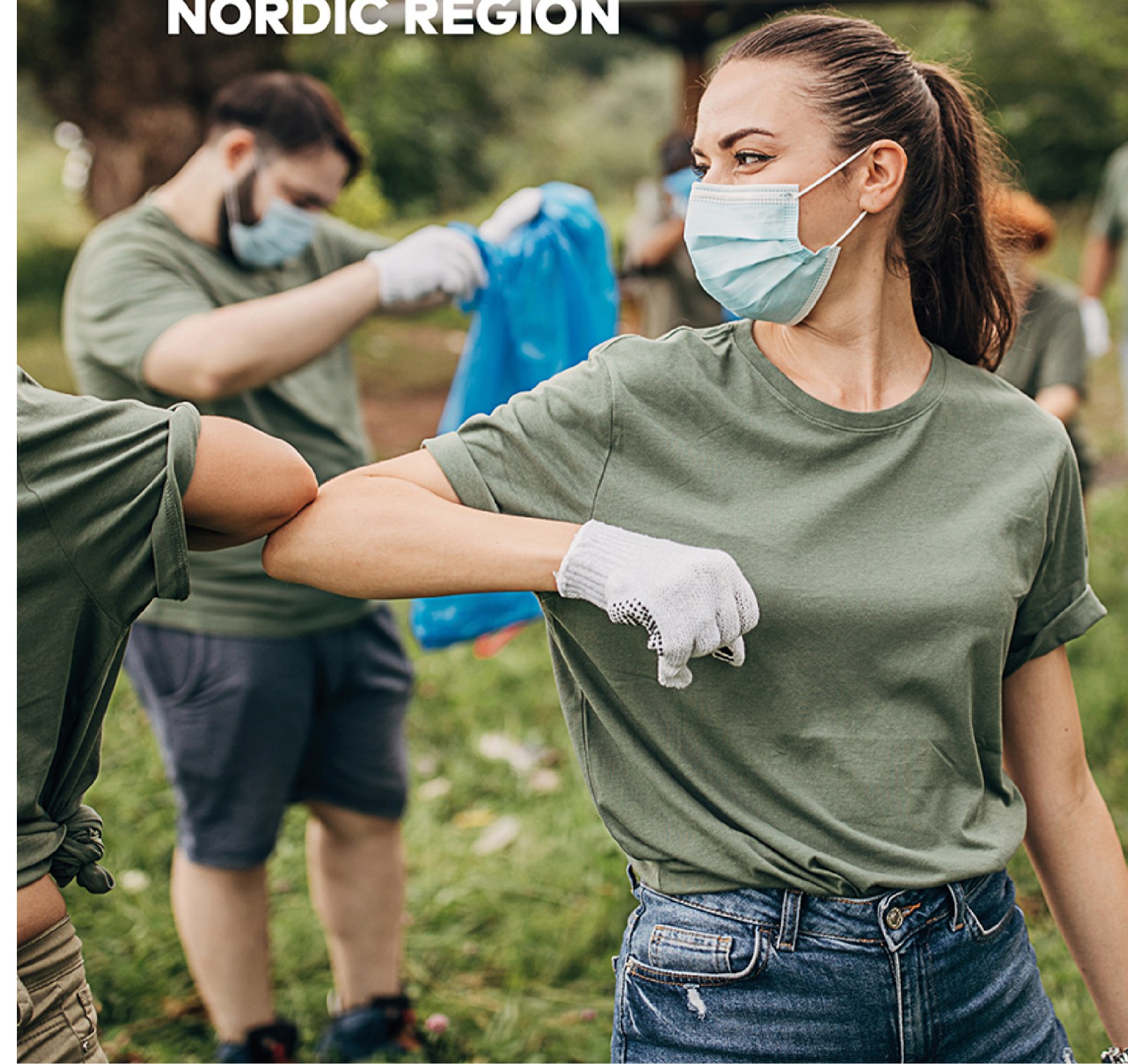


# COVID-19 POLICY RESPONSES AND GREEN RECOVERY IN THE NORDIC REGION



# Contents

Foreword	4
Preface – Covid measures	5
Summary	6
Sammendrag	8
1 Introduction	10
1.1 Definitions and limitations	11
2 Review on green stimulus measures	12
2.1 The understanding of green stimulus	12
2.2 Assessments of stimulus measures	13
3 Nordic stimulus measures in response to covid-19	20
3.1 Overview of Nordic financial stimulus measures	20
3.2 Comparison of total stimulus measures granted	20
4 Identification of sectors with green stimulus potential	23
4.1 Step 1: Identify impact of Covid-19 pandemic on Nordic economic sectors	24
4.2 Step 2: Identify impact of economic sectors on CO2 emissions	29
4.3 Step 3: Identify impact of economic sectors on the environment	33
4.4 Step 4: Identify economic sectors with the largest green stimulus potential	35
5 The impact of the Nordic financial stimulus measures on the climate and environment	38
5.1 Method for analysing impact of financial stimulus measures	38
5.2 Stimulus measures with potential impact on climate/environment	39
5.3 Climate impact of stimulus measures with direct budgetary impact	41
5.4 Environmental impact of Covid-19 stimulus measures with direct budgetary impact	49
5.5 Impact of guarantees and loans	52
6 Summary and discussion	54
Main findings	54
Discussion	57
Policy implications	59
References	60
Appendix A – NACE sectors	63
Appendix B – Stimulus measures by country	64
Appendix C – Sectors with largest negative economic impact per country	71
Appendix D - Contribution to total CO2 emissions by sector	75
Appendix E – Emission intensive sectors	79

Appendix F – Method for analysing effect on climate and environment	82
Appendix G – Environmental effect of Covid-19 stimulus per country	87
About this publication	90

This publication is also available online in a web-accessible version at <https://pub.norden.org/temanord2022-527>.

# Foreword

Since the winter of 2020, the spread of covid-19 has affected economic activity in the Nordic region. All the Nordic countries introduced fiscal policy measures to counteract the economic downturn and the negative effects the lockdown has on economic output and employment. At the same time, the Nordic countries are concerned with the more long-term crisis related to global warming, and the national targets for reducing greenhouse gas emissions and environmental degradation. The financial stimulus measures may exacerbate or positively impact challenges related to the environment and to greenhouse gas emissions.

In this project we have assessed the economic stimulus measures that have been introduced in the Nordic region, and their impact on climate and the environment.

The project is a cooperation between Menon Economics, Friðrik Már Baldursson, Professor of Economics at Reykjavik University and Erik Dahlberg at HBS Economics. We are grateful for all comments from the members of The Nordic Group on Environment and Economy (NME).

March 2022

Annegrete Bruvoll

*Project responsible*  
*Menon Economics*

Nina Bruvik Westberg

Erika Karttinen

*Operative project leaders*  
*Menon Economics*

# Preface – Covid measures

During the coronavirus disease 2019 (COVID-19) the Nordic governments have all launched powerful economic stimulus packages to protect businesses and households from losses of production and employment, and to avoid a deep recession. In the spring 2020 the climate and environment ministers issued a joint statement where they emphasized the need to exploit synergies between economic recovery and green transition.

The purpose of this project has been to map and analyze the stimulus measures in our countries that have impacts on climate and the environment. How “green” or “brown” have these measures been? Part of the task has been to identify the sectors of greatest relevance, i.e. the sectors significantly affected by the economic disruptions resulting from COVID-19, and at the same time relevant because they have substantial impact on climate or the environment. One interesting finding is that stimulus measures having a positive or negative climate and environmental impact seem to constitute a relatively small part of the overall economic stimulus. Overall, this could indicate that the synergies mentioned by the climate and environment ministers are either not so large or have not been utilized. This is one issue that the consultants have commented on in the study.

The report has been prepared by Menon Economics, in cooperation with Fridrik Már Baldursson, Professor of Economics at Reykjavik University and Erik Dahlberg at HBS Economics. Members of the Nordic group for Environment and Economy (NME) have provided comments on draft reports during the project. But the authors of the report are responsible for the content, and any views and recommendations presented in the report do not necessarily reflect the views and positions of the Nordic governments or of NME.

April 2022

Bent Arne Sæther  
*the Nordic working group for Environment and Economy*

# Summary

This report assesses the “green stimulus” relevance of the covid-19 stimulus measures in the Nordic region. By green stimulus we mean *measures that can achieve economic stimulus while also reducing greenhouse gas emissions and enhancing environmental and natural resource quality.*

All Nordic countries implemented comprehensive covid-19 stimulus packages after the outbreak of the pandemic, amounting to between 2000 euro per capita in Finland to 4400 euro per capita in Denmark. We have identified that *at least 6–21 percent* of the measures suit the definition as green stimulus in terms of decreasing greenhouse gas emissions. A lower share, *at least 2–13 percent*, contributes to increase greenhouse gas emissions. The picture is almost the same for the environment. This is in line with a similar study covering the G20 economies.<sup>1</sup> Hence, we do not find strong evidence of green stimulus in the covid-19 packages. However, neither do we find evidence that the net effects of the Nordic covid-19 packages on climate gas emissions and the environment were negative; the remaining measures are either assessed as not having any significant impact on emissions or the environment, i.e., schemes directed at sectors with low emission intensity or low environmental impact, or they are not possible to evaluate.

Most measures target several sectors or the economy in general, such as business cost support. For these support schemes, more comprehensive analyses for each measure are needed to conclude on the climate and environmental effects.

The main argument for green stimulus programs is that they can achieve economic stimulus targets while also improving the environment. This does, however, not agree with economic theory on policy design, which states that to achieve two separate policy targets efficiently, one separate instrument for each goal is needed. Our literature review supports this. For example, Chen et al. (2020) states that to put limited government funds to the best use, most of the pandemic-related stimulus should initially focus on investments that get people back to work quickly. This may be said to correspond to most of the Nordic stimulus measures.

Any public project of a certain size should undergo a cost-benefit analysis, where climate and environmental effects are considered in line with the positive benefits to employment and economic growth. In this approach, both elements in green stimulus - stimulating the economy while reducing greenhouse gas emissions and enhancing environmental and natural resource quality - are balanced. Direct instruments counteracting climate and environmental costs are generally more efficient than scaling down the measure to stimulate the economy.

For most of the covid-19 support measures undertaken by the Nordic governments, there is a lack of information enabling analysis of green effects. This reflects the urgency of getting the economic support schemes in place, where pre-evaluations based on full cost-benefit analyses were probably not prioritized. Our impression is that the short-term measures supporting companies and households were mostly

---

1. Nahm, Miller and Urpelainen (2022)

appropriate in that they prevented a catastrophic downturn in the economy and household incomes.

Some green stimulus measures can also reduce market failures, such as support for technology development, R&D and market introduction. Detailed, ex-post evaluations of the largest support schemes could bring insight into which instruments provide the most efficient green stimulus. This could be valuable information in future economic crises with little time to analyse the effects of the measures before implementation.

# Sammendrag

Denne rapporten vurderer i hvilken grad de økonomiske støtteordningene i Norden i forbindelse med covid-19 har vært *grønne støtteordninger*. Med grønne støtteordninger mener vi tiltak som stimulerer økonomisk aktivitet og samtidig bidrar til reduserte klimagassutslipp og bedret miljø.

Alle nordiske land implementerte omfattende stimuleringspakker etter utbruddet av pandemien, som beløper seg til mellom 2000 euro per innbygger i Finland til 4400 euro per innbygger i Danmark. Vi har identifisert at *minst* 10–20 prosent av tiltakene virker til reduserte klimagassutslipp, mens en lavere ande, *minst* 2–13 prosent, stimulerer til økte utslipp. Bildet er nesten det samme for miljøet (henholdsvis 2–13 og 2–13 prosent). Disse funnene er i samsvar med en lignende studie av G20-landene.<sup>2</sup> Selv om vi ikke finner sterke indikasjoner på grønn stimulans i de nordiske covid-19-pakkene, finner vi heller ikke at tiltakene samlet sett har hatt negativ innvirkning på klimagassutslipp og miljø; de resterende tiltakene vurderes enten å ikke ha noen vesentlig påvirkning på utslipp eller miljø, eller de er ikke mulig å vurdere.

De fleste tiltak retter seg mot flere sektorer eller økonomien generelt, for eksempel støtte til bedrifter for å opprettholde sysselsettingen. Det vil være nødvendig med mer detaljerte analyser for å anslå klima- og miljøeffekter av slike tiltak.

Hovedargumentet for grønne stimuleringsprogrammer er at de både kan støtte økonomisk vekst og ha positive klima- og miljøeffekter. Å oppnå flere mål med ett virkemiddel samstemmer imidlertid ikke med økonomisk teori, som sier at effektiv måloppnåelse krever ett virkemiddel per mål. Vår litteraturgjennomgang av covid-19-analyser støtter dette, der for eksempel Chen et al. (2020) påpeker at mesteparten av støtteordningene i pandemien bør fokusere på investeringer som får folk raskt tilbake i arbeid. Vi finner at dette også er i samsvar med de fleste av de nordiske stimuleringstiltakene.

Ethvert offentlig prosjekt av en viss størrelse bør gjennomgå en nytte-kostnadsanalyse, hvor klima- og miljøeffekter vurderes i tråd med de positive virkningene for sysselsetting og økonomisk vekst. Denne tilnærmingen balanserer begge elementene i grønn stimulans, både økonomisk stimulans og klimagassutslipp/miljø. Direkte virkemidler som motvirker klima- og miljøkostnader er generelt mer effektive enn å trappe ned tiltaket som skal stimulere økonomien for å nå alt med ett instrument.

For de fleste covid-19-støttetiltakene mangler informasjon som muliggjør analyser av grønne effekter. Dette viser at det har hastet å få på plass den økonomiske støtten, og forhåndsevalueringer basert på fulle nyttekostnadsanalyser kunne ikke prioriteres. Vårt inntrykk er at de kortsiktige tiltakene til støtte for bedrifter og husholdninger stort sett har nådd sine mål ved bygge unngå en vedvarende nedgang i økonomien og husholdningenes inntekter.

Støtteordninger som bygger ned markedssvikt, som støtte til teknologiutvikling, FoU

---

2. Nahm, Miller and Urpelainen (2022)



og markedsintroduksjon vil både kunne representere grønne støtteordninger og være kostnadseffektive. Etter-evalueringer av de største støtteordningene kan gi innsikt i hvilke virkemidler som mest effektivt kan stimulere både økonomien og klima/miljø positivt. Dette kan være verdifull informasjon i fremtidige økonomiske kriser, med knapp tid til å analysere tiltakseffekter før implementering.

# 1 Introduction

Since the winter of 2020, the spread of covid-19 has affected economic activity in the Nordic region.<sup>3</sup> All Nordic countries have introduced fiscal policy measures to counteract the economic downturn and the negative effects the lockdown has on economic output and employment. At the same time, the Nordic countries are concerned with the more long-term crisis related to global warming, and the national targets for reducing greenhouse gas emissions and environmental degradation. Lockdown measures and the economic downturn led to reductions in greenhouse gas emissions during 2020. The Nordic countries' ability to reduce their emissions will depend on the type and strength of the financial stimulus measures, which may exacerbate or positively impact challenges related to the environment and to greenhouse gas emissions.

The first fiscal policy measures that were introduced were mainly aimed at limiting the number of bankruptcies and securing jobs, as well as providing financial security for the laid-off and the unemployed. In the changing pandemic situation after the spring of 2020, the countries have continuously adjusted the measures to counteract the negative economic effects of lockdowns. In the beginning of 2022, we may face the end of the pandemic, but are still in an uncertain stage. It is likely that there will be long-term needs for financial support to bring the economy back to a more stable path. Most measures are designed independently of climate and environmental goals, but some are labelled as causing double positive effects: both stimulating GDP growth and the transition to low-emission economies.

Facing the multiple challenges, it is of great importance to identify fiscal instruments that at the same time contribute to the achievement of climate targets and reduce the pressure on the environment. The variation in the implemented instruments in the pandemic offers a broad set of measures to be analysed for this purpose. The question of interest is to identify which measures have the favourable property of serving both policy goals, and which stimulus measures should be less used if they undermine the environment and contribute to increased global warming.

The Nordic Working Group for Environment and Economy (NME) at the Nordic Council of Ministers (NCM) has requested a survey and an assessment of stimulus measures that have been introduced or are considered in the Nordic region, and their impact on climate and the environment. The target groups for the results are Nordic and international decision-makers, civil servants and politicians who prepare and execute the stimulus measures and coordinate fiscal and climate and environmental policy.

---

3. All Nordic countries have introduced national measures to limit the spread of infection. In addition, changes in other countries' economic activity have affected the Nordic countries.

In the announcement, the NME outlines four main questions:

**Question 1:** Identify and briefly summarize the knowledge base, including theory, about measures that have both a stimulus effect and that in the short and long term have a positive impact on the environment and climate.

**Question 2:** Identify sectors where stimulus measures are most relevant in light of the current economic crisis and which can lead to particularly large and positive environmental and climate impacts.

**Question 3:** Describe which measures the Nordic countries have implemented or plan to implement, which can be classified as environmental and climatic measures, or which counteract this development.

**Question 4:** Analyse whether there are any measures that can be effective in terms of economic activity, but which risk making it difficult for the Nordic countries to achieve their climate goals, and whether they can be designed in a different way so that they have so little negative impact on the environment as possible and contribute to the fulfilment of climate goals.

## 1.1 Definitions and limitations

The Nordic countries have introduced a wide range of measures and policies, including financial stimulus measures, mandates, bans and regulations. In this project we focus on the **financial** stimulus measures. When relevant, we refer to other policies that may impact economic growth and/or the climate/environment. In line with the tender requirements, we do not focus on EU's financial stimulus measures under the EU Green Deal.

We assume that all implemented covid-19 stimulus measures have the anticipated short-term positive effects on the economy. Hence, we do not focus further on the effects on employment and economic growth.

The measures are based on information in the respective country's state budget for 2020 and 2021 and cover the central government's stimulus measures only. We do not capture local stimulus measures unless the state transfers funds to this purpose.

We define positive **climate impacts** as impacts that reduce greenhouse gas emissions or adapts to climate change, compared to a scenario with the economic consequences of the pandemic but without the stimulus measures.

Positive **environmental impacts** are impacts that enhance environmental and natural resource quality, such as reduced pollution and preservation of biodiversity and ecosystem services, compared to a scenario with the economic consequences of the pandemic but without the stimulus measures.

The analysis is based on observations and data available up to the fall of 2021.

# 2 Review on green stimulus measures

## 2.1 The understanding of green stimulus

Even though there are several definitions of *green stimulus* in the literature, the definitions seem to be conceptually similar. The formulation by Strand and Toman (2010), in a working paper for the World Bank, represents a standard definition of green stimulus:

*"the application of policies and measures to stimulate short run economic activity while at the same time preserving, protecting and enhancing environmental and natural resource quality both near-term and long-term".*

Agrawala et al. (2020) argues that what separates green stimulus from green policies in general is that it is aimed at buffering an economic shock in addition to having environmental benefits. The literature includes several other terms used to describe similar concepts to green stimulus, e.g., green recovery<sup>4</sup> or sustainable recovery<sup>5</sup>.

The definition of *green* varies, as exemplified in the definition from Strand and Toman (2010), and is often context specific. The greenness of a measure can for instance be connected to carbon emission targets, environmental clean-up targets, biodiversity, air pollution, material usage efficiency, water usage, or investments in environmental R&D.<sup>6</sup> When we use the term *green* in this report, we mean any type of effect that can be said to preserve, protect, or reach targets related to the environment or climate.

The short-term or long-term economic benefit of stimulus measures is often measured as a change in employment<sup>7</sup>, or change in gross domestic product (GDP)<sup>8</sup>.

The main argument for green stimulus programs is that they can achieve economic stimulus targets while also reducing climate gas emissions and improving the environment. Hence, these measures are argued to have a double effect compared to non-green stimulus measures, as they can both assist with recovery from the covid-19 crisis and steer society onto a more sustainable path. While this sounds like a compelling argument, it does not coincide with economic theory on policy design, which states that to achieve two separate policy targets efficiently, one separate instrument for each goal is needed. Policies aiming to achieve two targets at once, in this case short- or long-term environmental benefits and economic gains, are difficult to design efficiently. Hence, we cannot take as a given that the first argument for green stimulus holds.

Another argument is that green stimulus can increase long-term competitiveness, as the global demand of green goods, services, and processes are believed to increase in

---

4. (OECD, 2021)  
5. Hepburn et al. (2020)  
6. (OECD, 2020)  
7. Popp et al. (2020)  
8. (IEA, 2020)

coming years.<sup>9</sup> An economic crisis can result in less focus on environmental questions and climate change, and thus offset needed structural change. For instance, recovery measures in support of carbon intensive technologies risk creating lock-in effects which holds back the green transition.<sup>10</sup> Green stimulus may be an opposing force. An example of stimulus based on this argument is the European Green Deal<sup>11</sup>, which combines covid-19 recovery with long-term greenhouse gas emission and resource-efficiency goals.

Both economic and environmental effects can be short- and long-term. Pollution clean-up is an example of a measure with primarily short-term effects, while infrastructure investments have more of a long-run impact.

## 2.2 Assessments of stimulus measures

In our search for empirical studies of efficient green stimulus measures, we find that the literature is scant in this field.<sup>12</sup> The same is reflected in Agrawala et al. (2020), who evaluates green stimulus packages in response to the global financial crisis 2007–08 and draws lessons for the covid-19. They conclude that evaluations of macroeconomic, labour market and environmental effects of the green stimulus measures are relatively scarce, and point to the difficult task of defining a suitable counterfactual to compare the impacts against.

We do, however, find some qualitative evaluations of green stimulus measures, and studies of economic stimulus on the environment and the economy.

Based on survey answers from 231 experts, including central bank officials, finance ministry officials, and other economic experts from G20 countries, Hepburn et al. (2020) identified policies with large potential for both economic recovery and positive climate impact. The experts were asked to assess recovery-policy types based on speed of implementation, long-run economic multipliers, and positive or negative climate impact potential. The results are shown in Figure 2.1. The authors identified five policies that can have both a positive climate impact as well as an impact on long-run economic multipliers:

- clean physical infrastructure investment in the form of renewable energy assets, storage (including hydrogen), grid modernisation and CCS technology
- building efficiency spending for renovations and retrofits including improved insulation, heating, and domestic energy storage systems
- investment in education and training to address immediate unemployment from COVID-19 and structural shifts from decarbonisation
- natural capital investment for ecosystem resilience and regeneration including restoration of carbon-rich habitats and climate-friendly agriculture
- clean R&D

---

9. Strand and Toman (2010)

10. Strand and Toman (2010), Hepburn et al. (2020)

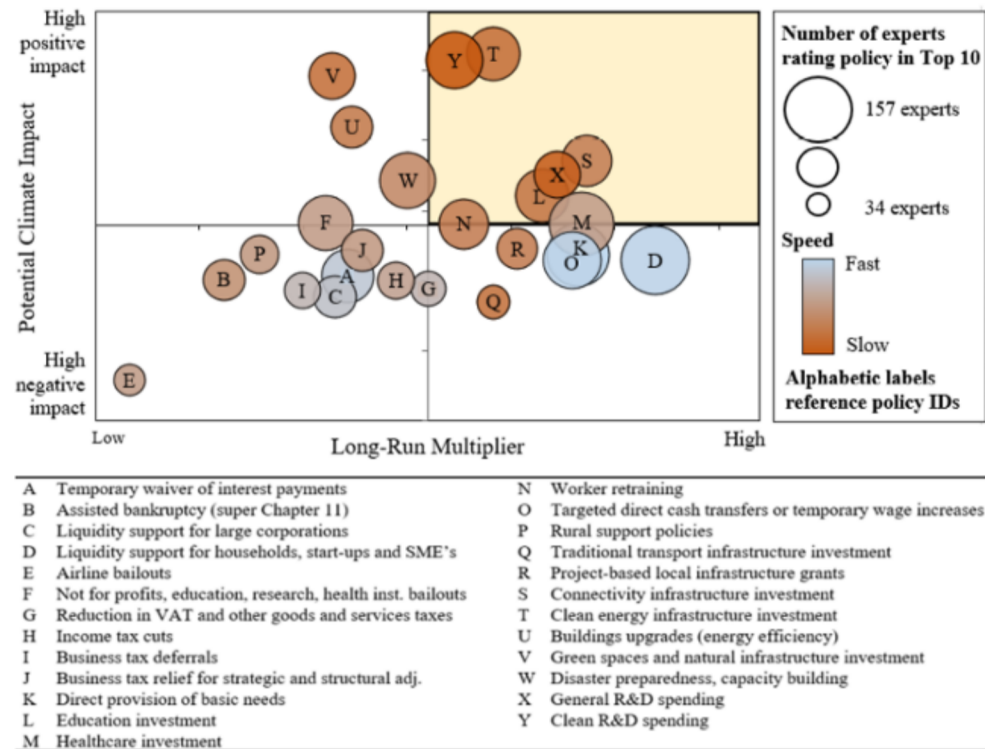
11. (European Commission, 2021b)

12. This is in contrast to the literature on double dividend effects of environmental taxes. This refers to the notion that taxes can both reduce pollution and reduce the overall economic costs associated with the tax system. If using the revenue generated from the environmental taxes to displace more distortionary taxes, economic growth may also be stimulated.

All the above-mentioned policies are assessed to be relatively slow to implement, implying that they are not suitable as rapid responses to economic crises. The paper does not identify any quickly implementable policy measures with a positive climate impact.

**Figure 2.1** Categorization of policy measures based on potential climate impact, long-run multiplier, and speed of implementation.

**Source:** Hepburn et al. (2020)



Strand and Toman (2010) gives a qualitative assessment of expected economic and environmental effects from a variety of stimulus measures, see Table 2.1. Many of these policies align with the policies suggested by Hepburn et al. (2020). The column "short-term stimulus" considers short-term economic effects, whereas the three other columns consider longer term effects.<sup>13</sup> Overall, the more labour-intensive a measure is, the higher is the expected economic effect (in terms of increased employment). Short- or long-term depend on how quickly different types of projects can be launched and the first- and second order effects. The effects on greenhouse gas emissions or other environmental factors vary between policies.

13. Strand and Toman (2010) present effects both for developed and developing countries. We present here the effects for developed countries.

**Table 2.1** Policies categorized based on short- and long-term stimulus effect, in addition to greenhouse gas (GHG) and environment and resource “co-benefits”<sup>14</sup>.

**Source:** Adapted based on Strand and Toman (2010)

Policy category	Short-term stimulus	Long-term growth	GHG emission reductions	Environment and resource “co-benefits”
<b>Quickly implemented, labour intensive, activities</b>				
Non-hazardous environmental clean-up	High	Low	Low	High
Natural resource maintenance, monitoring and policing	Medium	Low	Variable	High
Energy efficiency retrofits	High	Medium	Medium	Medium
Expansion of currently cultivated bio-energy	Medium	Low	Variable	Variable
Expanded biological carbon sequestration	Medium	Low	Medium	Variable
<b>Capital investments in environmental and natural resources</b>				
Conventional pollution control/prevention	Low	Medium	Variable	High
Increased renewable electricity production	Low	Variable	High	Medium
Introduction of new forms of bio-energy	Low	Variable	Medium	Variable
Energy efficiency improvements in new capital	Low	Low	High	Medium
Green transport infrastructure	Low	Low	Medium	Medium
Investment to strengthen resilience of natural resources to climate change	Medium	Medium	Variable	High
<b>Other specific programs with “green” characteristics</b>				
“Cash for clunkers”*	Medium	Low	Low	Low
Development and expansion of recycling systems	Low	Low	Low	Variable
Congestion reduction measures	Low	Medium	High	Medium
Altered urban forms for greater density and mixed use	Low	Medium	Medium	Low
Power grid expansion	Low	Medium	Low	Variable

\*Incentive programs to trade in old, less fuel-efficient cars for new, more fuel-efficient ones.

14. The co-benefits comprise, e.g., of internalization of otherwise non-corrected external effects. These can be environmental but can also include effects such as reduced accident rates and congestion from road traffic following increased fuel prices.

Strand and Toman (2010) argue that infrastructure investments in sectors like transport, energy, supply, and water could be compatible with long-term growth and environmental targets. While they conclude that these investments are important for long-term economic activity, they also note that measures categorised as green within these sectors are often large projects with long time horizons, making them less suitable for short-term stimuli. This is especially true for investments in the transport sector. The authors argue that investments in the energy sector could instead provide shorter-term economic gains.

Pollitt (2011) assessed the green elements of the fiscal stimulus packages in response to the financial crisis in 2008 in nine EU and four other countries. According to their evaluation, optimal recovery packages must include a balance between policies that provide short and long-term benefits (both economic and environmental). They also underline that the short-term economic benefits of green stimulus can be limited. They find that the short-term benefits are largely economic and could hence be equally met by non-green policies. Further, green R&D and innovation measures also bring long-term economic benefits from greater energy efficiency, reduced imports of fossil fuels and reduced exposure to volatile global energy prices.

### 2.2.1 Economic effects

Based on the empirical literature, green stimulus measures appear to have mostly long-term rather than short-term effects on the economy, even if there are some studies contradicting this conclusion. Even if the short-term effect of green stimulus is limited, the stimulus could still play an important role in economic recovery through its effects on long-term growth and employment.

Strand and Toman (2010) argue that green stimulus measures may have a limited effect economically, at least in the short run, compared to other available alternatives. Especially, they argue that government support for renewable energy is not an efficient way to increase employment in the short-term, since stimulating other sectors would create more employment. The conclusion is based on a literature review of papers studying economic effects of green stimulus in the EU overall in addition to country-specific studies on Denmark and Spain as well as the US. The effects of renewable energy investments could be different today, as unit costs for renewable energy have decreased and the investments required today are proportionately lower. Nevertheless, Agrawala et al. (2020) also conclude that the evidence of job creation from renewable energy policies is still mixed.

Popp et al. (2020) also conclude that "*while a green stimulus can help reshape the economy, it is less likely to help restart the economy*". They study the US American Recovery and Reinvestment act of 2009 (ARRA) and find that each 1 mill. dollars of green stimulus created 15 new jobs. However, these job gains are found in years 2013–2017, and they find little evidence of employment gains before this. Green stimulus, based on this study, does increase employment, but works more slowly than non-green stimulus. This is in line with the efficiency argument that two policy targets require two separate instruments. To put limited government funds to the best use, the authors argue that most of the pandemic-related stimulus should initially focus on investments that get people back to work quickly.<sup>15</sup>

---

15. This argument is presented in a published paper in 2020, Chen et al. (2020)



Similar to other scholars, Brahmabatt (2021) states, based on a literature review of theoretical and empirical studies on green recovery, that the win-win situation that green stimulus is argued to represent is unlikely to work in practise: "*Green recovery would yield more environmental benefits, especially in the medium and long term, but would generate a relatively slower and smaller recovery from the COVID crisis*".

On the other hand, a study by Pollitt (2011) for the European Commission finds that the green stimulus after the 2008–09 crisis did have a positive short-run impact on the EU economy.<sup>16</sup> The impact on short-term economic multipliers from green investments ranged from around 0.6 percent to 1.1 percent of GDP at the national level, and up to 1.5 percent of GDP at the European level. An important finding in this study is that co-ordinated green stimulus measures delivered greater short-term economic impact than green measures implemented by individual countries. The study also finds that the effects from green investments are similar to those from other investments.<sup>17</sup>

Further, Chen et al. (2020) argue that there is a place for green stimulus in a pandemic recovery even if it would not have significant short-run effects, as the long-run benefits of green stimulus on the economy are clear. The authors argue that green recovery measures should be seen as assisting in the inevitable transition to a greener economy, but that these may need to be combined with other policies that are better at tackling the pressing economic realities of the crisis. This is also supported by the findings from the expert interviews in Hepburn et al. (2020).

In their study for the European Commission, Pollitt (2011) claims that an optimal recovery package should include a balance between long- and short-term policies. They also argue that short-term benefits of green policies could be enhanced. They believe this could be done by using already prepared business plans that are quick to implement, or by increasing the use of "co-financing" from the private sector. An example of co-financing projects is vehicle scrappage schemes, where consumers are incentivized to exchange old cars for newer, more fuel-efficient ones. In this scheme, consumers are incentivized to purchase a new car and spend money they most likely would have saved otherwise, creating a larger short-term economic boost than would have been possible with public spending alone.

Additionally, combining green stimulus with training programmes could improve the stimulating effect. Popp et al. (2020) find that skill availability, that workers have the skills needed for the green economy, is crucial for the success of green stimuli. Hence, countries where the workers already have the skills needed will benefit more from green stimulus than countries that do not.<sup>18</sup> Building on these findings in another study, later in 2020, the authors provide suggestive evidence that combining green stimulus with training programmes improves the effectiveness of green subsidies on economic recovery.<sup>19</sup>

---

16. See Pollitt (2011)

17. Estimate is based on the short-term multiplier effect, the ratio of the boost to GDP. See Pollitt (2011).

18. This is consistent with the theories on the cost of job reallocation in labour economics. The larger the green skill gap in the community and the more non-green jobs that will be lost, the higher the cost of transitioning to a green economy will be. See Chen et al. (2020) for more.

19. Chen et al. (2020). The green stimulus programs assessed were a part of the ARRA green package. The ARRA package, amongst other things, provided funding for energy efficiency retrofits and the renewable energy industry. The training programmes were also directed at these activities.

### 2.2.2 Environmental effects

In the following, we summarize the effects of green stimulus measures on different green outcomes, specifically reduced greenhouse gas emissions through:

- investments in or subsidies for renewable energy,
- tax incentives and grants aimed at increasing building energy efficiency and/or reducing household energy consumption, and
- scrappage schemes incentivizing consumers to swap old vehicles for newer less fuel-intensive vehicles.

The reason for a focus on reduced greenhouse gas emissions is that the green measures after the 2008–2009 financial crisis, which most empirical studies within this topic are based on, were mainly targeted towards energy efficiency and climate change mitigation, both in Europe and the US.<sup>20</sup>

In general, there is evidence that green stimulus and green policy measures achieve environmental targets to some extent. However, the evidence is mixed, and green incentives, e.g., for vehicle scrappage or increased energy efficiency in buildings, can have unintended consequences that make them less efficient.

Green stimulus has been successful in accelerating the shift to renewable energy. A study by the US Council of Economic Advisors in 2016 shows that stimulus programmes in response to the 2008 financial crises increased renewable energy generation: solar electricity in the US increased 30 times from 2008 to 2015, and wind generation increased more than threefold. This development is to a large extent attributed to the deployments made possible by the US American Recovery and Reinvestment act of 2009 (ARRA). The ARRA program allocated \$90 bill. of the stimulus to renewable energy projects, which funded a variety of different projects through differing funding mechanisms.<sup>21</sup> Additionally, ARRA contributed to dramatic cost reductions, increasing the viability of renewable energy as an alternative to fossil fuels.<sup>22</sup>

Stimulus measures have also been directed to increasing building energy efficiency and reducing energy consumption. Energy efficiency stimulus includes tax incentives and grants for investing in insulation, installation of energy efficient lights, and retrofitting buildings. Installing smart meters, that inform consumers of their energy consumption, has been shown to stimulate reduced energy consumption.<sup>23</sup>

Incentives may also have unintended consequences as shown in Alberini et al. (2016). In the study, the effect on energy consumption from a new heat pump is measured on two groups, one which received an incentive to install it and one which did not. On average, household energy consumption is reduced by eight percent when a new, more energy-efficient pump is installed. However, among the incentive receivers (households) the effect is small, and the larger the incentive, the smaller the reduction in energy usage. Hence, environmental benefits might not increase in proportion to the size of the investment or could even be offset by behavioural

---

20. Pollitt (2011) and Chen et al. (2020)

21. Around 30 percent of the stimulus package was in the form of tax incentives, while 70 percent was in the form of spending. The funding was directed towards the following categories: renewable generation, energy efficiency, grid modernization, advanced vehicles and fuels, transit, carbon capture and storage, green innovation and job training, and clean energy manufacturing.

22. Council of Economic Advisors (2016)

23. See Agrawala et al. (2020) for a more detailed discussion of the literature

rebound effects. Based on this, Agrawala et al. (2020) conclude with that energy-efficiency programmes might need to be combined with measures that account for behavioural responses to improve policy design.

The environmental impact of scrappage schemes, which provide financial incentives to trade in vehicles with low fuel efficiency, are mixed.<sup>24</sup> In the US, the CARS programme introduced in 2009 is estimated to have reduced CO<sub>2</sub> emissions,<sup>25</sup> and a European study found that the scrappage schemes increased fuel efficiency of new cars during the financial crisis.<sup>26</sup> On the other hand, a German scrappage scheme resulted in people trading in smaller vehicles for medium-sized ones. Even though the new vehicles were more fuel-efficient, larger cars use more fuel than smaller cars, cancelling out some of the benefits from the scheme.<sup>27</sup> Additionally, based on a Pollitt (2011), the post financial crises scrappage schemes had limited environmental benefits as many vehicles would have been replaced soon with or without the schemes.

The effects from investing in green R&D are also mixed. Agrawala et al. (2020) have primarily looked at studies on investments in carbon capture technology. They conclude that projects in recovery packages in both Europe and the US had a low success rate, even though several other carbon capture projects have been successful in the same period. Agrawala et al. (2020) conclude that direct public R&D can create problems as governments need to try and pick winners for the investment to pay off, and that governments instead should try and encourage competitive selection to direct the investments better.

The mixed experiences do not disqualify green stimulus packages but point to the classical argument that separate instruments are needed to achieve separate policy targets efficiently.

---

24. Agrawala et al. (2020)

25. Li et al. (2013)

26. Grigolon et al. (2016)

27. *OECD/ITF (2011)*

# 3 Nordic stimulus measures in response to covid-19

## 3.1 Overview of Nordic financial stimulus measures

The Nordic countries have introduced a wide range of measures and policies, including financial stimulus measures, mandates, bans and regulations. The stimulus can be roughly categorized into the following groups of instruments:

- Tax deferrals
- Permanent tax reduction or exemption
- Loan guarantees
- Grants and subsidies
- Investments

The instruments have different aims, and target either specific sector(s) or the general economy.

Tax deferrals and tax reductions/exemptions are given to increase companies and households' liquidity, at the expense of forgone or postponed revenue to the government. Most of the tax deferrals or tax reductions/exemptions target companies, yet there are also examples of tax exemption given to households, e.g., Iceland's VAT refunds covering leisure housing, design and supervision of construction, car repairs, etc.

Loan guarantees are given in order to relieve credit constraints in the financial market. The loan guarantees are given to companies regardless of sector or target specific companies, such as airlines.

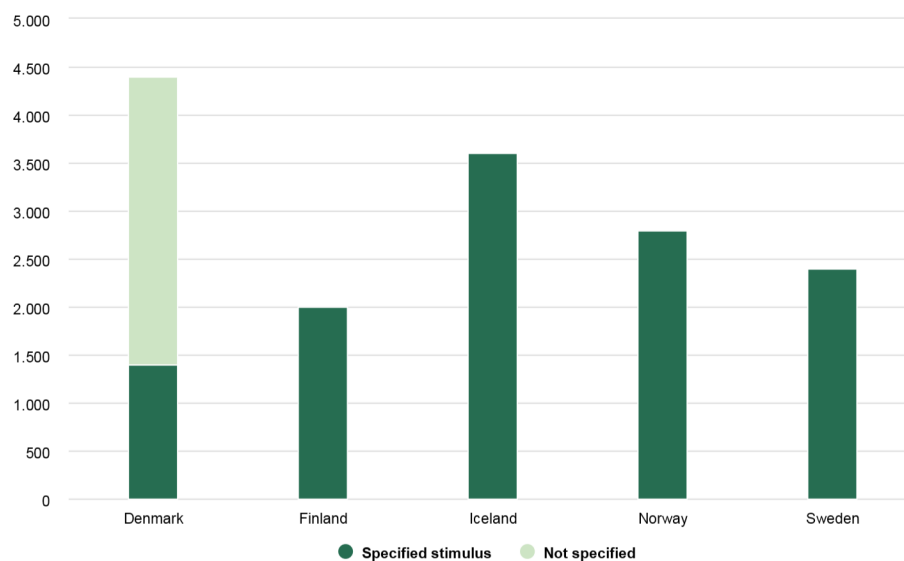
Grants or subsidies either 1) compensate for loss of income for companies or households or 2) target specific sectors to stimulate activity. In the first case, the grants/subsidies either compensate for proven income loss or expected future income loss, for example through purchase of transportation services. In the second case, the receiving party is not necessarily experiencing an income loss. The aim is instead to increase activity and thus raise current or future employment. Examples of this are grants to the construction sector or grants to research projects/funds.

## 3.2 Comparison of total stimulus measures granted

By stimulus measures, we mean all measures that the national governments have labelled a response to the economic consequences of the pandemic. Further, we have included all measures with a direct budgetary impact and excluded support to activities related directly to handling the pandemic, like support to hospitals and testing stations.

The Covid-19 stimulus packages differ both in composition and in total stimulus, amounting to between 1 bill. euros (Iceland) and 26 bill. euros (Denmark). All countries have agreed on large stimulus packages, and in all countries a significant

share of this has been directed as immediate support to all companies and households affected by the pandemic. Figure 3.1 shows the total stimulus *per capita* in all Nordic countries during 2020–2021.<sup>28</sup>



**Figure 3.1** Total covid-19 stimulus measures during 2020–2021 per country, specified and unspecified stimulus.<sup>29</sup> In euro per capita.

Based on our mapping, Denmark and Iceland have agreed upon the most generous stimulus packages measured per capita. Both countries have chosen to introduce large infrastructure projects running over several years as a response to the economic repercussions. Given that projects like these undergo long time investigation and processing before they are launched, it is likely that the infrastructure projects were planned, before the pandemic. There is a good chance that some of these packages would have been realized even without the pandemic. Still, we do not surmise on this matter, as they have been labelled corona stimulus by the respective national governments. Further, it is possible that the adoption of some of these measures were speeded up, and/or increased in size, because of the pandemic. To compare, Finland in late 2019 agreed upon a program called *One-off future-oriented investments* which runs from 2020–22 and totals 3 bill. euro. As this was agreed upon before the pandemic, it is not included as stimulus measures, even though it in practise could have had a stimulating effect.

The total amount of covid-19 stimulus granted is reported differently in all Nordic countries, and a direct comparison is therefore difficult. The total amounts per capita presented in Figure 3.1 hence be viewed with care. For example, even though

28. We have only included stimulus measures that, to the best of our knowledge, were planned for 2020 and 2021. We have based our analyses on planned implementation of measures, and the actual implementation might differ. We collected data during the fall of 2021, and hence we have not included any of the stimulus implemented due to new restrictions in December 2021 in several Nordic countries.

29. Danish stimulus had not yet been specified in terms of which initiative and sector the money should be directed to in October 2021

Denmark has agreed upon the largest amount of stimulus of all the Nordic countries, over two thirds of this was, to the best of our knowledge, not yet specified when we conducted this analysis<sup>30</sup> in terms of which initiative and sector the money should be directed to. Whether the stimulus will eventually be paid out or not, it most likely has not be distributed within 2020–2021, which is our period of observation. If we exclude the stimulus that is yet to be specified, Denmark goes from highest to lowest stimulus per capita in the Nordic countries.

For a more detailed description of the financial stimulus packages that have been implemented in response to the covid-19 pandemic in all Nordic countries, see Appendix B.

---

30. Danish stimulus had not yet been specified in terms of which initiative and sector the money should be directed to in October 2021

# 4 Identification of sectors with green stimulus potential

The purpose of this chapter is to identify economic sectors in the Nordic economies in need of stimulus following the Covid-19 pandemic, and where stimulus has green potential, e.g., a positive impact on the climate/environment (Question 2).<sup>31</sup>

This is done stepwise:<sup>32</sup>

- **Step 1:** Identify impact of Covid-19 pandemic on the Nordic economic sectors (section 4.1)
- **Step 2:** Identify impact of the economic sectors on the climate in terms of CO<sub>2</sub> emissions (section 4.2)
- **Step 3:** Identify impact of the economic sectors on the environment (section 4.3)
- **Step 4:** Identify economic sectors with the largest green stimulus potential (section 4.4)

In **Step 1**, we present and analyse how the various sectors<sup>33</sup> of the Nordic economies have been impacted by the pandemic in terms of gross value added (GVA), employment and the total number of hours worked. This provides an intuition of which sectors that have been/are in most need of stimulus measures, to mitigate the negative impacts of the pandemic. We primarily use data from Eurostat, which has comparable data for all Nordic countries.<sup>34</sup> We use data for the latest year available for all the Nordic countries. The national statistical offices of the Nordic countries provide more detailed data, which complement the analysis when needed.

In **Step 2**, we present and analyse the total greenhouse gas (GHG) emissions from the activity in each sector, as well as their emission intensities. This provides an intuition of the expected climate impacts of the stimulus measures directed for each sector.

In **Step 3**, we categorize the impact of different sectors on the environment. In contrast to greenhouse gas emissions (Step 2) there is no common unit for measuring environmental outcomes. Hence, we follow a more qualitative approach to identify sectors that may impact the environment.

In **Step 4** we combine information from the three previous steps. Sectors in need of stimulus (from Step 1) that negatively impact either the climate (from Step 2) and/or the environment (from Step 3) are most relevant in a stimulus perspective.

---

31. As described in section 2.1, the term green in this report refers to any type of effect that can be said to preserve, protect, or reach targets related to the climate and the environment, the latter including biodiversity, pollution, waste, land use, water use and ecosystem services.

32. This framework is based on a method developed for categorizing the state budget items by greenhouse gas emissions. (Menon and CICERO, 2020).

33. The identification of sectors follows NACE Rev. 2, the European standard classification of productive economic activities.

34. However, one should note that it is the respective national statistical offices that provide Eurostat with data.

## 4.1 Step 1: Identify impact of Covid-19 pandemic on Nordic economic sectors

The pandemic and the restrictive measures have impacted most, if not all, sectors of the Nordic economies. However, some sectors have clearly been more severely impacted than others. In principle, one can expect that the stimulus measures to support economic activity would primarily target the sectors that have seen the largest negative impact during the pandemic, while sectors that have been more mildly impacted should be in less need of stimulus measures. The sectoral economic growth from pre Covid-19 up to the end of 2021 also reflect the support measures made available for struggling companies (in all sectors) relatively early during the pandemic.<sup>35</sup> These measures have reduced the negative impacts on companies and employees, e.g., by enabling companies to furlough, instead of laying off, their workforce.

The impact on GVA, employment and hours worked differed substantially across sectors and, perhaps more surprisingly, across the Nordic countries. The impact on the total economy and eleven broad sectors in 2020 is presented in Table 4.1. The table also includes the average annual growth rate during 2017–2019 in parentheses, for comparison. To help visualise the magnitude of the impacts for the different sectors and countries, a growth rate of –5 percentage points or lower in 2020 compared to the average annual growth rate in 2017–2019 is coloured red, a growth rate of 0 percent to –4.9 percentage points is coloured yellow, and a growth rate of 0.1 percentage points or higher is coloured green.

Each Nordic country experienced negative growth in total gross value added (GVA) during 2020 compared to 2019, although the magnitude of the impacts varied substantially. While Icelandic GVA decreased by 6.3 percent, Norwegian GVA decreased by a more limited 0.6 percent. For Denmark, Finland and Sweden, the decrease was between 2.4 percent and 3.1 percent. However, Iceland also experienced a higher average annual growth rate during the three years preceding 2020 (4 percent) than the other Nordic countries (1.4–2.3 percent).

For the EU27, GVA decreased by 5.9 percent from 2019 to 2020. Hence, except for Iceland, the Nordic countries had a clearly lower economic recession compared to the EU27.

Iceland was also the hardest hit Nordic country in terms of employment, with a decrease of 4.6 percent in employment and a decrease of 7.2 percent in total hours worked. Denmark was the Nordic country with the lowest decrease in employment (-0.7 percent), while Norway experienced the lowest decrease in total hours worked (-2.2 percent). For all Nordic countries, the number of hours worked decreased more than the number of employed persons. This suggests that a large portion of the furloughs were used by companies to avoid having to lay off employees. For example, at one point during 2020, the three largest vehicle manufacturers in Sweden (AB Volvo, Volvo Cars and Scania) had fully stopped their production and more than 60,000 employees were furloughed. By October 2020, all employees had returned to work.<sup>36</sup>

For the EU27, employment decreased by 1.4 percent, similar to the Nordic countries,

---

35. For example, the Swedish government proposed measures for tax deferral and financial support for furloughing employees in March 2019. (Finansdepartementet, 2020).

36. (Sveriges Radio, 2020)



except for Iceland. The total number of hours worked decreased by 6.4 percent, which is a larger decrease than in the Nordic countries, except for Iceland.

**Table 4.1** Economic impact per sector and country in 2020. Percentage change in Gross Value Added (GVA), persons employed (PE), and hours worked (HW) in 2020 compared to 2019, fixed index values. (Average annual change during 2017–2019 for comparison).

**Source:** Eurostat.<sup>37</sup>

The colors indicate the difference in growth in 2020 and average growth 2017–2019:

			> 0.1 percentage points	-4.9 – 0 percentage points	-5 < percentage points
Sector	Denmark	Finland	Iceland	Norway	Sweden
<b>TOTAL – all sectors of the economy</b>	GVA: -2.4 (2.3)	GVA: -3.0 (2.0)	GVA: -6.3 (4.0)	GVA: -0.6 (1.4)	GVA: -3.1 (2.3)
	PE: -0.7 (1.4)	PE: -2.1 (1.8)	PE: -4.6 (2.4)	PE: -1.2 (1.5)	PE: -1.3 (1.5)
	HW: -2.8 (0.5)	HW: -3.0 (1.4)	HW: -7.2 (1.5)	HW: -2.2 (1.2)	HW: -3.2 (1.0)
<b>A - Agriculture, forestry and fishing</b>	GVA: 6.1 (10.9)	GVA: -2.8 (3.4)	GVA: -0.5 (4.2)	GVA: 0.2 (2.6)	GVA: 1.1 (0.2)
	PE: 3.0 (-1.3)	PE: -1.4 (-2.3)	PE: -2.8 (-1.3)	PE: -1.5 (0.5)	PE: 3.4 (-0.7)
	HW: 2.8 (-3.0)	HW: -1.1 (-2.0)	HW: -1.7 (-2.2)	HW: -1.0 (0.3)	HW: 1.3 (-1.4)
<b>B-E - Industry (except construction)</b>	GVA: -1.2 (4.0)	GVA: -0.4 (2.1)	GVA: -5.8 (2.0)	GVA: 5.5 (-0.9)	GVA: -5.2 (1.3)
	PE: -2.4 (1.5)	PE: -0.4 (0.7)	PE: -4.1 (-0.3)	PE: -0.3 (0.7)	PE: -1.8 (1.5)
	HW: -4.0 (0.3)	HW: -1.4 (0.8)	HW: -4.7 (-1.2)	HW: -0.4 (0.5)	HW: -6.1 (0.5)
<b>C – Manufacturing</b>	GVA: -0.3 (6.5)	GVA: -0.9 (2.1)	GVA: -5.0 (0.8)	GVA: -2.5 (1.6)	GVA: -6.3 (1.4)
	PE: -2.6 (1.5)	PE: -0.7 (0.6)	PE: -5.0 (-0.6)	PE: -1.8 (0.5)	PE: -2.4 (1.4)
	HW: -4.5 (0.3)	HW: -1.8 (0.7)	HW: -5.5 (-1.7)	HW: -2.2 (0.1)	HW: -7.4 (0.5)
<b>F – Construction</b>	GVA: 1.2 (1.9)	GVA: 4.1 (-0.4)	GVA: -6.8 (7.6)	GVA: -3.1 (2.9)	GVA: 1.0 (3.7)
	PE: 1.6 (2.9)	PE: -2.4 (2.1)	PE: -7.3 (8.8)	PE: 0.0 (3.8)	PE: -0.8 (3.6)
	HW: 1.7 (1.8)	HW: -2.5 (1.4)	HW: -8.3 (7.6)	HW: -0.5 (2.7)	HW: -4.4 (2.3)
<b>G-I - Wholesale and retail trade, transport, accommodation and food service activities</b>	GVA: -7.6 (3.0)	GVA: -10.1 (2.1)	GVA: -23.8 (2.5)	GVA: -6.3 (1.8)	GVA: -7.6 (1.8)
	PE: -2.1 (1.7)	PE: -7.5 (1.0)	PE: -14.8 (1.7)	PE: -3.9 (0.4)	PE: -3.9 (1.2)
	HW: -6.1 (0.3)	HW: -10.0 (0.8)	HW: -20.2 (1.0)	HW: -6.3 (-0.2)	HW: -6.2 (0.8)
<b>J - Information and communication</b>	GVA: 3.1 (2.7)	GVA: 4.6 (3.8)	GVA: -2.0 (8.4)	GVA: -1.0 (5.4)	GVA: 2.3 (8.6)
	PE: 1.6 (2.1)	PE: 2.1 (3.8)	PE: -1.2 (0.0)	PE: -2.0 (3.2)	PE: 5.0 (3.1)
	HW: 0.6 (1.1)	HW: 1.7 (3.1)	HW: -2.1 (0.2)	HW: -0.6 (2.7)	HW: 4.0 (3.4)
<b>K - Financial and insurance activities</b>	GVA: 3.2 (2.3)	GVA: -1.3 (-0.5)	GVA: 5.8 (4.8)	GVA: 3.4 (2.6)	GVA: 3.2 (2.2)
	PE: -1.4 (2.3)	PE: -4.0 (0.1)	PE: -3.6 (-1.7)	PE: 2.1 (0.0)	PE: 2.3 (1.6)
	HW: -2.3 (1.8)	HW: -3.8 (-0.6)	HW: -3.6 (-2.7)	HW: 2.6 (-0.4)	HW: 1.7 (-0.7)
<b>L - Real estate activities</b>	GVA: 1.5 (2.0)	GVA: 0.7 (2.4)	GVA: 1.7 (3.4)	GVA: 1.2 (1.3)	GVA: 0.6 (4.3)
	PE: 0.8 (1.3)	PE: 7.5 (1.7)	PE: -6.2 (7.4)	PE: 0.0 (1.1)	PE: 1.6 (2.6)
	HW: -0.3 (-0.7)	HW: 5.8 (1.3)	HW: -4.5 (6.5)	HW: 0.0 (0.0)	HW: 0.9 (3.1)

37. Gross value added and income by A\*10 industry breakdowns and Employment by A\*10 industry breakdowns

<b>M-N - Professional, scientific and technical activities; administrative and support service activities</b>	GVA: 1.5 (1.0)	GVA: -3.7 (5.7)	GVA: -20.8 (6.0)	GVA: -7.6 (4.8)	GVA: -5.0 (3.0)
	PE: -1.5 (2.3)	PE: -2.4 (4.4)	PE: -15.5 (4.6)	PE: -3.8 (3.9)	PE: -1.5 (3.1)
	HW: -2.5 (1.2)	HW: -3.3 (3.9)	HW: -18.3 (3.3)	HW: -5.7 (3.3)	HW: -3.2 (2.6)
<b>O-Q - Public administration, defence, education, human health and social work activities</b>	GVA: -3.8 (0.7)	GVA: -3.5 (0.6)	GVA: 4.5 (3.9)	GVA: -1.0 (1.4)	GVA: -2.5 (0.1)
	PE: 0.6 (0.7)	PE: 0.6 (2.1)	PE: 6.2 (3.0)	PE: 0.8 (1.0)	PE: -0.8 (0.8)
	HW: -1.5 (0.3)	HW: 0.8 (1.9)	HW: 4.0 (2.2)	HW: 0.0 (1.0)	HW: -1.0 (0.4)
<b>R-U - Arts, entertainment, recreation; oth. service activities; household activ., extra-territorial organizations/ bodies</b>	GVA: -18.3 (1.2)	GVA: -8.1 (1.4)	GVA: 0.2 (5.0)	GVA: -25.7 (1.5)	GVA: -5.0 (1.7)
	PE: -2.0 (1.1)	PE: -4.3 (0.9)	PE: 3.1 (4.0)	PE: -4.5 (3.9)	PE: -3.1 (1.5)
	HW: -5.6 (-0.2)	HW: -6.0 (0.1)	HW: -0.7 (2.9)	HW: -6.5 (3.7)	HW: -6.8 (1.1)

Three broad sectors stand out by being severely negatively impacted in almost all Nordic countries:

- The aggregated sector of *Wholesale and retail trade, transport, accommodation and food service activities*,
- The aggregated sector of *Arts, entertainment and recreation; other service activities; activities of households and extra-territorial organizations and bodies*,
- The aggregated sector of *Professional, scientific and technical activities; administrative and support service activities* - hereunder Travel agency, tour operators and other reservation service and related activities.

All these sectors, and especially the first two, are characterised by being highly dependent on human contact and interaction. For example, lockdown measures had a large impact on the day-to-day operations of retail stores, hotels, restaurants and cafes, as well as on the cultural sectors. While the specific types and levels of restrictions differed across the Nordic countries, such business activities were wholly or partially shut down for periods of time, due to the restrictions.

#### 4.1.1 Sectors with largest negative impacts per country

The national statistical offices provide more detailed information of how the pandemic impacted the various sectors of the Nordic economies. Table 4.2 provides an overview of the three sectors in each Nordic country that experienced the largest negative impact in 2020 compared to 2019.

*Accommodation and food service activities* were among the most negatively impacted in all Nordic countries. As above these activities are characterised by being highly dependent on human interaction. Similarly, *Arts, entertainment and recreation* were among the most negatively impacted.

*Transportation and storage* was also generally negatively affected in all countries. In Norway, this sector was not among the three most affected. Unlike the other Nordic countries, manufacturing was also among the hardest hit sectors in Sweden. For a more detailed description per country, see Appendix C.

**Table 4.2** The three sectors in each country with the largest negative impact in 2020 compared to 2019, in terms of Gross Value Added (GVA), Persons employed (PE) and Hours worked (HW).

**Source:** Statistics Denmark, Statistics Finland, Statistics Iceland, Statistics Norway, and Statistics Sweden.

<b>Denmark</b>	<b>Arts, entertainment and recreation</b>	<b>Accommodation and food service activities</b>	<b>Transportation and storage</b>
GVA	-36.4	-35.4	-21.2
Persons employed	-4.6	-8.7	-3.5
Hours worked	-11.2	-19.3	-7.0
<b>Finland</b>	<b>Accommodation and food service activities</b>	<b>Transportation and storage</b>	<b>Arts, entertainment and recreation</b>
GVA	-33.5	-25.8	-12.6
Persons employed	-22.2	-8.7	-9.4
Hours worked	-25.1	-11.8	-9.8
<b>Iceland</b>	<b>Accommodation and food service activities</b>	<b>Administrative and support service activities</b>	<b>Transportation and storage</b>
GVA	-50.8	-38.5	-35.7
Persons employed	-27.6	-27.5	-19.3
Hours worked	-37.3	-31.3	-23.7
<b>Norway</b>	<b>Accommodation and food service activities</b>	<b>Arts, entertainment and recreation</b>	<b>Administrative and support service activities</b>
GVA	-29.8	-25.7	-19.3
Persons employed	-10.9	-4.5	-7.9
Hours worked	-21.0	-6.4	-11.1
<b>Sweden</b>	<b>Accommodation and food service activities</b>	<b>Manufacturing of motor vehicles</b>	<b>Manufacture of other transport equipment</b>
GVA	-29.0	-17.7	-14.4
Persons employed	-15.4	-5.1	0.0
Hours worked	-18.5	-12.3	-3.4

\*Manufacture of motor vehicles, trailers and semi-trailers

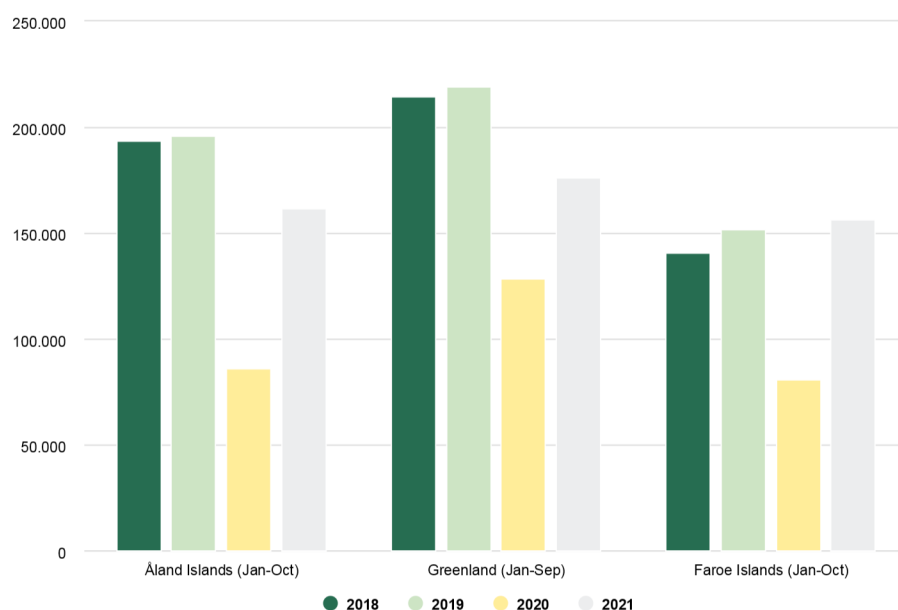
\*\* Manufacture of other transport equipment

#### 4.1.2 Åland, Greenland, and the Faroe Islands

For the autonomous region Åland and the autonomous territories Greenland and the Faroe Islands, we do not have access to as detailed data. The number of hotel nights serves as an indicator to the impact on inbound tourism, which is an important industry in these areas. The data reveals significant negative consequences to this sector from 2019 to 2020, and varying degree of recovery in 2021, see Figure 4.1.

**Figure 4.1** Number of hotel nights in Åland, Greenland and the Faroe Islands, YTD 2018–2021.

**Source:** Ålands Statistik- och Utredningsbyrå, Grønlands Statistik, Hagstova Føroya.<sup>38</sup>



The general picture is that the economies of Åland, Greenland and the Faroe Islands faced a significant recession after the outbreak of the pandemic in 2020. However, the recovery in terms of tourism indicators was obvious during the first part of 2021.

Åland experienced the largest decrease in number of hotel nights of the three geographies. In 2020, the number of hotel nights in Åland were 56 percent lower than in 2019. In April 2020, the registered hotel nights in Åland were 94 percent lower than in April 2019. During the most popular tourist month of the year, July, the decrease was 40 percent compared to the year before. The total year-to-date (January–October, latest data available) number of hotel nights in 2021 was 18 percent lower than in 2019. While the number of hotel nights in Åland decreased for almost all nationalities, the decrease was much larger for Swedish visitors. In 2019, Swedish nationals made up 41 percent of the hotel nights in Åland, while in 2020 they only made-up 11 percent. In contrast, visitors from Finland made up 49 percent

38. Based on latest available data for each respective geography.

of the hotel nights in 2019, but 83 percent in 2020. Still, the total number of hotel nights from Finnish nationals decreased by 27 percent in 2020 compared to 2019.

In Greenland, the number of hotel nights decreased by 34 percent in 2020 compared to 2019. As in Åland, April was the month with the largest relative decrease of 83 percent from April 2019. As in Åland, the Greenlandic tourism is still far from its pre-pandemic levels, with the year-to-date (January-September, latest data available) number of hotel nights being 20 percent lower in 2021 than in 2019.

In the Faroe Islands, the number of hotel nights decreased by 43 percent in 2020 compared to 2019. The largest decrease, 90 percent, was in April. Unlike Åland and Greenland, the year-to-date (January-October, latest data available) number of hotel nights in 2021 surpasses that of 2019 by 3 percent. Thus, it appears that the Faroese tourism sector has managed to recover more swiftly than its counterparts in Åland and Greenland.

## 4.2 Step 2: Identify impact of economic sectors on CO<sub>2</sub> emissions

To identify the impact of the economic sectors on CO<sub>2</sub> emissions we focus on two measures:

- Sectors' contribution to total CO<sub>2</sub>-equivalent emissions
- Sectors' greenhouse gas emission intensities, e.g., CO<sub>2</sub> equivalents per euro of gross value added (GVA)

By combining information on these measures, we find that the following sectors have the largest negative impact on CO<sub>2</sub> emissions:

- A - Agriculture, forestry and fishing
- B - Mining and quarrying / D - Electricity, gas, steam and air conditioning supply / E - Water supply, sewerage, waste management and remediation activities
- C - Manufacturing
- F - Construction
- G-I - Wholesale and retail trade, transport, accommodation and food service activities

In the following, we describe in detail the sectors' contribution to total CO<sub>2</sub>-equivalent emissions in each country, and the sectors' greenhouse gas emission intensities.

### 4.2.1 Sectors' contribution to total CO<sub>2</sub> emissions

The country profiles of greenhouse gas (GHG) emissions, measured in CO<sub>2</sub> equivalents, differ across the countries, due to varying size and sectoral composition of the Nordic economies. Furthermore, while there are international standards and instructions for national statistical offices' reports on CO<sub>2</sub> emissions, there are nonetheless differences in how the data is collected and classified.

In 2018 (the latest year where Eurostat presents data on GHG emissions for all

Nordic countries<sup>39</sup>) Denmark reported the highest total emissions of GHG, at 81 mill. tonnes<sup>40</sup>. Iceland was the Nordic country with lowest total GHG emissions, at 7 mill. tonnes. Emissions from Norway amounted to 69 mill. tonnes, from Finland 54 mill. tonnes, and from Sweden 48 mill. tonnes.

Figure 4.2 presents the relative distribution of GHG emissions per sector in each country, measured as GHG emissions per sector as share of total GHG emissions, excluding GHG emissions from households. We have only included the four most emitting sectors for each country in the figure, the rest are summed into the category "other sectors".

As the figure shows, there are some relatively marked differences in the sectoral composition of the GHG emissions across the countries. The transportation and storage sector (H) is a large source of emissions in all Nordic countries, but especially so in Denmark. The agricultural sector (A) is also amongst the 4 most emitting sectors in all Nordic countries. So is manufacturing, but to a varying degree. Not surprisingly mining and quarrying (B) is the second most emitting sector after transport in Norway, due to petroleum production. For more details by country, see Appendix D.

---

39. Eurostat, Air emissions accounts by NACE Rev. 2 activity [env\_ac\_ainah\_r2].

40. More than half (56 percent) of total Danish GHG emissions emanate from the transport sector. 90 percent of those emissions originate from international transport by Danish ships, airplanes, and vehicles (e.g., international shipping with Danish flagged ships).

**Figure 4.2** Share of total emissions of greenhouse gases from economic activity, CO<sub>2</sub> equivalents, by sector and country, 2018. Four largest emitting sectors specified per country. The rest are under "Other sectors".<sup>41</sup>



41. For a more detailed description of emissions per sector, see Appendix C.

#### 4.2.2 Sectors' greenhouse gas emission intensities

Sectoral emission intensities measure the sector's emissions with respect to its economic size. This allows for comparison of GHG emissions across sectors and countries, see Table 4.3. We measure emission intensities by emissions of greenhouse gas (GHG) measured in CO<sub>2</sub> equivalents per euro of gross value added (GVA).

The weighted average emission intensity of the Nordic economies is 212 grams of GHG emissions per euro of GVA, in 2017.<sup>42</sup> Iceland has the highest average emission intensity, with 353 grams of GHG emissions per euro of GVA, i.e., almost two thirds higher than the Nordic average. Sweden has the lowest average emission intensity, with 114 grams of GHG emissions per euro of GVA, i.e., almost half of the average Nordic emission intensity.

**Table 4.3.** GHG emission intensity, grams of GHG emissions (CO<sub>2</sub> equivalents) per euro of GVA, by sector and country, 2017.<sup>43</sup>

**Source:** Eurostat, *Air emissions intensities by NACE Rev. 2 activity*

	Lower emission intensity than the national average	Average emission intensity for each country	0 to 99 percent higher emission intensity than the national average	100 percent or higher emission intensity than the national average	
NACE	Denmark	Finland	Iceland	Norway	Sweden
<b>TOTAL - Total - all NACE activities</b>	308	270	353	221	114
<b>A - Agriculture, forestry and fishing</b>	3.265	1.572	1.377	765	1.318
<b>B - Mining and quarrying</b>	618	469	65	301	430
<b>C - Manufacturing</b>	156	347	1.040	548	239
<b>D - Electricity, gas, steam and air conditioning supply</b>	2.390	3.861	222	272	711
<b>E - Water supply; sewerage, waste management and remediation activities</b>	1.251	1.338	1.459	913	611
<b>F - Construction</b>	110	95	137	101	64
<b>G - Wholesale and retail trade; repair of motor vehicles and motorcycles</b>	34	28	47	42	35
<b>H - Transportation and storage</b>	3.110	1.131	2.262	1.775	414
<b>I - Accommodation and food service activities</b>	34	59	7	29	10
<b>J - U (see table note)</b>	14	19	14	14	12

42. The latest year with available Eurostat data on emission intensity across sectors for all Nordic countries

43. Note: J-U: All other sectors, such as information and communication, finance and insurance, professional services, arts and entertainment, etc. The emission intensity for sector J-U is calculated as the simple average for all these sectors, per country. All these sectors have very low emission intensities: the highest emission intensity is 43 percent lower than the national average (the Norwegian "Other service activities" sector).



In all Nordic countries, three sectors stand out by being more than twice (i.e., more than 100 percent) as emission intensive compared to the national average: 1) agriculture, forestry and fishing, 2) transportation and storage, and 3) water supply, sewerage, waste management and remediation activities. More details per country can be found in Appendix E.

For three other sectors, there are at least two Nordic countries where the sectors' emission intensities are more than twice as high as the national average: 1) mining and quarrying, 2) manufacturing, and 3) electricity, gas, steam, and air conditioning supply.

#### Emission intensity in transport

The aggregated sectoral analysis conceals important variation within the sector. This is especially relevant in the transport sector. A study from the European Environment Agency (EEA)<sup>44</sup> shows a clear hierarchy of passenger and freight transport modes based on historical averages for the EU-27. Based on this study, passenger flights and passenger cars have clearly higher CO<sub>2</sub> emissions per passenger kilometre than busses, ferries, and trains. The same hierarchy applies for freight transport, with air cargo and heavy goods vehicles having the highest emissions per tonne kilometre.

### 4.3 Step 3: Identify impact of economic sectors on the environment

There is no common unit for environmental outcomes, and we need to use other indicators to identify sectors that positively or negatively impact the environment.

The environmental state is closely linked to land and water use. Economic sectors that require land or water are thus expected to have a more negative impact on the environment compared to other sectors. To identify which sectors are relevant it is useful to consider the main factors of production in each sector. The production factors are broadly defined as land, labour, capital or entrepreneurship, where land includes water and other natural resources. Further, it is relevant to identify pollution intensive sectors.

Our assessment of the environmental impact by sector is presented in Table 4.4. The assessment of land and/or capital intensity is based on a qualitative assessment, while statistics are used to assess the impact on local air pollution<sup>45</sup>.

---

44. (European Environment Agency, 2021b)

45. We have looked primarily at impact on nitrogen oxides, particulates < 2.5µm, and particulates < 10µm.

**Table 4.4.** Economic sectors (Nace Rev. 2) that are land- and/ capital-intensive.**Source:** Qualitative assessment and Eurostat air emissions accounts by NACE Rev. 2 activity

Sector (Nace Rev. 2)	Land- and/or -capital intensive	Source of local air pollution
A - Agriculture, forestry and fishing	Yes	Yes
B-E - Industry (except construction and manufacturing)*	Yes	Yes
C – Manufacturing	Yes	Yes
F – Construction	Yes	Yes
G-I - Wholesale and retail trade, transport, accommodation and food service activities	Partly	Partly
J - Information and communication	No	No
K - Financial and insurance activities	No	No
L - Real estate activities	No	No
M-N - Professional, scientific and technical activities; administrative and support service activities	No	No
O-Q - Public administration, defence, education, human health and social work activities	No	No
R-U - Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	No	No

\*The B-E - Industry (except construction and manufacturing) includes B- Mining and quarrying, D – Electricity, gas, steam and air conditioning supply and E - Water supply, sewerage, waste management and remediation activities.

The sector *A- Agriculture, forestry and fishing* requires considerable land and water resources, thus impacting the environment negatively. Negative impacts may include soil degradation and water depletion, which further impact biodiversity. The sector is also a major source of air pollution, even though the air pollution levels vary within the Nordic countries. This is most likely explained by differences in both the size of sector and type of produce.

Sectors *B-E - Industry (except construction)*, *C – Manufacturing*, and *F – Construction* also require land and water resources and are major sources of pollution and waste. These sectors are also a major source of air pollution, even though it varies. Iceland, for example, has limited mining activity and hence almost no air pollution from *B – Mining and quarrying*. For Norway this sector is on the other hand a large source of air pollution (especially nitrogen oxides). *C – Manufacturing* is a large source of air pollution in all countries.

Transportation, a subsector of *G-I Wholesale and retail trade, transport, accommodation and food service activities*, requires land and also divides up the landscape. This has negative consequences for nature, affects wildlife and biodiversity etc. The transport sector is also a significant source of local air pollution. It, e.g., contributes to around 80 percent of all nitrogen oxide emissions in the Nordic countries<sup>46</sup> as well as contributing to noise pollution.

The other sectors in *G-I Wholesale and retail trade, transport, accommodation and food service activities* are smaller sources of local air pollution. Wholesale and retail

46. This varies by country, and Denmark is the highest emitter of nitrogen oxides overall and also in the transport sector.

trade contribute more to pollution than accommodation and food services, especially in Sweden, but in general these sectors contribute with less than 2 percent of total air pollution.

The remaining sectors are less land- and capital-intensive and rely to a larger extent on labour as input. They also contribute less to air pollution. In total, these sectors account for 1–3 percent of total air pollution in the Nordic countries, depending on the metric used.<sup>47</sup>

#### **4.4 Step 4: Identify economic sectors with the largest green stimulus potential**

In Step 4, we identify the economic sectors with the largest green stimulus potential based on the three previous mapping activities of:

- Step 1: the impact of the pandemic on the sectors, measured in terms of declines in gross product and employment / working hours closed
- Step 2: the sectors' impact on climate, measured in terms of emissions and emission intensity
- Step 3: the sectors' impact on the environment, based on qualitative assessments

In Table 4.5 we have compiled information from these mapping activities and color-coded the degree of negative impact. The colour coding provides a rough average of the impact found across the five Nordic countries. Green indicates low impact, yellow indicates medium impact, and red indicates large impact.

---

47. Nitrogen oxides, particulates < 2.5µm, or particulates < 10µm.

**Table 4.5.** Overview of sectors with green stimulus potential based on Step 1–3.

	Low	Medium	High	
Sector (Nace Rev. 2)	Column 1: Affected by the pandemic	Column 2: Impacts the climate	Column 3: Impacts the environment	Column 4: Green stimulus potential
A - Agriculture, forestry, and fishing				None
B-E - Industry (except construction)*				Low
C – Manufacturing				Low
F – Construction				Low
G-I – Wholesale& retail trade, transport, accommodation, food service activities				High
J - Information and communication				None
K - Financial and insurance activities				None
L - Real estate activities				None
M_N - Professional, scientific, technical activities; administrative and support service activities				None
O-Q - Public adm., defence, education, human health, social work activities				None
R-U - Arts, entertainment, recreation; other service activities; activities of household and extra-territorial organizations and bodies				None

\*The B-E - Industry (except construction) includes B- Mining and quarrying, D – Electricity, gas, steam and air conditioning supply and E - Water supply, sewerage, waste management and remediation activities.

As seen from Column 1, sectors **G–I** (wholesale& retail trade, transport, accommodation, food service activities), **M–N** (professional, scientific, technical activities; administrative and support service activities), and **R–U** (arts, entertainment, recreation; other service activities; activities of household and extra-territorial organizations and bodies) are the most affected by the pandemic. The sectors marked yellow are negatively affected by the pandemic to varying degrees in the different countries.

Column 2 shows the sectors with the largest emissions and highest emission intensities. The sectors **A** (agriculture) and **C** (manufacturing) and the subsector **H** (transportation) stand out in several countries. There are also differences between the countries, for example the extraction of oil and gas, a part of sector **B** (mining and quarrying), is a large emitter in Norway.

Column 3 shows the sectors with the largest impact on the environment. The sectors **A** (agriculture), **C** (manufacturing) and **F** (construction), as well as the subsector **H** (transportation) are considered to have the largest environmental impact.

We assess the green potential of the various sectors in columns 4, based on information in columns 1–3. This is done following a stepwise approach, where we gradually eliminate sectors that are not deemed relevant:

1. Sectors that are not significantly negatively affected by the pandemic, i.e., those that are green in the first column, are not deemed as relevant for green stimulus measures. Regardless of these sectors' impact on the climate and/or the environment, these do not need stimuli. This applies, among other, to the agricultural and public sectors.
2. Sectors negatively affected by the pandemic, but that do not have a significant impact on the environment nor climate, are not deemed relevant for green stimulus measures. This includes the culture sector, among other.

The remaining sectors are deemed to have green stimulus potential:

- B – Mining and quarrying / D – Electricity, gas, steam, and air conditioning supply / E – Water supply, sewerage, waste management and remediation activities
- C – Manufacturing
- F – Construction
- G–I – Wholesale and retail trade, transport, accommodation, and food service activities

The subsector transportation stands out as the sector with the largest green potential, as it is both heavily affected by the pandemic and has considerable negative impact on the climate and the environment.

This framework is used for the analysis of the impact of green stimulus measures in chapter 5.

# 5 The impact of the Nordic financial stimulus measures on the climate and environment

## 5.1 Method for analysing impact of financial stimulus measures

To analyse the impact on climate and/or environment from the stimulus packages in the Nordic countries, we have assessed all the measures following the steps described in Chapter 4:

- **Step 1:** Identify which economic sector(s) the measures target
- **Step 2:** Evaluate the impact of the measures on the climate
- **Step 3:** Evaluate the impact of the measures on the environment

Several of the measures target specific sectors, sometimes also with strings specifying how funds should be spent or conditional on other changes being made by the receiving party. By identifying the receiving sector (**Step 1**), we assess the expected impact on the climate/environment (**Step 2-3**).

Instruments that are considered relevant for climate are subject to further analysis. We separate between short- and long-term impact and the direction of the impact (negative or positive). The total impact on climate is the combined short- and long-term impacts. In most cases, the short- and long-term impacts point in the same direction, e.g., both are presumed either positive or negative, and thus the total climate impact is easy to assign. When the short- and long terms are assumed to point in different directions, we assess their relative strengths before signing the total impact.<sup>48</sup> Not all instruments are expected to have both short- and long-term impacts. For instance, increased funds to climate research as a stimulus measure are primarily expected to have long- term climate impacts.

Many instruments do not target specific sectors, like business cost support, but rather target companies across several sectors, or households. Unless there are strings attached, stipulating how funds are to be used, we do not know what the funds are spent on and thus cannot assess the expected impact on the climate/ environment through first-order nor second-order effects. The impact of these instruments on the climate/environment is hence not assessed in this study. This is, for example, the case for the general furloughing schemes, where employers can receive compensation for sending employees home without having to lay them off (the sectoral use of these schemes is described in more detail in Appendix B).

**Step 2** and **Step 3** builds on comparison of the actual development with the reference path. The reference path is defined as the most realistic development, without the investigated instrument. In this case, the reference path is then the situation with the economic consequences of the covid-19 pandemic, and without the stimulus measures.

---

48. For example, grants for building charging infrastructure for vehicles may result in increased emissions in the manufacturing sector (if produced within the country) in the short-term but is expected to reduce emissions in the transport sector in the long-term. We have here assumed that the combined short- and long-term effects are positive, i.e., that the long-term effect outweighs the short-term effect.

We have based the analysis in **Step 2** on the following principles:

- i. **Emission intensity of the receiving sector:** If stimulus is directed to sectors with low (high) emission intensity per euro, compared to the average economy, this is considered to decrease (increase) emissions.
- ii. **Substitution to alternatives with lower (higher) emissions:** If stimulus leads to substitution to activities with lower (higher) emissions, we consider emissions to decrease (increase). Note that this applies also if the activity receiving stimulus is in a sector with high emission intensity (see principle i).
- iii. **Specifications regarding climate effects of the stimulus measures:** Stimulus measures aimed specifically to reduce emissions either short- or long-term, are considered to reduce emissions. Note that this applies even if the activity is in a high emission intensity sector, or if no sector can be specified.

Considering i), it may seem counterintuitive that support to sectors with large emissions, such as the construction sector, is considered as climate friendly. The logic is that alternative public spending would either increase public support to other activities, or it induces more private spending (by lower need for taxation). Our approach is that support to activities with lower than national average emissions per euro/national currency contribute to lower the national emission intensity, and hence to reduced national emissions.

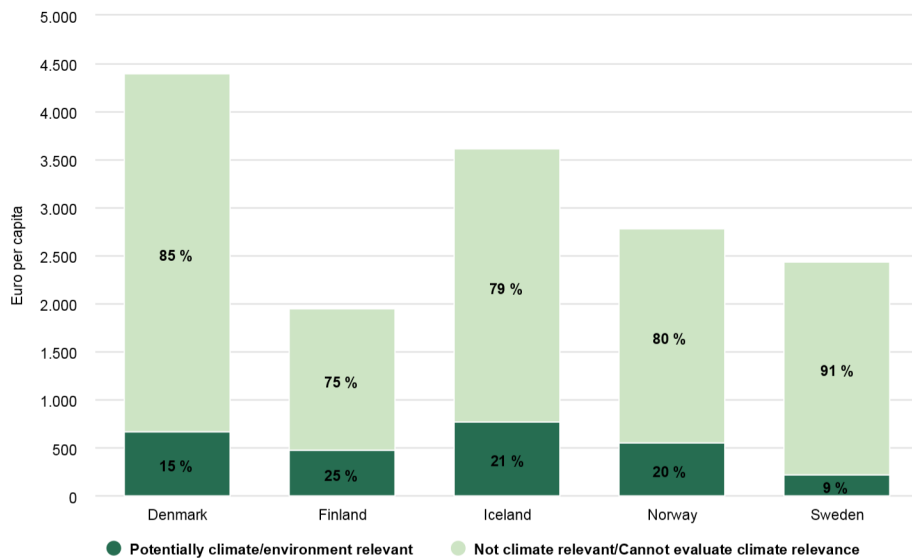
For assessing environmental impacts in **Step 3**, we need to rely on a more qualitative assessment, as the impact on the environment is more complex and spread over a multitude of effects. For the environmental effects, we have considered the potential effects from the economic activity on land use, water use, waste, pollution, and biodiversity, see Appendix F for more details.

Support schemes which trigger activities in sectors with low emission intensity or low environmental impact, and which are not covered by ii) or iii), are not part of this study. This applies, for example, to support schemes targeting the health, education, or culture sector, and in principle may also include support for building activities, industry and parts of the transport sector.

## 5.2 Stimulus measures with potential impact on climate/environment

We have identified the share of total Covid-19 stimulus measures where we can assess climate/environment effects. Most measures target several sectors or the economy in general, such as business cost support. For these support schemes, it has not been possible to evaluate the climate and environmental effects. Additionally, we do not consider support schemes directed at sectors with low emission intensity or low environmental impact as relevant (explained in section 5.1). As a result, between 9–25 percent of the total stimulus measures are evaluated as relevant green stimulus measures in this analysis, see Figure 5.1.

**Figure 5.1.** Total Covid-19 stimulus measures 2020–2021 per capita in all Nordic countries, in euro, and separated by whether climate/environment relevance has been possible to assess.<sup>49</sup>



Other factors also impact the share of measures we have been able to analyse. In Denmark, for example, over two thirds of the agreed stimulus is yet to specified in terms of which initiative and sector the money should be directed to. Hence, we cannot assess the climate or environmental effects.

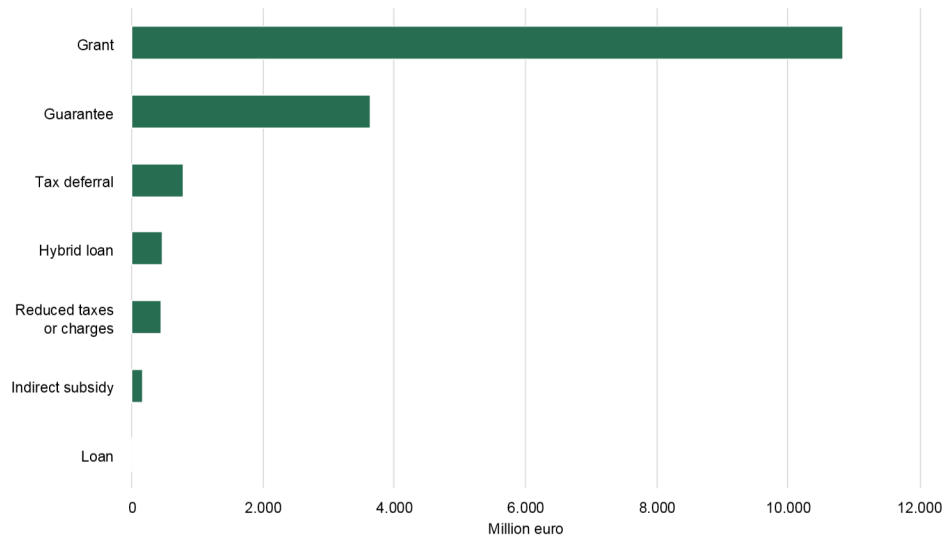
This overview only includes stimulus measures with a direct budgetary impact, like grants and tax reduction. Guarantees, loans, and tax deferrals are not included in Figure 5.1. Both categories could be combined if a financial cost for the state would be calculated for each of the measures without a direct budgetary impact. This cost would depend, among other things, on the perceived risk of the measure compared to an alternative investment the state could make. In lack of estimates of these costs for most measures, we treat them separately and examine the full guarantee/loan amounts. Measures where these estimates have been reported, like for example a tax deferral for the Norwegian petroleum industry<sup>50</sup>, are included in the further analyses.

Figure 5.2 shows the potentially climate or environment relevant stimulus by instrument. Most of the stimulus measures which are potentially climate or environment relevant have been given as grants and are hence subject to further analyses. Most of the guarantee or tax deferral measures have been directed towards the transport sector.

49. Note: This overview excludes measures that do not have a direct budgetary impact, like loans and guarantees.  
50. (Ministry of Finance Norway, 2020)



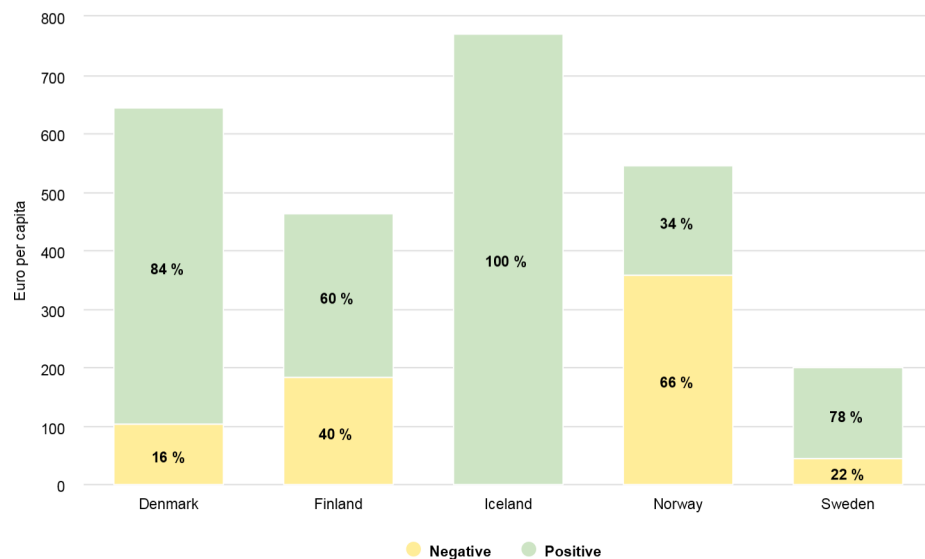
**Figure 5.2.** Potentially climate/environment relevant Covid-19 stimulus measures, by instrument, for all Nordic countries combined. Million euro.



### 5.3 Climate impact of stimulus measures with direct budgetary impact

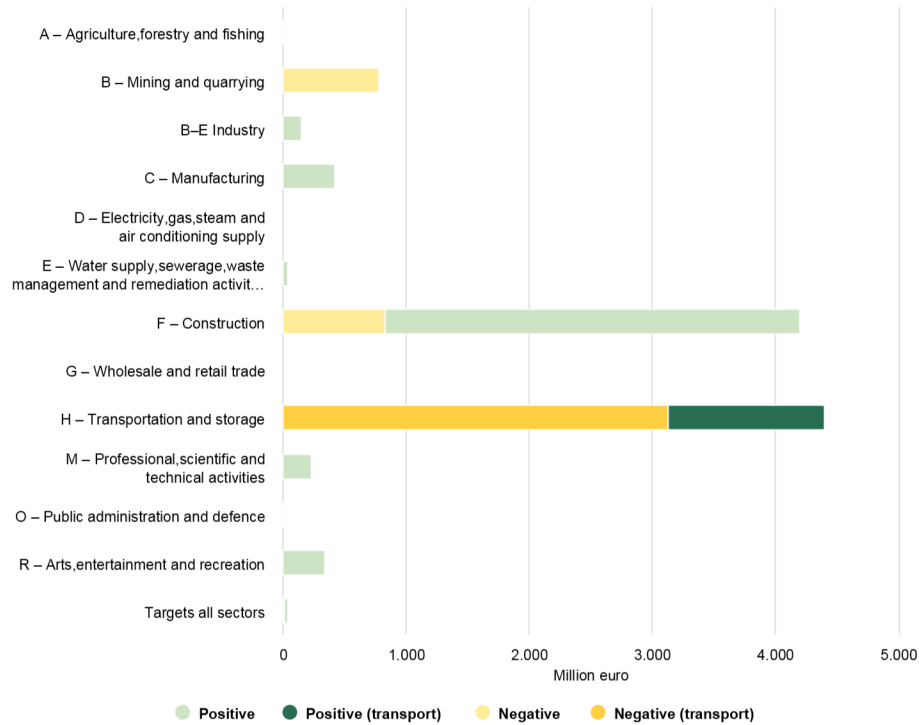
According to our data, more of the covid-19 stimulus measures evaluated in this analysis have had a positive than a negative climate impact, see Figure 5.3. Given that this excludes the effects of guarantees and loans given mostly to the high emission intensity aviation sector, it needs to be viewed in context with the measures presented in section 5.5.

**Figure 5.3.** Covid-19 stimulus measures by impact on climate in all Nordic countries, euro per capita.



The stimulus given to the construction and the transport sector had the largest impact on climate, see Figure 5.4.

**Figure 5.4.** Measures by impact on climate and target sector in all Nordic countries combined, euro per capita



In the transport sector, a majority of stimulus had a negative climate impact. There are, however, also several stimulus measures directed towards the transport sector with a positive climate impact, even though the sector has a high emission intensity. We have assessed the climate impact of the transport sector based on average emission intensities per subsector from the European Environment Agency (see also section 4.2.2).<sup>51</sup> Based on the average emission intensities, stimulus directed towards air and road transport are categorized as having negative effects on the climate while rail and water have a positive climate impact. Even if there are emissions from all transportation, supporting alternatives with lower emission intensities can support substitution from higher emission alternatives and reduce emissions from the transport sector in total. Further, all stimulus directed towards public transportation is also categorized with a positive climate impact, as it is assessed against the alternative of private road transportation.

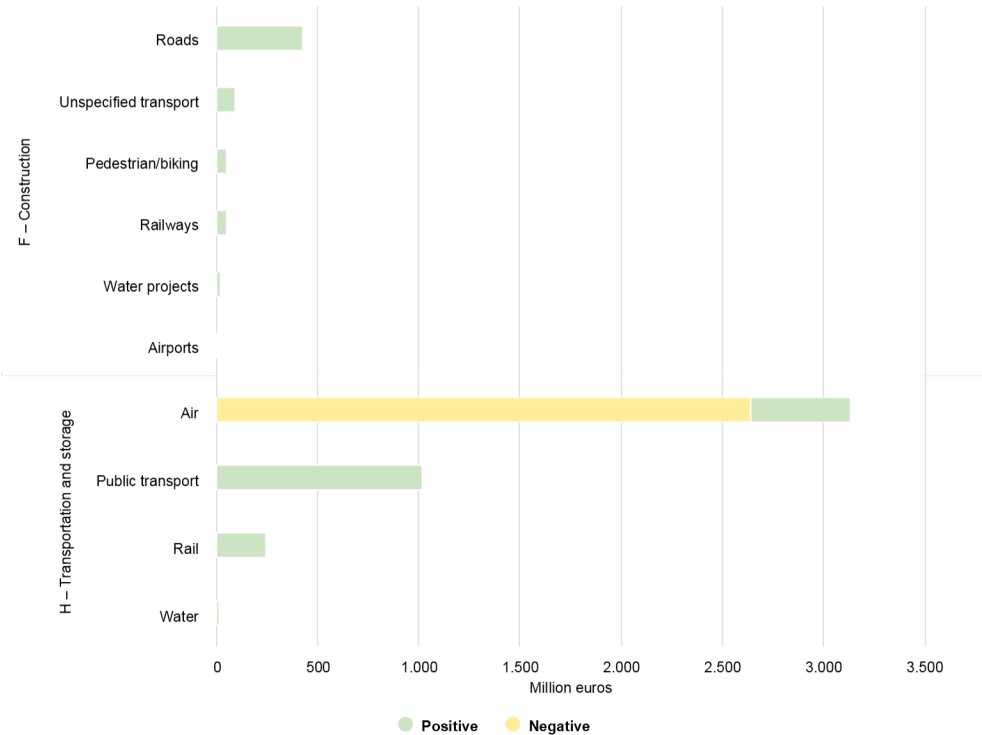
We have classified stimulus to the construction sector as positive for climate, as the construction sector has relatively low emission intensity in all Nordic countries (see Table 4.3 in section 4.2.24.2.2). Hence, stimulating this sector has less of an impact

51. (European Environment Agency, 2021b)

on climate than activities in other parts of the economy. Nevertheless, the long-term indirect effects of the activity in the construction sector might still increase emissions. This could for example be increased emissions due to deforestation and land use. The potential effect from this is not considered in the analysis. It is also true for example for investment in transportation infrastructure, of which there are examples in Finland, Iceland, and Sweden. E.g., if investing in new roads leads to more emissions from road transportation in the future, the total effects from the stimulus could in fact be negative.

Figure 5.5 compares the climate impact for construction of transport infrastructure and the transport sector, divided by subsectors. It might seem counterintuitive, that while air transportation has a mostly negative effect on emissions, support to the construction of airports has a positive effect. Likewise, the construction of roads is seen as positive, while stimulus directed towards road transportation would have been assigned a negative climate impact based on relative emission intensities. For this classification, we have put weight on the short-term impacts of construction on climate, compared to other sectors of the economy. Hence, we have not considered whether the activity the construction initiative supports will emit more or less than the economy on average.

**Figure 5.5.** Covid-19 stimulus measures for construction of transport infrastructure and the transport sector, by impact on environment and subsector. All Nordic countries combined, mill. euro.



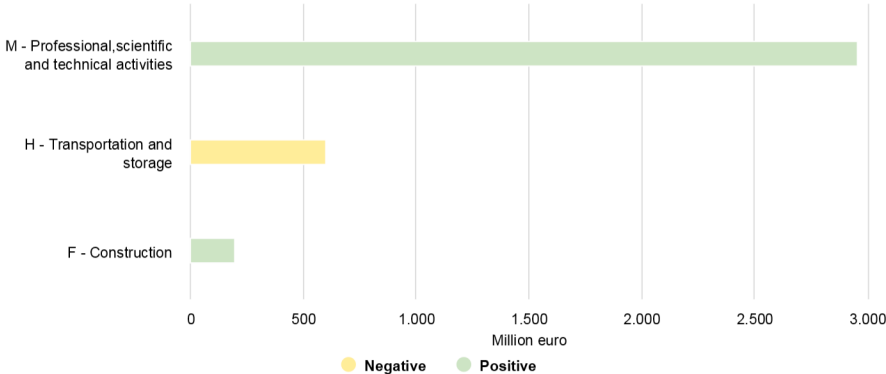
It is important to remember that our assessments are based on historical emission intensities of sectors and subsectors, and that these may change in the coming years. For example, transportation of people and goods on rail pollutes less than transportation on road today, but the planned electrification of road transportation could change the relative intensities in favour of road transportation in the future. Our analysis is based on the current emission intensities.

**5.3.1 Denmark**

In Denmark, the large package for green renovation of public housing represents most of the climate impact. As construction is a sector with a lower emission intensity than the national average, this is categorized as reducing emissions in the short run. Additionally, funds will be explicitly prioritized for measures that increase energy efficiency. Hence, the measure can contribute positively to emission reductions also in the long run through reduced energy consumption.

Further positive impacts are expected from the stimulus fundings directed to green research and preservation of nature and biodiversity, both categorized under sector M in Figure 5.6. The negative environmental impacts are expected from the various stimulus efforts towards the emission-intensive air transport sector which, as far as the official communication reveals, do not contain any specific environmental conditions or "strings attached".

**Figure 5.6.** Covid-19 stimulus measures by impact on climate in Denmark, mill. euro. Measures with no climate impact have been excluded.

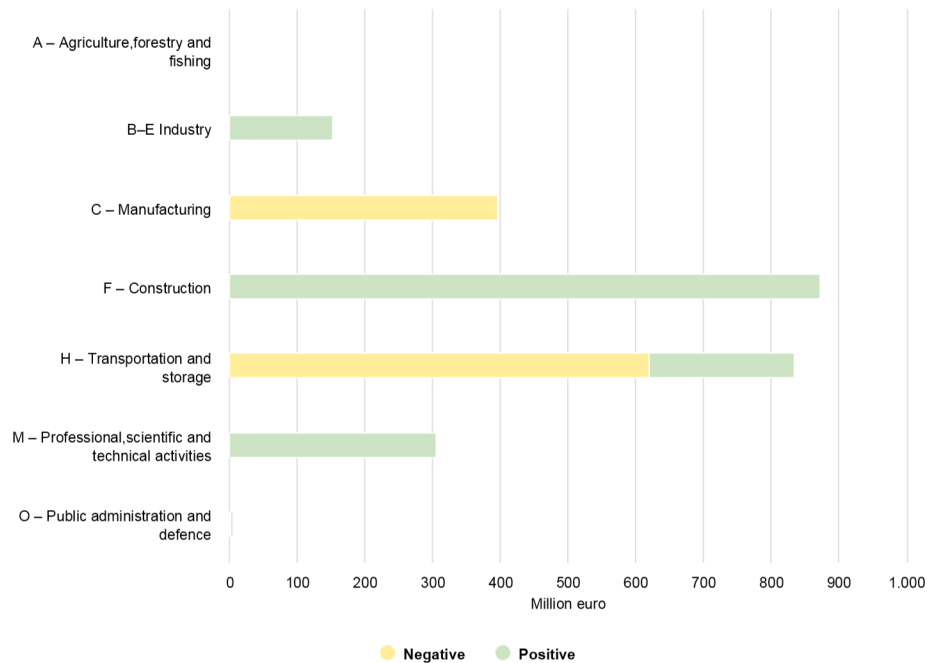


**5.3.2 Finland**

In Finland, most stimulus with a positive climate impact have been directed towards the construction sector. This includes, e.g., highway construction projects, interest rate subsidies for state-subsidised housing production, investment in cycling and walking infrastructure and investments in increased use of timber in construction. As

mentioned in the start of section 5.3, we have classified all construction measures as having positive climate impact, due to the low emission intensity of the sector, independent of whether the activity potentially increased emissions from other sectors in the long run. This is, of course, a simplification, as different parts of the sector have different emission levels.

**Figure 5.7.** Covid-19 stimulus measures by impact on climate in Finland, mill. euro. Measures with no climate impact have been excluded.



Stimulus to the research (sector M in Figure 5.7) also has a large positive climate effect. This positive effect mainly comes from a capitalization of the newly established Finnish climate fund.<sup>52</sup> Its operations focus on combating climate change, boosting low-carbon industry and promoting digitalisation. Another source of positive impacts on emissions is the category B-E industry, which is a Venture capital investment to the Finnish Minerals Group that works for responsible lithium-battery production.

The manufacturing and transport sectors have the largest negative climate effects. Initiatives in the manufacturing sector are classified as having a negative climate effect as the sector is relatively emission intensive in Finland (see Table 4.3 in section 4.2.2). In the transport sector, support packages for the national airline Finnair and the airport company Finavia constitute most of the stimulus with a negative impact. On the other hand, compensation of fair revenue in the public transportation system is classified as having a positive climate impact.

52. (Ministry of Finance Finland, 2020)

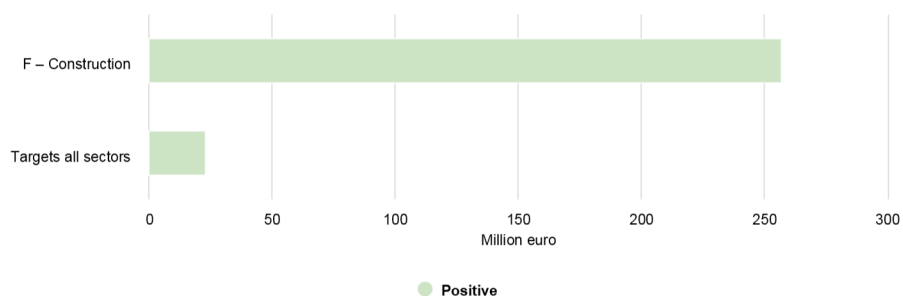
### 5.3.3 Iceland

In Iceland, the Covid-19 stimulus measures with a climate impact that can be assessed have been combined into large stimulus packages. In particular, the Icelandic government announced large infrastructure investments in 2020, which will be implemented during the time period 2020–2025. In this overview, we have only included the measures that are planned to be spent in 2020–21.

The positive climate effect from the infrastructure investment scheme is twofold. Firstly, it comes from measures directed towards the construction sector, as this sector has relatively low emission intensity. This includes both housing construction and transportation infrastructure investments. Depending on which type of transportation the investment is directed towards, the long run effects on the climate could be negative. As for construction investments in the other Nordic countries, we have still here placed weight on the short run effects of investing in the construction sector which has a relatively low emission intensity.

Secondly, it comes from funds set aside for energy transition, green solutions, and environmental projects. The funds will go to support to municipalities for improved sewage infrastructure; transition to renewable energy, increased carbon capture; infrastructure development for the circular economy. We have viewed the measure as positive for reducing emissions.

**Figure 5.8.** Covid-19 stimulus measures by impact on climate in Iceland, mill. euro. Measures with no climate impact have been excluded.



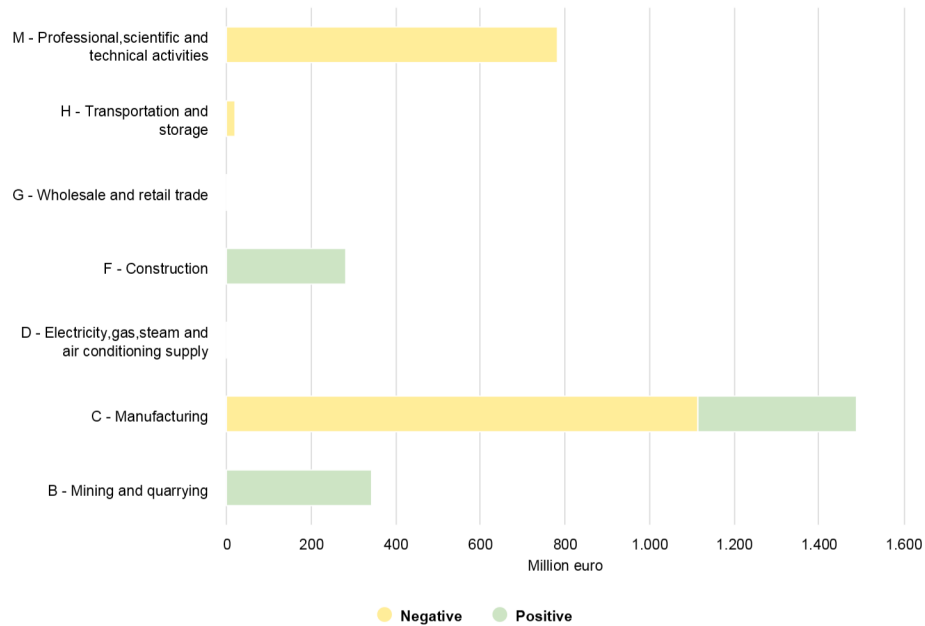
### 5.3.4 Norway

The largest positive climate effect in Norway comes from a NOK 3.6 bill. green transition package (*En pakke for grønn omstilling*<sup>53</sup>), which was announced in May 2020. This included measures directed towards, among other things, research, technological development, transition towards a more circular economy, and funds directed towards green shipping. In our categorisation, most of this fall under research (sector M in Figure 5.9), and some under manufacturing<sup>54</sup>. Additionally, some initiatives within the transport sector and construction sector have a positive climate effect. This includes support to public transportation and passenger rail transportation.

53. (Nærings- og fiskeridepartementet, 2020)

54. For example emission-free speedboats, see (Miljødirektoratet, 2020)

**Figure 5.9.** Covid-19 stimulus measures by impact on climate in Norway, mill. euro. Measures with no climate impact have been excluded.



The largest negative climate effect comes from the mining and quarrying and transport sectors. For mining and quarrying, the stimulus represents the estimated cost for the state from deferring taxes for the mining and quarrying industry in 2020. In total, the Norwegian petroleum companies are estimated to have had around EUR 11 bill. in increased liquidity in 2020 and 2021 due to the tax deferrals. This is estimated to cost the state EUR 800 bill.<sup>55</sup> The negative effects on climate in the transport sector mostly arise from different types of support to the aviation industry, including support to Avinor, purchase of domestic flights and reduced aviation charges.

### 5.3.5 Sweden

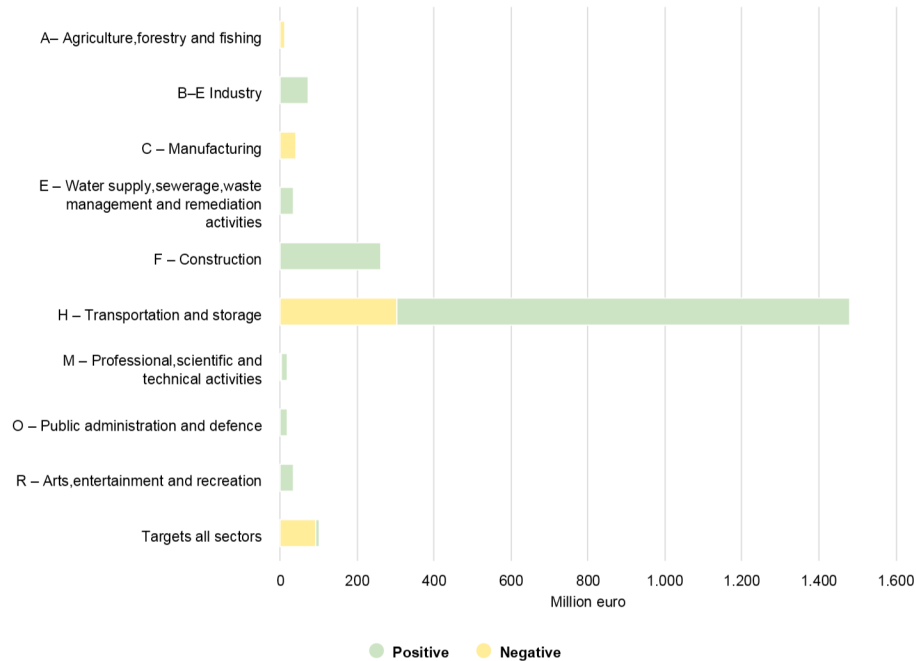
The largest stimulus measures that are expected to have a climate effect relate to the over 1,400 mill. euro of stimulus directed to the transport sector. Here, we estimate that the funding will mostly have a positive effect on the climate, since a substantial share of the funds are directed to, e.g., public transport and to freight rail transport – we therefore assume that those efforts will contribute to divert transport activity from more emission-intensive forms of transport.

Furthermore, we also assign a positive climate effect from the 500 mill. euro recapitalisation of SAS, which was coupled with more ambitious climate goals: SAS are to reduce their CO<sub>2</sub> emissions by 25 percent by 2025, instead of the original goal of the same reduction by 2030. Thus, although air transport is emission-intensive,

55. This is based on an estimate of the net present value from April 2021. (Finansdepartementet, 2021)

we assign a positive impact since we compare it to a scenario where the recapitalisation would not have come with any stricter environmental requirements. The negative climate impacts of stimulus to the transport sector in Sweden relate to other support measures to the air transport sector that did not come with any climate-related requirements.

**Figure 5.10.** Covid-19 stimulus measures by impact on climate in Sweden, mill. euro. Measures with no climate impact have been excluded.



The second largest climate impact is expected from stimulus measures directed to construction-related activities. The largest measure is that of renovation of buildings to increase their energy efficiency, maintenance of railroads (expected to divert transportation activities towards rail from more polluting forms of transportation) and support for the setting up of the charging infrastructure for electric cars.

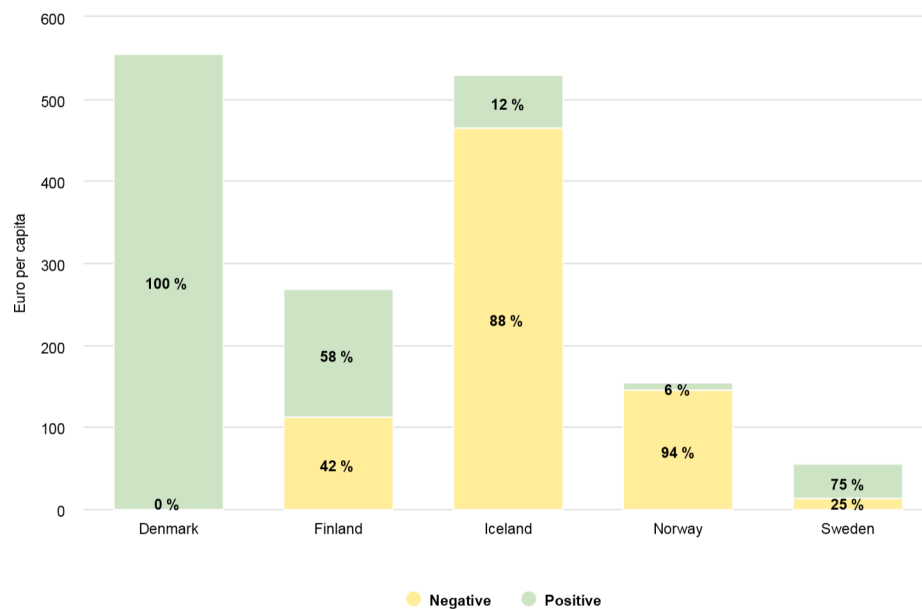
The positive impact expected from stimulus to industry is related to "Industriklivet", which contribute to develop solutions that reduce emissions from industrial activity. The negative impact assigned to measures targeting all sectors refer to the paused GDP-indexation of fuel taxes, which is expected to lead to increased use of fossil fuels than what would otherwise have been the case.



## 5.4 Environmental impact of Covid-19 stimulus measures with direct budgetary impact

Overall, the environmental impacts have been more difficult to assess than the climate impacts. We had to rely more on qualitative assessments. Keeping this in mind, we see that the overall environmental impact differs between the countries. Denmark has only measures with a positive environmental impact, while both Norway and Iceland have mostly implemented measures with a negative environmental impact. Sweden has the lowest amount of stimulus with identified environmental impact.

**Figure 5.11.** Covid-19 stimulus measures by impact on environment in all Nordic countries, euro per capita. Measures with no environmental impact have been excluded.<sup>56</sup>

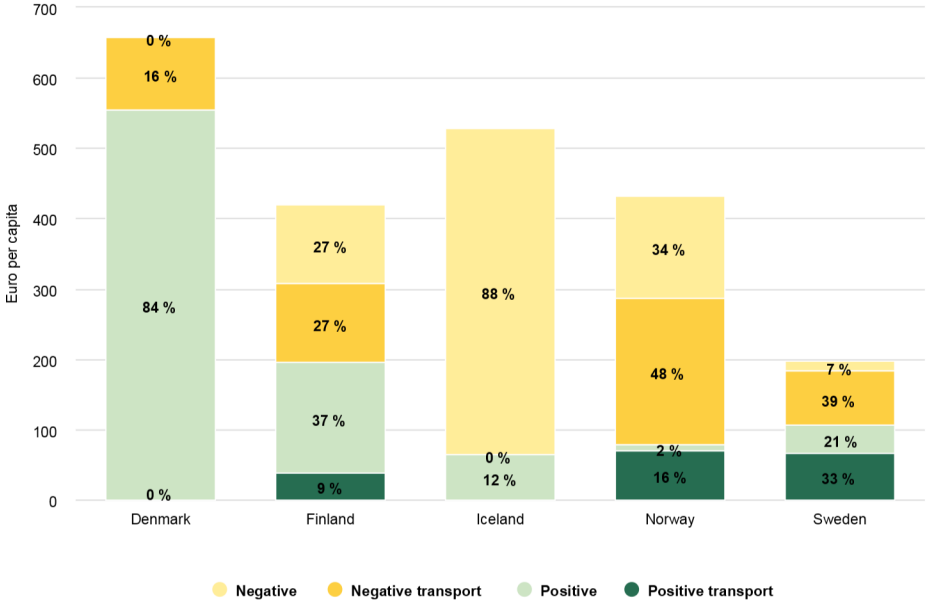


In Figure 5.11, we have not taken into consideration the environmental effects of the transport sector. This is a sector that has large environmental effects, through for example air, water, and noise pollution. If we include these effects, the environmental effects increase as illustrated in Figure 5.12.<sup>57</sup> All modes of transportation affect the environment, but to differing degrees. Here, we have classified rail transportation and water transportation as positive, as they have smaller environmental impacts than road and air transportation. Additionally, public transportation has also been classified as positive as it has a lower environmental impact per passenger than private transportation.

56. Does not include environmental effects of the transport sector

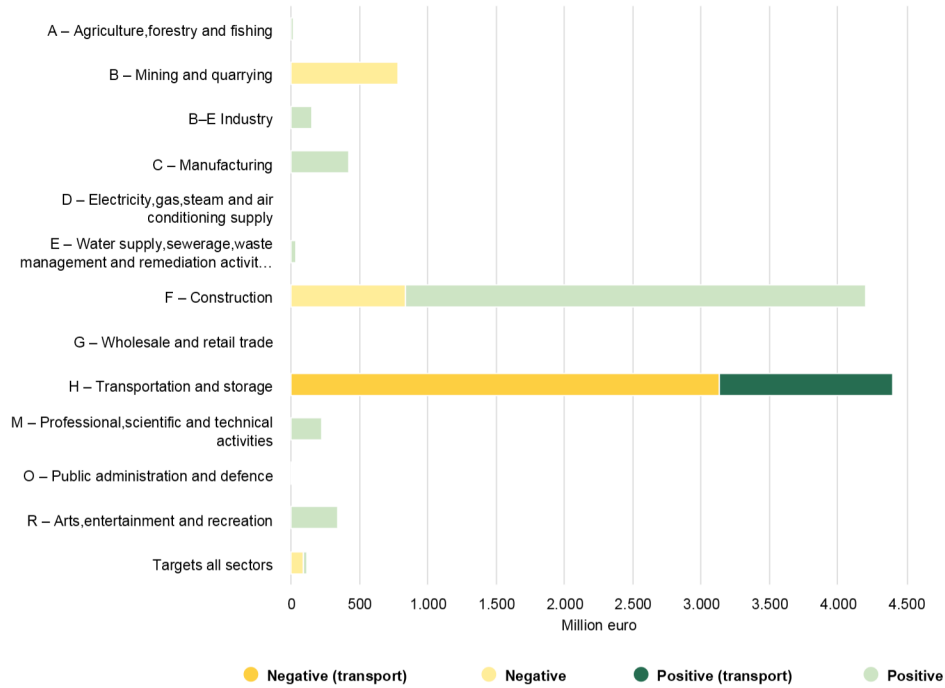
57. All countries have had stimulus packages directed towards the transport sector. For Iceland this has been only in the form of guarantees, which are not analysed here. See section 5.5.

**Figure 5.12.** Covid-19 stimulus measures by impact on environment in all Nordic countries including effect from stimulus to the transport sector, euro per capita. Measures with no environmental impact have been excluded.



As with climate effects, the stimulus given to the construction and the transport sector have the largest impact on the environment, see Figure 5.13. For an overview by country and sector, see Appendix G.

**Figure 5.13.** Measures by impact on environment and target sector in all Nordic countries combined, euro per capita. Measures with no environmental impact have been excluded.



Many of the initiatives that have a positive or negative environmental impact, also have a similarly positive or negative climate impact. These have already been discussed in detail in section 5.3. There are, however, some exceptions, where the climate and environmental impacts differ. These are discussed below.

Initiatives which we have categorized under sector R – Arts, entertainment, and recreation have positive environmental effects but, for most initiatives, no climate effects. Stimulus to this sector mostly constitutes of measures related to nature restoration and conservation. For example, Finland has agreed on funds to support water rehabilitation and migratory fish projects and will also improve flood risk management. Denmark has agreed on a package to improve biodiversity, which will be achieved through establishing more nature reserves and allowing for more forest to remain untouched.<sup>58</sup> Norway has agreed to direct funds for example towards helping endangered species and combatting invasive species,<sup>59</sup> and Sweden has directed funds for example towards restoration of wetlands.<sup>60</sup>

Some of the manufacturing stimulus in Finland which has a negative impact on climate, is considered to have a positive impact on the environment in the long run. This is for example the case for the investment in two multi-purpose offshore vessels, which are a part of the Defence Forces but will also be capable of responding to oil and chemical spills. Nevertheless, in this case, the positive environmental effects only materialize if there is an oil or chemical accident.

Stimulus directed towards the construction sector, which has a positive effect on

58. (Finansministeriet, 2020)

59. (Klima- og miljødepartementet, 2020)

60. (Regeringskansliet, 2020)

climate, has a mixed effect on the environment. If the construction stimulus for instance affects land use, like construction of new housing or transportation infrastructure, this has a negative environmental impact. For example, the Icelandic construction stimulus is viewed to have a negative impact on the environment as it affects land-use. In Sweden, support to charging infrastructure of electric vehicles, although it most likely will have a positive impact on the climate in the long run, is viewed to have a negative impact on the environment since it is likely to increase land use.

Some construction stimulus is nevertheless categorized as positive for the environment. This is mostly initiatives which include environmental objectives. The largest share of this is connected to the green renovations in Denmark, mentioned in section 5.3.1. There are also several other, smaller initiatives. In Finland, for example, there are initiatives to use more timber in construction and phasing out oil heating in both households and municipal buildings.

## 5.5 Impact of guarantees and loans

The guarantees and loans given out during the Covid-19 pandemic in the Nordic countries has been primarily directed towards the aviation industry. All countries have provided some type of support for air transport, e.g., Iceland has supported Icelandair, Finland has supported Finnair, Denmark and Sweden have supported SAS, and Norway has supported both the airport company Avinor as well as made available large loan and guarantee packages for aviation companies. None of these initiatives contained any specific climate or environmental conditions or “strings attached” and are therefore categorized as having a negative climate and environmental impact<sup>61</sup>, since the air transport sector is relatively emission intensive compared to other sectors (see section 4.2.2).

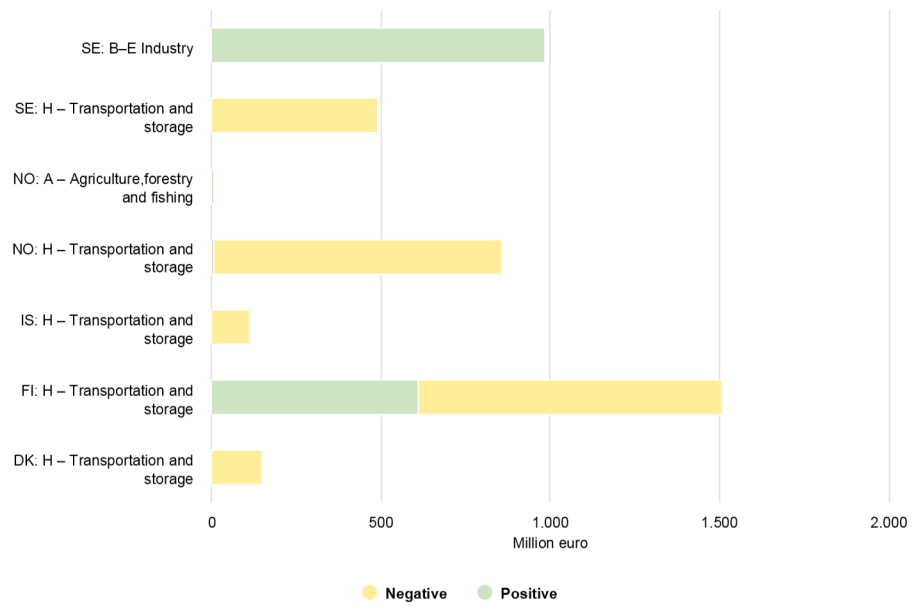
Some other loan guarantees have also been introduced: one in Finland for shipping companies, and the other in Sweden for industrial investments. Both have been classified as having a positive climate and environmental impact. The first is classified as positive as the stimulus is directed towards water transport, which has lower CO<sub>2</sub>-emissions and lower levels of air and noise pollution compared to air or road transport. The second is classified as positive as the purpose of the loan guarantees is to support the green transformation of industry (so called green credit guarantees). The scheme will only guarantee loans for industrial investments in Sweden which support the achievement of environmental and climate goals.<sup>62</sup>

---

61. Compared to a situation with the economic consequences of the pandemic, but without the economic stimulus measures.

62. (Riksgälden, 2021)

**Figure 5.14.** Guarantees and loans given out as Covid-19 stimulus measures by country and impact on climate and environment, mill. euro.



# 6 Summary and discussion

This report assesses the “green stimulus” relevance of the covid-19 stimulus measures in the Nordic region. By green stimulus we mean measures that can achieve economic stimulus while also reducing greenhouse gas emissions and enhancing environmental and natural resource quality.

The analysed measures include the covid-19 stimulus measures as described in the state budgets of the Nordic countries for 2020 and 2021. needed to conclude on the climate and environmental effects.

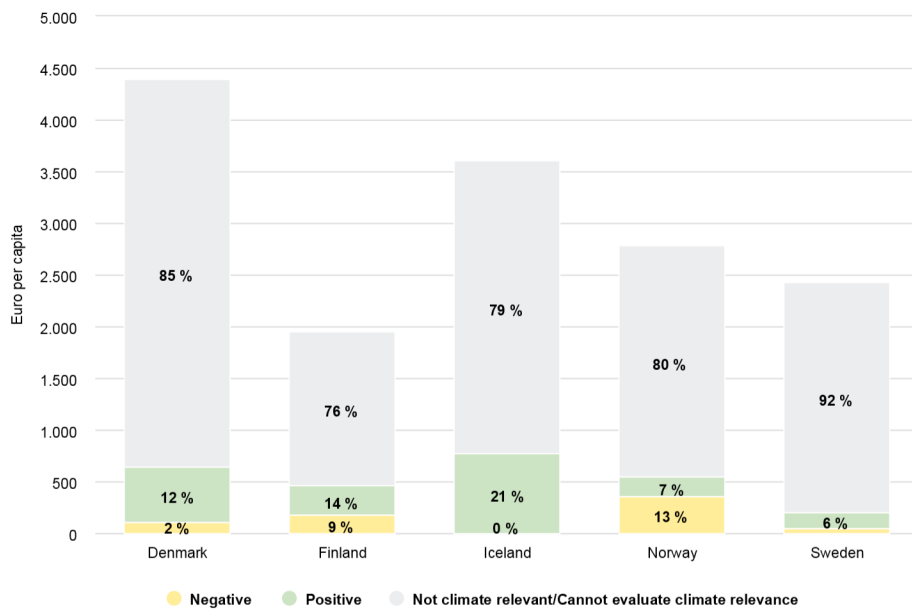
## Main findings

All countries implemented comprehensive covid-19 stimulus packages after the outbreak of the pandemic, in a range from 2000 euro per capita in Finland to 4400 euro per capita in Denmark. When comparing these numbers, it is important to keep in mind that what are announced as covid-19 measures within each country may differ, so that these figures are not a full picture of the countries’ fiscal measures to counteract the recession following the pandemic. Also, for some of the projects needing long-term planning, such as the infrastructure projects, there is a good chance they would have been realized sooner or later without the pandemic. Both Denmark and Iceland introduced large infrastructure projects running over several years as a response to the economic downturn.

The majority of measures (76–92 percent depending on country) are either assessed as not having any significant impact on emissions or the environment, i.e., schemes directed at sectors with low emission intensity or low environmental impact, or they are not possible to evaluate. Most measures target several sectors or the economy in general, such as business cost support. For these support schemes, more comprehensive analyses for each measure would have been needed to conclude on the climate and environmental effects. Additionally, over two thirds of the agreed stimulus in Denmark was, to the best of our knowledge, not yet specified, when this analysis was conducted, in terms of which initiative and sector the stimulus should be directed to.

When it comes to the effects on greenhouse gas emissions and the environment, we have identified that *at least* 6–21 percent of the stimulus measures fit our definition of a green stimulus in terms of decreasing greenhouse gas emissions. *At least* 2–13 percent of the economic stimulus packages contribute to increased greenhouse gas emissions. The picture is almost the same for the environment. The effects on the environment is very similar to those for greenhouse gas emissions. Hence, we focus on the effects on greenhouse gas emissions in this summary.

**Figure 6.1.** Total stimulus per country in 2020 and 2021, euro per capita, by assessed negative or positive climate impact in percent



Of the measures assessed to impact greenhouse gas emissions and the environment, we find that **Iceland** stands for the highest financial support per capita. The entire share falls under the definition as green stimulus. A large share is directed towards the construction sector. The emission intensity in the construction sector is relatively low compared to national average. We define support to activities with a lower than the average emission intensities as green in the sense as impacting emissions and the environment less than the alternative public or private spending. Also, Iceland has set aside funds for energy transition, green solutions, and environmental projects.

In **Denmark**, funds to renovation of public housing represents the largest share of green stimulus. Further, funds are prioritized for measures that increase energy efficiency, and to green research and preservation of nature and biodiversity. The negative impacts are expected from the various stimulus efforts towards the emission-intensive air transport sector which, as far as the official communication reveals, do not contain any specific environmental conditions.

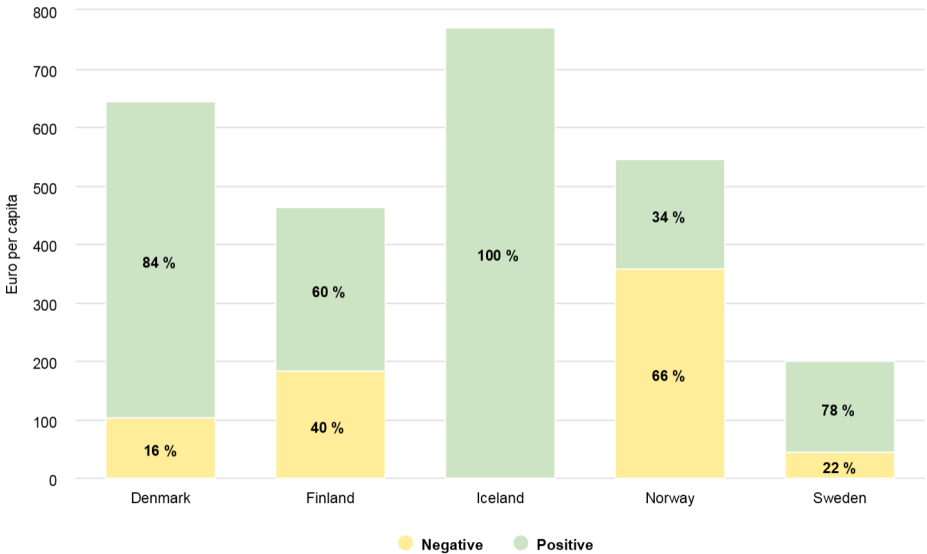
In **Finland**, most stimulus with a positive climate impact are directed towards the construction sector, including, e.g., highway construction projects, interest rate subsidies for state-subsidised housing production, investment in cycling and walking infrastructure and investments in increased use of timber in construction. Other sources are stimulus to research related to climate change, low-carbon industry and digitalisation and investment responsible lithium-battery production. Support to relatively emission intensive manufacturing and to the transport sectors, including aviation, have the largest negative effects.

The largest positive climate effect in **Norway** comes from a green transition package, including measures directed towards, among other things, research, technological development, transition towards a more circular economy, and funds

directed towards green shipping. Some initiatives within the transport sector and construction sector, including support to public transport, are assessed to have positive effects. In Norway, the share of the measures with negative climate and environmental effects is higher than the share defined as green stimulus. This is overall support in terms of tax deferrals to the mining and quarrying industry, and support to the aviation industry.

In **Sweden**, stimulus directed to the transport sector will mostly have a positive effect on the climate, since a substantial share of the funds are directed to public transport and rail transport, and hence a substitution from more transport with higher emission intensities. Furthermore, large funds were directed to recapitalisation of SAS with strings attached to more ambitious climate goals. Thus, although air transport is emission-intensive, we assign a positive impact since we compare it to a scenario where the recapitalisation would not have come with any stricter environmental requirements. Further, stimulus measures to renovation of buildings to increase their energy efficiency, charging infrastructure for electric cars and stimulus to emission reducing development in industrial activities. The negative impact assigned to measures targeting all sectors refer to the paused GDP-indexation of fuel taxes, which is expected to lead to increased use of fossil fuels than what would otherwise have been the case, and measures to the air transport sector that did not come with any climate-related requirements.

**Figure 6.2.** Covid-19 stimulus measures by impact on climate in all Nordic countries, euro per capita. Measures with no climate impact have been excluded.





## Discussion

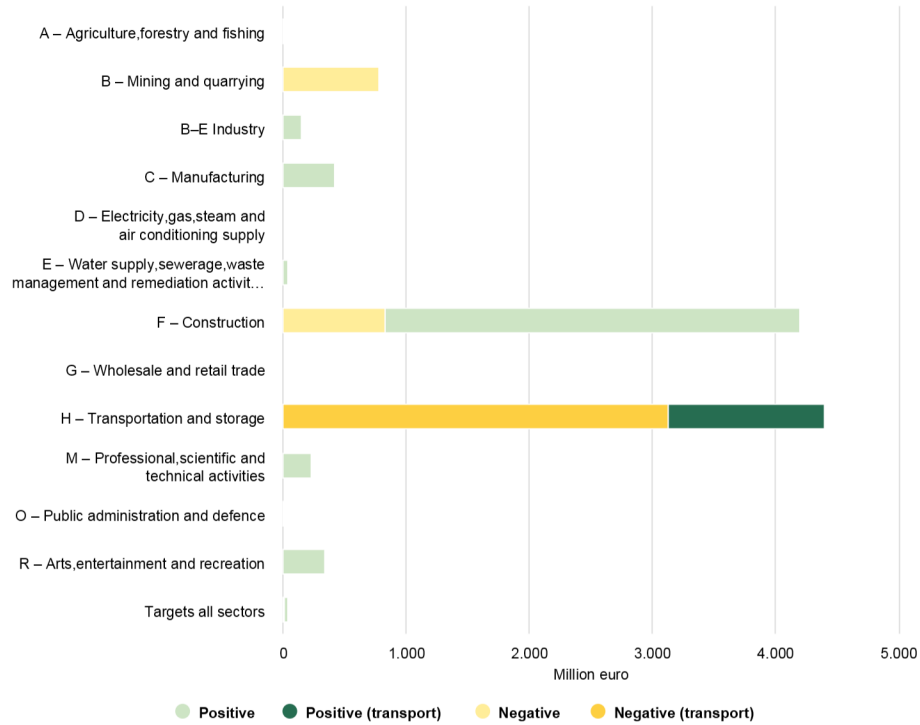
The construction sector constitutes the main share of the green stimulus measures. It may seem counterintuitive that support to construction is considered as climate friendly. Road projects contribute to a large share of the national emissions. However, so do economic stimuli in general. Alternatively, lower public spending to covid-19 measures would either increase public support to other activities, or, alternatively, more private spending (by lower need for taxation). Our approach is that support to activities with lower than national average emissions per euro/national valuta contribute to lower the national emission intensity, and hence to reduced national emissions.

This analysis is based on an aggregated sector level. The construction sector is very broad and covers a wide spectrum of activities, where some obviously have higher emission intensity than the national average. This clearly also applies to the transport sector. We have corrected for this in the classification of the stimulus measures when relevant information has been available.

Further, we consider measures aimed to lower emissions as positive, even if the emission intensities in the receiving sector are higher than average. This may also seem counterintuitive when it relates to, e.g., road traffic or aviation. Most transport is emission intensive and environmentally damaging, including parts of public transport. We have chosen to define support to reduce the climate and environmental pressure as positive, irrespective of the activity in question, when it promotes substitution to lower emissions within the sector. For some large support schemes, e.g., to the aviation sector, more detailed analysis could give more insight into if the measures contribute to significant changes, or if the measures are more-or-less renaming of already planned changes in technologies.

Other complicating aspects are the short/long term perspective and valuation of first/second order effects. In support to transport infrastructure, the construction phase is positive due to low emission intensity, but the usage may be negative (if running on fossil fuels) or positive (if running on renewable energy). Our approach is to assess the direct effects, hence in this example the construction phase. If the support incentivises substitution from more to less emission intensive activities, we assess the measure as emission reducing. This may be more relevant for the long run.

**Figure 6.3.** Measures with positive and negative impact on climates by target sector in all Nordic countries combined, euro per capita. Measures with no climate impact have been excluded.



It is important to bear in mind that our assessments are based on historical emission intensities of sectors and subsectors, and that these may change in the coming years. For example, transport of people and goods on rail pollutes less than transport on road today, but the planned electrification of road transport could change the relative intensities in favour of road transport in the future. Except for the effect of the stimulus measures, we have not taken such underlying technological changes into account.

Further, we have based our analyses on the value of the stimulus, not on expected reductions/increases in greenhouse gases. The value of the stimulus cannot be expected to correspond to the actual level of emission reduction/increase, and hence the overview should not be viewed as stating how much emissions have been affected by the stimulus directed to different sectors. For this reason, we also cannot conclude with the net greenhouse gas impact of the stimulus.

## Policy implications

Stimulation of the construction sector has been most important to lower the overall emission intensities in the Nordic countries. The emission intensities are lower than average in this sector. (Note that the long-term effects depend on the type of construction.) A learning for potential later economic crises is to stimulate activities with generally low emission intensities, and high labour intensities, if the main political goal of the stimulus is to counteract unemployment.

The main argument for green stimulus programs is that they can achieve economic stimulus targets while also reducing climate gas emissions and improving the environment. This does, however, not agree with economic theory on policy design, which states that to achieve two separate policy targets efficiently, one separate instrument for each goal is needed. Our literature review on covid-19 analyses supports this. For example, Chen et al. (2020) states that to put limited government funds to the best use, most of the pandemic-related stimulus should initially focus on investments that get people back to work quickly. This may be said to correspond to most of the Nordic stimulus measures.

Any public project of a certain size should undergo a cost-benefit analysis, where climate and environmental effects are considered in line with the positive benefits to employment and economic growth. In this approach, both elements in green stimulus - stimulating the economy while reducing greenhouse gas emissions and protecting the environment - are balanced. Direct instruments counteracting climate and environmental costs are generally more efficient than scaling down the measure meant to stimulate the economy.

For most of the covid-19 support measures undertaken by the Nordic governments, there is a lack of information enabling analysis of green effects. This reflects the urgency of getting the economic support schemes in place, where pre-evaluations based on full cost-benefit analyses were probably not prioritized. Our impression is that the short-term measures supporting companies and households were mostly appropriate in that they prevented a catastrophic downturn in the economy and household incomes.

Some green stimulus measures can also reduce market failures, such as support for technology development, R&D and market introduction. Detailed, ex-post evaluations of the largest support schemes could bring insight into which instruments provide the most efficient green stimulus. This could be valuable information in future economic crises with little time to analyse the effects of the measures before implementation.

# References

- Agrawala, S., Dussaux, D., & Monti, N. (2020). *What policies for greening the crisis response and economic recovery?* OECD Environmental Working Paper.
- Alberini, A., Gans, W., & Towe, C. (2016). Free Riding, Upsizing, and Energy Efficiency Incentives in Maryland Homes. *The Energy Journal, International Association for Energy Economics*.
- Brahmbhatt, M. (2021). Criticizing green stimulus for COVID recovery. *Wiley interdisciplinary reviews: Climate Change* 12(4).
- Chen, Z., Marin, G., Popp, D., & Vona, F. (2020). Green Stimulus in a Post-pandemic Recovery: the Role of Skills for a Resilient Recovery. *Environ Resource Econ* 76, 901–911.
- Council of Economic Advisors. (2016). *A retrospective assessment of clean energy investments in the recovery act*. Executive Office of the President of the United States.
- European Commission . (2021b, December). *A European Green Deal. Striving to be the first climate-neutral continent*. Retrieved December 20, 2021, from ec.europa.eu: [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en)
- European Environment Agency. (2021b, June 21). *Rail and waterborne – best for low-carbon motorised transport*. Retrieved December 20, 2021, from <https://www.eea.europa.eu/>: <https://www.eea.europa.eu/publications/rail-and-waterborne-transport>
- Eurostat. (2021). *Statistical Classification of Economic Activities in the European Community, Rev. 2 (2008)* . Retrieved from Eurostat: [https://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST\\_NOM\\_DTL&StrNom=NACE\\_REV2&StrLanguageCode=EN&IntPcKey=&StrLayoutCode=HIERARCHIC](https://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM_DTL&StrNom=NACE_REV2&StrLanguageCode=EN&IntPcKey=&StrLayoutCode=HIERARCHIC)
- Finansdepartementet. (2020, March 19). *Extra ändringsbudget för 2020 - Åtgärder med anledning av coronaviruset. Prop. 2019/20:132* . Retrieved from <https://www.regeringen.se/rattsliga-dokument/proposition/2020/03/prop.-201920132/>
- Finansdepartementet. (2021). *Meld. St- 2 (2020-2021) Revidert nasjonalbudsjett 2021*.
- Finansministeriet. (2020, December 04). *Aftale om biodiversitet giver historisk løft til Danmarks natur*. <https://fm.dk/nyheder/nyhedsarkiv/2020/december/aftale-om-biodiversitet-giver-historisk-loeft-til-danmarks-natur/>
- Grigolon, L., Leheyda, N., & Verboven, F. (2016). Scrapping subsidies during the financial crisis — Evidence from Europe. *International Journal of Industrial Organization, Vol. 44*.
- Hepburn, C., O’Callaghan, B., Stern, N., Stiglitz, J., & Zenghelis, D. (2020). Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?

Oxford Smith School of Enterprise and the Environment, Working Paper 20-02.

IEA. (2020, June 29). *Green stimulus after the 2008 crisis. Learning from successes and failures*. Retrieved September 29, 2021, from [iea.org: https://www.iea.org/articles/green-stimulus-after-the-2008-crisis](https://www.iea.org/articles/green-stimulus-after-the-2008-crisis)

Klima- og miljødepartementet. (2020, May 29). *Vil setje i stand natur- og friluftslivsområde*. Retrieved December 17, 2021, from [regjeringen.no: https://www.regjeringen.no/no/dokumentarkiv/regjeringen-solberg/aktuelt-regjeringen-solberg/kld/nyheter/2020-nyheter/vil-setje-i-stand-natur--og-friluftslivsomrade/id2704464/](https://www.regjeringen.no/no/dokumentarkiv/regjeringen-solberg/aktuelt-regjeringen-solberg/kld/nyheter/2020-nyheter/vil-setje-i-stand-natur--og-friluftslivsomrade/id2704464/)

Li, S., Linn, J., & Spiller, E. (2013). Evaluating "Cash-for-Clunkers": Program effects on auto sales and the environment. *Journal of Environmental Economics and Management*.

Miljødirektoratet. (2020, november 26). Retrieved december 10, 2021, from <https://www.miljodirektoratet.no/aktuelt/nyheter/2020/november-2020/89-millioner-til-utvikling-av-utslippsfrie-hurtigbater/>

Ministry of Finance Finland. (2020, June 03). *Government reaches agreement on fourth supplementary budget proposal for 2020*. Retrieved December 17, 2021, from <https://valtioneuvosto.fi/en/-/10616/hallitus-paatti-vuoden-2020-neljannestalisatalousarvioesityksesta>

Ministry of Finance Norway. (2020, June 08). *Economic measures in Norway in response to Covid-19 as of June 2020*. Retrieved December 20, 2021, from [regjeringen.no: https://www.regjeringen.no/en/historical-archive/solbergs-government/fin/economic-measures-in-norway-in-response-to-covid-19/id2703484/](https://www.regjeringen.no/en/historical-archive/solbergs-government/fin/economic-measures-in-norway-in-response-to-covid-19/id2703484/)

Nahm, J. M., Miller, S. M., & Urpelainen, J. (2022). G20's US\$14-trillion economic stimulus reneges on emissions pledges. *Nature* 603, 28-31.

Nærings- og fiskeridepartementet. (2020, May 29). *En pakke for grønn omstilling*. Retrieved October 29, 2021, from <https://www.regjeringen.no/no/dokumentarkiv/regjeringen-solberg/aktuelt-regjeringen-solberg/nfd/pressemeldinger/2020/ny-side5/id2704503/>

OECD. (2020, October 06). *Making the green recovery work for jobs, income and growth*. Retrieved December 20, 2021, from [oecd.org: https://www.oecd.org/coronavirus/policy-responses/making-the-green-recovery-work-for-jobs-income-and-growth-a505f3e7/](https://www.oecd.org/coronavirus/policy-responses/making-the-green-recovery-work-for-jobs-income-and-growth-a505f3e7/)

OECD. (2021). Retrieved 12 20, 2021, from [oecd.org: https://www.oecd.org/coronavirus/en/themes/green-recovery](https://www.oecd.org/coronavirus/en/themes/green-recovery)

OECD/ITF. (2011). *Car Fleet Renewal Schemes: Environmental and Safety Impacts*.

Pollitt, H. (2011). *Assessing the Implementation and Impac of Green Elements of Member States' National Recovery Plans*. European Commission (DG Environment).

Popp, D., Vona, F., Marin, G., & Chen, Z. (2020). The employment impact of green fiscal push: evidence from the American Recovery Act. . *National Bureau of Economic Research Working Paper #27321*.

Regeringskansliet. (2020, September 14). *Grön återhämtning i budgetpropositionen för 2021*. Retrieved December 20, 2021, from <https://www.regeringen.se/4a6530/>

contentassets/0a093ebf8c5c4488945f63d790746202/gron-aterhamtning-i-budgetpropositionen-for-2021-i-siffror.pdf

Riksgälden. (2021, September 8). *Regeringen föreslår höjd garantiram för statens gröna kreditgarantier*. Retrieved December 20, 2021, from <https://www.riksdagen.se/sv/press-och-publicerat/pressmeddelanden-och-nyheter/nyheter/2021/regeringen-foreslar-hojd-garantiram-for-statens-grona-kreditgarantier/>

Strand, J., & Toman, M. (2010, January). "Green Stimulus," Economic Recovery, and Long-Term Sustainable Development. *Policy Research Working Paper*.

Sveriges Radio. (2020, October 9). *Volvo avslutar alla coronapermitteringar*. Retrieved from <https://sverigesradio.se/artikel/7571490>.

Swedish Government. (2021, September 20). *Ekonomiska åtgärder med anledning av pandemin 2020–2021*. <https://www.government.se/articles/2021/09/economic-measures-on-account-of-the-pandemic-20202021/>

Teknikföretagen. (2021, April 14). *Experten: Därför är det halvledarbrist i fordonsindustrin*. Retrieved December 20, 2021, from <https://t.teknikforetagen.se/forskning-innovation/experten-darfor-ar-det-halvledarbrist-i-fordonsindustrin/>

The programme of Marin's Government. (2019, December 10). *Annex 2. One-off future-oriented investments*. Retrieved from [valtioneuvosto.fi: https://valtioneuvosto.fi/en/marin/government-programme/one-off-future-oriented-investments](https://valtioneuvosto.fi/en/marin/government-programme/one-off-future-oriented-investments)

Työ- ja elinkeinoministeriö. (2021). *Yritystukien tutkimusjaoston raportti 2021*. Työ- ja elinkeinoministeriön julkaisuja • Yritykset • 2021:25.

Valtiovarainministeriön. (2021). *Taloudellinen katsaus Syksy 2021*. Valtiovarainministeriön julkaisuja – 2021:51.

YLE. (2021, October 1). *Koronatukia on jaettu jo miljardeja suomalaisfirmoille – tarkastusviraston tyyli arvio: Tukea meni yrityksille, jotka eivät olisi tukea tarvinneet*. Retrieved December 20, 2021, from <https://yle.fi/uutiset/3-12115110>

# Appendix A – NACE sectors

**Table A.1.** NACE Rev. 2 Economic sector.

**Source:** Eurostat (Eurostat, 2021)

NACE Rev. 2 Economic sector	
A	Agriculture, Forestry And Fishing
B	Mining And Quarrying
C	Manufacturing
D	Electricity, Gas, Steam and Air Conditioning Supply
E	Water Supply; Sewerage, Waste Management and Remediation Activities
F	Construction
G	Wholesale And Retail Trade; Repair of Motor Vehicles And Motorcycles
H	Transportation And Storage
I	Accommodation And Food Service Activities
J	Information And Communication
K	Financial And Insurance Activities
L	Real Estate Activities
M	Professional, Scientific and Technical Activities
N	Administrative And Support Service Activities
O	Public Administration and Defence; Compulsory Social Security
P	Education
Q	Human Health and Social Work Activities
R	Arts, Entertainment And Recreation
S	Other Service Activities
T	Activities Of Households as Employers; Undifferentiated Goods- And Services-Producing Activities Of Households For Own Use
U	Activities Of Extraterritorial Organisations and Bodies

# Appendix B – Stimulus measures by country

In the following we briefly describe the measures each country has implemented or plans to implement. Each country's measures are identified based on information in the respective country's state budgets for 2020 and 2021.

## Denmark

To the best of our knowledge, there has been no official communication from the Danish government regarding the total aggregated value of financial stimulus measures launched as a response to the pandemic. However, by looking at the various financial packages that have been agreed, at least a total amount of approximately DKK 167 bill. has been agreed. This includes various types of funding, loans, guarantees, subsidies, and deferred taxes, directed at specific sectors, private consumers/homeowners, or specific companies. Of these 167 bill., 128 bill. is yet to be specified in terms of which initiative and sector the money should be directed to.

One of the larger initiatives launched by the Danish government is labelled "Green restart" (in Danish, *Grøn Genstart*), with an overall contribution of DKK 55 bill. DKK 24 bill. of those are payments to individuals for two weeks of holiday (that were originally intended to be "frozen" until people reach retirement, following a shift in the Danish holiday system). However, at the time of writing, only a small part of the remaining 31 bill. of the "Green restart" package has been specified in more detail such that it is possible to identify which sectors the funds have been directed to. Those funds are analyzed in more detail in the following sections.

In total, at the time of writing, only DKK 37.6 bill. of the DKK 167 bill. has been specified – out of those, DKK 6.3 bill. have been directed to a specific recipient sector (or a specific company, and thus it is possible to identify the sector). 88 percent of those DKK 6.3 bill. have been directed towards the air transport sector (NACE rev. 2 H51) and 12 percent to the arts, entertainment, and recreation sector (NACE rev. 2 R).

However, the DKK 167 bill. does not include the general schemes of compensation (e.g., to cover companies' wages and fixed costs) made available for businesses, regardless of sector. Currently, DKK 19 bill. have been paid out in wage compensations to Danish businesses across sectors. The wholesale and retail trade and accommodation and food services sectors have been the largest receivers of these funds. Furthermore, approximately DKK 16 bill. has been paid out as compensations for fixed costs.