize price differences across markets (Epex spot, 2023).

Fingrid and Russian grid operators signed an agreement on two-way electricity trade between Finland and Russia, starting in December 2014 (Fingrid, 2014 p. 36).

18 GWh of electricity was imported to Finland, covering 21.5 % of total consumption in the country (OSF, 2023).

…

Each term, the Finnish governments produces a Climate and Energy Strategy. In addition to containing the climate policy, it describes the government’s course of action in achieving its energy related goals. The NCP’s coalition’s strategy, written in 2013, stressed the importance of energy efficiency, improving energy independence, and securing adequate and affordable energy supplies while paving the way for long-term EU policies and carbon neutrality. The coalition believed that measures leading to reduction in emissions would be the most effective way to maximize cost efficiency. The government also recognized Finland's role as a ratifier of the UN Framework Convention on Climate Change and the Kyoto Protocol, and as an EU member state to achieve the

climate targets set by these organizations. The government's strategy advocated for integrating the European energy market to be as efficient and co-compatible as possible.

The strategy hoped that the climate policy of the EU would be suggestive, giving member states space to implement shared goals while minding local needs. Individual states would regulate their energy production through e.g., legislation, subsidies, and taxation. Domestic energy production was to be boosted by encouraging increasing wind and bioeconomy-based power production and innovation to create new bioeconomy-based solutions. The plan was to slowly replace coal and peat with renewables and wood, and that the state's climate and bioeconomy ambitions would not cause any hindrance to each other. Additionally, the coalition wished to grow Finland's energy exports. The coalition saw that there was some peat production that could not be replaced within 10–20 years. The strategy prohibited replacing the phased-out coal power with peat as well as peat with any fossil-based energy resource (Ministry of Economic Affairs and Employment, 2013).

- *The Centre Party's Government (2015–2018)*

- 2015 -

In 2015, the spot price of electricity plummeted to a record low not seen since 2004. The weather at the start of the year was warm, rainy, and windy. The price rose slightly due to a dry autumn, but a warm and humid December brought it down again. This caused problems for energy companies. Two big coal fired plants were closed in 2015 as unprofitable (Tampereen sähkölaitos, 2015 p. 12). In Finland, the price fell slightly less than in the other Nordic countries due to the different production structure and the delayed completion of the Olkiluoto 3 nuclear power plant (Fingrid, 2015 p. 53). The plant would not be finished until 2023 (Pohjolan Voima, 2023). There was a serious shortage of energy due to declining production and insufficient import capacity despite abundant foreign supply. The potential future energy shortage was a cause for concern. Fingrid, the national electricity transmission system operator, was tasked with increasing transmission capacity between Sweden. Construction was expected to start sometime in the 2020s (Fingrid, 2015 p. 54–55).

16.3 GWh of electricity was imported to Finland, covering 19.8 % of total consumption in the country (OSF, 2023).

- 2016 -

In 2016, the price of electricity stayed relatively low, increasing at the end of the year due to weakened Scandinavian hydro power generation and a rise in power plant fuel prices. The price was at its highest in November due to colder than usual weather (Helen, 2016). Energy imports from Russia increased by 50% due to the weakening of the Russian ruble as well as the increase of Nordic market price of electricity. Wind power generation grew to a record rate of 3.1 TWh, 31.8% higher in comparison to 2015, but covering only 3.6% of total electricity consumption (Tampereen Energia, 2016 p. 16).

An agreement was reached between the electricity transmission system operators, the Finnish Fingrid and the Swedish Svenska kraftnät, to build a new transmissions line between Finland and Sweden by 2025 (Fingrid, 2016 p. 72).

According to Fingrid, power generation was kept artificially low by renewable energy subsidies in Europe. A strong increase in renewable energy production left Northern Europe with much excess electricity, making production unprofitable. The market struggled with a lack of backup power, as much suitable capacity was reduced. Fingrid argued that the prices should be left to be determined by market forces, and that regional energy markets should be integrated further. The company also highlighted the future importance of introducing consumption flexibility to the retail market which reduces electricity consumption at the time of high consumption and price levels and passes it to a later time when energy is cheaper, stabilizing the system and lowering consumer costs (Fingrid 2016, p. 62–64).

19 GWh of electricity was imported to Finland, covering 22.3 % of total consumption in the country (OSF, 2023).

- 2017 -

In 2017, the price of electricity slightly increased, and so did its total consumption (Fingrid, 2017 p. 55, 62). An increasing share of electricity was imported, which led to a decline in domestic electricity production. More power was generated from renewable sources than the previous year. The availability of domestic hydro power was good as it accounted for 22.5% of production. The low price of electricity, as well as taxes and other administrative costs, discouraged the construction of new power generation capacity, meaning that most of it had to be built with subsidy funds (Tampereen sähkölaitos, 2017 p. 18). During peak consumption, energy was imported up to almost full transmission capacity. Due to efficient transmission, domestic capacity was not depleted, and backup capacity was not needed. Fingrid reported that 2017 was a record year for the usability of its cross-

border transmission, 99%, while the connections related disruptions were fewer than the previous year (Fingrid, 2017 p. 55 & 62–63).

20.4 GWh of electricity was imported to Finland, covering 23.9 % of total consumption in the country (OSF, 2023).

- 2018 -

In 2018, electricity consumption, production and prices rose. This was due to economic growth and weather conditions, as well as a sharp increase in the price of emissions allowances in spring. At the start of the year, the weather turned cold and dry, which, combined with high energy prices, reduced the availability of hydropower. Despite the rainy September in Norway, the year was the driest in the Nordic energy region in a decade. The price of emissions allowances rose because of the broadly improving economic situation and the EU's Market Stability Reserve that would be implemented the following year (Tampereen sähkölaitos, 2018 p. 10–11). The latter refers to an auction between 2019 and 2020 of EU emissions allowances. These allowances were not sold during the previous 2014–2016 auction due to a poor economic climate which lowered energy prices and weakened the incentive to reduce emission. Their auctioning was instead moved to a later period (European Commission, 2023). Fuel prices rose until autumn, when the trade war between China and the United States began. This lowered expectations for economic growth (Tampereen sähkölaitos, 2018 p. 11).

Lack of hydropower raised electricity prices in the Nordic countries and increased transmission from Russia. As a result, imports from Sweden decreased, while those from Russia increased (Fingrid, 2018 p. 51, 57).

19.9 GWh of electricity was imported to Finland, covering 22.8 % of total consumption in the country (OSF, 2023).

…

The CP's coalition's Climate and Energy Strategy followed similar principles to those of its predecessor: It stated that the future Finnish energy system should be ecologically sustainable, support the growth of the national economy and the competitiveness of the domestic firms, and ensure the security of supply. The strategy was guided by a roadmap made by the parliamentary committee of climate and energy. The strategy was also expected to map out future possibilities for Finland to influence European and international politics as a member of regional and global energy markets. The strategy stressed the importance of the availability of investments, funding, and markets as a factor in future projects' profitability. Country specific features such as climate, long distances, broad and

energy intensive industries, and domestic energy sources, especially biomass, were highlighted as things to remember when implementing the strategy.

The strategy strongly advocated for supporting and subsidizing projects and investments which would help Finland phase out fossil fuels. This support should continue until technology and competitiveness improve so that the projects are able to thrive under market conditions. Subsidies would be granted on a technologically neutral basis and in order of economic preference. Different measures were mentioned to add efficiency in the regional energy markets, such as adding flexibility to systems which connect supply and demand, as well as to activate small firms and individuals to enhance their energy efficiency. The goal was to make 50% of total energy usage renewable during the course of the 2020s, as well as to increase energy self-sufficiency to 55%, the latter including peat. The availability and use of domestic energy sources, particularly biofuels, would be increased. The possibilities of using various types of waste to create energy were also to be clarified (Ministry of Economic Affairs and Employment, 2016).

- *The Social Democratic Party's Government (2019–2022, examined up to 2021)*

- 2019 -

In 2019, the price of electricity decreased, though stayed relatively high in Finland in comparison to the Nord Pool system price despite sufficient supply of hydro power in the Nordic countries. For the most part, this was due to the postponed completion of Olkiluoto 3. The price of fuels in Europe was also low. This was partially caused by the anticipation of the end of the energy transmission agreement between Ukraine and Russia, leading to unusually full gas storages and low demand. During the year, gas surpassed coal in terms of volume of use (Tampereen sähkölaitos, 2019 p. 10–11). Differences in electricity prices between Finland and Scandinavia (Sweden, Norway) peeked during times when the supply of wind and hydro power in Scandinavia was plentiful, while in Finland companies only had more expensive energy sources available, making the country more dependent on imported energy. Differences in energy prices were occasionally great due to a lacking power transmission capacity between Finland and Sweden (Fingrid, 2019 p. 65).

Electricity imports from Russia decreased. This was because Russia had started to subsidize its own electricity production, which increased the price of electricity in the country (Fingrid, 2019 p. 65*).

* The information on the report is contradictory, as it suggests that imports of electricity from Russia both increased and decreased in 2019. Timo Kaukonen, Fingrid's senior electricity network management expert, confirmed the discrepancy in a private message, suggesting that it may have been an editing error, or that the claim of an increase in imports should refer to a multi-year trend rather than a change from last year. A table on page 68 of Fingrid's report on the use of the electricity system confirms that the electricity imports from Russia decreased in 2019 compared to the previous year.

20 GWh of electricity was imported to Finland, covering 23.3 % of total consumption in the country (OSF, 2023).

- 2020 -

In 2020, the market price of electricity was at a historical low, the lowest in 16 years. This had little to do with the Covid pandemic, and more with warm weather and the exceptionally good availability of hydro power. The average price in Finland was still slightly greater than that of the other Nordic countries (Tampereen sähkölaitos, 2020 p. 10). A planning for a third transmission connection with Sweden was started to further reduce limitations on energy trade. The project was expected to be completed in 2025 (Fingrid, 2020 p. 36).

Less electricity was bought from Russia due to the lower cost of Nordic energy (Fingrid, 2020 p. 33).

15.1 GWh of electricity was imported to Finland, covering 18.5 % of total consumption in the country (OSF, 2023).

- 2021 -

2021 was an exceptional year for energy trade. The price of electricity rose from the lowest in a long time to the highest ever seen in the country. It was also exceptional that this year, the rise of the price was not mainly affected by hydro power availability, but instead by the global market as the post-pandemic world was hit by an energy crisis. The latter was caused by a drastic increase in the price of fuels as well as emissions allowances. An especially strong increase was seen in the price of natural gas, from €20 per MWh to €180 per MWh. European companies expected the German-Russian Nord Stream 2 natural gas pipeline to be completed the same year and ease the situation, but as the reality turned out to be different, the state of the European gas storages was left historically weak. Due to high prices, the missing natural gas was largely replaced in many European countries with coal and lignite. The peak of the price hike took place in December as weather became colder and gas imports from Russia stayed low. This made companies more wary of the political tensions between Russia and Ukraine (Tampereen sähkölaitos, 2021 p. 12–13).

More electricity was imported from Russia than in the previous year due to higher Nordic prices (Fingrid, 2021 p. 43).

17.8 GWh of electricity was imported to Finland, covering 20.4 % of total consumption in the country (OSF, 2023).

…

The SDP's strategy for climate and energy highlighted the need to accelerate the adoption of green and renewable energy use and increase the efficiency of existing production and legislation. The government maintained a positive attitude on building and maintaining wind and nuclear power. It advocated identifying the most efficient use of raw materials to e.g., prevent certain valuable types of wood from being wasted as fuel. Peat producers were to be compensated and instructed on how to start a new business during the course of the resource's partial phase out. Not all production would be halted as some would still be needed for emergency storage.

The taxation of fossil fuels for vehicles would be gradually increased in accordance with the rise of consumer prices to make way for the coming of electric vehicles. The government would support smart and efficient power grid development to moderate transmission prices. Flexible consumption and production were encouraged with dynamic electricity prices. This would, together with a power reserve, further the integration of the energy systems of the European countries as well as diversify the Finnish supply, strengthening security of supply without compromising the national climate policy. Also related to this is the cyber security of Finland's energy systems, which the government promised to strengthen through drills, development projects and legislation.

The government would assure a timely completion of the third transmission connection to Sweden and promote integration of the Finnish and Baltic natural gas markets. Finland would be actively involved in defining European sustainability standards and developing European energy integration. It would initiate new projects and legislation to strengthen the energy system's cyber security.

Lastly, as a new topic, the strategy discusses plans for future fuel production in Finland based on green hydrogen. Hydrogen was seen as a suitable tool to help the energy and transport sectors meet their climate targets and, secondarily, as a sustainable export product with growing global demand. In 2020, Finland, together with 22 EU member states, began a joint sustainable development project focused on hydrogen-based solutions. The government's strategy called for a plan to prepare for a long-term development which would eventually lead to hydrogen-based solutions becoming economically competitive, at which point they would be adopted on a wider scale (Ministry of Economic Affairs and Employment, 2022).

7.5.1. Interpretations (Nord Pool Day-Ahead Prices for Electricity)

The price of electricity was strongly affected by the state of the economy and the availability of hydro power in Sweden and Norway. The lack of hydro power made market electricity less available, increasing its price (Helen, 2016, Fingrid, 2014 p. 40, Tampereen sähkölaitos, 2011 p. 23, 2012 p. 25, 2017 p. 18, 2018 p. 10–11, 2019 p. 10–11, 2020 p. 10, 2021 p. 12–13 & Vantaan energia, 2016). This increased the need to use more emissions intensive fuels in electricity production, as is explained in the interpretative analysis #3: Price of Coal for Electricity Production (see p. 97). The economy, on the other hand, decreased the price in the form of reduced demand, during which energy consumption was lesser than usual (Fingrid, 2014 p. 40, Tampereen sähkölaitos, 2019 p. 10–11, Vantaan energia, 2016). The availability of spot electricity was also affected by the local temperature as it affected the overall need for energy (Helen, 2016, Tampereen sähkölaitos, 2011 p. 23, 2013 p. 6, 2015 p. 12, 2018 p. 10–11 & 2021 p. 12–13).

The price occasionally changed due to closure of power generation capacity, price of Russian energy and relations with Russia, state of the international trade, and expectations set for the completion of the Olkiluoto 3 nuclear power plant (Fingrid, 2012 p. 30–31, 2016 p. 53, 2016, p. 62–64, Tampereen sähkölaitos, 2019 p. 10–11 & 2021 p. 12–13).

The last major factor in the price changes was the Covid-19 pandemic. The end of the pandemic made the demand for produced goods grow, as countries around the world recovered from its effects, increasing energy demand and prices (IEA, 2023 & Tampereen sähkölaitos, 2021 p. 12–13). All these things suggest that the imports of electricity were not always affected by causes related to national level politics.

Imported electricity did not produce any emissions on the Finnish soil. Only electricity imported from Russia was likely to emit GHG, as most of Russian energy is generated by burning fossil fuels (BP, 2021). Around 60% of electricity imported to Finland came from Russia in 2011, 25% in 2016, and 35% in 2021 (OSF, 2023).

This still leaves out the possibility that the correlation between the day-ahead price of Nord Pool electricity and Finland's emissions is a result of market electricity causing those emissions. Instead, it can be argued that imported electricity reduced national emissions whenever it was affordable and available.

When observing the graphs 33 and 34 (see p. 117), one can see that the portion (%) of imported electricity always followed the trend of the consumed amount (GWh). The portion of imports from

Nord Pool was determined by the affordability and availability of importable power. This means that electricity was imported whenever it was competitive against other sources. The trends between the price of Nord Pool electricity and the consumption of imported electricity were the most similar during the Covid-19 pandemic. At that time, both price and consumption decreased in 2020 and increased strongly in 2021 when the demand for energy recovered.

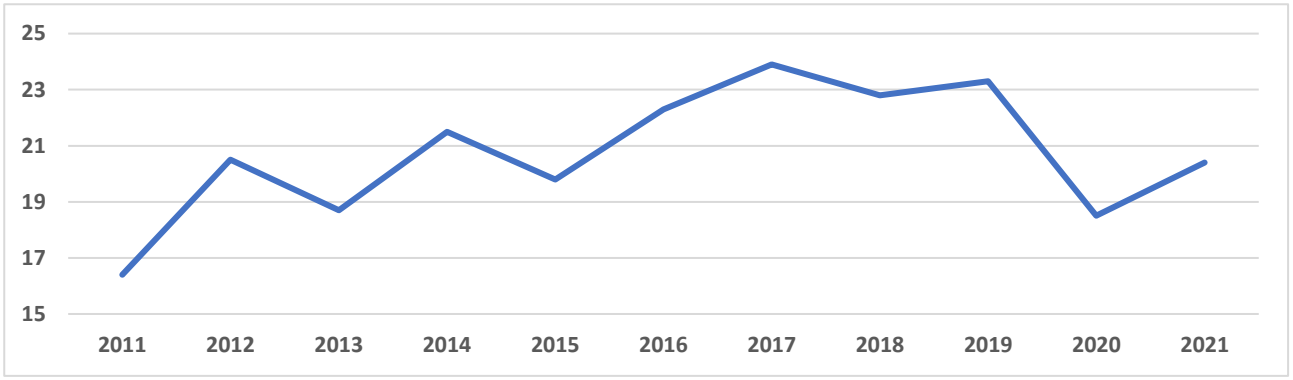

Image 33 – Share of net imports of electricity in total electricity consumption (%). Retrieved from OSF (2023).

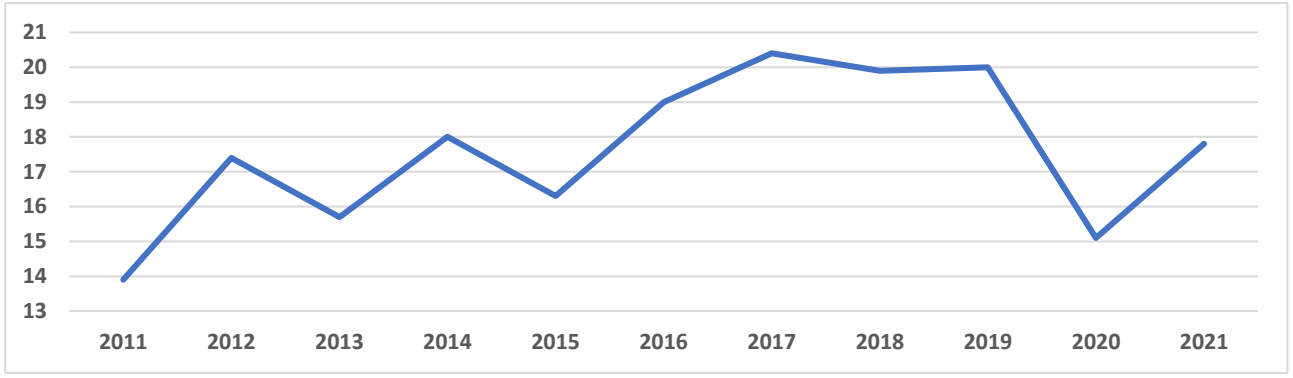

Image 34 – Net imports of electricity to Finland (GWh). Retrieved from OSF (2023).

In the long term, Finland's energy transmissions system operator Fingrid worked towards:

1) increasing the country's power exchange possibilities to and from its neighboring countries, as demonstrated by Fingrid's past efforts to pursue Russia to import Finnish energy under market economy conditions (Fingrid, 2012 p. 30–31 & 2014 p. 36),
2) increase and maintain transmission capacity between Finland and its EU partners, mostly Sweden (imports) and Estonia (exports) (see images 35 and 37, p. 118–119) as mandated by EU legislation, which prioritized the availability of affordable power to all of its citizens (Eur-lex, 2019 # 2, 41).

3) ensuring Finland's ability to expand renewable energy generation capacity while also securing its security of supply, all in accordance with the Climate and Energy Strategies of the past three governments (Fingrid, 2023).

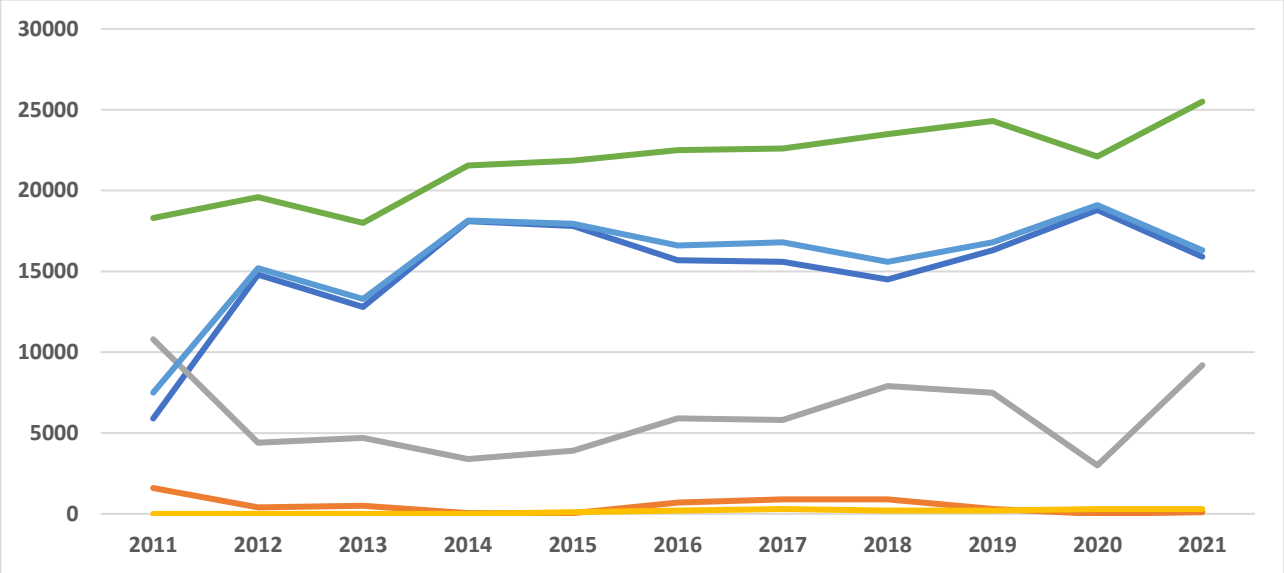

Image 35 – Gross electricity imports to Finland by supplier country or group of countries (GWh). From the topmost one in 2018 the variables are: 1) All included countries combined 2) All included countries excluding Russia 3) Sweden 4) Russia 5) Estonia 6) Norway. Retrieved from Fingrid (2015 p. 49, 2019 p. 68, 2021 p. 48).

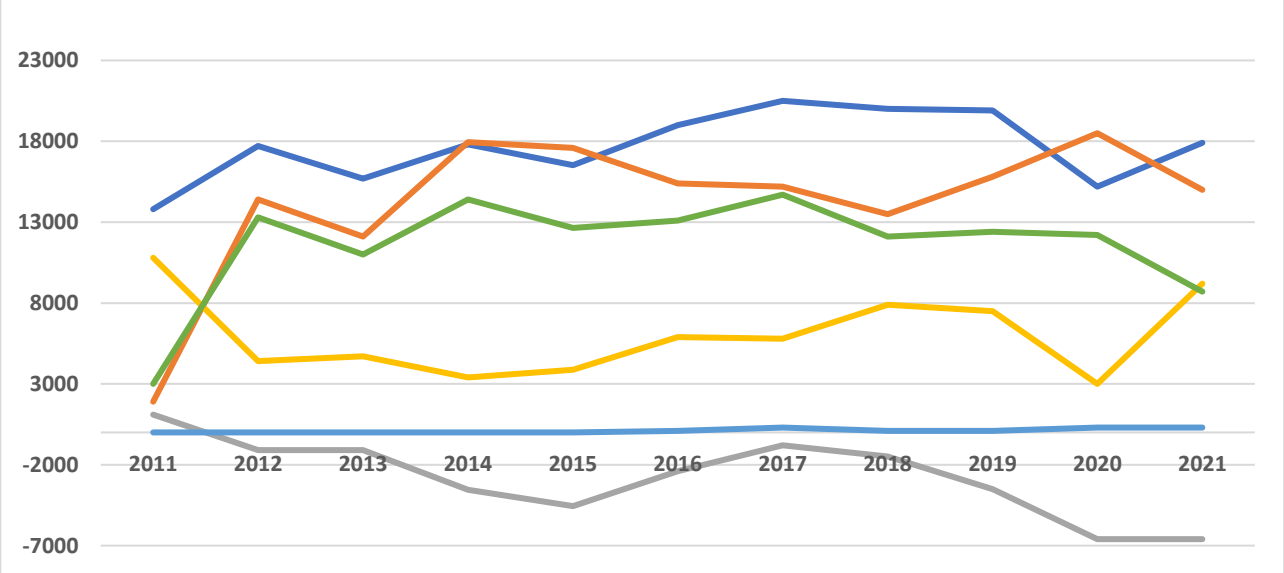

Image 36 – Net electricity imports (imports minus exports) to Finland by supplier country or group of countries (GWh). From the topmost one in 2020 the variables are: 1) Sweden 2) All included countries combined 3) All included countries excluding Russia 4) Russia 5) Norway (mostly zero GWh imported) 6) Estonia. Retrieved from Fingrid (2015 p. 49, 2019 p. 68, 2021 p. 48).

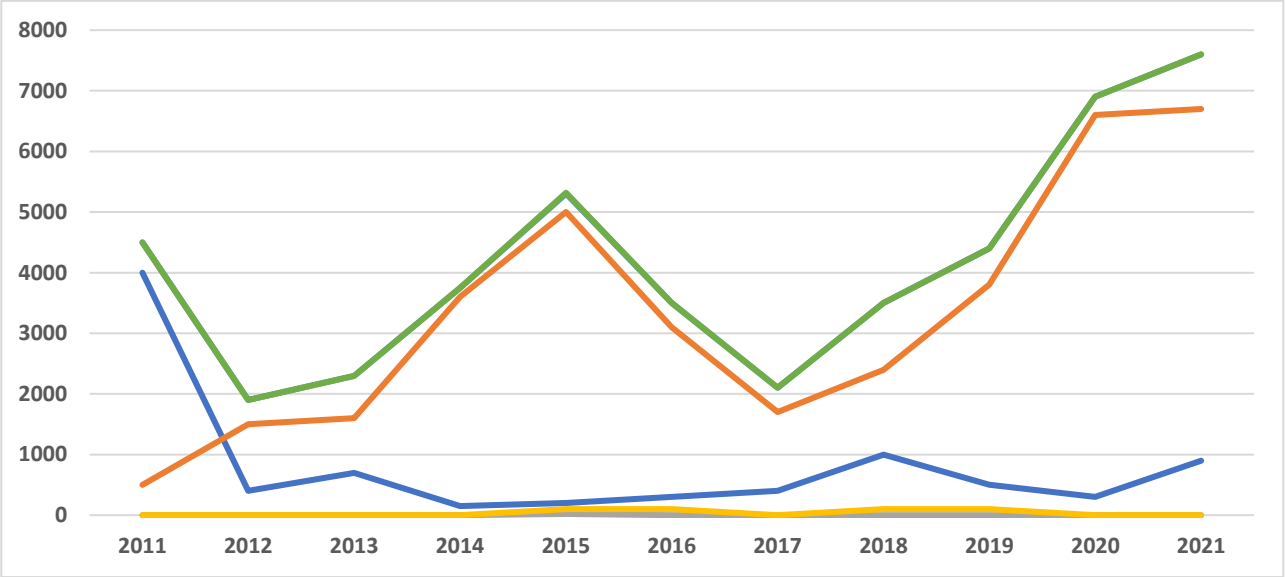

Image 37 – Electricity exports from Finland by export country or group of countries (GWh). From the topmost one in 2018 the variables are: 1) All included countries combined both including & excluding Russia 2) Estonia 4) Sweden 5) Norway & Russia (mostly zero GWh exported). Retrieved from Fingrid (2015 p. 49, 2019 p. 68, 2021 p. 48).

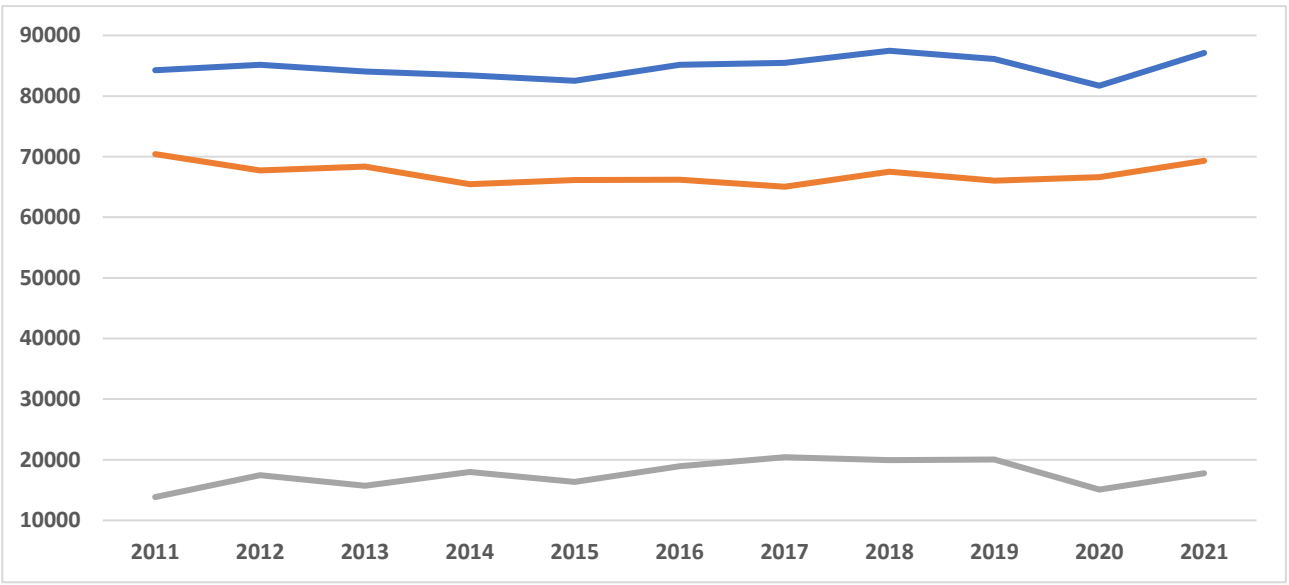

Image 38 – Total consumption of electricity (GWh). The variables are set in the following order starting with the uppermost one: 1) Total electricity consumption, 2) total electricity generation, 3) net imports of electricity. Retrieved from OSF (2023).

Despite the global nature of climate change, the NCP's government advocated for local, state-level decision making to solve climate related problems. This suggests that the coalition believed the local actors to understand the gravity of climate change. This is in line with the government's claim that

climate change mitigation should not conflict with local interests as this would not be necessary for the already climate change aware member states (Ministry of Economic Affairs and Employment, 2013).

The NCP's government was determined to phase out coal without replacing it with peat. This was easier said than done because the price of coal was decreasing everywhere in the world giving the resource a competitive edge against Finland's domestic sources (Elonen, 2014).

The NCP's government firmly believed in the future of nuclear power as it granted one a construction permit. This was done despite strong critique from one of the coalition parties as discussed in the analysis #1 (See p. 58), and the fact that there was a major ongoing power plant project three years late from completion at the time of the publication of the government's strategy (Areva, 2007).

The CP's coalition acted on the problems that occurred during the last government's term. This time, in addition to climate goals, safeguarding energy independence had a central role in the policy. This was in line with the government's decision to strengthen Finland's energy self-sufficiency by increasing the share of domestic energy sources to 55% (Ministry of Economic Affairs and Employment, 2016 p. 4 & 11–12).

At the same time, the government adopted a "technology neutral" stance on energy subsidies, which changed the logic with which the government handed out monetary support to energy companies. As was found in the interpretative analysis #1: Annual Change in GDP Volume, it was expected that this approach would benefit wind power companies (Pohjanpalo, 2017).

Hydrogen as an energy source received much more visibility in the SDP's coalition's strategy than it did in those of the previous governments (Ministry of Economic Affairs and Employment, 2022). High expectations were set for this resource due to its significant economic and environmental potential (Ministry of Economic Affairs and Employment, 2023). The way hydrogen was seen by the SDP's government was similar to the way the previous coalitions saw biofuels: Both were seen as important tools to tackle climate change and as promising potential export products (Centre Party, 2015 p. 3–5).

To ensure its competitiveness on hydrogen production in an economically safe way, Finland joined its fellow EU member states to develop solutions related to the future of the resource (Ministry of Economic Affairs and Employment, 2022). In general, international cooperation became increasingly important during the course of the three observed terms as interconnectedness and smart grids brought increased efficiency and security to the consumers (Fingrid, 2012 p. 30–31, 2013 p. 25, 2014 p. 41,

2016 p. 54–55, 2017 p. 55 & 62–63, 2019 p. 65, 2020 p. 36). According to the European Commission (2018), this is supposed to improve energy security, efficiency, and accelerate the adoption of clean energy sources among the EU member states.

The SDP's government also took a harsher stance on peat setting a date for its phase out, changed forest management to strengthen the national carbon sink and maintained a positive attitude on renewable and nuclear power (Ministry of Economic Affairs and Employment, 2022). The government conducted economic measures to boost the popularity of electric vehicles which were at the time increasing in popularity (Sutinen, 2021).

According to the climate report published in 2023, emissions belonging to the European Emissions Trading System, mainly energy production, were reduced significantly in 2022, mostly due to changes in energy use. As a result, expectations for reductions in this category of emissions grew exponentially. The reason for this development was the growing volume of investments towards the green transition (Saavalainen, 2023). This correlates with the analysis #3, according to which renewable energy sources were becoming increasingly popular around the world at the expense of emissions intensive fossil fuels (Toivonen, 2017 & see p. 100).

8.1. TO CONCLUDE

As is evident from the thesis as a whole, the international treaties defined the obligations and guidelines that the Finnish governments had to follow during the eleven years. The most important of these was the 2015 Paris Climate Agreement, which most Finnish citizens hoped would bring a comprehensive solution to climate change. These plans did not always work out as hoped, as the Centre Party (CP) and SDP-led governments often disagreed on EU-wide forest policy. These objections led to mixed results, and sometimes resulted in favorable changes for the Finnish economy.

Repairing the recession-ravaged economy caused by the 2008 and 2011 economic crises was a top priority for the first two governments and defined much of their climate policy. The aim was to improve the state of the economy and employment by promoting the recycling of materials, clean technologies, and bioeconomy products. When the economy finally improved under the CP’s government, it helped the country shift its focus away from immediate short-term priorities.

The SDP’s coalition had a more ambitious view on climate change mitigation, but it also had to put the economy first when the Covid-19 pandemic hit the country. The cost of the additional measures and the new international crises increased the national debt, which prevented the government from continuing into the next term. A new development to the SDP's government was also the handling of the future hydrogen economy. The new form of industry was expected to become a means for Finland to help achieve carbon neutrality and a major export product.

Forests and bioeconomy proved to be the most divisive part of Finland's climate policy, as their economic potential became a burden on efforts to combat emissions. In the search for new and innovative uses for wood, the forest industry managed to substitute many environmentally harmful products, while also reducing the capacity of forests to remove emissions. This led to the disappearance of carbon sinks in 2021, when the land use sector became a source of GHG emissions for the very first time.

Despite the initial financial losses in the industry, the National Coalition (NCP) led government was confident that the forestry sector would eventually become profitable. This became true during the CP’s coalition, when global demand for cardboard and other wooden products began to grow. This was not entirely unproblematic as it weakened the national carbon sink to the extent that the scientific community began to believe that the government's forest policy was not entirely based on scientific knowledge to combat climate change.

One of the harmful products displaced by wood was coal, a significant source of GHG emissions. Its phase out was agreed on already by the NCP's government and was well under way during that of the SDP thanks to the subsidy fund set up by the CP's coalition. The work initially faced challenges due to the lack of alternative energy sources.

Together with wood-biofuels, the importance of peat grew when it became clear that domestically available energy sources were needed to meet the challenge of energy security. This was because the retirement of coal, which was mostly imported from Russia, proved to pose a security of supply issue. Because peat is as polluting as coal, the SDP's coalition launched a process to phase it out by 2030.

Internal relations affected the three governments' climate policies differently. The CP's coalition was the least divided by it. The coalition parties were united on climate and forest policy, and any criticism of shortcomings came unilaterally from outside the government. Same did not apply on the rest of the governments, especially that of the SDP, of which performance was visibly affected by internal disagreements. This was mostly forestry-related, pitting environmentalists, the Greens, and the Left Alliance, sometimes joined by the EU, against the economic perspective of the rest of the government.

During the period under observation, climate change increasingly became an everyday political issue. Interest in the topic peaked in 2018, when it became a key issue during the parliamentary elections. Thereafter, the economy emerged as a major concern, assuming the political status it had before. However, the way people discussed climate policy had changed, by becoming more polarized, as there was now a better understanding of how climate policies can affect people's daily lives.

8.2. Future Prospects

As shown by this thesis, Finland's future climate policy will face both challenges and successes. By the end of the SDP's term of office, the two largest sources of emissions, coal, and peat, were being phased out. The retirement of these energy sources was no longer a political issue. The electricity market was becoming increasingly efficient as European countries became more interconnected. Energy investments were increasingly favoring renewable energy sources. Alongside the successes, a problem emerged with the growing need for wood for industrial purposes. This weakened the national carbon removal, leading to the LULUCF sector to become a net emitter in 2021.

Every year, the Finnish Environmental Institute (Syke) releases a report to inform the government about the state of Finland's GHG emissions and the sufficiency of the volume of carbon removal capacity in relation to targets and obligations. In 2022, it was concluded that Finland's emissions and

removals will not be enough to meet the climate target set at EU level. This may likely require Finland to buy carbon capture and storage units from other countries. The price of this purchase would be determined by the amount of removal units available for sale in other countries.

Outi Honkakuja, Head of the Climate Unit, said that the biggest challenge in mitigating climate change will be to transform the LULUCF sector and increase carbon sinks. According to Honkakuja, the sector is unlikely to meet its carbon removal targets for 2021–2025. If the 20 million tons of CO2 deficit cannot be met, there will likely be an additional burden on the major sources of emissions, which are transportation and agriculture. In particular, the transport sector would be subject to stricter regulations to increase the share of renewable fuels in the regular transportation fuel mix and to increase the share of electric cars in the Finnish car population (Saavalainen, 2023).

Petteri Taalas, Director of the World Meteorological Organization, spoke at the climate panel for the 2023 government negotiations. He was invited to serve as the government's climate expert. Taalas prioritized reducing greenhouse gas emissions and preventing deforestation outside Europe, as reducing logging in Finland would only increase it elsewhere in the world. In an interview with YLE, Taalas explained that the collapse of carbon sinks is due to the slowdown in tree growth and the age structure of forests. However, he did not mention the increased logging activity in recent years, which has been highlighted by the Finnish Climate Panel.

Markku Ollikainen, head of the panel and former climate advisor to the government, was concerned that Taalas did not understand the binding nature of the EU's climate targets and the costs of non-compliance, which could end up costing Finland billions of euros (Pelli HS, 2023). Ollikainen argued that combating deforestation, for example by irrigating peat fields and increasing carbon sinks by afforesting abandoned mineral soil and thin peat fields, is the cheapest way to reduce emissions in Finland in the short term. If these measures do not have the desired effect, policy makers will have to resort to difficult regulatory measures to reduce deforestation (Frilander, 2023).

The new NCP’s government (2023–2027) has announced that it will keep 2035 as the target date for Finland's carbon neutrality, on condition that it does not impose additional costs on public finances (Saavalainen, 2023). As the national climate policy advances and the emissions sources get fewer, the discussion about reducing emissions focuses on fewer and fewer emitters, unless the government wishes to bring a broader group of actors under tighter regulation to ease the burden of the most critical sectors. This is reminiscent of what Mike Hulme stated about climate governance: The distribution of the financial burden is likely to be a bigger challenge than the costs themselves (p. 8). Under these circumstances, Finland's climate policy will continue to evolve into the 2020s.

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