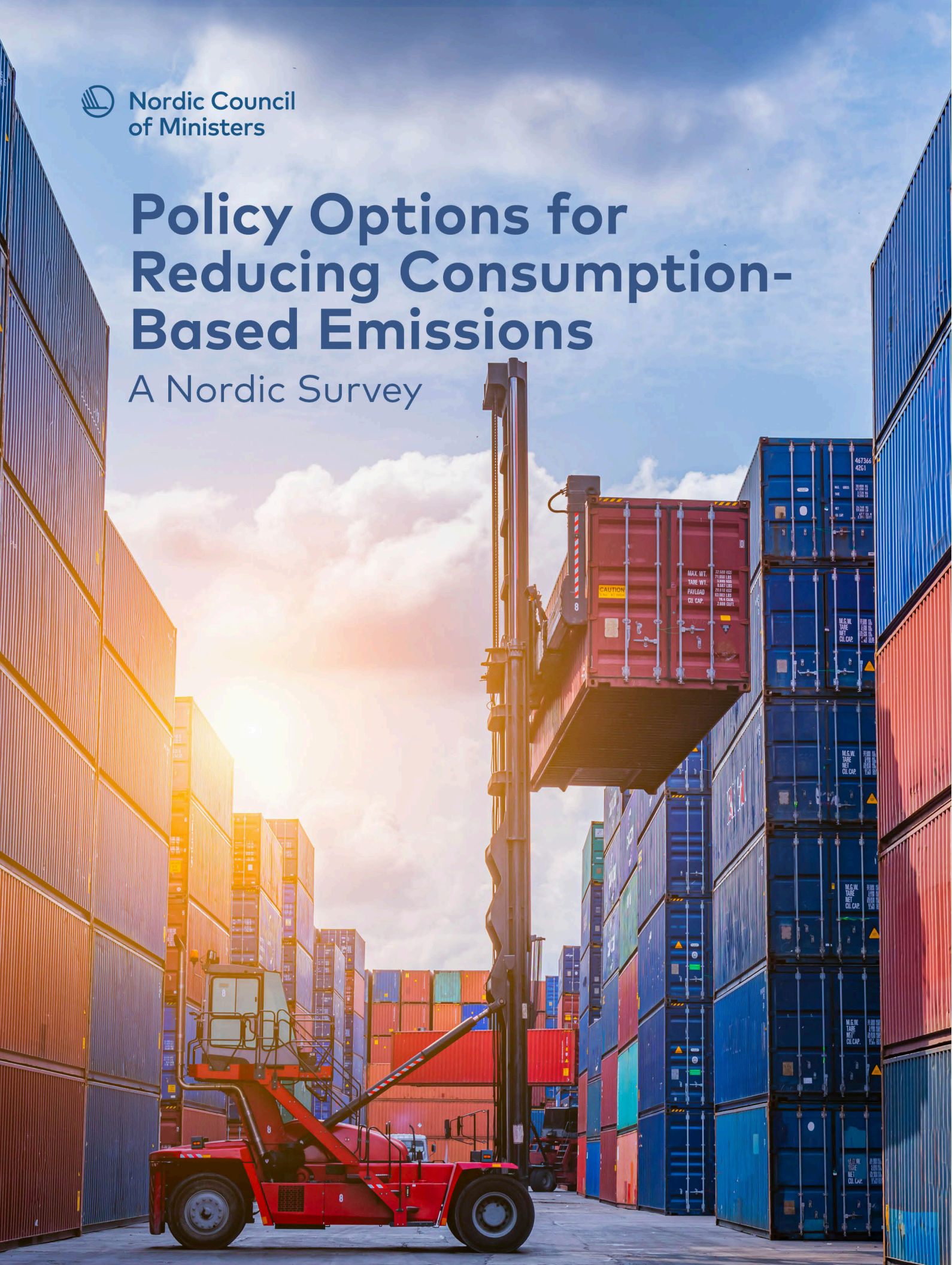
Nordic Council of Ministers

Policy Options for Reducing Consumption-Based Emissions

A Nordic Survey



Preface

This report has been commissioned by the Nordic Working Groups for Environment and Economics (NME) and for Climate and Air (NKL). The report has been prepared by a consortium led by Mistra SC in cooperation with representatives from other research organizations, namely Aarhus University, University of Iceland and Cicero.

NME has in earlier projects dealt with the issue of consumption-related emissions in order to broaden the approach on how emissions originating from activities in a certain country can be reported. This project is a follow-up of these earlier reports and it attempts to give a state-of –the-art assessment of where we stand now in terms of consumption-based emissions especially from a policy point of view. In rich countries consumption-based emissions of greenhouse gases are typically higher than territorial ones. Both territorial and consumption-based emissions have decreased but it has been argued that the decrease has not been significant enough to be in line with international agreements.

The report concludes with recommendations, including improving statistics for consumption-based emissions, enhancing Nordic cooperation, and encouraging policy packages that integrate informational, economic and regulatory measures. These mixes are essential to reducing emissions effectively and ensuring broad public acceptance.

Members of the Nordic Working Groups for Environment and Economy and of Climate and Air have provided comments and inputs to the report during the work. The authors of the report are responsible for the content as well as the assessments and recommendations, which do not necessarily reflect the views and the positions of the governments in the Nordic countries.

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Magnus Cederlöf

Chair of the Nordic Working Group for Environment and Economics

Contents

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Summary

This report investigates policy options for reducing consumption-based greenhouse gas emissions (GHGs) and other air pollutants across the Nordic countries. Its focus includes key consumption sectors like food, electronics, textiles, and home furnishings, which significantly contribute to emissions both domestically and through imports. It also provides more general policy options. Nordic consumption has a large environmental footprint, leading to discussions about complementing territorial climate targets with consumption-based targets. A notable example is Sweden's proposal to achieve net-zero consumption-based emissions by 2045.

In rich countries, consumption-based GHG emissions are typically higher than territorial GHG emissions. Both consumption-based and territorial emissions have decreased but it has been argued that this decrease has been insufficient to be in line with international agreements. The report also emphasizes that addressing GHGs often has co-benefits for other pollutants like nitrogen oxides (NO_x) and sulfur oxides (SO_x), improving public health as well as environmental quality.

The report presents a mapping of around 100 policy options in a "longlist". Of these, 21 promising policies were selected and analysed further using a so-called Policy Delphi method. Insights were gathered from 23 Nordic experts who ranked the policies on their potential to reduce emissions and their feasibility. The policies cover regulatory measures, such as emissions standards for products, as well as informational and economic instruments. Regulatory standards were rated highly for both effectiveness and feasibility, whereas policies targeting individual consumption behaviours, like flight restrictions, faced lower feasibility ratings due to expected public resistance.

The report concludes with recommendations, including improving statistics for consumption-based emissions, enhancing Nordic cooperation, and encouraging policy packages that integrate informational, economic and regulatory measures. These mixes are essential to reducing emissions effectively and ensure broad public acceptance. The report stresses that no single policy is a "silver bullet". Instead, a variety of mutually reinforcing or complementing policies will be key to achieving climate and other environmental goals.

Svensk sammanfattning

Den här rapporten undersöker styrmedel för att minska konsumtionsbaserade utsläpp av växthusgaser (GHG) och andra luftföroreningar i de nordiska länderna. Sektorer som studeras inkluderar livsmedel, elektronik, textilier och heminredning, vilka bidrar betydligt till utsläpp både nationellt och genom import, men rapporten inkluderar även bredare styrmedel. Konsumtionen i Norden har ett stort miljöavtryck, vilket leder till diskussioner om att komplettera territoriella klimatmål med konsumtionsbaserade mål. Ett exempel är Sveriges förslag att uppnå nollutsläpp av konsumtionsbaserade växthusgaser till år 2045.

I rika länder är konsumtionsbaserade utsläpp vanligtvis högre än territoriella utsläpp. Både de territoriella och de konsumtions-baserade utsläppen har minskat, men det går att argumentera för att de inte minskat tillräckligt snabbt jämfört med internationella överenskommelser. Rapporten betonar också att minskade utsläpp av växthusgaser ofta för det positiva med sig att utsläpp av andra föroreningar, såsom kväveoxider (NO_x) och svaveldioxider (SO_x), samtidigt minskar vilket förbättrar både folkhälsan och miljökvaliteten.

I rapporten presenteras en kartläggning av cirka 100 styrmedel samlade i en "lång lista". Från listan valdes 21 styrmedel ut och analyserades vidare med hjälp av en så kallad Policy Delphi-metod, där 23 nordiska experter rangordnade styrmedlen utifrån deras potential att minska utsläppen och deras genomförbarhet. De olika styrmedlen täcker regleringar, såsom utsläppsstandarder för produkter, samt information och ekonomiska instrument. Standarder och andra regleringar rankades högt för såväl effektivitet som genomförbarhet, medan styrmedel som riktar sig mot individers eller hushålls konsumtionsbeteenden, såsom restriktioner för flygresor, ansågs ha lägre genomförbarhet på grund av förväntat motstånd från allmänheten.

Rapporten avslutas med ett antal rekommendationer, till exempel att förbättra statistiken för konsumtionsbaserade utsläpp och att stärka det nordiska samarbetet. Vidare argumenterar rapporten för styrmedelspaket - paket av styrmedel som innehåller informationsinsatser, ekonomiska styrmedel och regleringar. Just kombinationer av styrmedel är avgörande för att effektivt minska utsläppen och säkerställa bred acceptans från allmänheten. Rapporten understryker att inget enskilt styrmedel är ett alexanderhugg. Snarare kommer kombinationer av ömsesidigt förstärkande eller kompletterande åtgärder vara viktiga för att reducera utsläppen av växthusgaser och andra luftföroreningar.

Acknowledgements

We would like to extend our great appreciation to the external experts participating in the Policy Delphi: Eva Heiskanen, Heta Heiskanen, Sarah Olson, Antti Kinnunen, Meri Löyttyniemi, Mats Björsell, Søren Løkke, Jessika Richter, Magnus Bengtsson, Juudit Ottelin, Frode Longva, Robert Höglund, Marit Widman, Johan Stensson, Mònica Guillen-Royo, Jamil Khan, Katarina Eckerberg and Maria Sandow. Thanks a lot to Emil Dæhlin for his input on Norwegian statistics and to Megan Eardley and Lakin Anderson for editing and to Ida-Lina Strang for layout. Last but certainly not least, many thanks to the secretariat as well as the members of the Nordic Working Group for Environment and Economy (NME) and the Nordic Working Group for Climate and Air (NKL) under the Nordic Council of Ministers for fruitful discussions. Your comments and constructive critique helped us along the way. All remaining errors are solely our own. Eskil Engström and Markus Larsson are the main authors of this report and contributed equally. Other co-authors have contributed with written texts, comments and edits.

1. Introduction and Background

The transformation of the Nordic countries' economies towards sustainability is gaining momentum on a broad front. In all Nordic countries, new cleantech companies are emerging, and established industries are transitioning their production to limit their impact on the surrounding environment. At the same time, a significant portion of the Nordic countries' environmental impact is caused by our consumption, both from domestic goods and services, and from imports, where production often takes place in countries with weak environmental regulations.

The Nordic Council of Ministers expresses this as follows: "Nordic consumption must change if SDGs (Sustainable Development Goals) are to be achieved." They continue: "Nordic consumption has a huge environmental and climate footprint in other parts of the world. The Nordic Council of Ministers is working to turn this around and make the Nordic Region the most sustainable region in the world" (Nordic Council of Ministers, 2023a).

Climate targets are usually based on territorial emissions, i.e. emissions occurring within the country's geographical borders. Territorial emissions are also reported to the UNFCCC (United Nations Framework Convention on Climate Change) and negotiated in international agreements. However, the consumption-based emissions of greenhouse gases[1], which include emissions related to the country's consumption regardless of where they occur, are typically higher and not reduced in the same way as the territorial emissions. There are therefore discussions in Nordic countries about whether there should be consumption-based climate targets complementing the territorial targets. An example of such a discussion is the recent investigation from the Swedish Government's Environmental Objectives Committee, which included all parties in the Swedish parliament, that suggests that Sweden should also have a net-zero climate goal for consumption-based greenhouse gases by the year 2045 (SOU 2022:15).

Politically, focus has lately been on climate change and emissions of GHGs. This is also mirrored in coverage in the media. However, much of what is said about climate and GHG emissions also holds true for other air pollutants like carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2) and particulate matter (PM). Consequently, addressing one environmental problem could at the same time address other problems. Conversely, some climate mitigation strategies risk exacerbating other environmental issues, e.g., driving

1. The most important greenhouse gases are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and F-gases (HFC, PFC, SF_6 and NF_3, which are used as e.g. refrigerants).

biodiversity loss. Reduced territorial emissions might in some cases also increase consumption-based emissions if dirty production is moved to countries with less environmental regulation. Nevertheless, addressing climate and other air pollutants could bring a range of non-environmental co-benefits to society. According to the Intergovernmental Panel on Climate Change (IPCC) (2023, p. 31): "Many options are available for reducing emission-intensive consumption while improving societal wellbeing. Socio-cultural options, behaviour and lifestyle changes supported by policies, infrastructure, and technology can help end-users shift to low-emissions-intensive consumption, with multiple co-benefits." Thus, the IPCC identifies challenges as well as expresses hope. This report delivers insights into how policies can support behaviour and lifestyle changes necessary to achieve a low-emission society.

Goals, main focus, delimitation and content of report

The overall goal of the project is to map out policy instruments to reduce consumption-based emissions (climate-impacting emissions and other air pollutants) on the national level in the Nordic countries. The project will also analyse policy instruments in terms of effectiveness, feasibility and distributional effects. Additionally, we will describe how consumption-based emissions have developed over time in the Nordic countries. The initial focus of the project, following the call from the Nordic Council of Ministers, was on policies targeting consumption of food, electronics, textiles and home furnishings. These consumption areas contribute significantly to emissions (both climate-related and other air pollutants) (Fauré et al., 2019). However, most policy instruments are not specific to particular product groups. The policies discussed here are therefore, in general, more broadly adaptable. Existing policies, as well as policies discussed but not implemented, or previously implemented but later phased out, are also studied.

Consumption–oriented policy options are here defined as actions by policymakers to change consumer behaviours. Note that such policy instruments may target individual behaviour, as well as the retail companies that market goods to consumers. Thus, the policy instruments may be directly consumer-based, or retailer-based, and may also influence consumption choices of industries in supply chains e.g. the choice of materials (Grubb et al., 2020). Policy instruments can also target public consumption. We have chosen consumption-oriented as a broad-scope term but recognize that this definition is similar to *demand-oriented* policy measures (which is a common term in some literature) (Grubb et al., 2020).

In addition to mapping policy instruments in each country, the Nordic Council of Ministers requested that "the distributional effects of the policy instruments be analysed, as well as aspects such as feasibility and [national or EU] competence".

To this, we have added aspects such as effectiveness, i.e. goal fulfilment, and cost-effectiveness, as these aspects are also essential. These identified aspects together form the basis for a model, which can be found in similar combinations in models for policy analysis. For example, Figure 1 illustrates a model inspired by Jagers and Matti (2020), which places the "feasibility" of policy instruments at the intersection of *effectiveness*, *cost-effectiveness*, and *political constraints* (or governance). Closely related to political constraints and feasibility is *acceptability* where low acceptability of a suggested policy could be a major constraint. We return to these issues in sections 5, Policy and Acceptability, and 8, Discussion and Conclusions, below.

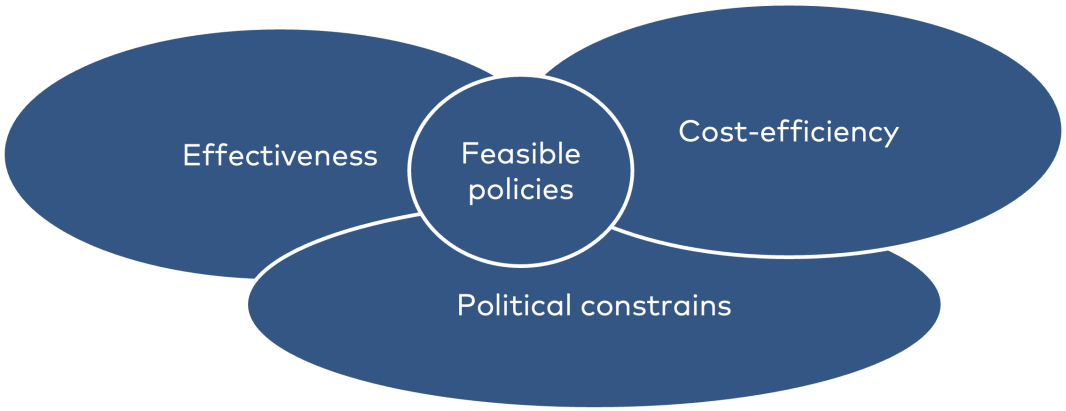


Figure 1: Feasibility of Policy Instruments (based on United Nations, 2021; Jagers and Matti, 2020)

The Nordic Council of Ministers' compilations of environmental policy instruments (e.g. Nordic Council of Ministers, 2023b) provide a good starting point for this study. The recurring report "The Use of Economic Instruments in Nordic Environmental Policy" lists the majority of the Nordic countries' respective economic instruments aimed at climate-impacting emissions, other air pollutants, and various other environmental issues (Nordic Council of Ministers, 2023b). The most recent compilation covers the period 2018–2021. To avoid duplicating previous surveys, we have based our work on the Nordic Council of Ministers' existing reports.

The present report focuses on consumption-based emissions of both GHGs and other air pollutants. As with emissions of GHGs, the majority of consumption-based emissions of nitrogen and sulfur oxides, as well as particulate matter, occur outside Sweden's borders (Palm et al., 2019). It is reasonable to assume that the situation is similar in other small, open economies, including neighbouring Nordic countries. Since a significant portion of these emissions are associated with the

combustion of fossil fuels, the primary sources will largely be the same as for greenhouse gases. Consequently, policy instruments aimed at climate-impacting emissions often also affect other air pollutants, and vice versa.

As the Nordic Countries pursue a broad spectrum of climate mitigation measures, there is a need to take stock of those implemented and proposed policies which could enhance reduction of emissions of consumption-based greenhouse gas and other air pollutants. The present project aims to conduct such a broad mapping of implemented and proposed measures. This aim also corresponds to an increased emphasis on the need for policy mixes, or policy packages, in the sustainability transition literature (Salo et al., 2023; Lindberg et al., 2019). A mix of policies is viewed as instrumental in unlocking transitions, as there is no single 'silver bullet', neither in climate mitigation, nor in reducing emissions of other air pollutants. Here, it is suggested that policymakers need to pay attention to a broader set of mutually reinforcing policy mixes or packages. The mapping in this report, presented in Table 6, offers a broad set of instruments from which policymakers could draw inspiration.

Furthermore, the Policy Delphi method, described below, facilitates in gathering expert rankings and judgments of the potentials and drawbacks of a limited number of policies. This method allows us to identify "promising policies" that the participating experts deem to have a high potential to reduce emissions and be feasible to implement.

In section 2 of this report, calculation methods for consumption-based emissions are described. In section 3, focus is placed on the Nordic countries. Similarities and differences are discussed both in terms of calculation methods and actual consumption-based emissions in the Nordic countries. EU perspectives of consumption-based emissions and consumption-oriented policies are presented in section 4, followed by a discussion on policies and acceptability in section 5. In section 6 we present methods used, including the Policy Delphi, and material used in the report. Results are presented in section 7. The report ends with section 8, Discussion and Conclusions, which also includes policy recommendations.

2. Calculation Methods for Consumption-Based Emissions

The most common way to calculate consumption-based emissions for a country is to use Environmentally Extended Multi-Regional Input-Output Analysis (EE MRIOA), either on its own, or in an approach in which it is a part of the method. The basis for EE MRIOA is the Input-Output Tables for a country. These are typically collected by statistical offices as a part of the National Accounts of a country. A central part of the Input Output (IO) Tables are matrices with industrial sectors on the axes. The numbers in the tables (usually in monetary units) describe how different sectors trade with each other. For example, the food industry is a sector that produces food products. In order to do so, the food industry needs to buy products from the agricultural sector, but the industry also needs transport services, energy, machinery etc. The tables describe how much each sector buys from the other sectors. In principle, each sector buys products from all other sectors in order to produce the goods and services it produces. In addition, the Input-Output tables also include information about the proportion of production that goes to private consumption, public consumption, investments (both private and public) and exports. There are also tables that show imports.

By connecting Input-Output tables for several countries and regions, a Multi-Regional Input Output Analysis can be made. Careful work is then needed to make sure that imports and exports in the different tables match each other.

Environmental information can be added to the calculations using tables for Environmental Extensions. These are tables that describe emissions (or resource uses) that are associated with a specific industry sector in a specific country. These are typically described as intensities, expressed as, for example, the mass of an emission per monetary unit, for the specific product group in the specific country.

Using these tables and matrix algebra, it is possible to calculate the emissions from consumption in a specific country (e.g. Wood et al., 2015). The calculations cover the whole supply chain regardless of where the production takes place.

Several models are available for EE MRIOA (e.g. Dawkins et al., 2019). The differences between them include, for example: how many, and which, countries and regions are included; how many, and which, industries and product groups are included; which environmental impacts are included; and which data sources are used. There are also different types of modelling choices that have to be made, for example, when data from different data sources needs to be combined and matched. That means that it may be difficult to compare results, for example

between two different countries, if different methods for EE MRIOA have been used in analysing each country.

An advantage of EE MRIOA is that it covers all sectors in the world. The method can be described as a top-down method, since a starting point is the total emissions of a country, totals which are allocated to the different sectors in the country in the Input-Output tables. But this also means that uncertainty typically increases with the level of disaggregation. Results for specific sectors, product groups, societal groups or sub-national regions are typically more uncertain than data for a whole country. Another advantage is that it is based on data from the System of Environmental and Economic Accounting[2] (SEEA) which is internationally standardised and harmonised (United Nations et al., 2014).

Greenhouse gases are probably the most common group of emissions that are studied with EE MRIOA. Results are sometimes presented for CO_2 (which is the most important greenhouse gas) or for CO_2 equivalents, other greenhouse gases typically aggregated based on their Global Warming Potentials for a time frame of 100 years. Depending on the data availability, results can also be calculated for a broad range of emissions and resources (e.g. Palm et al., 2019; Persson et al., 2019; Brown et al., 2022). One example of interest for this study is different types of air pollutants such as NO_x, SO_2 and particulates. Data for these emissions are typically collected in the SEEA and so data availability is, in general, reasonably good.

Consumption-based emissions are sometimes calculated for only private consumption, and sometimes for all consumption including public consumption and investments (including both private and public investments in buildings, infrastructure, factories etc.).

Calculation of consumption-based emissions has developed significantly during the last decade(s) and can be expected to develop further in future. A likely trend is that calculation of consumption-based emissions will be incorporated into the normal work of statistical offices. Statistics Sweden currently produces statistics on consumption-based emissions of both greenhouse gases and other air pollutants as a part of Sweden's official statistics. Eurostat also regularly produces statistics on consumption-based CO_2 emissions. It seems likely that more statistical offices will follow suit and produce statistics for consumption-based emissions of greenhouse gases, but also other air pollutants.

Exiobase is probably the most used EE MRIOA model, both in general, and specifically by statistical offices in the Nordic countries (Wood et al., 2015). This model has been developed and updated by a research consortium. However, several actors have suggested it would be advantageous if an international organisation

2. System of Environmental Economic Accounting

would develop and update a model that could be used by many countries. Eurostat has developed, and keeps developing, Figaro (Remond-Tiedrez and Rueda-Cantuche, 2019) which is an EE MRIOA model. Figaro may become a model preferred by institutional actors. Exiobase and other EE MRIOA models can then continue to be developed for research purposes.

Statistics Sweden recently made a comparison between Exiobase and Figaro (Cederholm et al, 2024). The study showed that the overall results for the consumption-based emissions of Sweden were 8.5% higher when Figaro was used instead of Exiobase, and that larger differences occurred for more disaggregated data.

Cederholm et al. (2024) also compared how Exiobase and Figaro are updated. Both models include data from a number of different sources. When time series are produced, data are updated for the relevant years. In some cases actual data are used, and in some cases data are modelled using updated macro-economic data. Data on emissions are typically more updated than the IO tables and data for OECD countries are typically more updated than non-OECD countries. Figaro has the advantage of using real IO tables, while the last year data for intermediate use matrices in Exiobase is 2011 and data for more recent years are modelled. Efforts are currently ongoing between several international actors to coordinate the compilation of IOA (Input-Output Analysis) tables and faster updates with consistent quality can be expected in the future.

An aspect of EE MRIOA is that all products within a product group are assumed to have the same emission intensity on a monetary basis. So, to give an example, a product that costs twice as much as another one in the same product group is assumed to cause double the emissions. This can lead to overestimations of the environmental impacts of both expensive products and the footprints of higher income groups (André et al., 2024; Leferink et al., 2023). This is also one reason why EE MRIOA is less suitable for analysis of products. Instead, other methods such as Life Cycle Assessment (LCA) (e.g. Hellweg et al., 2023) may be more suitable in those cases. Hybrid models have also been developed in which some data comes from EE MRIOA and some from LCA or process data (e.g. Andersson, 2020; Carlsson Kanyama et al., 2021; Heinonen et al., 2022) which can avoid some of the limitations of EE MRIOA. The Joint Research Center has also developed methods for calculating consumption and consumer footprints based on LCA bottom-up methodology (Castellani et al., 2019). In these approaches, the environmental impacts of a limited number of products calculated with LCA are assumed to represent the whole product group. Although the development of EE MRIOA models has been strong, there is still a need for future research. Examples of questions that can be addressed include:

- How can land use and land use changes be included in the models?
- How can emissions of greenhouse gases from the use of biofuels be included?
- How can aviation be better included?
- How can other types of emissions and resources than greenhouse gases and air pollutants be included in better ways?
- How can future consumption-based emissions be modelled?
- How can consumption-based emissions for regions and municipalities be calculated?

3. Consumption-Based Emissions in the Nordic Countries

As described below in the sections for Denmark, Finland, Iceland, Norway and Sweden, calculations of consumption-based emissions of greenhouse gases have been made for all countries. However, the methods used to make the calculations differ. For Denmark, Finland, Norway and Sweden, similar but non-identical methods have been used. In all cases, national statistics data are used for the studied country, and then combined with an EE MRIOA model for the rest of the world. An advantage of this approach is that data for the studied country that is considered to be of high-quality can be used, while still being able to include the whole supply-chain with an EE MRIOA model. The linking between the national statistical model and the rest of the world model can be done in different ways (e.g. Palm et al., 2019). For all countries, Exiobase (Wood et al., 2015) is currently used for the rest of the world.

For Iceland, another approach is used which differs in several ways. One difference is that a hybrid method is used where process data for some emissions are combined with data from an EE MRIOA (Heinonen et al., 2022). Another difference is that only private consumption is considered and that data on consumption expenditures are not taken from national statistics, instead data from a survey is used.

Since different approaches have been used across all countries, the absolute numbers may not be directly comparable. It is preferable if results can be calculated using one method when comparing different countries. Eurostat (2024) calculate consumption-based emissions of CO_2. They use the MRIOA model Figaro. Their results are presented in Figure 2.

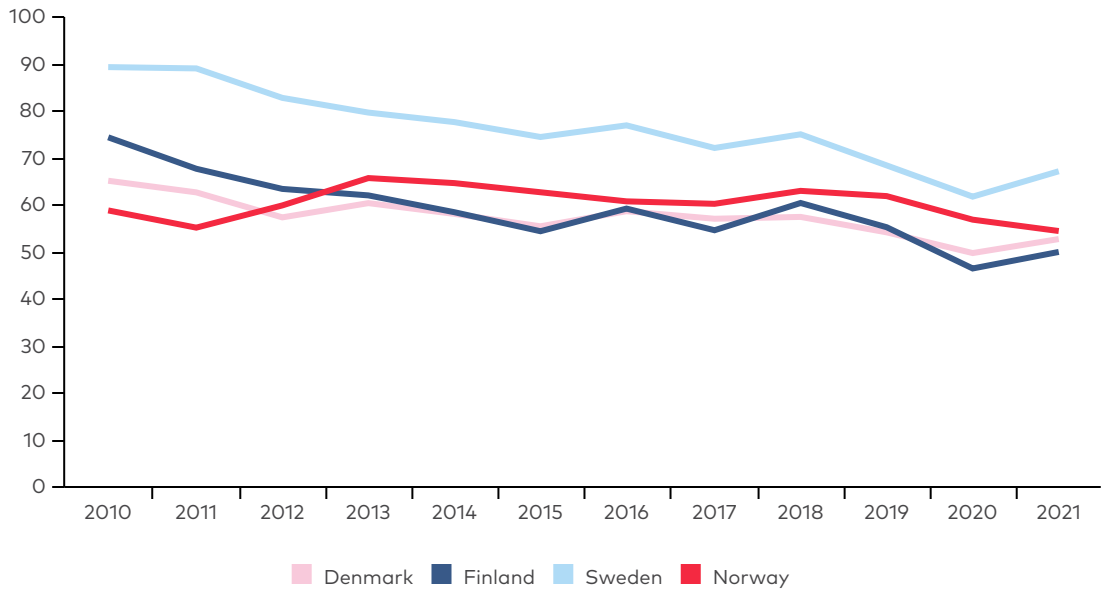


Figure 2. Consumption-based CO_2 emissions, million tonnes per year (Eurostat, 2024)

It may be noted that there are similarities in the results for the different countries. Emissions show a declining trend, although it may be argued that emissions are not declining fast enough in relation to international agreements to limit global temperature increase to well below 2 °C and strive for 1.5 °C. Consumption-based emissions are also higher than territorial emissions in the Nordic countries. Globally, total consumption-based emissions are equal to production-based emissions (which equals territorial emissions plus international transport). However, for rich countries, consumption-based emissions are typically higher than territorial emissions.

It can be noted that the declining emissions trend is also seen in the more detailed data for specific countries presented in Figure 3 below. It can also be noted that emissions vary between different years, indicating the importance of longer time series in order to see trends. Since only CO_2 emissions are included here, the total emissions of GHGs are higher than shown here. Figure 2 illustrates total CO_2 emissions per country. In Figure 3 the CO_2 emissions per capita are shown. Whereas Sweden emits the most CO_2 per year in total of the four neighbouring countries (Figure 2), Swedish consumers emit less per capita compared with their neighbours. Emissions for Denmark and Finland tail each other both in total (Figure 2) and per capita (Figure 3).

The slow decrease in Norwegian total emissions (Figure 2) can partly be explained by a growing population and possibly by the large oil and gas sector. Norwegian per

capita emissions (Figure 3) are decreasing faster than total emissions. However, Norwegian per capita emissions are decreasing slower than those of other studied Nordic countries. Even if production is not increasing, an increasing amount of energy, and thus emissions, is required to extract remaining oil and gas as reserves are emptied. It is however unclear if this has a significant influence on the consumption-based emissions. This indicates a need for further studies on the efficiency of policies in different countries.

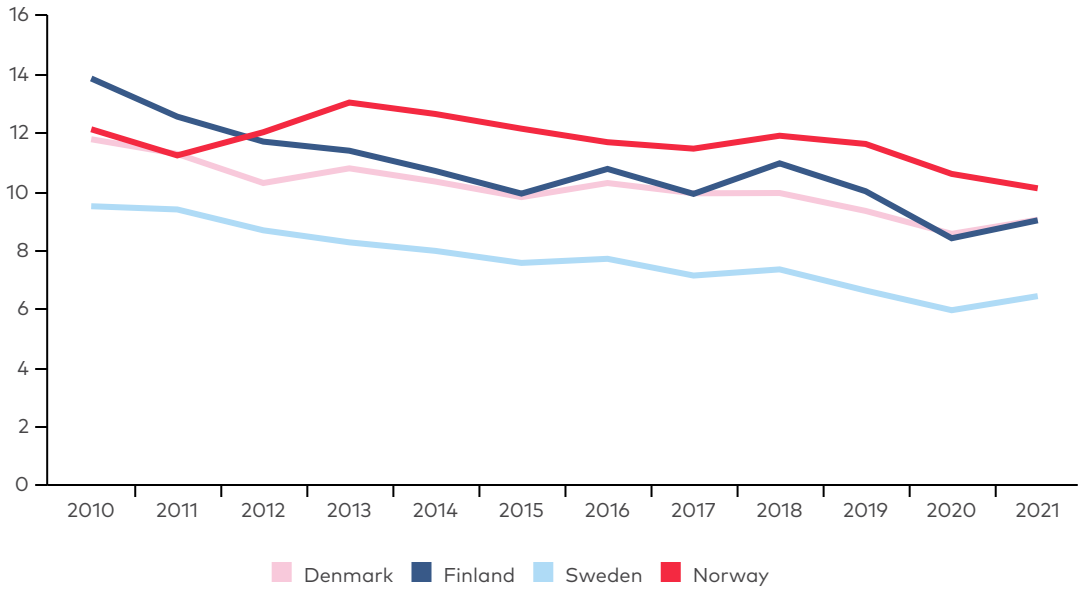


Figure 3. Consumption-based CO_2 emissions per capita, tonnes per capita and year (Eurostat, 2024)

The emissions associated with a country's consumption can occur all over the world. Table 1 shows some of the countries where CO_2 emissions occur related to Denmark's, Finland's, Sweden's and Norway's consumption. First it can be noted that the most important country, in terms of emissions, for all four countries is the country itself. For example, the most important country, where most emissions occur, for consumption in Norway is Norway. Somewhere between slightly more than a third (Norway) and a little less than half (Finland) of the emissions are occurring in the home country. That means that more than half of the emissions are occurring in other countries. Some of the relevant countries are shown in Table 1. The share of emissions depends both on how much is imported from that country and how large the emission intensities are in that country. It can for example be noted that somewhere between 3 and 5 percent of the emissions are occurring in Germany. This is a reminder that the EU as a whole is important for all four

countries. Approximately 3 to 5 percent of the emissions associated with each country's consumption occur in other Nordic countries. Thus, on average, as much CO_2 emissions are imported from Germany to each of the Nordic countries in Table 1 as are imported from the neighbouring Nordic countries together, although the German economy is larger than the economy of the Nordic countries combined. This reflects the relative importance of the Nordic economies for each other as well as the German economy in inter-European trade.

That China accounts for 9–15 percent of imported consumption-based CO_2 emissions in the four countries reflects the importance of China in global trade. CO_2 imports from the USA only account for a fraction of CO_2 imports from China even though the US economy is substantially larger (IMF, 2024).

Table 1. Share of Denmark's, Finland's, Sweden's and Norway's consumption-based CO_2 emissions that occur in some selected countries.

Country where emissions occur	Denmark	Finland	Sweden	Norway
Germany	5.0	3.0	5.1	3.2
Denmark	41.9	0.8	2.0	1.7
Finland	0.4	46.6	1.5	0.6
Sweden	1.2	1.3	37.5	1.6
China	10.2	9.3	12.0	15.0
India	2.0	1.5	2.4	2.1
Norway	1.1	2.4	1.9	34.8
UK	0.9	0.5	1.0	1.0
USA	2.3	1.4	2.4	3.0

Country specific information

The Nordic countries have many similarities, as well as important differences, in their emission of greenhouse gases and other air pollutants, and in policies addressing emissions. Comparing sectors emitting the most territorial GHGs in the respective countries exemplifies this.

Denmark stands out among Nordic countries due its large agricultural sector. In Denmark, 30% of emitted greenhouse gases come from agriculture and land use, 34% from energy, industry, and heating, 30% from transport, and 6% from waste (Danish Council on Climate Change, 2024).

In Finland, the stationary energy production sector is responsible for approximately 50% of the territorial GHG emissions without the LULUCF sector, followed by transport (20%), agriculture (14%), and industrial process emissions (10%).

In Iceland, the almost fully renewables based stationary energy production system leads to a different profile. The energy sector emissions occupy a share of slightly below 40% of the country's overall emissions, but these mainly consist of transport and fishing fleet fuel use. Industrial process emissions have also a roughly 40% share, and agriculture around 14% share.

Norway differs from other Nordic countries in its oil and gas industry, which is responsible for 25% of Norway's GHG emissions. This is followed by industry and mining (23%), road traffic (17%) and agriculture (10%) (Statistics Norway, 2024).

In Sweden, 33% of emitted greenhouse gases come from industrial processes, 32% from domestic transport and 14% from agriculture (Swedish Environmental Protection Agency, 2024).

One important difference between the countries is their affiliation with the EU. While Denmark, Finland and Sweden are EU members, Norway and Iceland are tightly integrated with the EU via the European Economic Area (EEA) and they also cooperate closely with the EU on climate policies. The current report focuses on national polices, but the country specific descriptions below also cover regional or local initiatives in order to illustrate the potential to address emissions at this level.

Denmark

Statistics

Statistics Denmark publishes yearly environmental accounts of greenhouse gas emissions and other air pollutants. In 2022, Denmark emitted 44 million tonnes of CO_2 equivalents (CO_2e) within its borders. This corresponds to 7.5 tonnes of CO_2e per inhabitant of Denmark. Denmark is a small, open economy and therefore total emissions within its borders differ from its overall climate footprint. The climate footprint shows how Danish private and public consumption and investments contribute to the global emission of greenhouse gases - regardless of whether the emissions occur in Denmark or in other countries via the import of goods. Logically, emissions from production for Danish export are not included. The calculation of a country's climate footprint can in practice only be done through complicated model calculations, where simplifying assumptions and estimates have to be made. That means climate footprints are characterized by considerable uncertainty, especially the estimation of emissions abroad. In addition, there are no international guidelines or reporting obligations for these calculations yet (Pedersen, 2021). Statistics Denmark therefore regards calculations of the climate footprint as "experimental statistics" (Statistics Denmark, no date). However, they still publish an estimate of the Danish climate footprint, which was 64 million tonnes of CO_2 equivalents in 2022, corresponding to 11 tonnes of CO_2 equivalents per inhabitant of Denmark (Statistics Denmark, no date).

Since at least 2007, there has been a downwards trend for consumption-based GHG emissions attributed to consumption and investments in Denmark (see Figure 4). By 2022, it was estimated that Denmark had reduced greenhouse gas emissions within its borders by 41 percent since 1990 (Statistics Denmark, no date). However, by 2022 the Danish consumption-based GHG footprint had only been reduced by 18 percent since 1990. While the climate footprint within Danish borders had decreased by 45 percent, the estimated climate footprint in other countries from consumption and investments in Denmark had increased by 31 percent in the same period (Statistics Denmark, 2021).

The consumption category in which the Danish consumption-based GHG footprint has declined the most is housing, which is consistent with a large part of the decrease in greenhouse gas emissions being due to the switch to renewable energy, such as wind power, solar, and biomass. In 2022, renewable energy accounted for 45.5 percent of energy consumption in Denmark (Statistics Denmark, no date). In all other consumption categories, including public procurement, the decline is marginal, and emissions from investments were higher in 2022 than in 1990.

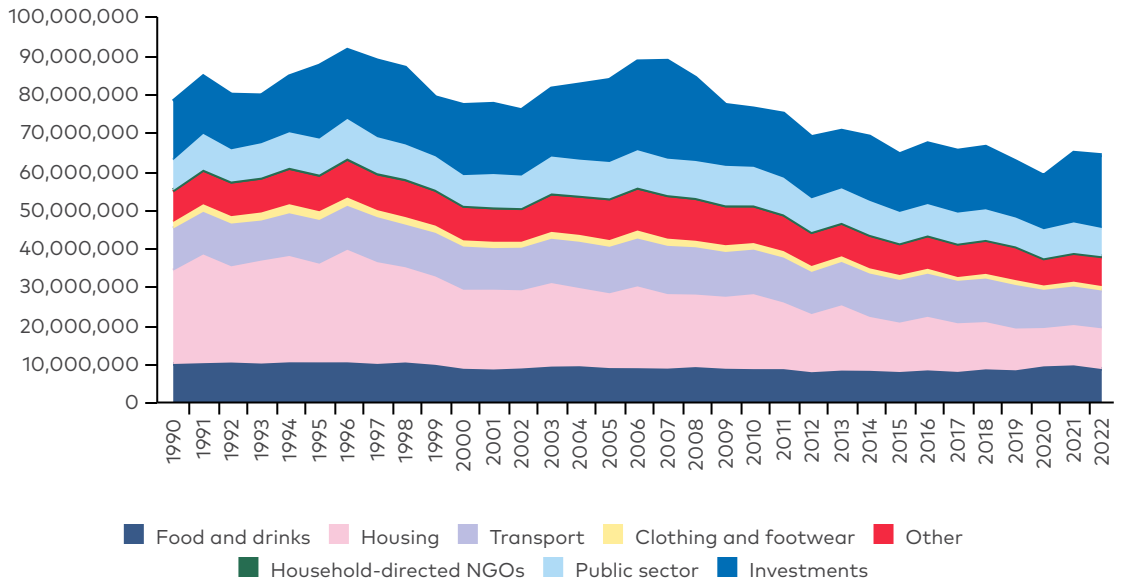


Figure 4. Historic trend for consumption-based GHG (ton per year) by consumption and investment category 1990–2022.

Source: Statistics Denmark, https://www.statistikbanken.dk/aftryk1

Objectives and policy

In 2020, the Danish Parliament decided on a Climate Act with the goal of achieving overall climate neutrality in 2050 and reducing greenhouse gas emissions by 70 percent in 2030 compared to 1990 (Retsinformation, 2021). In 2022, the current government changed the target year for overall climate neutrality to 2045 (The Danish Prime Minister's Office, 2022). Although the rate of reduction of emissions within Danish borders seem to be on track to reach national and international targets (Ministry of Climate, Energy and Utilities, 2024), the estimated reduction in global emission from consumption and investments in Denmark is much smaller, primarily because estimated emissions abroad are increasing, or decreasing at a lower pace than domestic emissions. The Danish Climate Council, among others, has expressed a concern that Denmark's consumption-based GHG emissions are not decreasing as much as required by the Paris Agreement (Klimarådet, 2023).

The Danish Climate Act does not define clear targets for limiting environmental pressures outside Denmark's borders. However, it expresses the ambition that Denmark should play a leading role in international climate efforts, to inspire and influence the rest of the world. The Climate Act also mentions several global action areas, which have subsequently become part of the government's long-term global climate strategy (Ministry of Foreign Affairs of Denmark, no date). However, the strategy has been criticised for lacking concrete and quantitative goals for

Denmark's global climate action, which makes it unclear exactly what it intends to achieve and what is to be measured Klimarådet. In its foundation, the Danish government writes that it wants to increase the ambitions for Denmark's footprint in the world and in this connection examine the consequences of setting a target for the climate footprint of Danish consumption. However, while acknowledging the ambitions, the Danish Climate Council calls on the government to work to concretize efforts for specific global action areas (Klimarådet, 2023).

Municipal/regional initiatives

As of the end of 2023, almost all Danish municipalities have approved and politically anchored climate action plans ready to go from plan to action (Local government Denmark, 2024) as part of the *Klimaalliancen* (the Climate Alliance), which in April 2023 succeeded the DK2020 collaboration. The municipal action plans are certified by the C40 Cities Climate Leadership Group (Concito, 2023) as compatible with the Paris Agreement. If the municipal climate action plans live up to their ambitions, they will surpass the national 70% reduction target. The plans focus on all sectors within the municipality's geographical area including emissions from end consumption. For example, in the energy sector, almost all municipalities aim to phase out individual oil and gas boilers, either by expanding the district heating network or promoting heat pumps. In addition, many municipalities are working to establish wind and solar energy plants and phase out fossil fuels from district heating. In the transport area, the municipalities work mainly to electrify public transport and expand charging infrastructure for electric cars. In addition, they aim to change citizens' transport behaviour, including promoting cycling and co-driving arrangements. Approx. 2/3 of the municipalities plan to convert the municipality's own car fleet to electric or plug-in hybrid models.

The municipalities expect to achieve most of their emission reduction from the energy sector (112% overall in 2030), compared to the municipality's selected base year (2016–2020), primarily by reducing the use of fossil fuels (92%). Emissions in the transport sector are expected to be reduced by 25%, by 63% in industry, by 33% in agriculture and land use, and by 23% in other sectors.

Finland

Statistics

Finnish Environment Institute (SYKE) publishes yearly environmental accounts on consumption-based greenhouse gas emissions. The latest publication covers the period 2000–2021. Their consumption-based greenhouse gas accounting follows the environmentally extended input-output approach, and utilizes the ENVIMAT model developed for the Finnish economy by Finnish Environment Institute, Thule Institute, University of Oulu, and MTT Agrifood Research Finland (Seppälä et al.,

2011). It was updated for the year 2019 to include a multi-region input-output model EXIOBASE to improve the calculation of emissions outside Finland. The trend since the first year, 2000, has been declining despite increasing consumption expenditure. This mostly relates to decreases in the GHG intensity of energy production both in Finland and globally. Another reason for the decrease is the improved preciseness of the assessment related to the production and delivery chain emissions of the foreign countries which actually participate in the chain (Finnish Environment Institute, 2024). According to SYKE, the Finnish consumption-based GHG footprints in 2021 for private consumption were approximately 7.7 tonnes per person. This represents an almost 50% reduction since the peak year 2003. However, the footprints are still well above the global average as well as the mitigation pathway for the Paris target for limiting global warming to well below 2 degrees C (Heinonen et al., 2022; Vogel and Hickel, 2023).

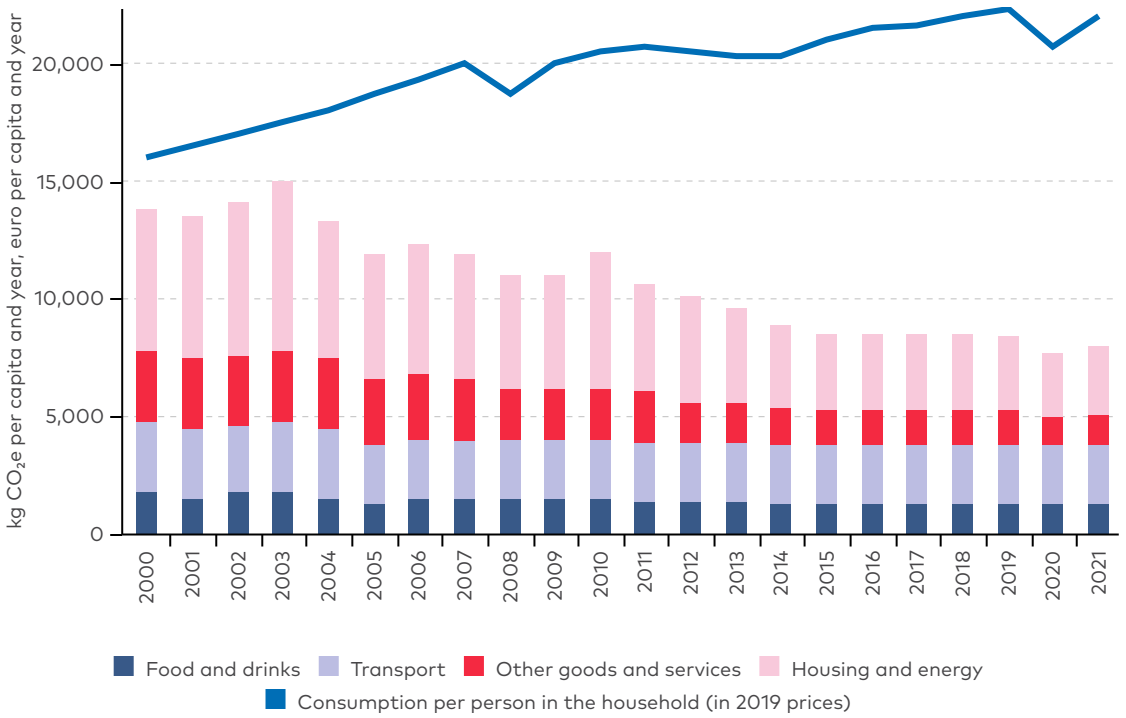


Figure 5. Average expenditures and consumption-based CO_2e-emissions of Finns 2000–2021

Objectives and Policy

The Finnish climate policy is guided by the Finnish Climate Act (Finlex, no date). The law sets GHG mitigation targets for the years 2030, 2040 and 2050 based on territorial emissions accounting (i.e. excluding emissions outside the Finnish

territory). The goal for 2030 is a 60% reduction compared to the 1990 level, an 80% reduction by 2040, and a 90 95% reduction by 2050. Furthermore, the law includes the target of carbon neutrality by 2035, achieved by balancing emissions and sinks. The Finnish Environment Institute (SYKE) produces annual information about the consumption-based emissions in Finland. Currently there is no connection between the consumption-based accounting and the Finnish climate policy.

There are some signs that this connection will be made on a policy level. Although the focus remains on territorial emissions, the Medium-Term Climate Change Policy Plan Towards a Carbon-Neutral Society in 2035 recognizes the need to steer consumption towards higher climate-sustainability (Finnish Ministry of the Environment, 2022). The plan discusses the need to steer consumption based on analysis which reveals that Finland is not on the way to reach the carbon neutrality target of 2035 without further actions. The Medium-Term Climate Change Policy Plan Towards a Carbon-Neutral Society in 2035 encourages consumers to halve their carbon footprints. Based on this premise, the collaborative project Policy instruments to reduce the carbon footprint of household consumption was launched between Finnish Environment Institute (SYKE), University of Helsinki, and Natural Resources Institute Finland. Using the ENVIMAT model and a Policy Delphi approach, researchers suggest that the consumption-based carbon footprints can almost be halved by 2035 by adding policies to steer consumption (Salo et al., 2023). Consumption-based emissions are also briefly covered in Finland's Annual Climate Report 2023 (Finnish Ministry of the Environment, 2023) with references to the above-mentioned Policy instruments project, and to carbon footprint calculations produced by Finnish Environment Institute (SYKE).

Municipal/regional initiatives

In January 2023, the Finnish Environment Institute (SYKE, no date) published the municipal level consumption-based carbon footprints for all the municipalities in Finland for the first time (Carbon Neutral Finland, 2023). In the future, updates will be published along with the national level consumption-based figures. Thus far there is no direct connection between the consumption-based accounts and municipal level climate policies in Finland.

Iceland

Statistics

Consumption-based greenhouse gas emissions are not measured in Iceland. However, recent research from the University of Iceland concerning the consumption-based carbon footprints of private consumption, puts the consumption-based carbon footprints at just under 7 tonnes per capita (Heinonen et al., 2022), see Figure 6.

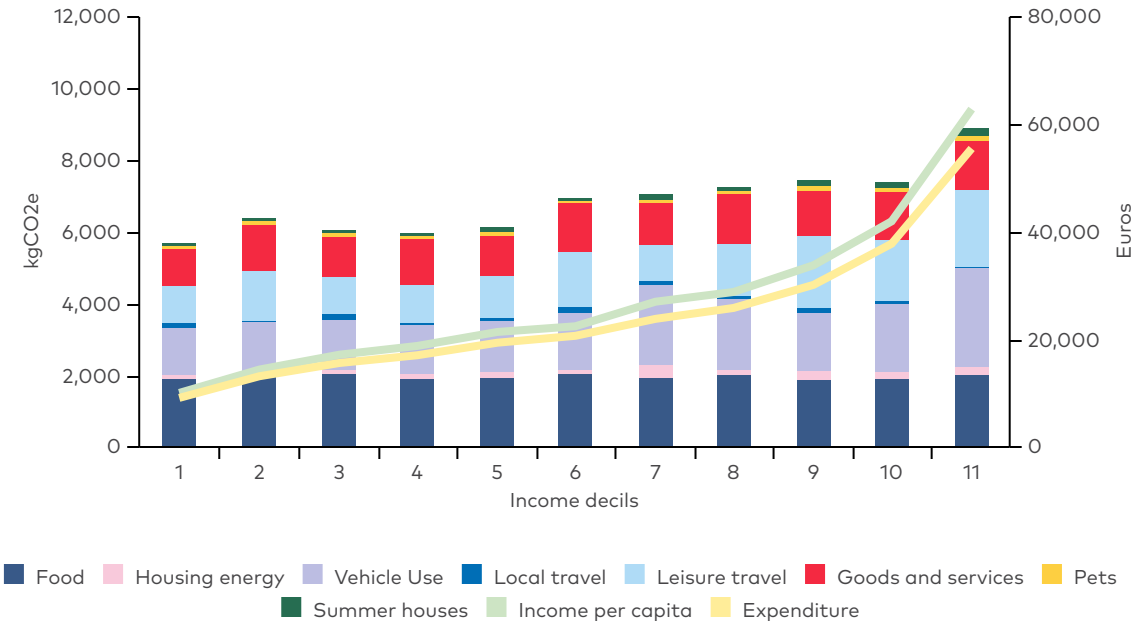


Figure 6: Carbon footprints of Icelanders across eleven per capita income brackets (Heinonen et al., 2022, cropped Figure 1).

Objectives and Policy

Iceland does not have any quantified environmental targets for activities happening outside the country's borders. Policies aimed at reducing consumption-based carbon emissions are few, and those which do exist pertain to food, flights (CORSIA), environmental education, fossil fuel tax, and waste (Government of Iceland, 2023).

As an initiative, the former prime minister Katrín Jakobsdóttir, established the cooperation platform Sustainable Iceland, which has the role of speeding up action to achieve the UN Sustainable Development goals, wellbeing and a just transition (Government of Iceland, Prime Minister's office 2023). It brings together representatives of the Icelandic parliament, central government, municipalities, and NGOs.

One of the tasks of the platform is to formulate a sustainable development strategy for Iceland. The draft was open for comments in the first quarter of 2024 (Ministry of the Presidency, 2024). The strategy recognizes the climate impact of consumption and acknowledges that the country has the lowest performance on the topic of sustainable consumption and production. This topic is on the list of the 5 key goals that the platform will prioritize.

The draft strategy refers to the global effects of local consumption as "spillover effects". These are to be tackled by reducing consumption and implementing a circular economy. How this can be achieved is unclear, although the draft mentions

that the EU taxonomy will contribute to this development, and it emphasizes the importance of international cooperation on data gathering. The draft further claims that negative spillover effects will be minimized by increasing the country's contributions to development cooperation. The platform held a side event at the High-level Political Forum on Sustainable Development 2023 to discuss strategies to manage the spillover effects and achieve the SDGs globally.

Municipal/Regional Initiatives

Reykjavík City is by far the most populated municipality in Iceland and has the most developed climate neutrality goals and aims to become carbon neutral by 2040 (Reykjavík City, 2021). However, their carbon accounting does not include the climate impact of consumption. It is briefly mentioned in their climate accounting document, where it is stated that adding the impact from personal consumption of food, other products, and services would double the carbon footprint of the municipality (EFLA consultants for Reykjavík City, 2022). In their Climate Action Plan, consumption is mainly mentioned in terms of transportation and sorting waste. However, there are also actions to create vegetable markets in neighbourhoods and support projects that focus either on repairing electronics or tool libraries (Reykjavík City, 2021).

Norway

Statistics

The research and data available concerning emissions from consumption in Norway is scarce. Every year Statistics Norway publishes statistics on territorial emissions, with contributions from different sectors such as oil and gas extraction, manufacturing industries and mining, and road traffic (Statistics Norway, 2022). So far, however, the statistics have been limited to territorial emissions and do not provide consumption-based numbers.

The first official estimate for consumption-based emissions was published in 2024 by the Norwegian Environment Agency (Norwegian Environment Agency, 2024). Other reports initiated by the private sector (e.g., Future in Our Hands, 2021; 2024) as well as the public sector (NOU, 2023: 25) also address consumption-based greenhouse gas emissions. The estimates for the consumption-based emissions show a large spread, depending on which method and data they use, as shown in Figure 7 (for CO_2 emissions). This is similar to the uncertainties identified by Statistics Denmark (see above). These estimates include both private and public consumption as well as investments.

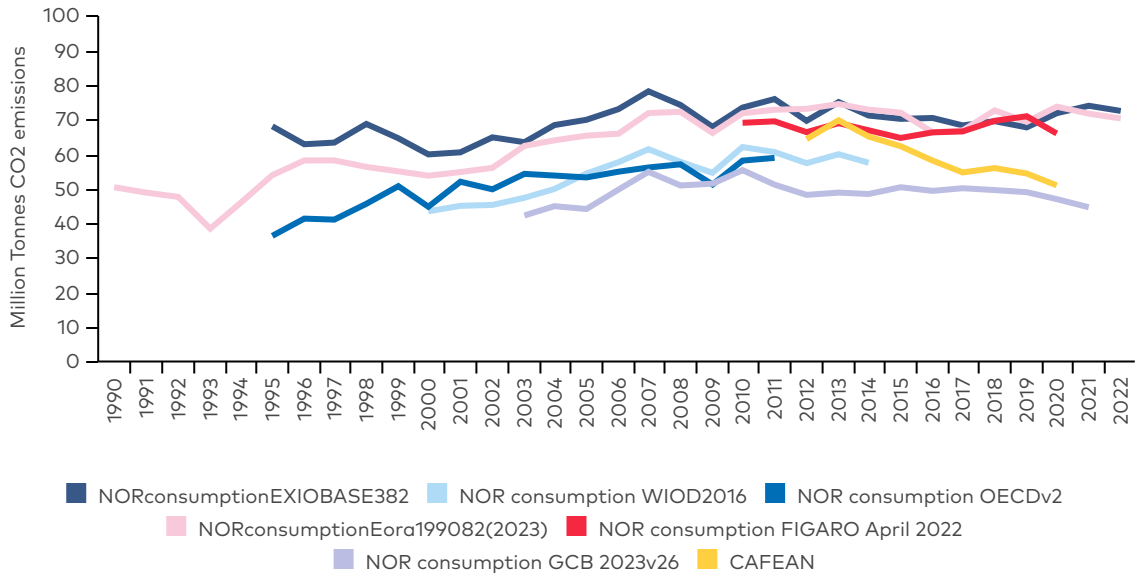


Figure 7. Different estimates of the consumption-based CO_2 emissions in Norway. Figure based on data collected by Robbie Andrew (Consumption-based emissions (robbieandrew.github.io)) and the CaFean report (Norwegian Environment Agency, 2024).

Figure 8 shows how the consumption-based emissions originate from the consumption of different products and services.

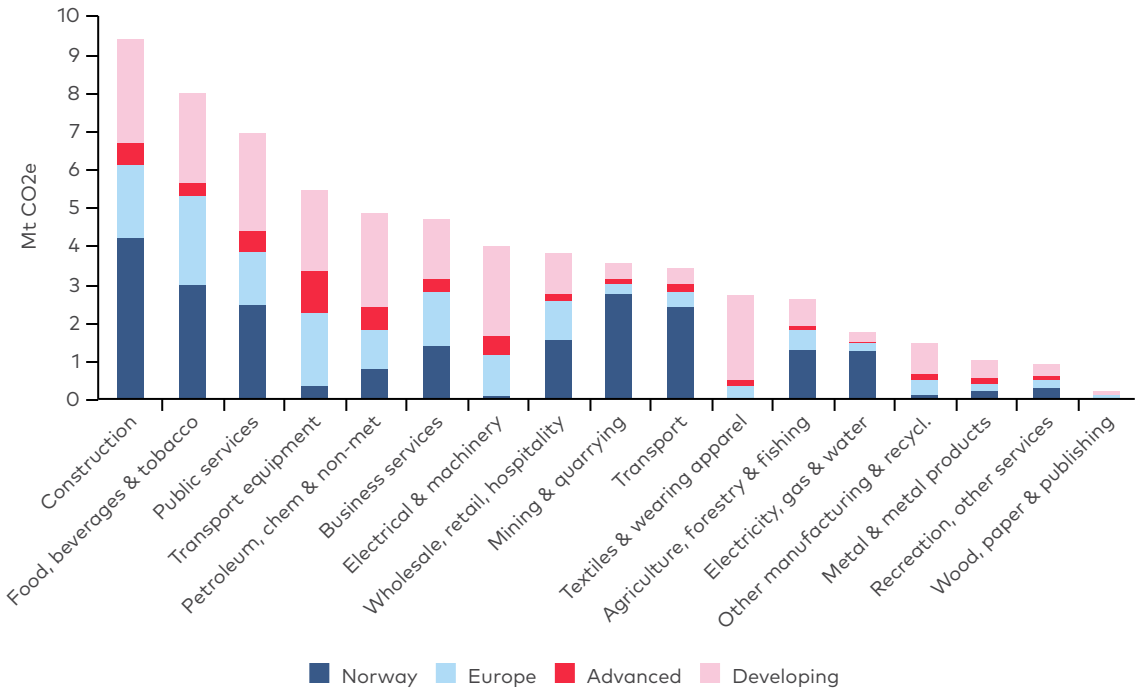


Figure 8. The emissions embodied in final products in Norway 2020, by origin of emissions aggregated by sector. Figure taken from a CaFean report (Norwegian Environment Agency, 2024)

Norwegian consumption-based emission in 2017 was in total 58.2 million tonnes CO_2 equivalents ($MtCO_2e$), or 11.1 tonnes CO_2 equivalents per citizen (Future in Our Hands, 2021). 42% of the emissions were produced abroad, mainly in other European and Asian countries. Household consumption comprised 64% of the total footprint, or 7.1 tCO_2e/person. For comparison, the global average household consumption footprint has been estimated to 3.4 tonnes of CO_2 equivalents per capita (Ivanova et al., 2015). The household footprint was mainly made up of emissions connected to transport, food, and housing, including energy consumption (Future in Our Hands, 2021, p. 2). Direct greenhouse gas emissions from Norwegian households have decreased by 30% since 1990 and constitute 7.2% of direct greenhouse gas emissions from Norwegian economic activity (Statistics Norway, 2024, Tabell 13932).

On a global scale, Norway's consumption continues to be high. According to calculations from the OECD, Norway has the third-highest material consumption of all the OECD countries (NOU 2023: 25). While the territorial perspective (which is the 'default' accounting perspective today) does not consider to what extent Norwegian consumption is produced abroad, Norwegian consumption causes emissions abroad. Norway also uses a lot of products, which emit dangerous environmental substances (Norwegian Environment Agency, 2017). Indirectly, through the consumption of fuel, the Norwegian petroleum sector also matters for consumption-based emissions. However, in comparison to the large export of petroleum, these emissions within Norway are rather small.

Objectives and Policy

Norway's climate mitigation target is in line with the EU's, with its latest Nationally Determined Contribution under the Paris Agreement in November 2022 being a reduction of at least 55% by 2030 below 1990-levels. The government's Climate Action Plan for 2021–2030 (Meld. St. 13 (2020–2021)) states that from 1 January 2030, Norwegian greenhouse gas emissions will be offset by emission reductions in other countries either through emission trading, international cooperation on emission reductions or project-based cooperation. The Climate Change Act requires that the government submits updated climate targets to the Parliament every five years. Norway cooperates closely with the European Union to reach their common climate targets. Norway has been part of the EU Emission Trading System since 2008 and entered an agreement with the EU in 2019 to join the EU's Effort Sharing Regulation (ESR) and the Land Use, Land-Use Change and Forestry (LULUCF) Regulation (Farstad et al., 2024).

Norway does not have a quantifiable goal to reduce consumption-based emissions of greenhouse gases. The 2050 Climate Change Committee has recommended that the government develops such a goal for domestic and international emissions (NOU, 2023: 25, p. 221).

Municipal/Regional Initiatives

Norwegian municipalities are important service providers for education, care, and renovation, with many employees and users. Through public procurements they have the opportunity to influence suppliers of products and services. They manage a large and varied building stock; they are often one of the major builders in the local community; and they own car and machinery fleets. Many Norwegian municipalities also have shares in power plants and can therefore influence energy supply and energy use in their region. The Planning and Building Act assigns to the municipalities a comprehensive and long-term planning responsibility. Through land-use planning and decisions about the location of industry, housing and infrastructure, municipalities can influence the scale of emissions from transport and stationary energy use. As an administrative body, the municipalities also manage the implementation of various types of legislation that target construction and waste. Moreover, they manage support schemes for the agriculture sector, which affect the development of energy consumption in that sector. Municipalities finally play a role in providing information and campaigns to inspire people to change their behaviours in a more environmentally friendly way.

Some Norwegian municipalities have started to work on consumption-based emission accounting at the municipal level (Miljødirektoratet, 2022). This is important because the mentioned national datasets do not include direct emissions from the production and transport of goods and services consumed within the municipalities.

The extent to which Norwegian municipalities have taken actions seeking to reduce consumption-based emissions varies. Some have made plans and strategies targeting reduced consumption (Oslo Municipality, no date a) and use the possibility of influencing such emissions via procurements (Oslo Municipality, no date b). It has become relatively common to establish circular economy projects, which aim to get goods from the waste stations back into the economy (e.g., Christensen, 2024). Some 'best practice' examples such as *Vollebekk Fabrikker* have attracted considerable attention internationally (e.g., Urban Resource Center, 2019, p. 12). There are also initiatives targeting the building sector (Padriv Oslo, no date).

Sweden

Statistics

Statistics Sweden publishes yearly environmental accounts concerning consumption-based greenhouse gas emissions and other air pollutants.[3] The latest publication covers the period 2008–2021. Methodological development for the national accounts of consumption-based environmental pressures has taken

3. nitrous oxide; sulphur dioxide; nitrogen oxides; carbon monoxid; non-methane volatile organic compounds; ammonia; particles < 10 µm; particles < 2,5 µm. KVALITETSDEKLARATION Miljöräkenskaper – Miljöpåverkan från konsumtion

place in collaboration between state agencies and research institutions within the PRINCE program. The general historic trend for consumption-based GHGs and other air pollutants is towards lowered environmental pressures (see figures 9 and 10). Swedish consumption-based GHG footprints in 2021 was approximately 8 tonnes per person and year, which makes a 29% reduction in per-capita emissions since 2008 (SEPA, 2023). However, it has been questioned if Sweden's consumption-based GHG emissions are decreasing in line with a fairly distributed Paris-compliant carbon budget (Vogel and Hickel, 2023).

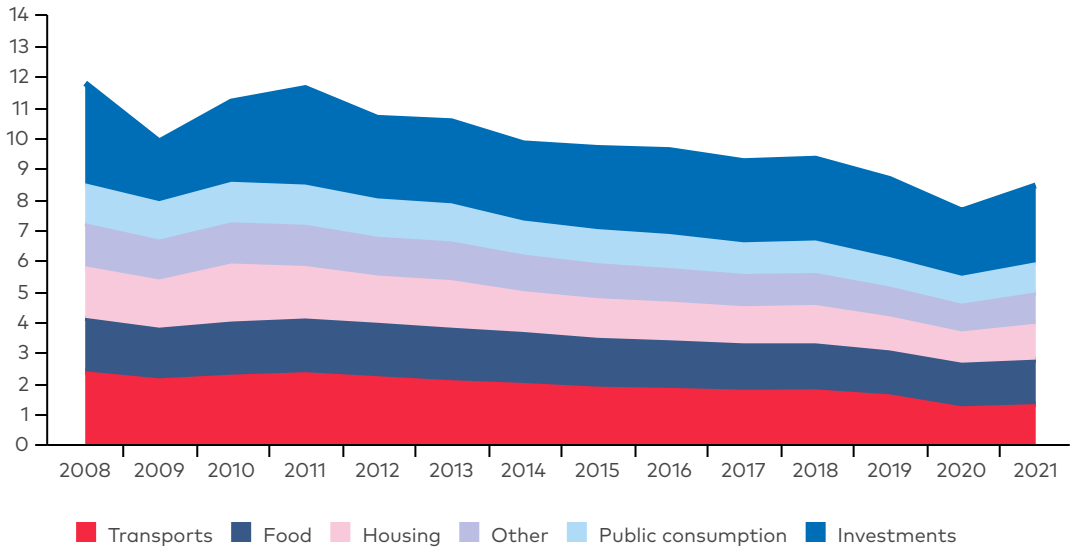


Figure 9. Consumption-based GHG emissions, tonnes CO_2e per person and year (Statistics Sweden, 2024)

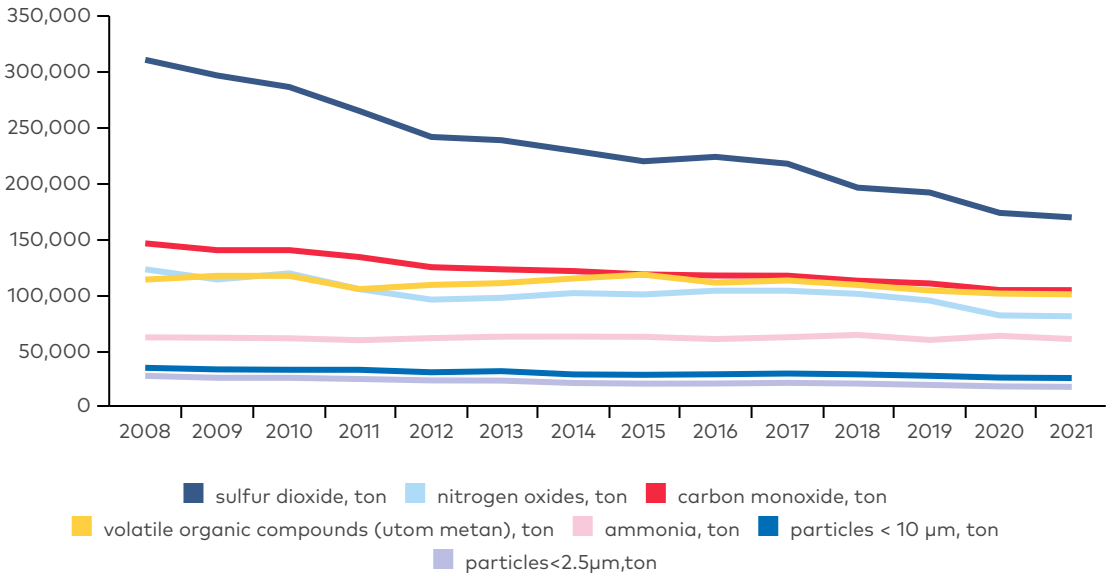


Figure 10. Environmental impact of household consumption (air pollutants) (Statistics Sweden, 2024)

Objectives and Policy

The overall Swedish environmental policy objective, the so-called Generational Goal is to "hand over to the next generation a society in which the major environmental problems in Sweden have been solved, without increasing environmental and health problems outside Sweden's borders" (SEPA, 2024). The objective to limit environmental pressure outside Sweden's boarders has since 2010 been the primary justification for developing consumption-based accounting and policy measures. In 2022 the cross-parliamentary Environmental Objectives Committee (SOU 2022:15) proposed a consumption-based GHG emissions target for 2045, designed as to be fulfilled primarily by meeting the territorial target, in combination with lowered imported emissions as the exporting countries deliver on their Nationally Determined Contributions. Moreover, it is proposed that "international climate benefits" could be used as flexibility to reach the target, which includes negative emissions, the use of international credits from investment abroad, and climate benefits associated with Swedish exports. Climate benefits from exports is a novel measure (which the committee proposed should be developed further), estimating the emissions avoided if Swedish exports "push out" goods with a relatively higher climate impact.

Several public referrals to the proposed target design have questioned whether it would in fact raise Sweden's ambitions and call for additional policy measures (Remissammanställning, 2022). In terms of policy, the Environmental Objectives Committee proposes a strengthened framework for public procurement and increased international commitment, but refrains from proposing further policy, such as demand-oriented measures. The Environmental Objectives Committee also proposes an alternative mitigation pathway, in line with the aim to keep global warming below 1.5 °C, which could be reached by increased international climate benefits, but which alternatively could necessitate behavioural changes (Larsson et al., 2022).

Sweden does not currently have any quantified targets for air pollutants or other environmental pressures outside the country's borders. In response to the proposed Swedish consumption-based climate target, the Swedish Chemical Agency points out the interdependence between a climate policy and other environmental pressures, with possible positive and negative synergies. The Swedish Chemical Agency calls for multiple environmental indicators to be developed and monitored in combination.

Municipal/Regional Initiatives

A number of Swedish municipalities, regions, and county administrative boards have adopted local consumption-based GHG emissions targets. A common formulation for these targets among the groups is to cut emission by half by 2030. At present, national statistical services do not offer consumption-based emissions data on municipal or regional level, which has been requested by several Swedish

municipalities. However, recently the Consumption-Compass Project has published data which breaks down the national statistics on a postcode level (SEI, 2024). Such disaggregation of consumption-based data on the local level could facilitate policy action, but disaggregation is also associated with more uncertainties of the data quality. Further publications of the Consumption-compass are dependent on continued funding. Municipal and regional policy measures are outside the scope of this mapping, but previous work in this area exists. The Swedish Environmental Protection Agency has, for example, directed a program with the aim of mapping such policy initiatives (André et al., 2021). Local governance has a central role in reducing consumption-based emission, but as a number of referrals to the Environmental Objectives Committee state, such work needs to be supported by statistical services and national governance to be successful.

Ambitions to Reduce Consumption-Based GHG Emissions Across the Nordics

The country descriptions show ambitions to tackle and decrease consumption-based emissions across the Nordic countries. However, the quality of the published statistics to support such efforts varies. Comparability between the Nordic countries' own statistics is low, as a result of the lack of standards for collecting and publishing data. Nevertheless, the Eurostat data is sufficient to follow and compare general trends across the Nordics.

Ambition levels are also difficult to compare as only Sweden, Norway and Denmark have proposals for quantified consumption-based GHG emissions targets. As political discussions unfold, it is far from clear what new possible targets and institutional frameworks might emerge. In addition to the political discussions, there are also continuous academic discussions on the merits and drawbacks associated with integrating targets for consumption-based GHG emissions within national climate policy frameworks.

Due to differing emission reduction ambitions among countries, implementing policies solely aimed at producers can pose challenges such as carbon leakage and domestic job loss. To address this issue, policies targeting consumption (which treat domestic activities and imports equally) can be employed. A potential first step for such policies is to adopt national consumption-based targets. However, to avoid destabilizing the current territorial-based target regime within the UNFCCC, consumption-based targets should complement, rather than replace, territorial targets (Morfeldt et al., 2023).

While discussions continue concerning the role consumption-based GHG emissions should have in national climate policy frameworks, we argue that clarified ambitions are desirable. Beyond the aspiration of reduced consumption-based emissions, the formation of objectives which specify the pace of mitigation or total cumulative emissions is advisable, to facilitate the evaluation of overall policy success or failure.

4. EU Perspective on Consumption-Based Policies

The main focus in this report is on national policy options for addressing consumption-based emissions. However, since consumption-based emissions often involve multiple countries, coordinated approaches can be especially effective. Recognizing this, the EU has a significant opportunity to adopt EU-wide regulatory measures. In terms of scope, pace, level of ambition and coordination across sectors, the European Green Deal, is the world's most ambitious attempt at reaching net-zero emissions by 2050. Launched in December 2019, the European Green Deal has generated a range of new laws, action plans and standards, including the climate package 'Fit for 55'. Out of the long and ambitious list of green EU policies, Axelsson et al. (2024) lists 10 EU consumption-oriented policy measures, see Table 2. below.

Table 2. Identified consumption-oriented EU policy measures

Policy name		EU implementation stage/ status	Formal adoption date	Main consumption categories targeted	Responsible to implement	Affected sectors
Ecodesign requirements for energy-related products	Directive	Adopted, to be repealed	21 October2009	Appliances	Manufacturer, importer	Consumer
Community Ecolabel scheme (EU EcoLabel) Regulation	Regulation	Adopted	25 November 2009	Appliances	Manufacturer, importer	Consumer
EU Public Procurement Directive	Directive	Adopted	26 February 2014	Public consumption	Government	Industry
Revised Directive on waste 2018/851	Directive	Adopted	30 May 18	Household goods, appliances, food	Government	Industry
Carbon Border Adjustment Mechanism	Regulation	Adopted	10 May 2023	Investments	Importer	Trade, Industry
Emissions Trading System (ETS) and revision of the ETS for road transport and buildings (ETS2)	Directive	Adopted	10 May 2023	Housing, Mobility	Retailer	Consumer
Deforestation Regulation	Regulation	Adopted	31 May 2023	Investments	Importer, traders	Agriculture, Forestry
Energy Efficiency Directive	Directive	Adopted	13 September 2023	Housing, public consumption	Government, Wholesaler, retailer	Industry, Consumer
Empowering Consumers for the Green Transition	Directive	Provisional agreement	Expected 2024	Household goods	Manufacturer, retailer, trader	Consumer
EcoDesign for Sustainable Products Regulation	Regulation	Provisional agreement	Expected 2024	Household goods, appliances	Manufacturer, Importer, distributor	Industry, Consumer

Source: Table produced by Axelsson et al. (2024).

In relation to the consumption categories specifically highlighted in this report – food, household furnishings, textiles, and electronics – it is important to mention the Ecodesign Directive, which was first adopted in 2009. This directive has been regularly updated and expanded with new regulations. The EcoDesign for Sustainable Products Regulation is another significant policy measure expected to be adopted later this year.

Another relevant measure for the focus areas of food and furniture is the Deforestation Regulation. This requires importers of cattle, cocoa, coffee, oil palm, rubber, soy, and wood to ensure that their supply chains do not include embodied emissions associated with deforestation or forest degradation.

However, more general policy measures also lead to improvements across various specific consumption categories. The Emissions Trading System (ETS) for industries continues to prove effective in consistently reducing consumption-based carbon emissions as well.

Another policy development is the EU's Carbon Border Adjustment Mechanism (CBAM), which is currently being implemented and could be extended in the future to include more product groups and a wider range of indirect emissions (European Commission, 2024). The aim of the EU's CBAM is to prevent carbon leakage by imposing a price on the carbon emissions associated with imported goods, aiming to make both domestic and foreign producers subject to the same carbon costs. Another benefit of CBAM is that it incentivizes exporting countries to implement carbon taxes or emissions trading schemes. Norway, which is a member of the European Economic Area and cooperates closely with the EU to reach the climate targets, has not yet decided whether to join CBAM (Farstad et al., 2024).

Initially, CBAM covers basic materials such as cement, aluminium, fertilizers, iron and steel, as well as energy in the form of electricity and hydrogen. A few downstream products, such as screws and bolts, are also included. The EU CBAM is implemented in stages starting from 2023 and will fully apply from January 1, 2026. The EU will, before January 2026, conduct a comprehensive review and present a report to the Parliament and the Council, examining whether and how to expand CBAM. In particular, the Commission will assess whether to extend CBAM to other goods at risk of carbon leakage, including organic chemicals, plastics, and other downstream goods. More basic materials and downstream products could be included in the future to cover more of the consumption-based emissions.

Analysing how important hot-spots for consumption-based emissions, such as meat and intercontinental air travel, could be addressed through EU-wide policies is an important area of policy work for the upcoming years.

5. Policy and Acceptability

Acceptability refers to peoples' negative or positive evaluation of a policy. In contrast to acceptance, acceptability refers to evaluations of a hypothetical policy, i.e., before people have experienced the effects of that particular policy. Peoples' attitudes toward policies are typically affected by a variety of factors, which can be divided into individual-level factors and policy-specific factors (Drews & van den Bergh, 2016).

Individual-level factors can include factors that are unique to each individual. Attitudes towards policies tend to be more positive when an individual values the environment and feels concerned over climate change. Positive attitudes are also associated with having a more left-wing as opposed to right-wing ideological identification (Bergquist et al., 2022). Carbon taxation initiatives in Sweden and Norway have further shown that having a high degree of trust in government is an important prerequisite for accepting environmental policies (Harring & Jagers, 2013; Kallbekken & Sælen, 2011). Environmental policies are typically perceived as less effective in countries with a higher degree of political corruption (Harring, 2014).

Policy-specific factors relate to how perceptions of the design of a policy affect attitudes. Research shows that perceived fairness, both in terms of procedural and distributional fairness, is important. Procedural fairness is related to peoples' perceptions that the decisions surrounding policy design and implementation have been made fairly. Perceptions about procedural fairness can often be improved by inviting citizens early on to the design process, letting them actually influence decisions and ensuring that decisions are made transparently (Kuntze & Fesenfeld, 2021; Ross et al., 2014). Perceptions of distributional fairness have to do with whether costs and benefits of a policy will be fairly distributed among different population segments. For example, climate policies are often evaluated negatively when financial effects disproportionally affect low-income groups (Brannlund & Persson, 2012).

Besides perceptions of whether aspects of a policy are fair, its perceived effectiveness in achieving its stated aim is an important dimension that determines the acceptability of a policy (Ejelöv & Nilsson, 2020). For example, negative attitudes toward a meat tax in Sweden have been found to be related to perceptions that a tax will not in fact decrease consumption (Bendz et al., 2023). However, when people receive more information about the measured effectiveness of a policy, their attitudes tend to become more positive (Reynolds et al., 2020).

People also evaluate policies based on their type and design. Information policies like labelling are often the most preferred type of consumer policy, likely because they are voluntary and any costs related to implementation or administration are often not obvious to the consumer (Ejelöv et al., 2022). Likewise, it has been argued that the often high degree of support for subsidies may partly be due to the non-transparent financial cost to consumers (for example, subsidies being funded by an increase in other taxes) (Jagers & Hammar, 2009). Environmental taxes and regulations are, on the other hand, often less acceptable to citizens, presumably because of the more apparent monetary costs of taxes, borne by the taxpayer, and the coercive nature of regulations (Cherry et al., 2012). There is however, evidence in Sweden suggesting that already implemented taxes and regulations are on average as acceptable to citizens as subsidies (Ejelöv et al., 2022). This may be an example of the general effect of people expressing more positive opinions of policies once they have experienced the effects of the policy (Eliasson & Jonsson, 2011; Nilsson et al., 2016). The difference in attitudes toward taxes/regulations and subsidies might therefore be more pronounced before than after implementation.

While hypothetical taxes are generally less acceptable compared to subsidies and information policies, certain design choices can make them more popular. Specifying how the revenues from an environmental tax will be used generally creates more positive attitudes toward the tax (Maestre-Andrés et al., 2021). Using revenues specifically for green investments or other types of funding for environmental projects tends to be the most acceptable (Maestre-Andrés et al., 2019; Ewald et al., 2022). For example, attitudes toward a Swedish air passenger tax became more positive when revenues were used to finance an increased use of biofuels for aviation (Matti et al., 2022). This may be due to a perception of increased policy effectiveness such that possible inefficiencies of the actual tax may be offset by using revenues for projects that can effectively improve environmental conditions. However, in discussions concerning a tax on red meat, Swedish and Norwegian citizens preferred using the tax revenues for reducing the VAT on vegetables and fruit (Grimsrud et al., 2019) or other unspecified food. In this case, funding environmental projects was among the least acceptable uses (Ejelöv et al., forthcoming). This example indicates that using revenues to reduce consumer costs is another important priority, which goes beyond the question of ensuring policy effectiveness.

As policies with actual or perceived individual financial costs are often negatively evaluated, researchers have investigated the acceptability of different strategies to reduce the financial burden on consumers. Redistributing tax revenues back to citizens in the form of a lump-sum payment can increase the acceptability of a tax, especially when the (positive) distributional effects of recycling are communicated (Carattini et al., 2017). While lowering income taxes to compensate for the cost associated with an environmental tax is often one of the less acceptable ways to reduce costs for consumers (Beiser-McGrath & Bernauer, 2019), in Sweden,

reducing income taxes as a compensatory mechanism increases support for raising the carbon tax rate among right-wing voters but not left-wing voters (Jagers et al., 2019).

Certain other design choices like implementing taxes in conjunction with subsidies that offset the possible negative effects of the tax (such as subsidizing public transport while raising fuel taxes), or bundling taxes into packages of policies with a connected aim, can increase acceptability (Eriksson et al., 2008; Fesenfelt et al., 2020). This logic may also apply to the order in which policies are implemented, where taxes can appear more acceptable if their introduction has been proceeded by the implementation of a policy that offsets possible negative consequences of the tax (Montfort et al., 2023). Consumers further tend to prefer policies targeting industry, likely because they do not perceive these policies to impact them as much as consumer-directed policies do, and because they perceive that they alone do not bear the burden of responsibility (Hardisty et al., 2019; Kantenbacher et al., 2018). Policy packages where production requirements are introduced alongside consumption taxes can for these reasons also increase the acceptability of the proposal (Fesenfelt, 2022).

6. Approach to Policy Mapping and Delphi Methodology

Research Approach

Our research approach is summarised here and described in more detail below. The approach follows a rationale of conducting a broad range mapping to identify implemented and proposed consumption-oriented policies across the Nordic countries. To allow for this broad scope, previous mappings, reports, and other publications have been utilised. Workshops with scientists, experts and practitioners were held to identify publications on policies. In a first step, a comprehensive mapping was conducted by the Swedish project team, resulting in a longlist compilation of policy options.

In a second step, the draft mapping was reviewed by a cross Nordic panel representing Denmark, Finland, Iceland, Norway, and Sweden. The panel included experts in the consumption-based emissions and policy field (see Table 3 with project team). The Nordic expert team added examples from Nordic countries or, in some cases, examples beyond the Nordic context to the list. At the same time, they merged similar policies to avoid having too many policies resembling each other on the list. The cross-Nordic panel was also involved in the selection of particularly promising policies for the Policy Delphi. This selection of policies needed to be substantially shorter than the initial list.

Table 3. Project team and Nordic experts

Project team and Nordic experts		
Göran Finnveden	professor, KTH, Mistra Sustainable Consumption (SC)	Head of project
Jörgen Larsson	associate professor Chalmers, Mistra SC	Sweden
Emma Ejelöv	Post doc, Chalmers, Mistra SC	Sweden
Karin Bradley	professor, supervisor, KTH, Mistra SC	Sweden
Eskil Engström	PhD candidate KTH, Mistra SC	Project team
Markus Larsson	Post doc, KTH, Mistra SC	Project team
Jonatan Järbel,	science journalist, KTH, Mistra SC	Communicator
Jukka Heinonen	Professor, University Iceland	Finland and Iceland
John Thøgersen	Professor, Aarhus University	Denmark
Merethe Dotterud Leiren	CICERO – Center for International Climate Research, Oslo	Norway
Karen Haugs Langvik	CICERO – Center for International Climate Research, Oslo	Norway

In a third step, a Policy Delphi method (described below) was utilised to gather expert judgments and opinions on a reduced number of selected policies. The Policy Delphi was carried out in two rounds. In a first round, experts ranked policies according to their evaluated potential to reduce emissions and feasibility while substantiating their judgments with comments. In a second round, the experts could see the others' anonymous rankings and comments and they were able to revise their rankings and reply to comments. For the second round of the Policy Delphi, the number of selected policy measures were further reduced to allow for an in-depth discussion among the experts. Policies were selected based on high rankings by the experts as well as strategic considerations related to political and media agendas, and whether the policy is of national or EU-level competence.

The research approach takes a broad scope, distilling a broad range of policy measures towards the most promising policy options.

Mapping Consumption-Oriented Policy Measures (steps 1 and 2)

Academic Literature Scoping Review

The academic literature scoping review used selected keywords (search string "consumption based" OR "consumption-based") AND (carbon OR co2 OR ghg OR "greenhouse gas" OR "air pollution") AND (poli*) AND (Sweden OR Denmark OR Norway OR Finland OR Iceland OR "the Faroe Islands" OR Åland). The search was made on 4 October 2023 in the SCOPUS (n=33) and Web of Science (n=133) databases. Duplicates were eliminated to get a unique number of articles (n=113). The criteria for inclusion of articles was based on (1) an explicit empirical focus on one or multiple Nordic countries and (2) a substantive discussion on one or more (national) policies. Following the criteria, inclusion was based on a screening of titles and abstracts (n=25), and in-text analysis, which resulted in 16 reviewed articles. The articles were primarily read for policy evaluations discussing *effectiveness* (potentials to reduce emissions, cost-effectiveness, etc.) and *feasibility* (distributional effects, administrative constraints, distributional effects and policy acceptance).

Mapping Consumption-Oriented Policy Instruments

Several previous policy mappings were analysed alongside the literature review. The Swedish research program Mistra Sustainable Consumption has previously conducted several mappings of policies for the focus areas of vacation travel, food, and home furniture. Svenfelt et al. (2022) previously published parts of these mappings. Moreover, the consumption-oriented policy mapping also draws on earlier reviews and compilations. For instance, Grubb et al. (2020) drew on an extensive mapping of consumption-oriented policy measures compiled within the EU Carbon-CAP project, employing a ranking methodology to assess the effectiveness and feasibility of 33 potential instruments (an approach similar to that used in this report). Ottelin et al. (2019) reviewed more than 100 papers covering consumption-based carbon footprints, searching for suggestions for policies. They identified about fifteen broad national policy recommendations.

In addition to the previous conducted mappings, an extensive number of reports have been scanned for policy proposals. See online appendix for a complete list of sources in the mapping. In Table 4 below, some key sources are listed. Three consecutive workshop sessions have been facilitated with (i) researchers, (ii) societal partners, and (iii) the international scientific advisory board of Mistra Sustainable Consumption. We utilized workshops to get feedback on our project design and to identify possible sources and reports on demand-oriented policy measures within the Nordic context.

The initial mapping of policies conducted by the Swedish project team was, in a second step, reviewed and complemented by a cross-Nordic researcher panel (representing Denmark, Finland, Iceland and Norway). In this step, the list of policy measures was complemented with examples from Nordic countries and, in some cases, examples beyond the Nordic context.

All identified policies have been compiled in a longlist (see Table 6). Similar policy proposals have been merged into generic categories with a common general description. Specific policy proposals, for instance, the exact design and level of a carbon tax, have not been included as a specific policy measure but as parts of a policy measure category.

Table 4. Key sources

Key sources		
Previous mappings	The Carbon-Cap Project	Crawford-Brown et al. (2014); Grubb, et al. (2020)
	Mistra Sustainable Consumption mapping	Parts of the mapping are published in Svenfelt et al. (2022)
	Literature review of policy implications of consumption-based carbon footprint studies	Ottelin et al. (2019).
	Mapping of policies for sustainable consumption	Dalhammar, Mont, Lehner (2022a).
Reports	Policy measures for sustainable food consumption	Röös et al. (2021).
	Swedish Environmental Protection Agency on food policy measures	Hennlock, Tekie, Roth (2015).
	Report on policies to extend the use-life of consumable goods	Dalhammar et al. (2022b).
	Policies to reduce the environmental impact from consumption	Persson, Persson, Nykvist (2015).
	Use of Economic Instruments in Nordic Environmental Policy 2018–2021	Nordic Council of Ministers (2023b)
	National Communication and Biennial Report Under the United Nations Framework Convention on Climate Change	UNFCCC, Biennial Update Reports | UNFCCC
	Measures to reduce the carbon footprint of household consumption (in Finnish: Ohjauskeinoja kotitalouksien kulutuksen hiilijalanjäljen pienentämiseen)	Salo, M. et al. (2023), Finnish government
	Reports to the EU, e.g. "Report for Sweden on climate policies and measures and on projections"	SEPA (2023b)

Policy Delphi (step 3)

In a third step, the longlist was again reviewed by the Nordic expert panel. The initial ranking by the cross-Nordic research panel was used to select a limited sample from the longlist (Table 6) of policy instruments for a Policy Delphi.

The Policy Delphi method is described by Löe and colleagues (2016) as a tool "(...) aimed to generate ideas, and to uncover and evaluate policy alternatives, through structured, critical collective debate among anonymous panellists." The Delphi method was originally developed by the RAND Corporation and the US Air Force to capture expert opinions via iterations of questionnaires (Linstone, 1999). Several Delphi variations exist today. These include Classical Delphi, Decision Delphi, Ranking-Type Delphi, and Policy Delphi (Paré et al., 2013; Schmidt, 1997). Common principles for Delphi techniques include anonymous panels of experts engaging in multi-round structured dialogue, through which results from the initial round are synthesised before they are returned to the experts in subsequent rounds of discussion (Loë et al., 2016). Although early Delphis were used to find a consensus amongst experts, contemporary Policy Delphis are often used to identify expert perceptions and divergent opinions. The assumption is that expert views on policy measures can add relevant knowledge, although this approach cannot precisely estimate if a policy measure is, for instance, effective or feasible.

In this report, Nordic experts (Denmark, Finland, Iceland, Norway and Sweden) rank policy measures judged according to their potential to reduce greenhouse gas emissions and other air pollutants as well as according to their feasibility. The participants were given the following descriptions:

Potential to reduce emissions: if designed and implemented in a sufficiently strong form, is the potential low or high regarding reduction of emissions within the consumption categories where it would be implemented?

Feasibility: refers to a number of different aspects such as:

- Acceptance: is the policy likely to be accepted by the general public and politicians? Is there a low acceptance amongst any certain group or industry interests?
- Administrative feasibility: are there legal constraints (such as international agreements) or a lack of possibilities to implement and data to follow up compliance?
- Cost-efficiency: is the cost associated with a policy low relative to the benefits achieved?
- Distributional effect: does the policy measure risk disadvantaging any particular group and how?
- Societal resilience: does the policy contribute to increased societal resilience, decreased vulnerability, civil contingencies?

The experts are also asked to give qualitative comments on broader aspects (administrative feasibility, distributional effect, societal resilience, other barriers to implementation, enabling measures). In a second round, the same participating experts can see the anonymous assessments of the other participants and decide if they want to update their assessments. The Policy Delphi method effectively facilitates structured expert dialogue and reveals and evaluates policy options in complex and controversial areas (Löe et al., 2016).

The Policy Delphi assembled 23 participants in two rounds (the second round had one non-respondent). Responses for the first round was collected between the 6th of January and 27th of April 2024. Responses for the second round were collected between the 6th of May and 13th of June 2024.

A selection of a smaller number of policies for the second round was made based on high-rankings in both categories but also for strategic reasons where policies covering different categories of measures were chosen. Consideration was also given to the comments from round one, where the participants commented that some policies were very similar.

Table 5. Experts in the Policy Delphi

Country representation		Affiliation	
Sweden	11	Academic	13
Finland	4	Consultant	2
Norway	4	Research institute	3
Denmark	2	NGO/ Think thank	2
Iceland	2	State agency	3
Total	23	**Total**	23

7. Results

Consumption-Oriented Policy Mapping

Mapping the Academic Literature

Our literature review found a growing body of academic literature (n=113) that addresses consumption-based greenhouse gas emissions and related policies in the Nordic context. Most articles focus on quantifying emissions and highlighting unsustainable consumption levels requiring policy interventions. The current literature lacks specific policy implementation discussions.

This literature review includes only articles discussing policy measures (n=16). None of these articles focus on policy comparisons or the evaluation of existing policies, though some introduce methodologies for assessing policy impacts. Policy recommendations vary and often stem from studies targeting specific areas like food, transport, or consumption of durable goods (e.g. Clarke et al., 2017; Heinonen et al., 2022; Kirikkaleli et al., 2023).

Several articles quantify potential GHG emission reductions from specific policies. Consumption-based accounting identifies emissions sources and policy intervention areas overlooked in territorial inventories, such as international transport and imported products (e.g. Clarke et al., 2017; Isenhour & Feng, 2016; Kirikkaleli et al., 2023). Schmidt et al. (2019) observe stable overall consumption-based emissions in Sweden from 1995 to 2014 but noted a shift towards embodied emissions in imports. They recommend policies targeting high-emission products or advocating for changes in production processes through international technology transfer (Schmidt et al., 2019). Since 2014, the consumption-based emissions have decreased in Sweden although slower than the territorial emissions as noted above.

The most common policy recommendation is to implement demand-oriented measures to complement other strategies. Studies propose using demand-oriented policies to raise awareness among consumers and policymakers (e.g. Dawkins et al., 2019; Heinonen et al., 2022), but warn against overemphasizing consumer responsibility (Dawkins et al., 2023). Isenhour & Feng (2016) highlight that an extensive focus on consumption-based GHG emissions in Sweden has had marginal policy implications, noting political sensitivity and resistance to demand-oriented measures at higher policy-making levels.

Wood et al. (2018) develop a framework to estimate GHG reduction potential for various consumption-based policies, using Multi-Regional Input-Output tables. Westin et al. (2019) propose a method to evaluate the impact of planned actions on consumption-based environmental footprints. Heinonen et al. (2022) suggest

considering GHG intensity per monetary unit to avoid rebound effects from monetary savings spent on carbon-intensive categories.

Few articles discuss economic impact, feasibility, or political and societal acceptance. Schmidt et al. (2019) argue that consumption-reducing policies may disproportionately impact economically vulnerable individuals. Dawkins et al. (2023) found that 40% of Swedish households face risks from food price hikes and transportation costs, while high-income households are responsible for most air travel emissions. They call for transitional assistance policies targeting high-emission demographics and supporting vulnerable groups based on measures of environmental effectiveness, social equity, and political feasibility.

Ottelin et al. (2018) find that Nordic welfare states have more equal carbon footprints among their citizens compared to other countries, but also contribute to high carbon and material footprints. They suggest green investments supported by carbon pricing, although they acknowledge regressive effects on low-income groups. Returns from carbon taxation could fund low-carbon infrastructure and welfare services, or education and green investments to mitigate these impacts (Ergon et al., forthcoming; Ottelin et al., 2018).

Mapping Non-Academic Literature

In addition to academic articles, non-academic literature was also mapped as part of this research. We used the Nordic Council of Ministers periodical report "Use of Economic Instruments in Nordic Environmental Policy" as a starting point to map policy literature. Since the report collects information on environmental policy in all Nordic countries, it was most effective to begin with the latest report, covering the years 2018–2021 (Nordic Council of Ministers, 2023b). We also examined national publications concerning all studied countries. These publications include national communications, and biennial reports to the United Nations Framework Convention on Climate Change (UNFCCC, several years), as well as reports related to the development of emission and policies to reduce emissions published by national environmental protection agencies and statistical agencies. We further examined reports from Mistra Sustainable Consumption (see Table 4).

Policy Instruments Longlist

We compile all identified policies in a longlist. Similar policy proposals have been merged into generic categories. Specific policy proposals, such as exact designs and levels of proposed carbon tax, have not been included as specific policy measures. Rather, they have been included in the policy measure category. This has allowed us to compile, and briefly describe, approximately one hundred policy proposals. An absolute majority of the identified policies are consumption-oriented (i.e., directly targeting consumer behaviour). In some cases we have added measures which are not explicitly consumption-oriented, but which have been characterised in the literature as key to reducing consumption-based emissions.

We have relied extensively on previous mappings (see Table 4). The Carbon-Cap project is an important source for our policy measure descriptions (see Grubb et al., 2020). To save space the longlist presented here does not include references. For the full record, we refer to the online appendix which is available in the form of an Excel file. Our hope is that making our full mapping available and editable will support future research and policy analysis.

Table 6. The longlist: Consumption-oriented policies in the Nordic countries (in use today, previously used, or discussed)

Name	Type	Description
Product labels	Information instruments	Requirement to provide information on product labels on emissions of greenhouse gases and other air pollutants.
Negative labelling	(inf)	Food products with negative labelling that signals if there is an environmental or health problem with the product
Positive labelling	(inf)	Ecolabelling or certification can reduce the environmental impact in two ways; by the producers changing their production in order to be eco-labelled and by the labelling changing the consumers' choices.
Environmental declaration	(inf)	Forms of environmental declaration include energy declaration on the energy performance of houses, but also graded labelling (e.g., traffic-light colours + letters) which combines negative and positive labelling
Information campaign	(inf)	Information campaigns that inform consumers on products and behaviour that cause high emissions of greenhouse gases and other air pollutants.
Promotions for vacationers in the home country	(inf)	Campaigns to increase the status of vacationers in the home country, such as cottage vacations, active vacations or learning vacations such as summer courses.
Consumer guides and dietary advice	(inf)	Mandatory information available to consumers on environmental and health effects of food items and diets.
Environmental education	(inf)	Develop pedagogical materials that can help teachers increase students' knowledge about food and its environmental impact.
Energy and climate advice	(inf)	Energy and climate advice is a free service that helps consumers become more energy-smart and reduce their energy use. Energy and climate advisors help the consumer with questions about heating, energy efficiency, transport, energy costs and much more.

The hourly measurement reform	(inf)	The purpose of the hourly metering reform is to give electricity users incentives to change their consumption pattern and thus shift part of their electricity consumption from times of the day when the electricity price is higher to times when the price is lower.
Energy labelling	(inf)	Energy labelling shows how energy-demanding a product is. The energy class is shown on a scale from A to G, where A is the best, and with arrows from green to red.
Product location at point of sale	(inf)	Low carbon products are given preferential placement at retail stores, internet sites, etc
Rankings and award campaigns	(inf)	Product manufacturers and/or sellers are given publicly celebrated awards for low carbon performance through government, trade or third-party organisations
Approved technology lists	(inf)	List of specific low carbon technologies that are given preferential procurement
Graduated tax on advertising	(inf)	Size of VAT on advertising increases with increasing carbon implications, within each class of products.
Advertising regulation	Regulatory & Administrative Instruments	Advertisement restrictions regarding where, when or how products or services with high emission intensities can be marketed.
Business emission agreements/allowances	(reg&admin)	Businesses are required to acquire allowances for Scope 1 & 2 (at least) emissions, generally with trading
Requirements for improved sustainability	(reg&admin)	Successively increased demands are placed on food sold in the grocery store to be sustainable, for example through targets/requirements relating to climate, biological diversity, health and social aspects.
Public procurement	(reg&admin)	Requirements that public agencies must choose low or zero emission products or services when available.
Reduce emissions from public employee business trips	(reg&admin)	Reduce the number of long-distance business trips by public employees in the state, regions and municipalities. For example, by setting goals and guidelines for reduced business flying, technology for remote meetings and individual bonuses for reduced flying.
Linking public procurement to national climate change acts	(reg&admin)	Legal requirements to consider national climate goals in all public procurement

Consumer carbon budget/personal carbon allowances	(reg&admin)	Consumers are provided an annual carbon budget and cannot exceed this, perhaps (but not necessarily) with allowance for trading; note that this budget might be either for individual categories, or might be specified as an aggregate emissions and consumers can choose how to allocate the budget across categories
Flight rights	(reg&admin)	Consumption is regulated by allocating emissions rights to consumers, in this case for flights, in order to reduce emissions from flying.
Consumption rights for meat	(reg&admin)	Regulate meat consumption by distributing consumption rights for meat to the consumer, in this way the total volume of meat sold is regulated, but the consumer can choose to use his consumption right or to sell it on.
Regulatory standards	(reg&admin)	Regulation of emissions from products.
Reduction obligation for aviation fuels	(reg&admin)	Blending of biofuel into jet fuel, with timed quotas for the proportion of biofuel that must be mixed in time. The reduction option may also include the blending of synthetic aviation fuels and be broadened to include increased efficiency as a requirement.
Sector trade body standards	(reg&admin)	Voluntary product performance standards set by trade organisations and to be followed by all outlets in that trade
Licenses	(reg&admin)	License is required either to sell or purchase high carbon products
Supply chain procurement requirements	(reg&admin)	Consumer-facing outlets establish embodied carbon requirements on intermediate producers, with refusal to procure unless the requirements are met
Voluntary agreements by trade organisations	(reg&admin)	Trade organisations adopt voluntary commitments to reducing embodied and/or usage carbon of products offered to consumers
Required recycling	(reg&admin)	A ban on disposal (including landfilling and incineration) of products and materials that can be reused or recycled is introduced.
Sale of leftover food	(reg&admin)	Offer a range of things based on leftover food from restaurants or commercial kitchens.
Extended producer responsibility	(reg&admin)	Producers have responsibility for collecting and recycling products at end of use.
Product ban	(reg&admin)	Products are banned based on criteria of embodied and/or usage carbon

Prohibition of certain vehicles in urban zones	(reg&admin)	An environmental zone limits the type of vehicle that may be driven within a specific area.
Ban on short flights	(reg&admin)	A short-haul flight ban is a prohibition imposed by governments on airlines to establish flight connections over short distances.
Shop product choice	(reg&admin)	Point of sale operators voluntarily restrict products to lower embodied and/or usage products
Waste targets, requirements and/or prices	(reg&admin)	Product recycling is motivated through waste policies that place either a requirement for, or a price on waste generation
Deposits on purchased goods	(reg&admin)	Deposits are initiated to enhance recycling of goods to reduce raw materials requirements
Repair checks and repair funds	(reg&admin)	Consumers get access to repair vouchers when purchasing certain product groups which can be redeemed to reduce the price of repairs or upgrades to the product.
Minimum price limits	(reg&admin)	Very low prices are banned to remove from markets products that have less incorporation of externalities
Limits on percentage ownership or use	(reg&admin)	Nations or municipalities restrict the number of a given product (such as cars) that can be purchased and/or owned (note: some nations such as Singapore have applied this instrument for vehicles, but none have applied it in other products/sectors)
Extension of product lifetime	(reg&admin)	Enhancement of product lifetime, including removal of planned obsolescence, and ban on disposal of unsold and functional products.
Ban on disposal of unused products	(reg&admin)	Companies are prohibited from disposing of unsold and functional products and are required to instead resell, donate or reuse products.
Information on service life and repairability	(reg&admin)	Introduce requirements for labelling with expected lifespan of goods within durable goods, linked to a lifespan guarantee. One example is the EU initiative for Digital Product Passport
Minimum requirements for repairability	(reg&admin)	The possibility of repairing many goods is very limited or non-existent today. Minimum repairability requirements would require manufacturers to design products to be taken apart and repaired. The minimum requirement can also be supplemented with a requirement for the producers to inform the consumer about how long they will provide spare parts.
Extended right of complaint	(reg&admin)	Extend the statutory period for right of complaint, which would give companies an incentive to sell goods with better quality

EU Eco-design for Sustainable Products Regulation	(reg&admin)	The proposal establishes a framework to set eco-design requirements for specific product groups to significantly improve their circularity, energy performance and other environmental sustainability aspects. It will enable the setting of performance and information requirements for almost all categories of physical goods placed on the EU market (with some notable exceptions, such as food.
Carbon tax	Economic instruments	The carbon tax is levied on most fossil fuels in proportion to their carbon content, this could be expanded to include also e.g. CO_2 from fuels used for fishing and agriculture.
Fuel and vehicle taxes	(econ)	Key policy instrument for reducing consumption-based emissions but is extensively covered in previous literature.
Carbon Border Adjustment Mechanism	(econ)	Importers who bring certain types of goods (CBAM goods) into the EU from third countries are obliged from 1 January 2026 to declare embedded emissions of greenhouse gases in the goods and to purchase certificates corresponding to the embedded emissions. This policy measure could also be used for other types of goods.
Consumption taxes	(econ)	Many countries have consumption taxes based on emissions of greenhouse gases on petrol and diesel. This could be expanded to other product categories.
Excise duties	(econ)	Introduce point taxes to reduce or redirect consumption from environmentally harmful or unhealthy goods and services.
Flight tax	(econ)	Tax on air travel tickets
Frequent flyer tax	(econ)	Progressive tax on air travel, with an increasing tax the more you fly.
Taxes on unsustainable food	(econ)	Taxes on meat and dairy products so that the price for the consumer is increased to reduce the consumption of these and thus also the climate impact.
Bonus-malus systems	(econ)	A bonus-malus is a system where products with relatively low emissions of carbon dioxide are rewarded at the time of purchase with a bonus, while products with relatively high emissions of carbon dioxide are charged with a higher tax.
Bonus-malus system for flights and trains	(econ)	Introduce a system with an integrated air-train tax, where increased taxes (malus) on air travel are used to direct subsidies (bonuses) to train travel. Such a system can even out the price difference to flights and increase demand for train travel.

Bonus-Malus system for home decoration	(econ)	Products with a low environmental impact and a long lifespan are stimulated by a lower fee, while goods with a higher environmental impact and a shorter lifespan are charged a higher fee (for example through VAT differentiation).
Cash compensatory measures	(econ)	Environmental taxes risks being regressive (i.e. effecting people on low income more). Targeted, compensatory measures have been proposed to address this.
Fee & dividend for climate-harming consumption	(econ)	Environmental taxes risk being regressive (i.e. affecting people on low-income more). Targeted, compensatory measures have been proposed to address this. Policy packages can combine e.g. consumption taxes with a refund targeted specifically towards low-income households.
Subsidy	(econ)	Subsidies directed at purchases of low emission products which have the potential to grow and push out technologies or practices with higher emissions. Subsidies can be targeted towards novel technologies and products as well as established ones.
VAT differentiation	(econ)	Regulate the VAT so that it is, for example, lower on services and used goods, which would benefit, for example, repairs over new purchases.
Subsidize repair services	(econ)	Subsidize repair services to increase the profitability of these companies/organizations and, by extension, speed development. Can happen e.g. through reduced tax or VAT.
Investment subsidies	(econ)	For instance, investment subsidies which reduces demand for high carbon products, for instance subsidies for electric vehicles or home batteries for solar power
Industry subsidies	(econ)	Key policy instrument but outside the explicit scope of this mapping
Remove climate-damaging subsidies for aviation	(econ)	For example, municipalities and regions that currently support, or own local airports can remove subsidies and deny new construction or expansion of runways.
Abolish animal subsidies	(econ)	Abolish subsidies for animal consumption, such as the "school milk allowance".
Subsidies on sustainable food	(econ)	Subsidize products and thereby lower the price for the consumer to get a consumer to choose a product with less climate impact than one with a higher impact.
Tax deductions for sustainable services/products	(econ)	Tax deductions can for instance, be given to companies/organisations which work with upcycling products

Subsidize second-hand sales	(econ)	Subsidize second-hand sales to increase the profitability of these companies/organizations and, by extension, speed up development (1). Can, for example, be done through reduced tax or VAT, or through forms of municipal support in the form of financing premises for second-hand sales (2).
Energy efficiency	(econ)	Measures directed at lowering electricity or other power demand from private households*
Tax reductions for home instalation of green technology	(econ)	*
Support for certain environmentally-enhancing installations in single-family houses	(econ)	*
Support conversion from oil heating in residential buildings	(econ)	*
Investment support solar cells	(econ)	*
Product user fees	(econ)	A fee is attached at point of sale based on carbon associated with subsequent use
Refund mechanism	(econ)	Part of the price of purchase is refunded based on the product re-entering the recycling stream
Preferential finance terms	(econ)	finance terms on loans – including credit cards – tied to carbon implications of product choice within a given category of goods.
Finance policy	(econ)	Key policy instrument but outside the explicit scope of this mapping
EUs sustainable finance taxonomy	(econ)	Key policy instrument but outside the explicit scope of this mapping
Enabling recycling	(econ)	Facilitate for consumers to re-cycle products and materials at end of use.
Enabling product sharing	(econ)	Creation of the infrastructure to enhance the ability of consumers to share products rather than purchase individual items.
Spaces for sharing	(reg&admin)	Requirement that developers set aside space for the sharing economy

Mandatory metering	(Enabling)	Requirement of metering for at least heat and electricity in buildings, and potentially for automobile use
Infrastructure improvements	(Enabling)	Key policy instrument but outside the explicit scope of this mapping
R&D and innovation policy	(econ)	Key policy instrument but outside the explicit scope of this mapping
Work time reduction		Employers and other organizations can choose to facilitate sustainable lifestyles by offering the opportunity to reduce working hours (with a corresponding reduction in wages).
Targets and accounting of consumption-based emissions	(reg&admin)	Set targets for consumption-based emissions where emissions outside the country's borders are also included.
Climate calculations for consumers		Tools that calculate individual climate impacts from transport, housing, consumption and food and provide inspiration for how you can live more sustainably.
Consumption-based Paris-compliant 1.5 carbon budgets as a climate policy framework. Calculated for the European Union*		
International cooperation		Key policy instrument but outside the explicit scope of this mapping. High-income countries can direct investment and technology transfer to developing countries for their decarbonization
The Green Climate Fund		Key policy instrument but outside the explicit scope of this mapping. The UN Green Climate Fund is currently the world's largest multilateral fund to help developing countries finance climate mitigation.
Tax free shopping	Enabling increased consumption	Norway Customs Regulations. Tax free - possibility to bring in goods duty free for personal use (encourages flying rather than the opposite)
Conditioning tax deduction for home repair		Tax deductions can be made for costs for home-repair if the work increases energy efficiency or reduces overall use of resources and materials.
Reduce incentives for commuting to work by car		Tax deductions for expenses from commuting to work should be neutral in relation to way of transport.

Policy Delphi

The Policy Delphi was conducted in two rounds. In round 1, the Nordic expert panel was asked to rank each policy according to their potential to reduce emissions, as well as their political feasibility (i.e. the likelihood for a policy to turn from idea into applied politics). Rankings were made 1–5, where 5 indicates a large potential to reduce emissions/high feasibility (see figures 11 and 12).

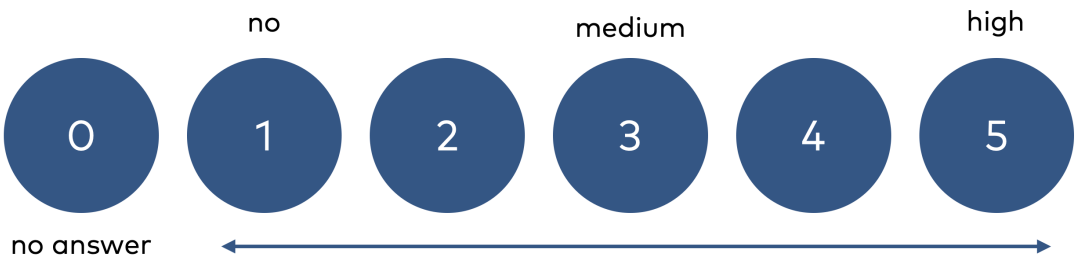


Figure 11. Rankings 1–5, 0 indicates missing values.

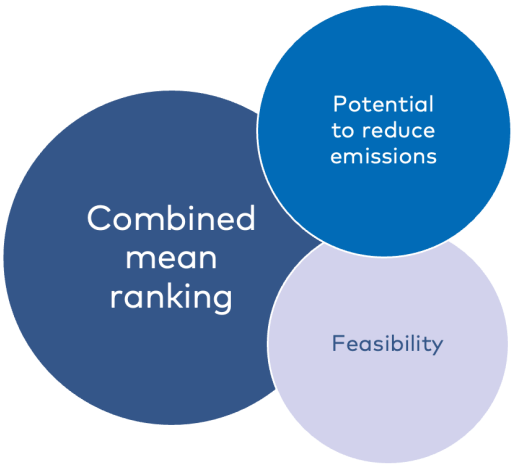


Figure 12. Rankings are presented in means for "potential to reduce emissions", "feasibility" and combined scores of both.

Round 2.

The selection of policies for the second round was based on high rankings regarding potential to reduce emissions and feasibility. For strategic reasons, the selection covered policies from different categories and policy instruments that are most relevant at the national level. Consideration was also given to the comments from round one, where participants observed that some listed policies were very similar.

We selected twenty-one of the long listed consumption-based policies for the Policy Delphi (Table 6). Out of these twenty-one policies, twelve were ranked further in round 2. In Figure 13 the final twelve policies are listed alongside their respective mean ratings. We observe that experts take each other's objections seriously and adjust their rankings downwards.

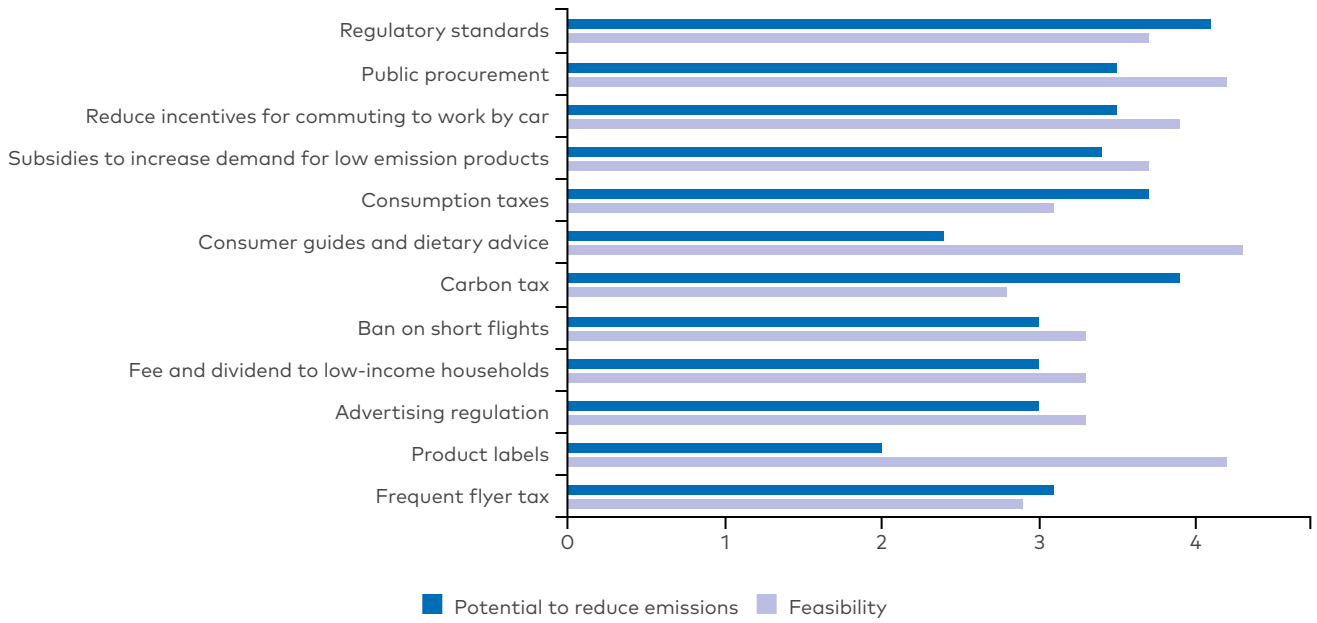


Figure 13. Highest to lowest overall ranking (round 2)

For each of the studied policies in round 2 we show the rankings assigned by the 23 participating experts, using bar diagrams (below). The diagrams highlight the relationship between *potential to reduce emissions* and *feasibility* rankings but they also show the spread of rankings assigned by the experts.

Regulatory Standards

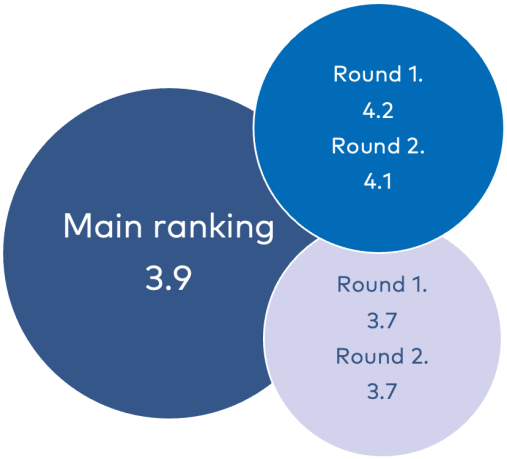
Regulation of emissions, energy use, material use, etc, related to the production of products.

Example: In the Ecodesign directive, maximum emissions for specific product groups can be introduced.

The use of regulatory standards is ranked high among experts, especially in terms of potential to reduce emissions. As one expert puts it: *"Feasible and effective since it puts demands on producers - same rules for all and long-term change, often acceptable for companies (as well as consumers)."* In the words of another expert: *"Strong instrument!"*

Participating experts discussed examples, including EU's requirements related to cars and the Ecodesign directive. They believe public acceptance would be high, e.g.: *"It could be a way to mimic the effect of a much higher carbon price with potentially less public backlash.'* However, even if the general population is in favour of legal standards, these could be "met by resistance from producers." To prevent production from moving to countries with looser regulations, *"regulations must also include imported goods, and produced goods from other countries."* Another objection is that there is a risk of rebound effects, i.e. that *"the reduced emissions lead to an increase in the demand for the products."*

Others commented that monitoring would be a challenge and that the use of regulatory standards is *"feasible with some products, not with many."* They observed that while regulatory standards work well for specific examples, such as cars and aluminium, the conditions of production for these goods may be difficult to replicate. They are often situated within the administrative boundaries of the regulatory body (e.g. EU) and dominated by a few producers. Thus, *"[i]mplementing and monitoring similar regulations in economy-wide scale for all product classes which are manufactured in a less geographically or producer condensed manner would be far more difficult and the related costs/uncertainties would be extremely high."*

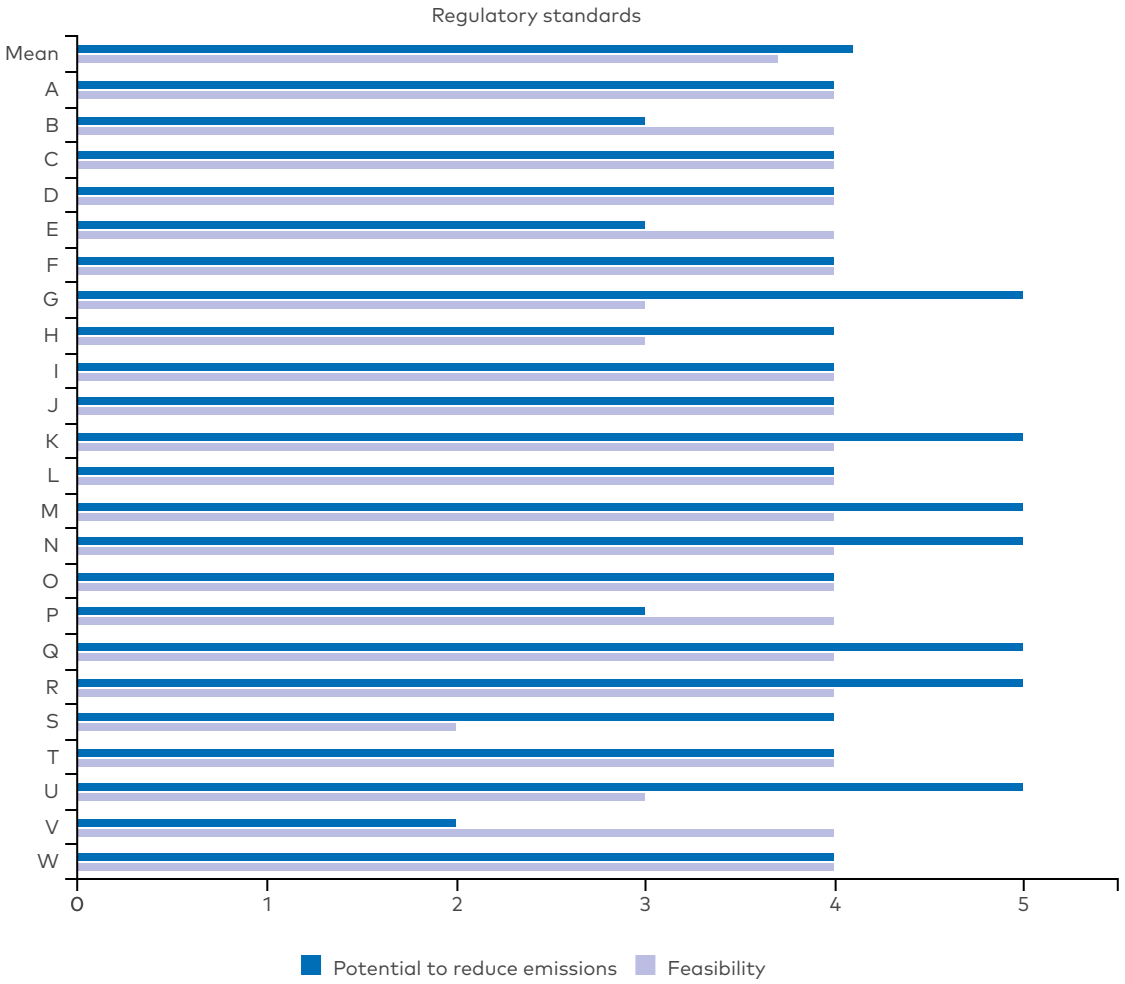


+ same rules for all

+ generally high feasibility and potential to reduce emissions

- works better for few large producers than for many small

- risk for production moving to other countries



Public Procurement

Requirements that public agencies must choose low or zero-emission products or services when available.

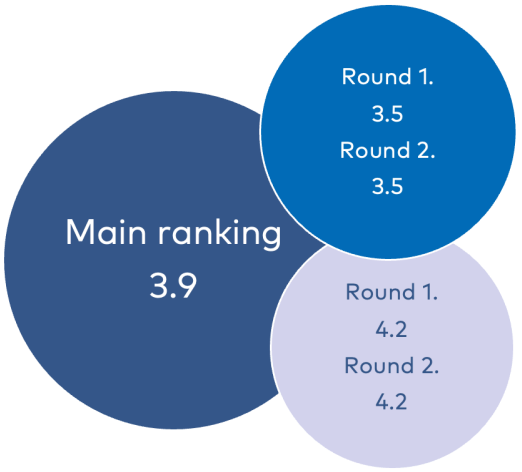
Example: Finland has developed green public procurement criteria to promote the transition from HFC technologies to alternative low GWP technologies. Finnish public procurement policies mandate that public agencies avoid purchasing equipment containing F-gases.

The mean ranking for *public procurement* is among the highest of all policies, especially concerning *feasibility*. Mean rankings did not change between the two rounds but remained high. The overall mean score of this policy measure is explained by an above-average ranking of potential to reduce emissions together with a high ranking of feasibility.

A new report from the Nordic Council of Ministers (2023c) suggests that public procurement policies related to food could benefit population health and the environment. Experts point at both direct and indirect effects of such policies. Some experts suggest that there may be limited direct effects but substantial indirect effects, e.g.: "Only 2–3% of food sales are to schools, hospitals, etc in Sweden, and the climate impact per meal in schools are already MUCH lower that private meals (...), however the indirect effect could be substantial. If kids were served only vegan food in 12 years it would make them used to it."

The general message is that public procurement is a "relatively feasible measure that is currently underused" and that is important to not only focus "on GHG emissions (and other air pollutants) but also the impact of other harmful substances (e.g. pesticide use) and loss of biodiversity." Experts mentioned that sectors other than those studied in this report might be more important in terms of reducing emissions: *"Most important sector in terms of CO_2 from public consumption is likely the use of cement in infrastructure"*, a sector with large emissions and with already existing low emission alternatives.

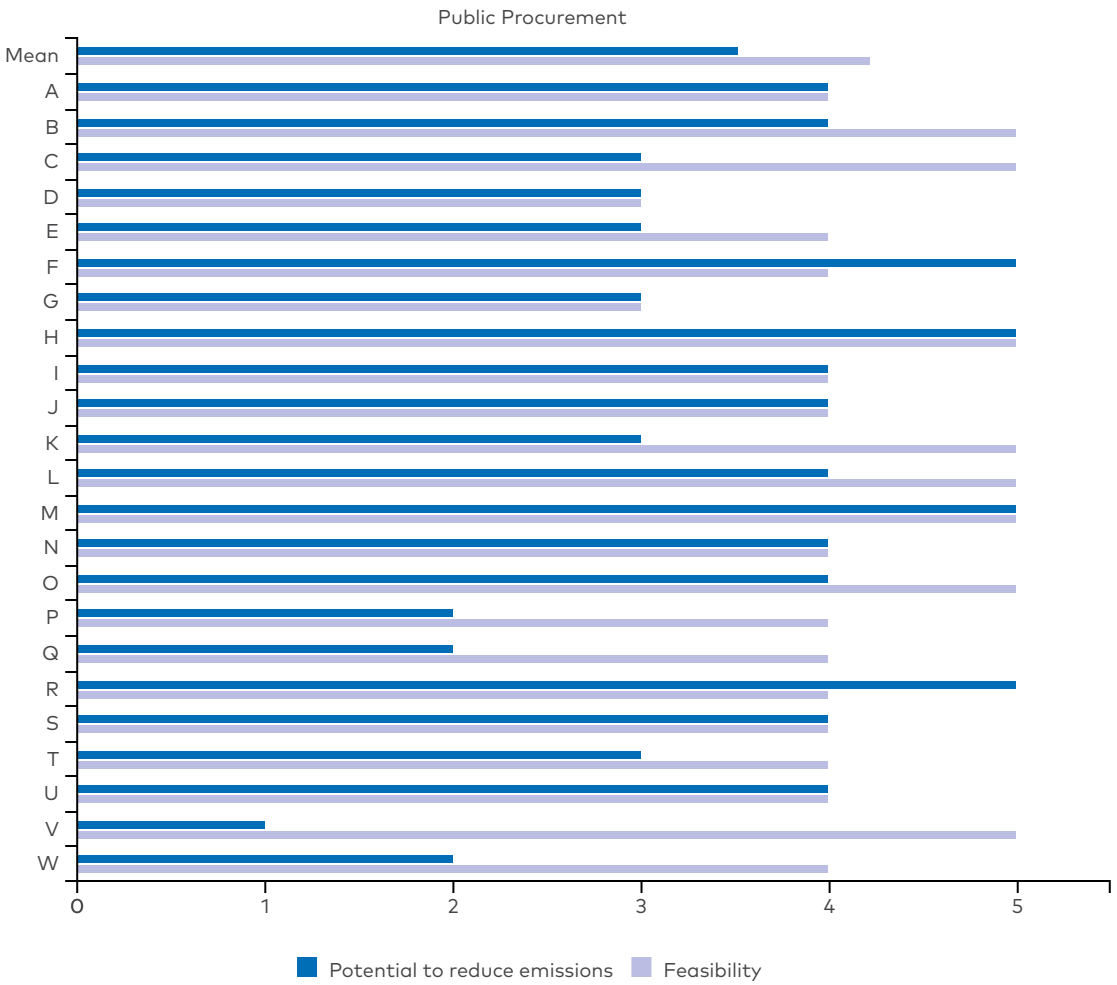
However, some concerns were raised. One expert observed that existing regulations could limit green public procurement: '*Our experience is that sometimes the laws need to be revised to allow the procurement."* Another raised concerns about the importance of price in procurement: "*it also tends to be that price dominates no matter what other criteria exist."*



+ generally high feasibility and potential

+ substantial indirect effects

- *"Feasibility depends on the political parties in office"*



Reduce Incentives that Promote Commuting to Work by Car

Tax deductions for expenses related to workers' commutes should be neutral in relation to transportation type.

Example: In some countries you can deduct expenses from commuting to work in your income declaration. In Sweden, commuting by car is encouraged since more can be deducted if you commute by car than by public transport.

The ranking for potential to reduce emissions marginally increased between round 1 and round 2. However, the ranking for feasibility marginally decreased. Mean ranking remained high, at 3.7, in both rounds.

There is a general agreement that a system of subsidizing commuting by car, especially subsidizing it more than commuting by public transport, is problematic. As one respondent expressed it: "*[i]t is somewhat crazy that car use is subsidized beyond public transport and active modes.*"

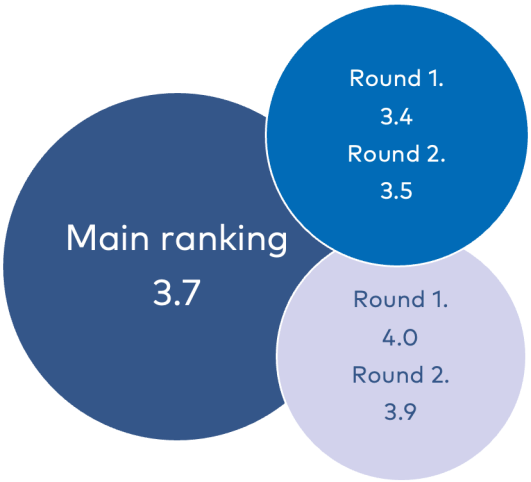
Others raised concerns that policy changes that reduce incentives to commute by car might have distributional effects. This concern was expressed by one expert as: *"[t]his initiative is key but may have distributional effects in areas where public transport are weak"* and by another as: *"Needs to be considered how this will effect people in more sparsely populated areas."* Thus, offering alternatives to using your own car is crucial. *"Making it easier, cheaper, and more favorable to travel by public transportation"* has changed the way people travel in Norway. *"Oslo has made large changes, with a huge effect the last decades to remove cars from the city with a combination of initiatives. Tax might be favorable, but not the most visible and effective one in changing travel behavior."*

It was noted that the distributional effect of this policy might be progressive, which might help with acceptance and perception of fairness. The current commuting policy design favours men, since men are overrepresented among those commuting by car. Thus, as one expert noted, changing the incentives for commuting is important for gender equality.

Although the potential to reduce emissions might not be huge, there is a general agreement that a changed policy is desirable: *"Maybe it is not the biggest potential as it is debatable how much this motivates commuting by car, but the signal might matter and it should be feasible enough."* For example, in Denmark this is already in place: *"In Denmark, the deduction is purely based on the distance to work and not related to the mode of transportation, which shows that it's feasible to do."* One objection against a purely distance-based policy is that low-emitting means of

transport should be prioritized and subsidized higher, alternatively, high-emitting means of transport should be taxed higher. Following this, the deduction should not be neutral in relation to transportation type.

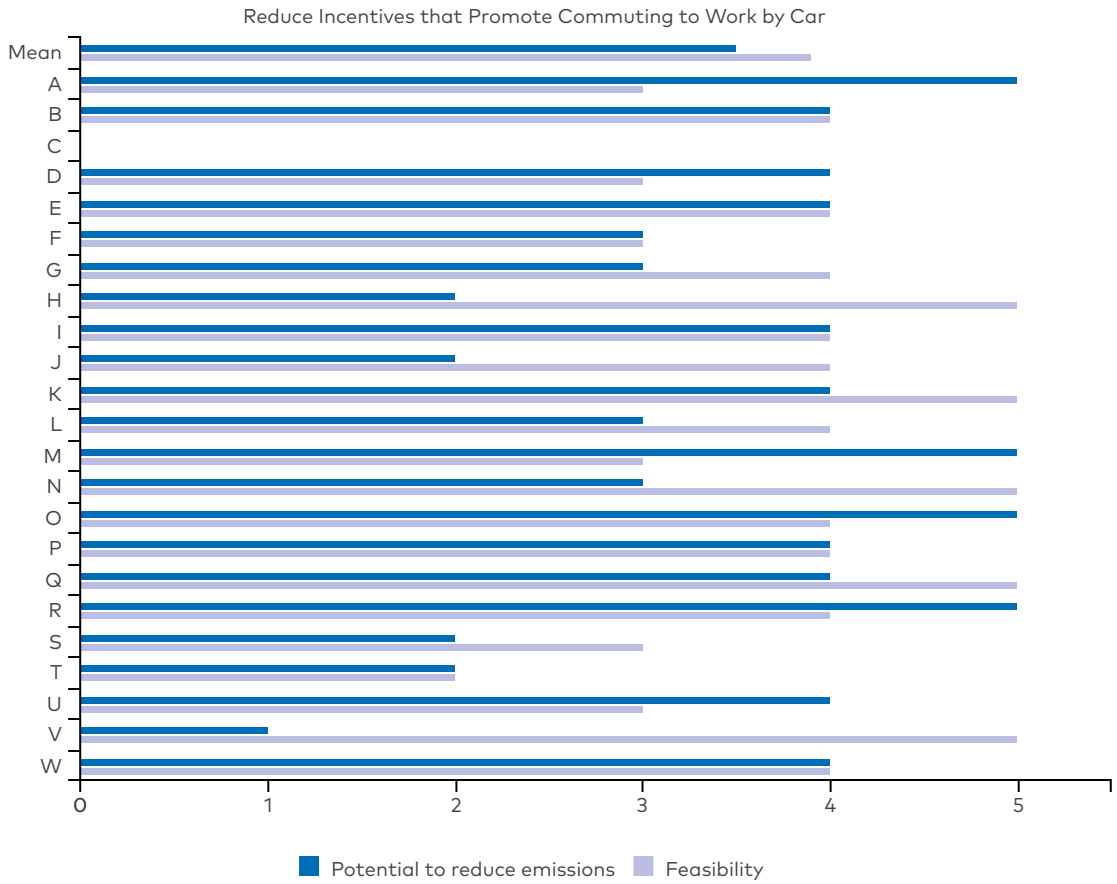
The general response is that the suggested policy is *"feasible and should be undertaken to even out the playing field."* One respondent expressed doubts in that: *"in the car-dominated world we live in, the reality would be that not many political parties would be willing to campaign for this."*



+ "it is a weird subsidy that should be removed"

- those affected are likely to oppose

- low political feasibility in Sweden

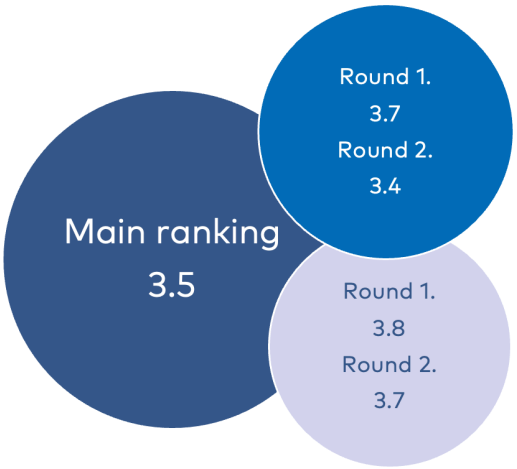


Subsidies to Increase Demand for Low-Emission Products

Subsidies designed to increase consumer demand for low-emission products have the potential to push out technologies or practices with higher emissions. Subsidies can be targeted towards novel technologies and products as well as established ones.

Example: Subsidies to purchase electric vehicles are often described as early support to help grow the market. The Nordic Council of Ministers (2024) also suggests subsidising vegetables simultaneously in all Nordic countries to benefit health and the environment. This policy relates to consumption taxes, see below.

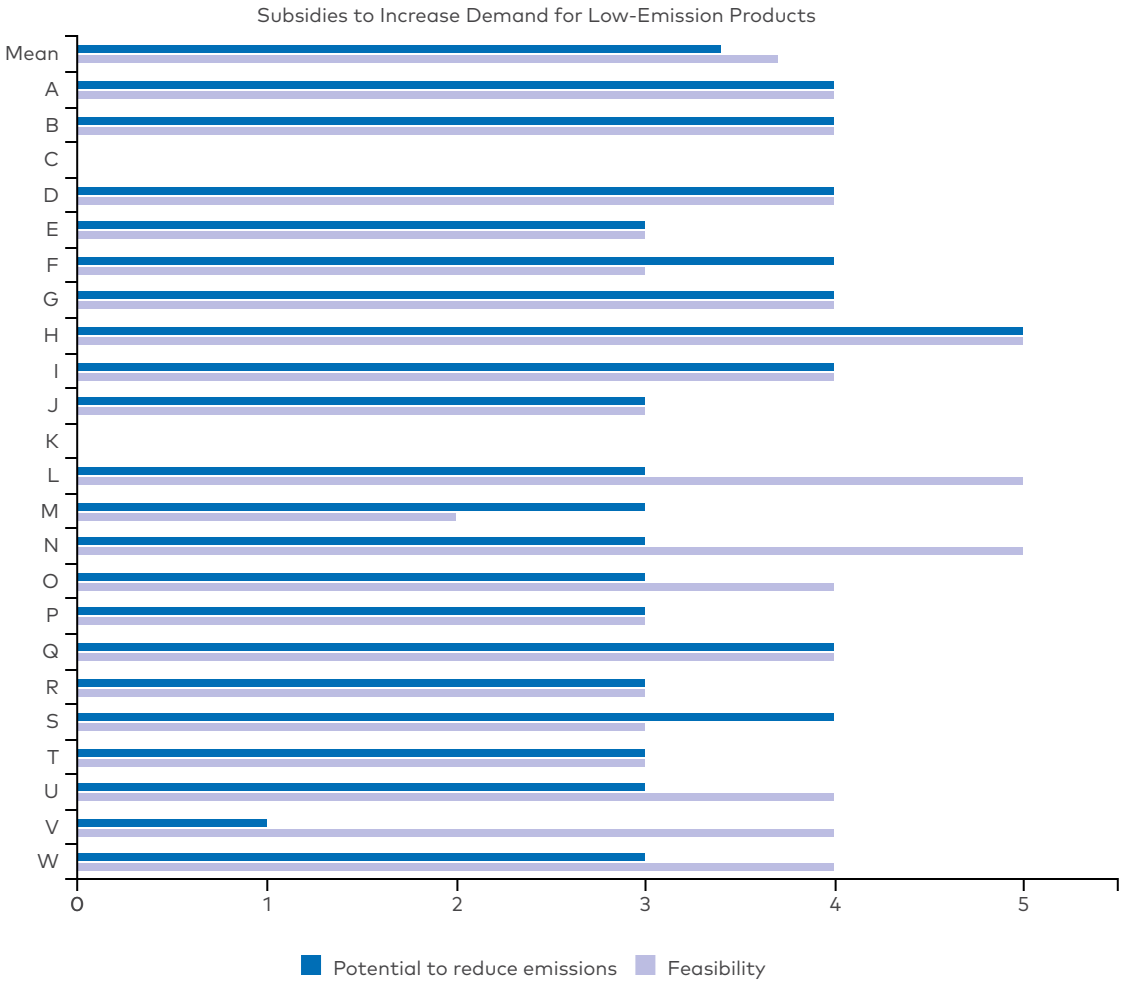
Subsidies rank among the highest in both rounds, with a somewhat lower mean ranking in the second round. However, expert comments suggest there are several potential challenges with subsidies (if not supported by other policy measures). One argument is that while subsidies might help introduce new low-emission products by compensating for initial competitive disadvantages, they are not as effective as consumption taxes on high-emission products. A combination of subsidies and taxes could be more effective. Here, the expert group is quite split on whether subsidies targeting electric vehicles (EVs) are successful or not. Some noted that EV subsidies largely have gone towards affluent consumers, and one expert suggested that EV subsidies should be restricted to supporting small and low-cost EVs. Another expert observed a high risk of lobbyism playing a role in defining most technologies as "low-emissions" to gain subsidies. In general, there are several comments suggesting that existing fossil subsidies should be removed. Several experts, influenced by comments in the first round, favour a bonus-malus construction, where high-emission products and activities are taxed, to finance subsidies for low-emission products and activities.



+ generally high feasibility and potential

+ removal of fossil subsidies a potentially effective measure

- risk of subsidies benefitting affluent consumers and marginally better technologies



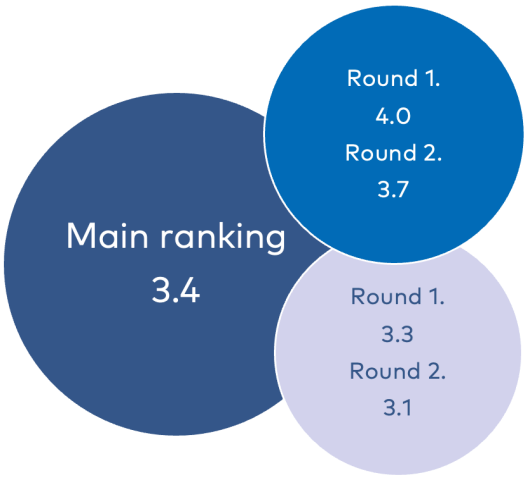
Consumption Taxes

Many countries have consumption taxes based on emissions of greenhouse gases on petrol and diesel. This could be expanded to other product categories.

Example: Distance-based passenger taxes on air travel or excise duties/ consumption taxes on beef and dairy products (domestic and imported). A new report from the Nordic Council of Ministers (2024) suggests taxing meat and sugar simultaneously in all Nordic countries for the benefit of both health and the environment.

The mean ranking of this policy measure decreases between rounds 1 and 2.

One expert argued that consumption taxes can shift consumer behaviour. This expert observed that consumption taxes can shift consumer behaviour without putting domestic producers at a disadvantage, since imported goods would have the same tax. However, in the case of the Danish agriculture sector, which has a large export of food, calculations indicate that such taxes are significantly less effective in reducing emissions than production taxes. Therefore, to achieve the same reduction in emissions, consumption taxes would need to be much higher, likely facing resistance from both the public and commercial sectors. Others point to the possibility of compensating affected companies or people (in the case of regressive distributional effects), either by direct paybacks (see fee-and-dividend) or by making sustainable options more affordable. One expert stresses that consumption taxes should be implemented across all Nordic countries because of the significant cross-border shopping. There has been an interesting debate on an all Nordic taxation of meat and sugar which we will return to in Chapter 8: Discussion and Conclusion.

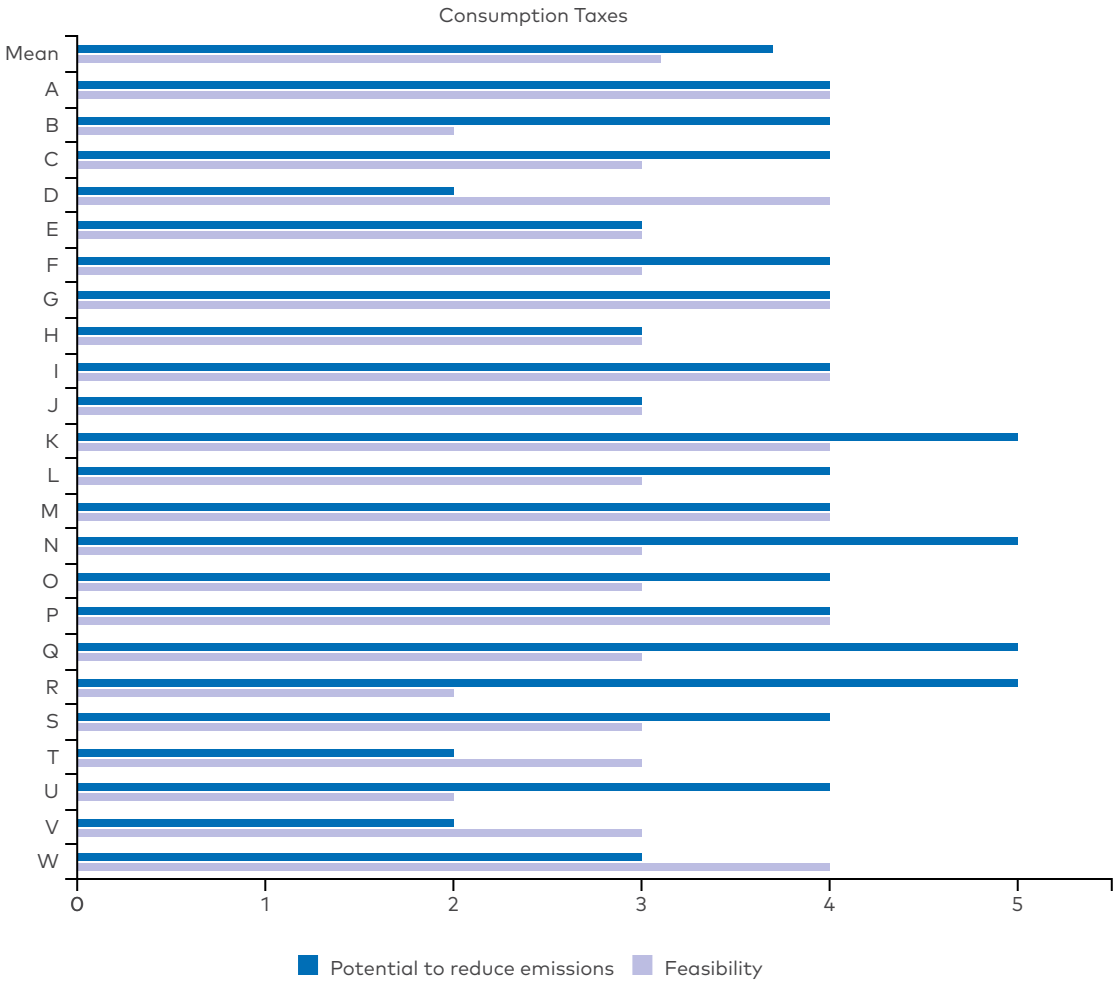


+ significant potential to reduce emissions

- possible unequal distributive effects

- low public acceptance (but possible to counteract)

- strong opposition from producers



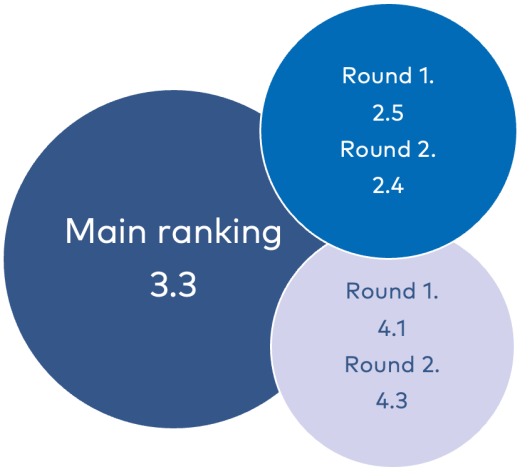
Consumer Guides and Dietary Advice

Mandatory information on the environmental and health effects of food items and diets directed at consumers.

Example: The Nordic Nutrition Recommendations have recently been updated. The new recommendations aim to clarify the links between food intake and consequences for both health and the environment (Nordic Council of Ministers, 2023c; 2024). The reform of the national diet recommendations is now ongoing in the Nordic countries.

The change between the two rounds is marginal, with a slight decrease in the estimation of the potential to reduce emissions and a slight increase in the feasibility ranking. Overall, the potential to reduce emissions was judged to be low, while the feasibility was judged to be high. Several experts noted that this type of guide and advice is already common but has limited effects on consumer behaviour. One expert observed that while foods with lower environmental footprints are often healthier, health arguments often have a stronger impact on behaviour. Others add that this measure could affect public meals, such as school lunches. Some argued that producers can be influenced towards more environmentally friendly production methods. Another aspect raised by respondents is that including environmental aspects in dietary advice might be sensitive amongst agricultural interest organisations.

There has been a lively debate about the recently updated Nordic Nutrition Recommendations (Nordic Council of Ministers, 2023c; 2024). We return to this in the report's Chapter 8: Discussion and Conclusion. See also Consumption taxes above.

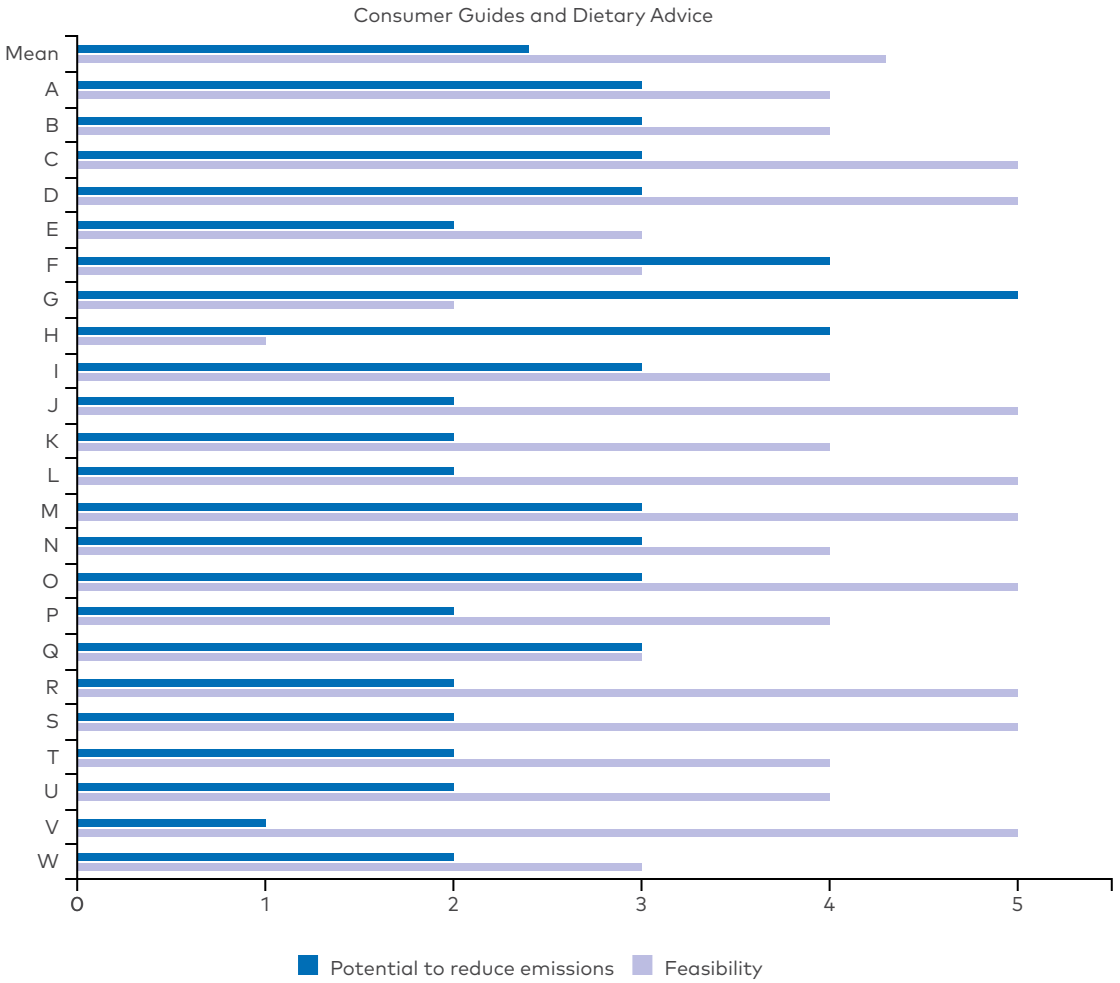


+ judged as highly feasible and possible to build on existent policies

+ has the potential to influence public meal providers and producers

- low direct potential to change the behavior of consumers

- resistance from agricultural interest organisations



Carbon Tax

A carbon tax is currently levied on most fossil fuels in proportion to their carbon content. The tax could be expanded to include CO_2 from fuels used for fishing and agriculture.

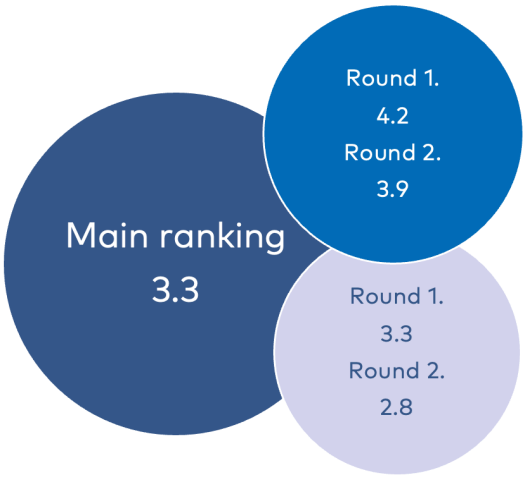
Example: As part of the Danish Climate Act, agreements have been made on a higher and more harmonised CO_2 equivalents tax for industry and a CO_2 equivalents tax on agriculture, which will be negotiated in 2024. Taxing fossil fuels and CO_2 could further reduce the emissions of other air pollutions.

In a review of the consumption-based emission footprint literature, Ottelin et al. (2019) found that carbon pricing is the most widely supported policy recommendation. However, there is an extensive discussion on the regressive effects of carbon pricing (Ottelin et al., 2019; Dawkins et.al, 2023).

Next to a ban on short flights (see below) carbon taxation is the measure which falls most in the overall ranking between the first and second round (from 3.7 in round 1 to 3.3 in round 2). This ranking should be interpreted with caution because experts use competing definitions of carbon tax. Some experts interpreted the carbon tax as a proposed tax levied at agriculture, linked to current discussions about removing tax exemptions related to diesel used by farmers. Others interpreted the carbon tax as more extensive. With a focus on carbon taxation in the agricultural sector, several experts stress the importance of including taxes for other greenhouse gases (e.g., methane). Their concerns underscore the challenge of accurately measuring and monitoring other greenhouse gases in agriculture.

The comments indicate that most experts consider carbon taxes potentially effective in reducing emissions. The drawbacks include possible feasibility issues, resistance from affected sectors, and public acceptance. Some experts stressed these drawbacks more forcefully and argued that the levels needed for carbon taxation to be effective are rarely implemented and that the tax often has many exceptions.

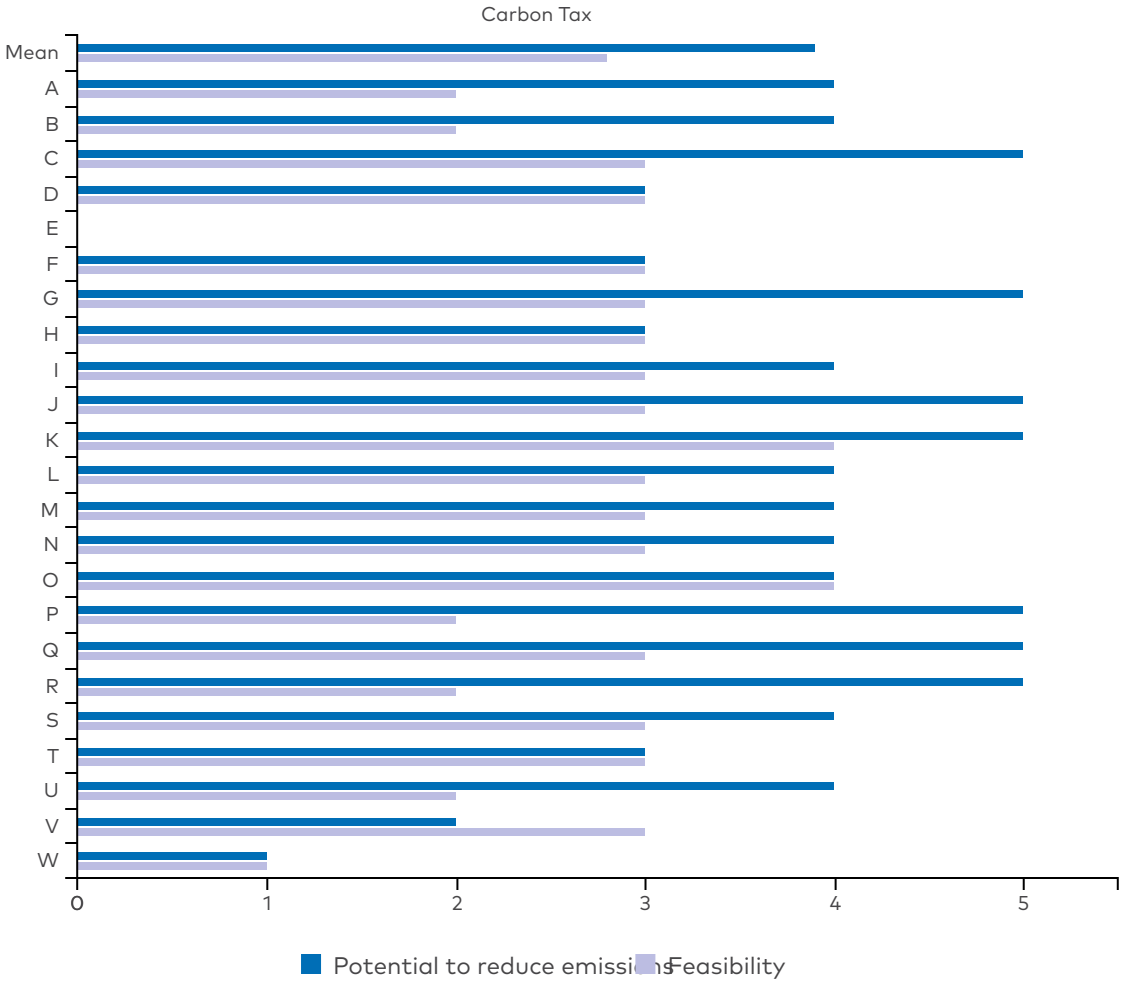
One expert notes that a carbon tax is not aimed at consumers directly but, for instance, at fuels used in the agricultural or fishing industry. However, because of the common assumption that producers pass the costs of production on to consumers, carbon taxes are often included in classifications of demand-oriented policy measures. Some experts asserted that an EU-wide carbon tax would be preferable to prevent losses in competitiveness and carbon-leakage. Another expert argued that an EU wide tax very unlikely would pass the EU parliament since decisions regarding taxes need consensus.



+ high potential to reduce emissions (if applied to several sectors)

- risks strong resistance from affected sectors (and in the EU parliament)

- difficult to measure and monitor GHG emissions in agricultural production



Ban on Short Flights

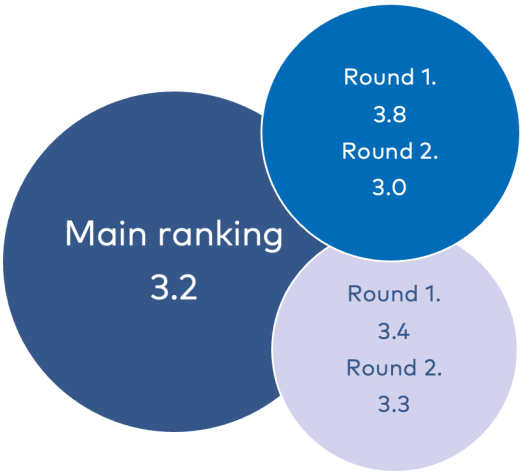
A short-haul flight ban is a policy governments impose on airlines to eliminate flights over short distances.

Example: France has passed a bill to ban flights between destinations which can be reached within 2,5 hours by train.

A ban on short flights is, for instance, discussed by Dalhammar et al. (2022a) as a potentially strong policy measure to avoid consumption (as opposed to the dominant strategies of *shifting* and *improving* consumption).

A ban on short flights is one of two policy measures which falls the most in the ranking between the first and second rounds (from 3.6 in round 1 to 3.2 in round 2). This decrease is largely explained by a drop in the ranked potential (note the missing values from respondents O and Q).

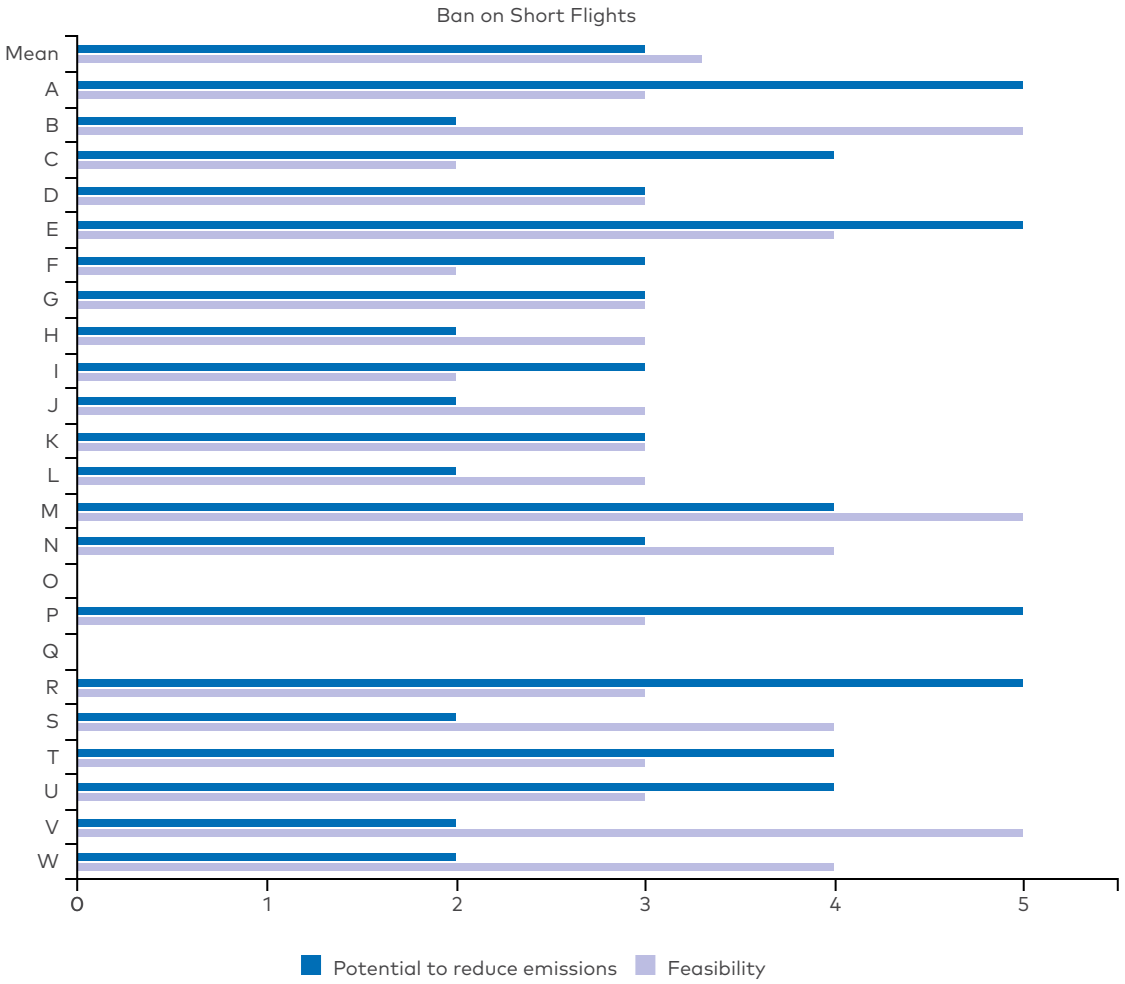
The prevailing argument against a high potential to reduce emissions is that short-haul flights represent a small part of aviation emissions. Some experts observed that the composition of aviation emissions differs between the Nordic countries, where short-haul flights are rare in Finland but more common in Norway. Some noted that effective short-haul flight bans would depend on the availability of transportation alternatives (e.g. train infrastructure). Referring to difficulties faced in France, a few experts saw major problems in monitoring and designing a ban on short flights. Most, however, judge this instrument as quite feasible with an important yet limited potential.



+ feasible on routes which are accessible by trains

- concerns a limited amount of air travel emissions

- difficulties in policy design and implementation



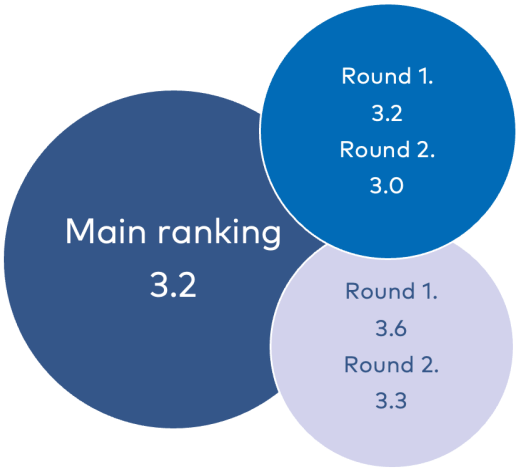
Fee and Dividend to Low-Income Households

Environmental taxes risk being regressive (i.e. disproportionately impacting people with low incomes). Targeted, compensatory measures have been proposed to mitigate this risk. Policy packages can combine e.g. consumption taxes with a tax refund for low-income households.

Example: Incomes from increased tax on fossil fuels can be used to support low-income households in rural areas.

Increasingly, calls for compensation measures are raised in the context of fair transition discussions, and to create public acceptance of climate policies. Several studies indicate a high acceptance for fee and dividend policies (e.g. Ewald et al., 2022; Coleman et al., 2023). However, Matti et al. (2022), studying Swedish public opinions of fee-and-dividend in the context of air travel tax, found that this proposal was less favoured than redirecting revenues towards increased use of bio-fuels for aviation.

The expert group was split on this policy measure, although less so in the second round. The mean ranking was lowered from 3.4 in the first round to 3.2 in the second round. Those more positively inclined towards this measure underscored how it could create greater public acceptance of carbon pricing. Some argued, however, that general dividends to the whole population might create more public acceptance than focusing on low-income groups. Those more negatively inclined argued that refunds risk going towards increased consumption. Thus, rebound effects would reduce the potential to mitigate emissions slightly. One expert counter-argued that marginal spending generally has a substantially lower carbon intensity than the taxed consumption types. One category of objections to this policy measure related to administrative difficulties and national prohibitions that prevent ear-marking the use of taxes. One expert who was positively inclined about the measure argued that its feasibility is low because the Finish Ministry of Finance is very reluctant to earmark taxes.

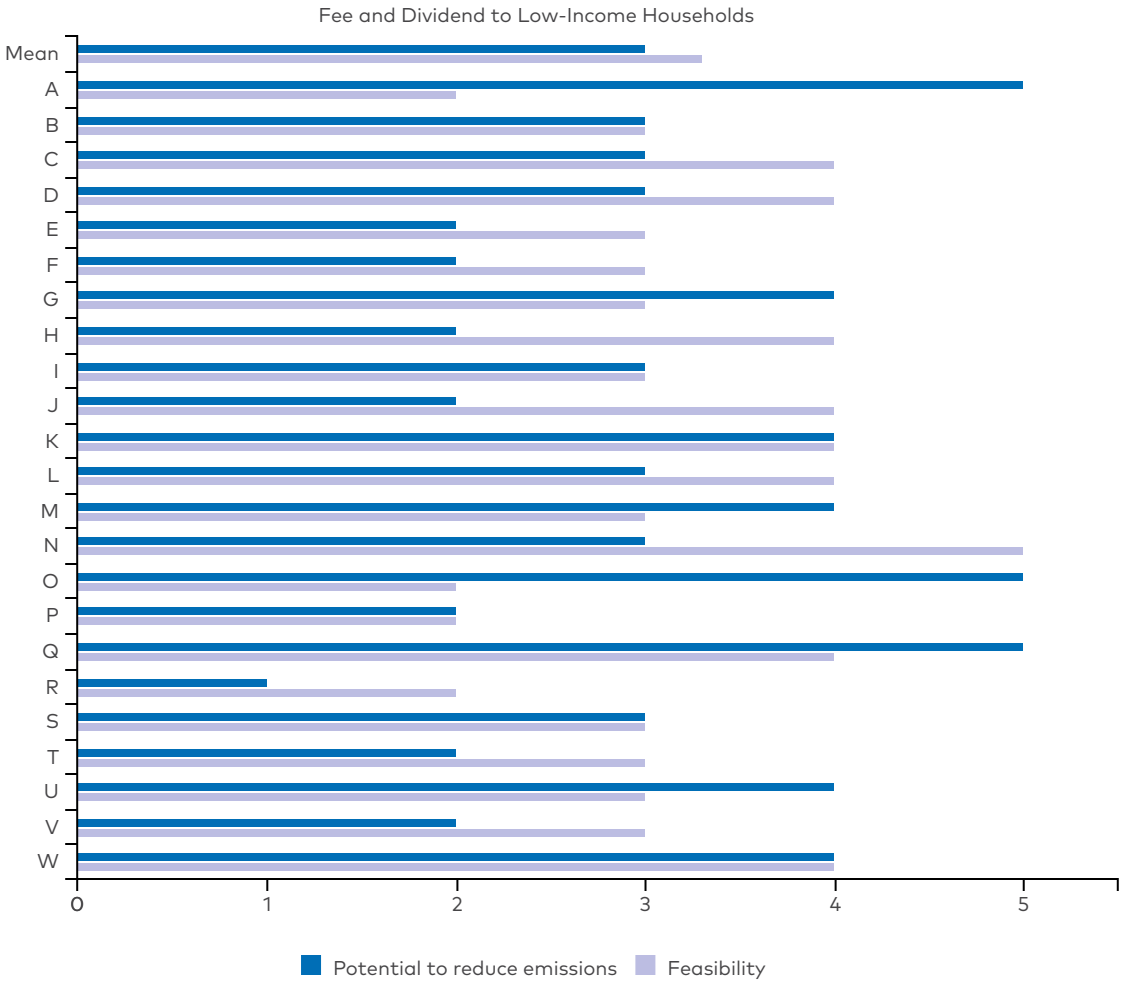


+ increased public acceptance of carbon pricing

- risks of some rebound effects

- administrative difficulties

- political resistance against earmarking of taxes



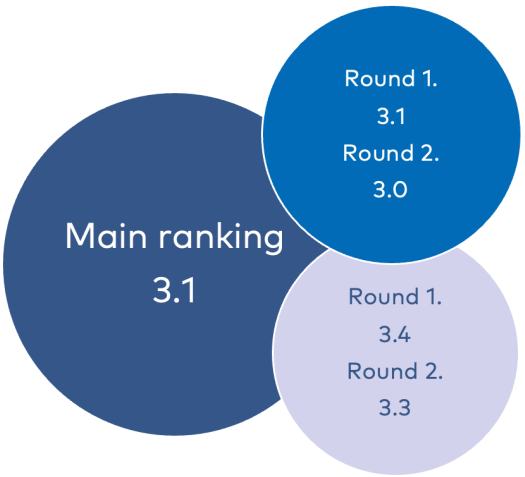
Advertising Regulation

Advertisement restrictions place limits on the location, time, and methods by which products or services with high emission intensities can be marketed.

Example: The Stockholm Region has adopted a ban on fossil ads in the public transport system and the Dutch city of The Hague recently passed a law "banning advertisements promoting fossil fuel products and climate-busting services" (The Guardian, 2024).

Advertisement regulations have for instance been analysed in relation to unhealthy and environmentally harmful food options (Statskontoret, 2019; Röös et al., 2021), and climate information on advertising for air travel (Larsson et al., 2019).

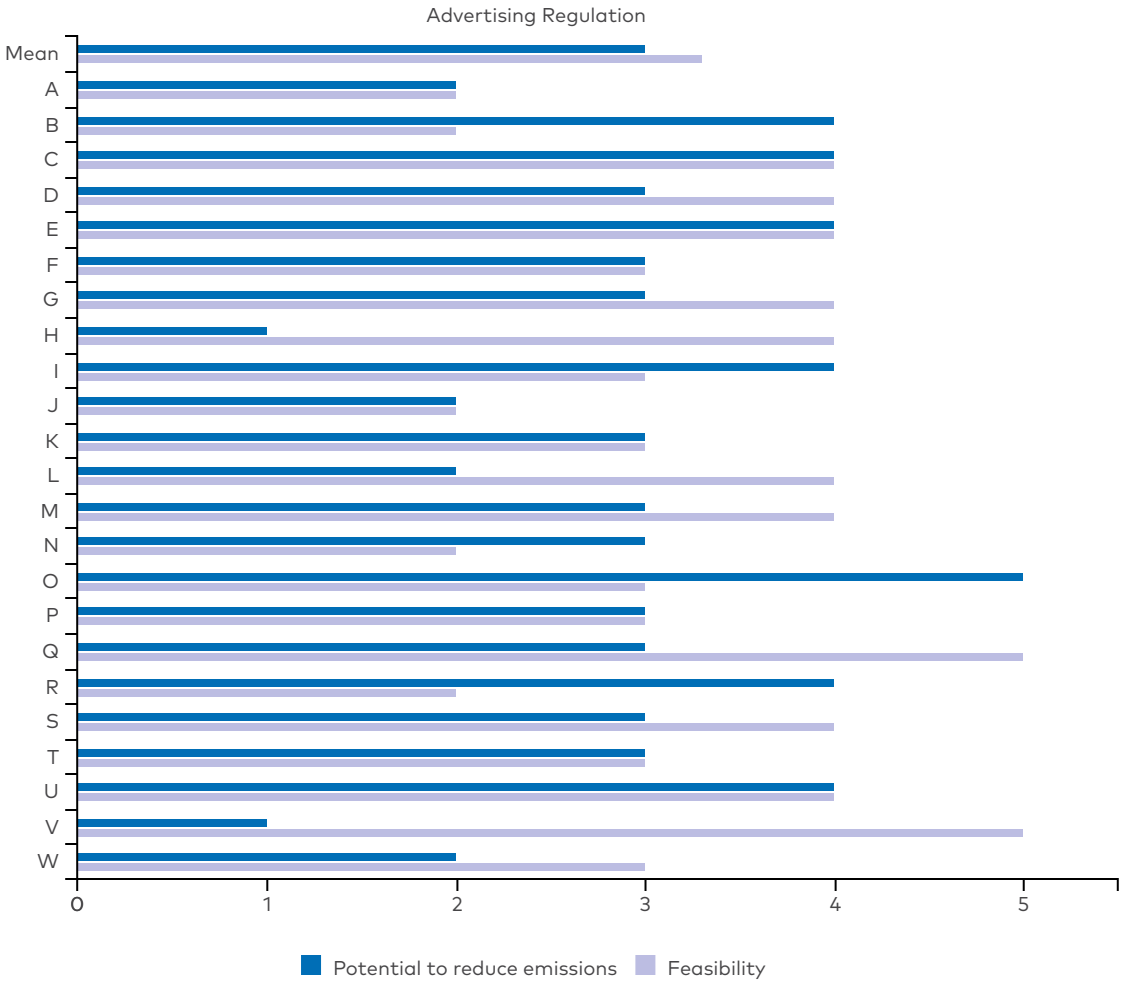
Disagreement among experts evaluating this policy measure was rather high and reflected in an extensive range of views in the comments. The disagreement did not diminish in the second round, instead, several experts noted counter arguments but decided to maintain a similar ranking. The distinguishing factor seems to be between those who see the potential of an advertisement ban as part of a bigger cultural shift and those who see a limited direct potential of regulating advertising. This dividing line also seems to pertain to banning specific forms of advertising or regulating advertising more broadly to limit its role in maintaining a consumerist culture. One expert stated that social media platforms are a context where citizens should have the option to opt out of advertising, similar to the right to deny paper junk mail in the mailbox. Another expert argued that a debate on advertising regulation could raise awareness and have an influence on its own.



+ signal value (affecting the societal debate)

- limited direct effects

- legal challenges for regulating advertisement on internet and TV



Product Labels

Requirement to provide information on greenhouse gas emissions and other air pollutants on product labels.

Example: It has been suggested that information on greenhouse gases emissions should be provided for air travel.

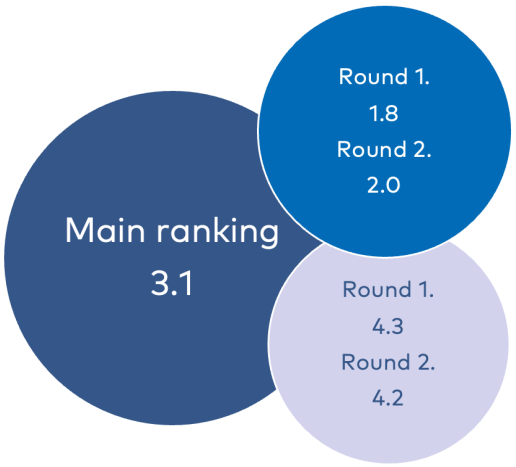
Food is an area in which product labelling is common in relation to health effects. Many proposals for labelling to address environmental effects also exist (Röös et al., 2021).

Common discussions on product labelling consider whether the labelling should add *positive* markers to "good" products, *negative* markers to "bad" products or include neutral environmental declarations (Röös et al., 2021) or both of these (Thøgersen et al., 2024). A substantial scholarly debate exists on the effectiveness of product labelling in changing consumer behaviour (e.g., Majer et al., 2022; Potter et al., 2021).

The experts demonstrated broad consensus on the low potential to reduce emissions and the high feasibility of product labels in rounds 1 and 2. In round 2, the expectations for reduced emissions were slightly higher and expectations for feasibility slightly lower compared to round 1.

The expert comments did not include objections against product labelling in principal but raised several warnings about strategies that are over-reliant on changing consumer behaviour with informational approaches. One expert noted that recent research in Finland demonstrates that environmentally related information on food/lunch has less influence on consumer choices than the taste and appearance of the food. However, another expert, who ranked the policy higher than the mean value, argued that product labels can also influence producers to lower their emissions to improve the labelling. In general, the experts agreed that although product labels have little value on their own, they can be considered good additions to raise awareness and as parts of larger policy packages.

Product labels were included in the second round of the Policy Delphi, even though they received a low score in the first round, in order to analyse the expert discussion on informational policy instruments (which all received a low ranking in the first round).



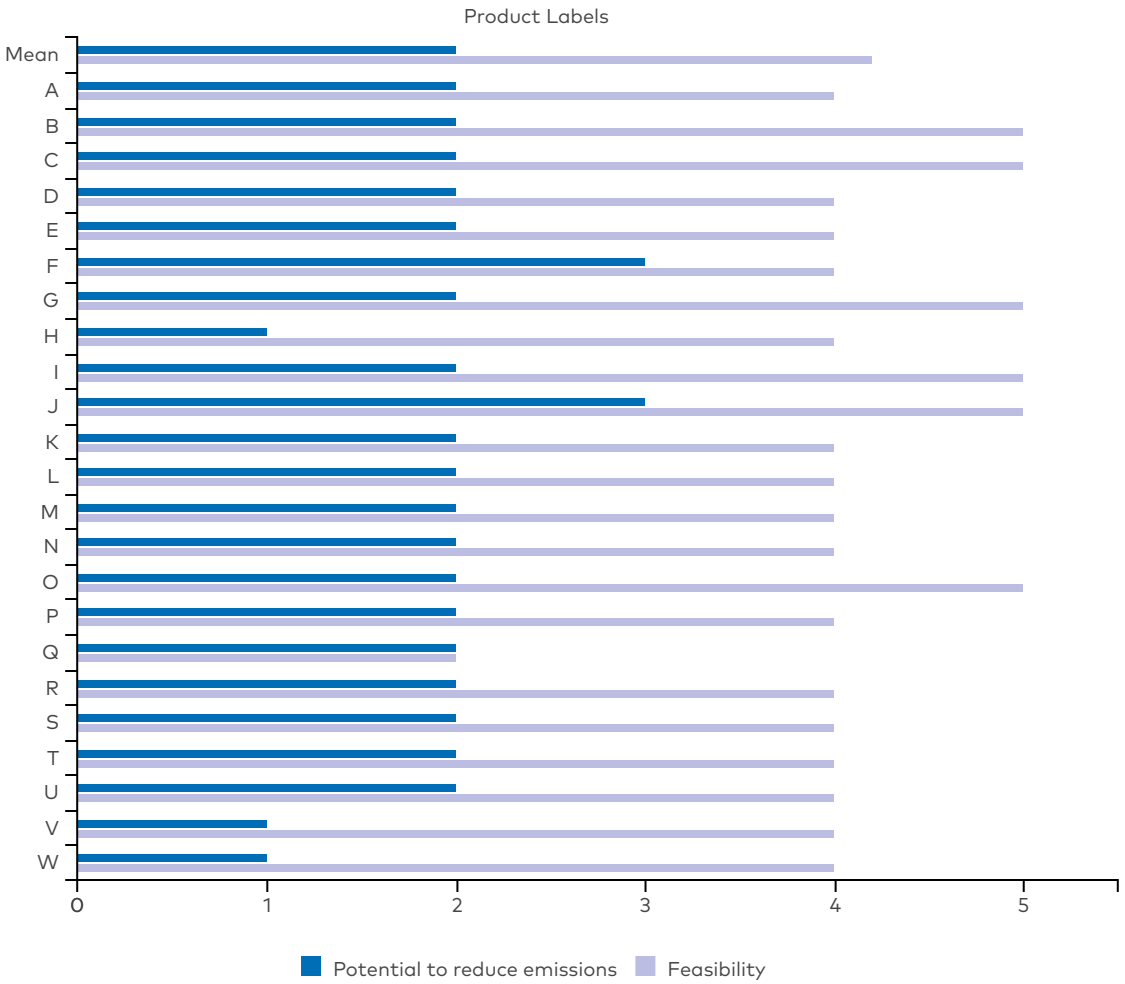
+ has the potential to influence environmentally motivated consumers

+ could influence producers to lower their emissions

- has little influence on most consumer behaviour

- difficult (and possibly costly) to provide reliable emissions data on all products

- risks shifting the responsibility to the consumer and away from political action



Frequent Flyer Tax

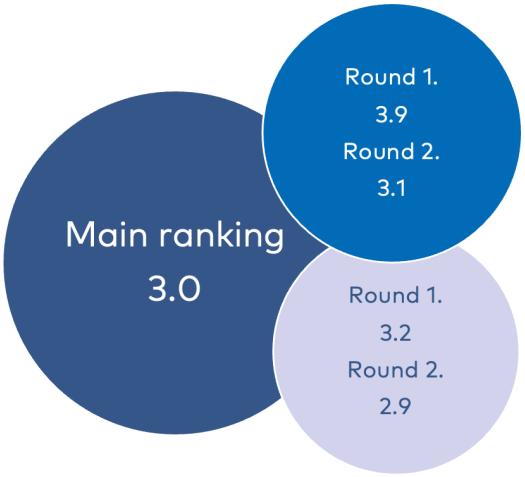
A progressive tax on air travel, with an increasing tax, the more you fly.

Example: A frequent flyer tax would not target individuals who book occasional trips. Instead, it would take the shape of a progressive tax that targets people in proportion to how much they fly.

The policy option of a frequent flyer tax was analysed by Larsson et al. (2020), which found that the Swedish public support was weak. However, this finding could be explained by the novelty of the tax, as survey answers tended to be more negative towards previously unknown proposals (Larsson et al., 2020). Matti et al. (2022) argued that a fee-and-dividend, which directs the revenues back to the public, is an alternative that could increase the support of a frequent flyer tax.

The experts raised questions about how a frequent flyer tax could be designed to increase its feasibility. Several experts commented on the possible integrity issues in registering all flights. A way to solve this problem, one expert suggested, would be to design a frequent flyer tax in such a way that the tax on one or two flights would be deductible in the yearly tax declaration. With this design, a state registry of flights would not be needed. If a person wanted to "hide" having made a specific flight he or she could refrain from making the tax deduction. It was suggested that public acceptance of this tax could be increased if the frequent flyer tax was geared towards individuals with very large carbon footprints. Yet, it could also increase resistance from special interest groups (for instance, for business travel). Some experts discussed the challenge of establishing a tax that would be high enough to effectively reduce emissions, while being low enough to win public support (and not meet too much political resistance from special interest groups). If the tax level is too low, better-off frequent flyers could bear the cost and maintain their travel habits, while migrants flying frequently to visit family might be disproportionately affected.

In the second round, more experts agreed that issues of monitoring the policy proposal constitute a considerable obstacle to its feasibility. Others agreed that less affluent groups would be disproportionately impacted by the tax. The mean ranking also fell from 3.5 points in round 1, to 3.0 points in round 2. Most, however, maintain that given the right design and information, a frequent flyer tax could become publicly supported because of its strong appeal to equity and fairness.

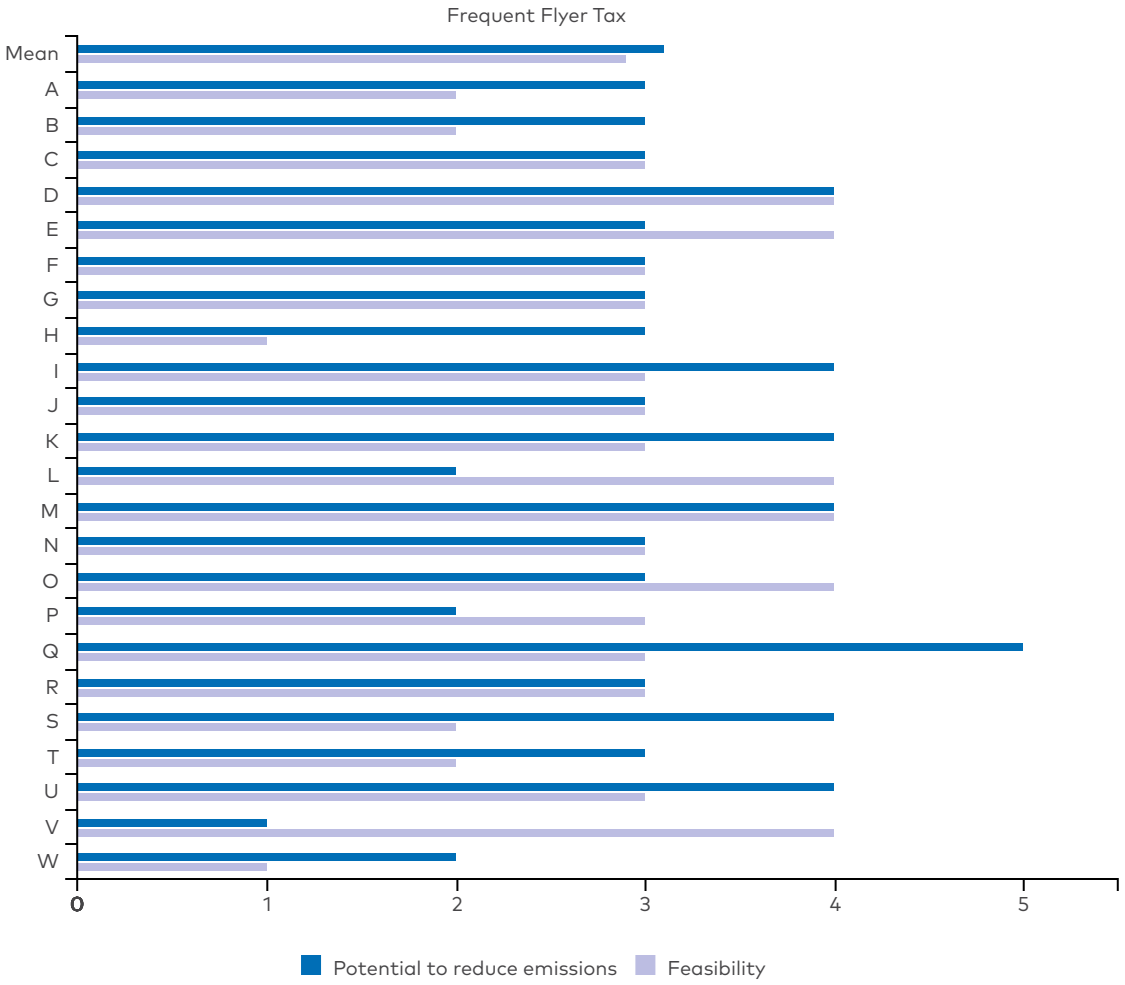


+ strong, fair transition appeal (frequent flyers can generate very large individual carbon footprint)

+ information about its content could raise the public acceptance

- integrity issues and administrative difficulties (can perhaps be solved by a tax deduction system)

- risks legitimising a one-flight-per-year norm



Round 1.

In Figure 14 and below, the results for the policy instruments that were only considered in Round 1 are presented. Comments from the Nordic expert group are summarised, including pros and cons with the respective policies. For each policy, the mean rankings of the potential to reduce emissions and feasibility estimated by the 23 experts are listed.

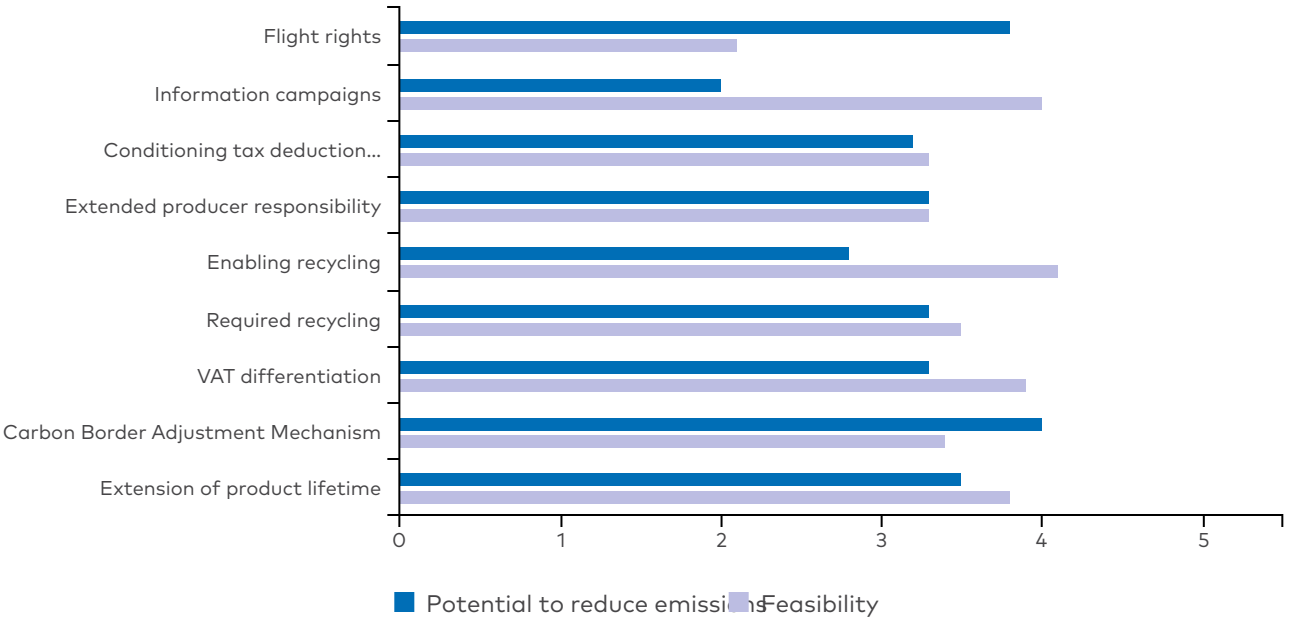


Figure 14. Selected policies for Policy Delphi round 1.

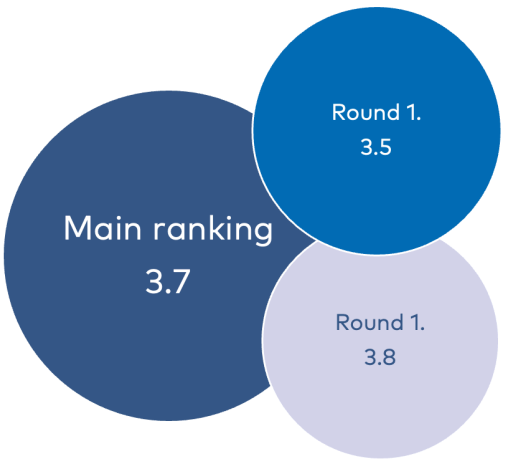
The policies are arranged from the lowest mean ranking (both "potential to reduce emissions" and "feasibility), "flight rights", to the highest ranking, "extension of product lifetime".

Extension of Product Lifetime

Enhancement of product lifetime, including bans on planned obsolescence, and on the disposal of unsold and functional products.

Example: France introduced legislation against deliberately planned obsolescence in 2015, and against "irreparability" in 2020.

Ways to extend product lifetime for home furniture and textiles in Sweden are explored by Mont et al. (2021). Generally, the experts judged this policy measure as potentially effective, feasible, and necessary. This policy measure was not included in the second round of the Policy Delphi because it was judged to be best handled on the EU level (beyond the focus on national policy in this report).



+ has strong public support

+ possible co-benefits in reducing material use and creating new business opportunities

- hard to monitor and enforce bans on planned obsolescence

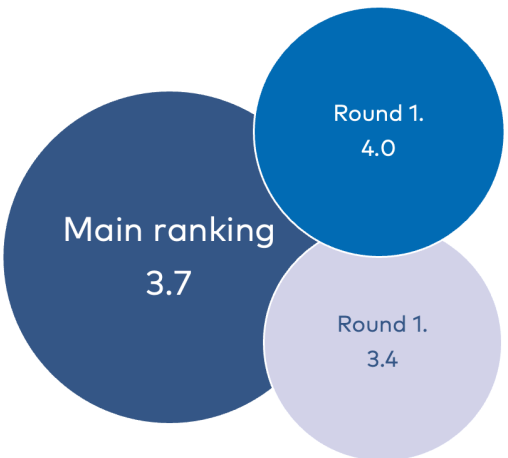
- trade-off with energy-efficiency gains of new products, such as new cars, fridges, etc.

Carbon Border Adjustment Mechanism

Importers who bring certain types of goods into the EU from third countries are obliged from 1 January 2026 to declare embedded emissions of greenhouse gases in the goods and to pay a fee corresponding to the costs for the European certificates for the embedded emissions unless they have already paid a corresponding tax or fee in the producing country. This policy measure could be used for different types of goods and for any air pollution or other environmental impact.

Climate tariffs on imported goods have been discussed for many years as a way to reduce embodied emissions and protect domestic industries from undue competition from regions with less stringent climate policy regulations (Persson et al., 2015). The joint foreign trade policy in the EU means that these discussions have led to an EU-level framework. One expert remarked that it is still uncertain if the non-EU member Norway will join the EU CBAM.

The experts' comments underscored the expectation that CBAM regulation could protect European industries and jobs *and* facilitate more stringent climate policy, while pressuring countries outside the EU to price carbon. However, some experts were more cautious, warning that CBAM could cause trade conflicts and have negative economic impacts on exporting countries. One expert argued that more focus should be on collaborating with exporting countries to implement cleaner technologies (e.g., technology transfer and investments). The experts also noted difficulties in calculating embodied carbon emissions in imported goods, leading to overall issues of monitoring in any expanded CBAM regulation. Although the experts described CBAM as a key piece of legislation, it was not selected for the second Policy Delphi round based on the focus on national legislation for this report.



+ safeguards EU industries and jobs

+ incentivises exporting countries to price carbon

- potential trade conflicts and negative impacts on the economy of exporting countries

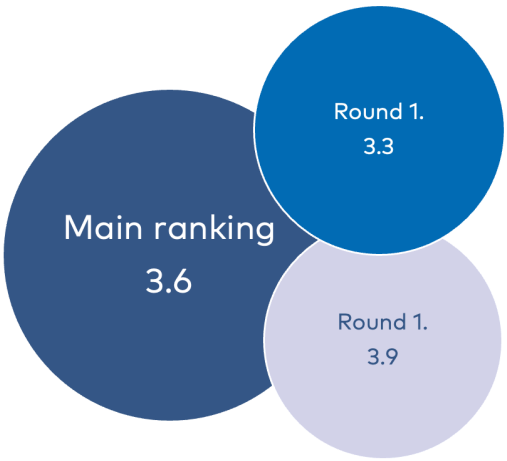
VAT Differentiation

Regulate the VAT so that it is lower on services and used goods, to promote repairs over new purchases.

Example: In 2017 the Swedish VAT on certain repaired goods was lowered from 25% to 12%. This policy was repealed in 2022.

Proposals for VAT differentiation are discussed in academic as well as non-academic publications. Examples include reduced VAT on services such as rental services, and hairdressing (Larsson and Nässén, 2019), differentiated VAT on food, based on health impact and environmental effects, including increased VAT on red meat and reduced VAT on fruit and vegetables (Röös et al., 2021).

The experts' evaluation of VAT differentiation was generally positive. However, most experts deemed the overall potential as moderate. One expert noted that since most consumption causes emissions, a general raise of consumption taxes could be called for. Experts who have ranked the highest potential to reduce emissions (5), seemingly see a VAT differentiation as part of a larger VAT reform. Such reforms could substantially shift the cost between consumption categories towards categories with higher impacts and reduced costs on consumption categories with lower impacts. For the second round of the Policy Delphi, we have considered such proposals under the broader "consumption taxes" section. VAT differentiation was therefore not included in round 2, even though it scored fairly high.



+ already tested system (proposed in Norway and introduced and later removed in Sweden)

+ high public acceptance

- administrative difficulties and costs (making the VAT system more complicated and thus a less popular reform among tax authorities)

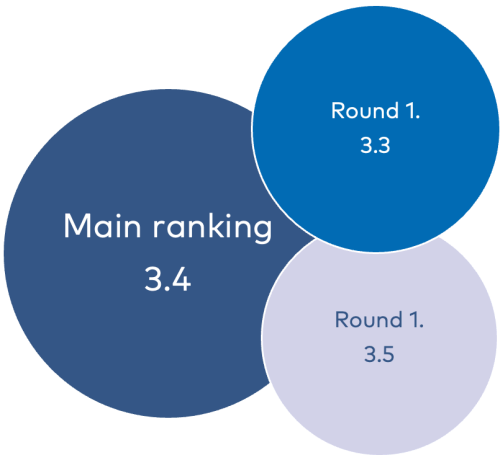
Required Recycling

A ban on disposing products and materials that can be reused or recycled is introduced. The ban includes landfilling and incineration strategies of disposal.

Example: In many countries, there is a ban on landfilling of organic materials. The next step in the waste hierarchy could be to ban the incineration of materials that can be recycled.

Proposals for required recycling include requirements for the sale of leftover food (Parekh & Svenfelt, 2022). Such legislation has, for instance, been implemented in France and proposed in Norway. Experts note that regulation for waste prevention and management is favourable to implement across the EU.

Required recycling can be compared to enabling recycling, where the former has a higher potential to reduce emissions while the latter is deemed more feasible.



+ could facilitate a circular economy of recycled materials

+ should be combined with standards to increase recyclability

- landfilling of plastics could be favourable over incineration (which emits GHG, at least until Carbon Capture and Storage is in place)

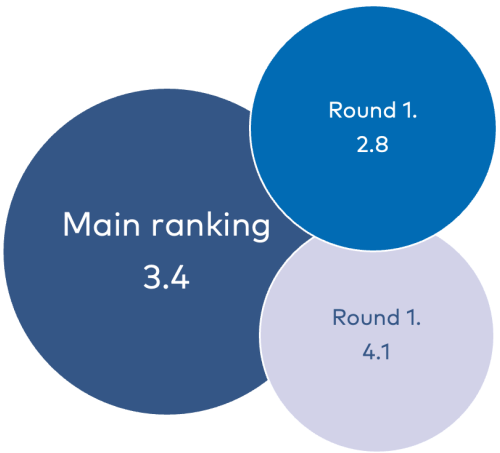
- efforts to avoid waste should take precedence. This follows from the EU waste hierarchy (EU waste framework directive (Directive 2008/98/EC)

Enabling Recycling

Provide facilities for consumers to recycle products and materials at the end of use.

Example: Demand that there be waste disposal sites close to where people live.

Enabling increased recycling is a commonplace proposal for sustainable consumption (Dalhammar et al., 2022b). Systems for recycling are common across the Nordic countries. The experts judge this policy measure as highly feasible, but it needs to be expanded to have a greater potential to reduce emissions. Expectations regarding the degree to which enabled recycling could reduce emissions are moderate. Several experts note that reductions in overall consumption that produce waste are more important. Moreover, longer lifespans of products, before they become waste, are also preferable.



+ an already existent and popular system which could be expanded

- moderate expectations of potential to reduce emissions

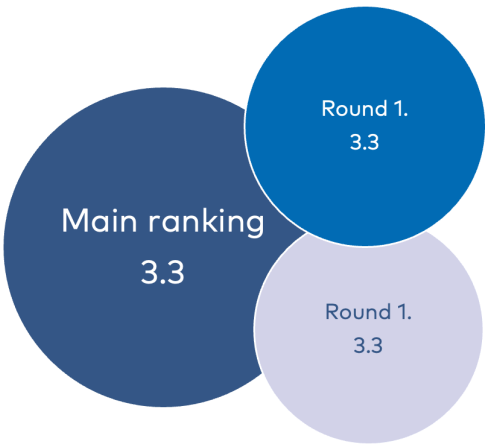
- efforts to avoid waste should take precedence

Extended Producer Responsibility

Producers are responsible for collecting and recycling products at the end of use.

Example: In several countries, producers must collect and recycle packaging materials and electronic product waste. This requirement could be expanded to other product categories.

Proposals for extended producer responsibility (EPR) are, for instance, discussed by Schoonover et al. (2021) and Dalhammar et al. (2022b). New areas for EPR include consumer durables, such as furniture, which are not consumed often but have substantial environmental footprints. Several experts comment that the EPR is vital to promoting a circular economy. However, the policy design must facilitate production changes and not only confer extra costs to the customer. Moreover, EPR is insufficient and must be complemented by overall demand-side reductions for several types of products.



+ changes in design could increase recyclability

- needs the "right" policy design to change production and be effective

- could meet resistance from commercial interests

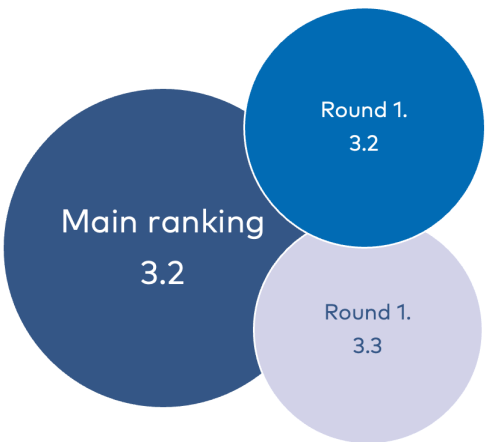
Conditioning Tax Deductions for Home Repairs

Tax deductions can be made for home repair costs if the repair increases energy efficiency or reduces the use of resources and materials.

Example: In Sweden, a person (i.e. not a company) who hires a craftsman to do ROT (Repairs, conversion, extension) work may be entitled to a tax deduction – a ROT deduction for labour costs. In practice, this deduction subsidises increased recourse use, which is why a condition is being suggested.

In 2022, the cost for the ROT deduction for the Swedish government was 12 billion SEK, which is substantial. "The Swedish National Audit Office recommends that the government reduce the ROT deduction by designing it in a way that increases its cost-effectiveness in relation to the goal of combating undeclared work" (Riksrevisionen, 2023, p. 6, our translation). There is also a gendered bias to this policy. Following the Swedish National Audit Office, 60% of the tax deductions from ROT are given to men and 40% to women. Thus, our proposal is a green design of an existing policy.

One expert comments that Denmark has had a system for tax deductions in place, but it was removed in 2021. A similar system has also been discussed in Finland for many years but has not been implemented. An administrative issue that is brought up is that energy-saving renovations are often performed in combination with another refurbishment. Distinguishing renovations that conserve from those that increase energy and resources use could thus be difficult.



+ large potential in reduced carbon footprints for older buildings (in energy systems relaying on fossil energy)

- difficulties in administering deductions

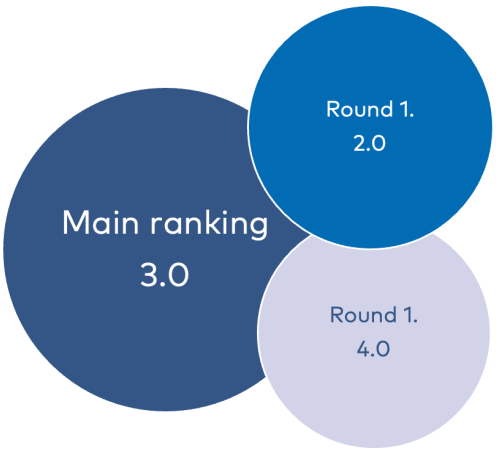
- possibly unfair as it benefits homeowners, i.e. it is regressive (a critique valid also for the present ROT deduction in Sweden)

Information Campaigns

Information campaigns that inform consumers on products and behaviour that cause high emissions of greenhouse gases and other air pollutants.

Example: Already existing guides and advice for food could be broadened to include also other consumption categories.

An extensive body of research explores (and critiques) information campaigns aimed at promoting sustainable consumption (for instance, see Shove, 2010; Fischer et al., 2021). The expert judgments point at high feasibility and low potential to reduce emissions (the direct opposite of flight rights discussed below). The comments underline that information campaigns alone cannot change behaviour but may complement broader policy packages.



+ can increase the effectiveness and acceptance of other policy measures

+ high feasibility

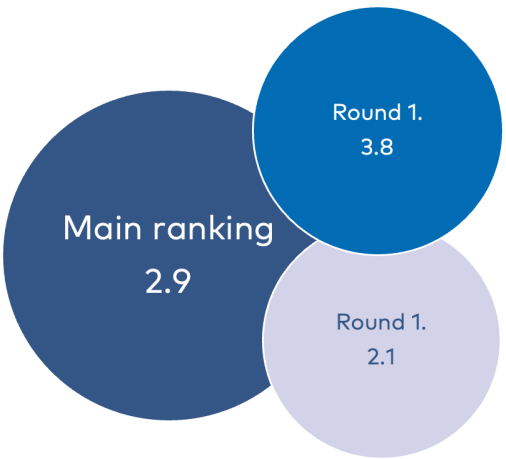
- low potential to reduce emissions/little impact on behaviour

Flight Rights

Consumption can be regulated by allocating emissions rights to consumers. Flights rights can be used a proxy for emissions.

Example: A system with individual flight rights can be compared to the EU's Emissions Trading System (ETS). Individual flight rights could, in a similar way, be used, saved, sold or cancelled. The question of whether or not individual flight rights could be traded is not discussed here.

Flight rights, in terms of personal carbon allowances, have, for instance, been studied by Larsson et al. (2020). Their findings indicate that, at present, the Swedish public support for such a measure is low. Also, in the Policy Delphi, the experts express that the overall feasibility of flight rights is low while the potential to reduce emissions is high. This makes flight rights stand out, with the greatest discrepancy in ranked feasibility and potential. The potential to reduce emissions also extends beyond GHG, as reduced air traffic with current combustion technologies would also reduce other local air pollutants (e.g. NO_x) and noise (Riley et al., 2021). Several experts note the administrative difficulties in setting up a system of flight rights and that the public registry of who travels where could be problematic regarding private integrity.



+ high potential to reduce emissions

+(-) equal rights are fair, but affluent frequent flyers could buy up quotas

- integrity issues and administrative difficulties

- low public support

Cross-Cutting themes in the Policy Delphi

The iterating process of the Policy Delphi-method can be seen as a filter. Only policies that the panel of experts considered promising enough in terms of potential to reduce emissions and feasibility pass through the filter. Following this process, all 21 policies discussed in round 1 of the Policy Delphi have passed the filter once. The twelve policies discussed in round 2 have passed the filter a second time. This does not mean that other policies from the longlist are not promising. Some of them could have qualities not considered here.

Here we summarise a few key lessons from the Policy Delphi process. Very few policies are judged to have no potential or be fully unfeasible. Instead, most policies are seen as important, but have little impact on their own. The comments also make clear that many types of the included policy measures are implemented somewhere in some form at present, but that more stringent policy design and enforcement is needed.

An important issue which recurred in the comments is that of resistance/acceptance towards policy measures. Such resistance is understood equally in terms of public resistance, as in political resistance and resistance from commercial interests. At present much focus has been put on public resistance to policies, but our expert comments underline that resistance from commercial and other interests are important factors.

The question of resistance/acceptance is occurring at the level of policy proposal and policy design, in terms of implementing *strong* versions of policy measures, and the risk of public or commercial interests' resistance. A fruitful direction for further exploration would be to analyse *stronger* versions of policy design for already existent policies (e.g. how to move from a *weak* to *strong* version of a certain policy). Relatedly, further research is needed to determine whether combinations of policy measures could make them more acceptable. That is, if a policy package consists of 'sticks' as well as 'carrots,' it could increase the feasibility of one or several measures. This question is highly relevant but outside the scope of this report.

Generally, there are low expectations on informational policy measurements. However, the fact that they have limited effectiveness on their own does not mean that they are unnecessary. It is more accurate is to call information campaigns insufficient. They should be expected to have limited impact if they are not combined with other policy instruments. In some contexts, information campaigns can be a necessary part of a policy package and/or a sequence of policy measures (for example, to create legitimacy for an environmentally progressive policy) or to convey and teach practical skills (Klintman, 2024, personal communication;

Klintman, 2017). Information is seen as important to raise the public acceptance for stronger policy option. Following analysis in chapter 5 Policy and Acceptability: *"Informational policies like labelling are often the most preferred type of consumer policy"*.

The mean ranking of policy measures decreased in many cases in round 2 as the experts took in objections raised by others. This decrease may be read as a sign that the participating experts took the exercise seriously and allowed other experts' comments to influence their own rankings.

Several experts noted difficulties associated with implementing consumption or carbon taxes, where consumption or businesses might move across borders. Examples include, how a Swedish flight tax could move air travel to Kastrup in Copenhagen, or Norwegian food taxes increasing boarder shopping in Sweden. This suggests that there is a need to harmonize consumption and carbon taxes across the Nordic countries. Harmonized tax levels would disincentivize shifting consumption over boarders and create equal terms of competition between Nordic businesses.

8. Discussion and Conclusion

As pointed out by the EU's Scientific Council (2024), most policy instruments traditionally have been technology-focused and aimed at the supply side. There are however several examples of demand-side policy instruments, e.g. carbon taxes on fossil fuels.

In addition to the direct effects linked to individual behaviour (like driving or heating and cooling your house), changed behaviours can potentially impact emissions 'upstream' (activities that produce consumer goods, including from imported goods) as well as 'downstream' (e.g. emissions arising from waste disposal). This also means that changes in behaviour can impact 'embodied' emissions in imports as well as domestic production (Grubb et al., 2020).

Moran et al. (2020) estimates that opportunities from changes in consumer behaviour could reduce the EU's overall carbon footprint by about 25%. Thus, substantial reductions, crucial for reaching nationally as well as internationally set mitigations targets can be achieved with existing technologies already in place. This is also in line with a Swedish study focused on food, holiday travels and furniture (Carlsson-Kanyama et al., 2021). The original call from the Nordic Council of Ministers suggested to limit the study to policies targeting consumption of electronics, food, textiles and home furnishings (or rather emissions of GHGs and other air pollutants stemming from this consumption). This turned out to be immaterial since very few policies were this specific. In order to conduct a broad survey and report substantial results, we had to broaden our scope to other categories of consumption.

New Policy Instruments May Be Politically Sensitive

Consumption-oriented policies could be necessary as well as cost-effective ways to reduce emission. They are however less common, partly because it is politically sensitive to point at individual behaviour and how these behaviours should change.

Acceptance of policy instruments is necessary for their implementation. This acceptance is needed both among decision-makers and the general public (Ewald et al., 2022; Coleman et al., 2023). Acceptance of policy instruments can increase if multiple instruments are combined, e.g. in packages containing both carrots and sticks. Combining reduced consumption, or reduced emissions from consumption, with other goals, such as improved health and lower household expenditures, can also be effective as a driver of change (Tobi et al., 2019). For example, there might

be more positive response from a message highlighting the health aspects of a certain diet, rather than focusing on its environmental effects. Additionally, the order in which policy instruments are introduced can affect how they are received and their effectiveness (Meckling et al., 2017). In this project, we compiled policy instruments aimed at consumption and analysed them in terms of effectiveness and feasibility, to ultimately provide policy recommendations.

Consumer-based policy faces several challenges in design and implementation. One challenge is the political risk associated with targeting households and private consumers, i.e. to tell individuals what to do and place responsibility of action and the potential economic burden on households instead of companies and governments. Consumption based policies thus have a potential for controversy (Schanes et al., 2019; Grubb et al., 2020). Thus, consumer policies have to be transparent and supported by the same democratic processes, public debate and critical scrutiny of their costs and benefits as are other policy instruments.

One example of a recent public debate over a consumer policy is when the Nordic Council of Ministers' secretary general Karen Ellemann launched the idea of a tax on meat and sugar coordinated across all Nordic countries. Ellemann (2024, our translation) argues: "If the Nordic countries jointly implement these types of policy measures, it can increase public acceptance, which often poses a challenge. Acting together can also reduce the risk of trade simply shifting across borders and simplify things for the food industry by having similar regulations and conditions in all Nordic countries". The value of this proposal, however, was immediately disputed by Finland, Norway, and Sweden's Ministers of Agriculture (Essayah et al., 2024, our translation): "A Nordic meat tax is completely the wrong approach." The ministers continued: "Developing a meat tax would hit Nordic agriculture hard – to the detriment of both farmers, the climate, and consumers." This example illustrates the political sensitivity around introducing consumer policy targeting food.

It is however interesting to note that all the Nordic countries have a significant number of consumption-oriented taxes and other policy instruments in place which have widespread acceptance. One example is the VAT which in some countries also is differentiated between different product groups. Other examples include taxes on alcohol and tobacco products. In addition, there are other types of policy instruments for these products including regulations on when and how the products can be sold and on advertising. Among the environmentally oriented consumer-oriented policies there are CO_2 taxes on fuels and bans on certain hazardous chemicals. All these policy instruments have, in general, a high acceptance in the Nordic countries. This suggests that it should be possible to increase the number of consumer-oriented policies for environmental purposes.

Conclusions from the Policy Delphi

In the process of identifying effective and feasible policies, we assembled a longlist of policies that are either in use today, have previously been used, or have been discussed in the Nordic countries. This list contained approximately 100 policies which are briefly described in Table 6. A cross-Nordic panel (listed as the authors of this report) was used to review the mapping and select 21 policies with high potential and feasibility for the Policy Delphi. In the Policy Delphi, 23 experts were invited in two consecutive rounds to rank policies according to their potential to reduce emissions and their feasibility.

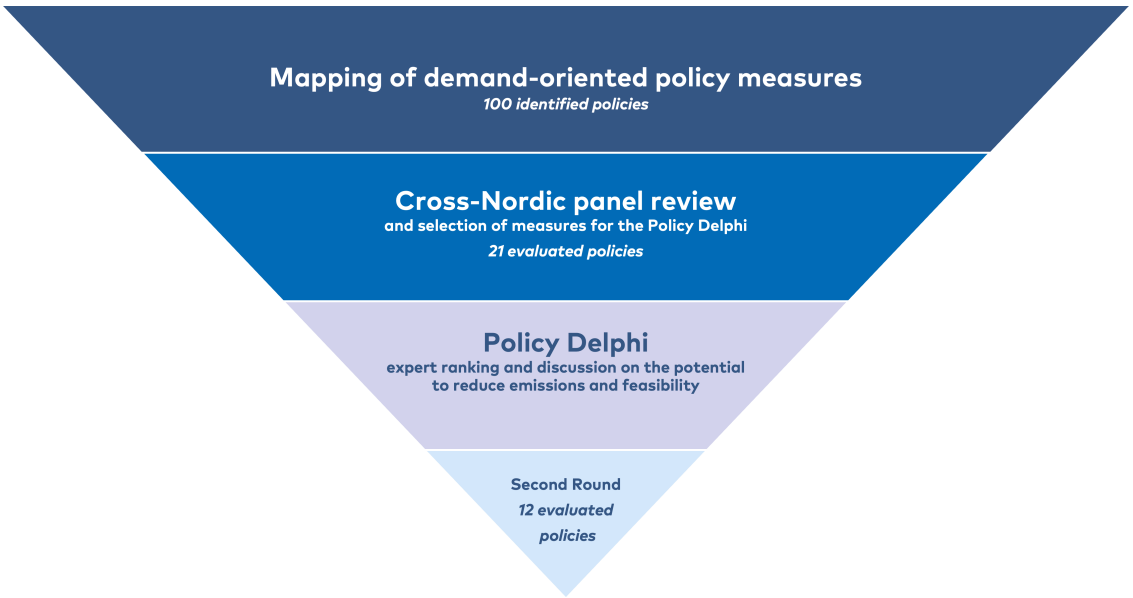


Figure 14. From the longlist of policy measures to the shortlist of policies identified as most promising through a review of Nordic experts and a two round Policy Delphi.

When considering the potential to reduce emissions and the feasibility of the different policies, the respondents were instructed to consider distributional effects, feasibility and legal constraints, as requested by the Nordic Council of Ministers. They were also asked to consider efficiency in reducing emissions, cost-effectiveness, and acceptability. In Figure 15, we have modified the model illustrated in Figure 1 in the introduction to include these aspects. The model also illustrates that acceptance is closely linked to perceived distributional effects and, in turn, the feasibility of a policy instrument. Thus, according to the respondents,

the policies most interesting in terms of reducing emissions of GHGs and other air pollutants scored relatively high in most of the aspects of Figure 15.

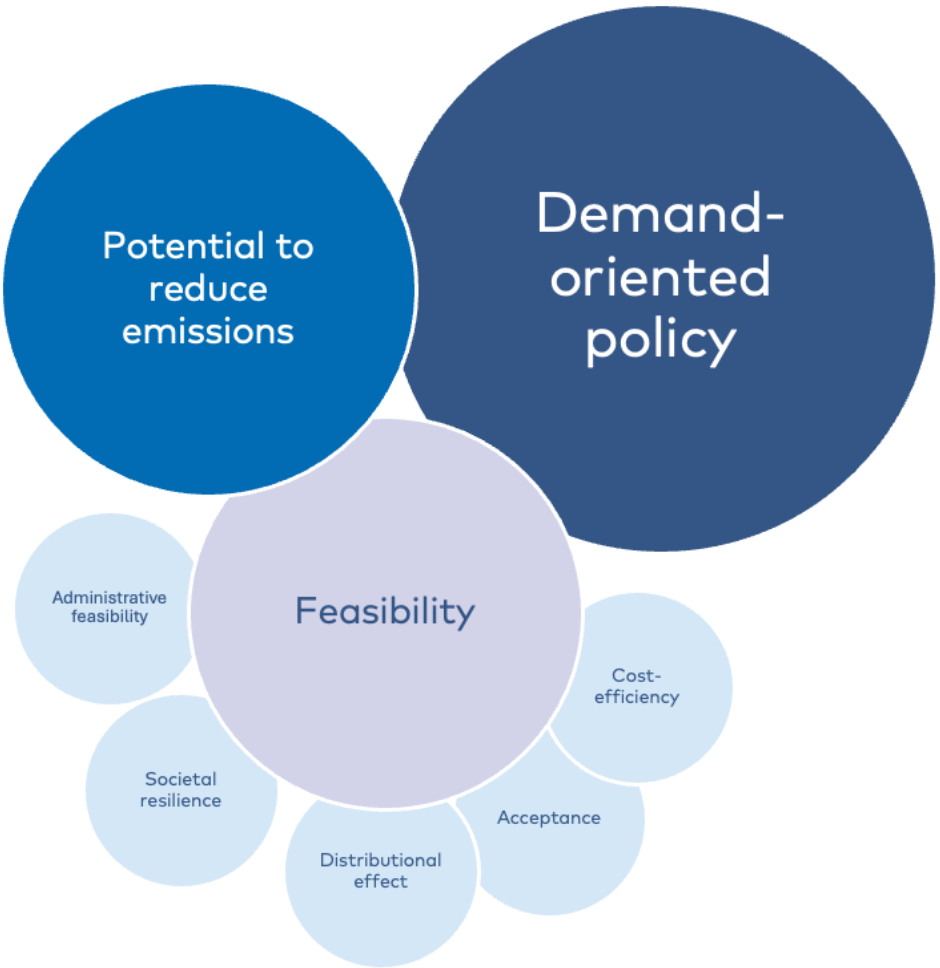


Figure 15. Policy for Consumption-Based Emissions (extended version)

Not all policies that were highly ranked by the experts were selected for the second round. One example of a policy scoring high on both potential to reduce emissions and feasibility was the CO_2 border duty CBAM (Carbon Border Adjustment Mechanism). This policy is however not a national competence - it is decided upon at EU-level. Following this, *CBAM* was not included in round 2 of the Policy Delphi. Neither was *Conditioning tax deduction for home repairs.* This policy suggestion will not result in increased expenses for the government. On the contrary, it is an example of reducing a subsidy for activities causing emissions. The proposed policy thus has the potential to save governmental expenses as well as to reduce

emissions. However, following comments from the experts, it was seen as too difficult to discriminate between home improvement investments that will decrease, or increase, emissions/related environmental impacts associated with building.

The 12 policies in round 2 are fairly evenly distributed across different categories of policies (see Table 7). Three can be categorised as information policies. Four of the policies concern taxes and three are examples of subsidies. One policy, fee and dividend, qualifies for both the tax and the subsidies categories. Three policies are categorized as regulations. These three are rather different. A ban on short flights does not have much in common with regulatory standards or public procurement. This is a simple and straightforward way of categorising, but one could argue that the categorization should be done differently. For example, reduced incentives for commuting to work by car is, of course, as much a regulation as a reduced subsidy or tax deduction, and public procurement could not be performed without taxes.

Table 7. Categorizing the twelve policies in Policy Delphi round 2

Policy	Labelling or other information	Tax	Subsidy, dividend or tax deduction	Regulations including ban	Climate related	Other air pollutants
Frequent flyer tax		X			X	X
Product labels	X				X	X
Advertising regulation	X				X	X
Fee & dividend to low-income households		X	X		X	X
Ban on short flights				X	X	X
Carbon tax		X			X	X (indirectly)
Consumer guides & dietary advice	X				X	X
Consumption taxes		X			X	X
Subsidies to increase demand for low emission products			X		X	X
Reduce incentives for commuting to work by car			X		X	X
Public procurement				X	X	X
Regulatory standards				X	X	X

Reduced incentives for commuting to work by car do not result in increased expenses for the government. On the contrary, it most likely would save tax money as well as reduce environmental damage. As practiced in Sweden today, the tax deduction for commuting by car is a textbook example of a perverse incentive[4]. Designing tax deductions for home repairs that increases energy efficiency or reduces material use would be a good example of how to deal with perverse incentives, but that policy did not make it into round 2 of the Policy Delphi.

All twelve policies in round 2 of the Policy Delphi are related to climate. All of them impact at least indirectly other air pollutants as well. This is because, as discussed above, many airborne pollutants stem from the combustion of fossil fuels. Targeting transportation, e.g. flying or commuting by car, will have positive effects beyond the reduction of GHGs emissions. Policies that increase demand for biofuels could be an exception, since the incineration of biofuels emits air pollutants including NO_x and PM.

One reflection is that several of the 12 policy options do not directly target consumption. Another reflection is that some policies focus directly on greenhouse gases and only indirectly on other air pollutants. Of course, general policies such as public procurement, regulatory standards and consumption taxes, could be geared towards any environmental issue. A third reflection is that out of the studied policies, quite a few policies target transportation (see Tables 6 and 7 above), which initially was not a main objective of this study. Two out of the twelve policies directly concern flying – a frequent flying tax and a ban on short flights. Few policies in the compilation of policies directly target food consumption, electronics, textiles or home furnishing, which were specified areas of consumption to study following the call. Whether this is a sign that these areas are neglected, or if they are covered in other ways in environmental policy, is out of the scope of this study.

Pros and Cons of Consumption Taxes

When using economic policy measures, such as taxes, it is generally accepted that it is most cost-efficient to place the tax on emissions. This approach provides both producers with incentives to reduce emissions and consumers with incentives to lower their consumption of high-emission products, as these become more expensive due to the emission tax. If consumption is taxed instead of emissions (for example, taxing beef instead of methane emissions) it does not directly incentivize producers to mitigate emissions.

However, there are several exceptions where consumption taxes are worth considering (Morfeldt et al., 2023). One example is when international agreements prevent the taxation of emissions. This is the case for international aviation.

4. Perverse incentive - Wikipedia

Another example is when monitoring costs related to emissions are prohibitively high (Schmutzler and Goulde, 1997), as may e.g. be the case with methane emissions from the agricultural sector.

Especially for small, open economies, such as the Nordic countries, it is also important to consider that emission taxes can lead to decreased competitiveness for domestic producers, resulting in increased imports and job losses, but not necessarily any reduction in global emissions. These "leakages" can, at least in part, be reduced by providing subsidies to farmers and other producers, as has been proposed in Denmark along with a methane tax (Svarer, 2024). The leakages can also be reduced by taxing consumption instead of emissions.

It is also important not to conflate the relatively high consumption taxes required to generate substantial emission reductions with high societal costs. When collecting consumption taxes, other taxes can be reduced or the tax revenues can be used for subsidies or other purposes benefitting society. The same is true for emission taxes. It is unclear how the economy and employment would be impacted by high consumption taxes on, for example, beef and air travel, which would depend on how the tax revenue is spent (this could include corresponding reductions in income taxes and/or increases in transfer incomes or public consumption.)

Policy Recommendations

Our main message is that available consumption-based emissions statistics and trends motivate and support policy action. This action could be further supported by improved statistics, clear policy ambitions and Nordic cooperation. Furthermore, our mapping shows that there is no lack of possible options for policymakers that seek to reduce consumption-based emissions. Here we have used Nordic experts to identify a longlist of current and potential consumption-based policies, to rank and evaluate 21 different policies, and to identify a number of particularly promising policies, detailing possible barriers and enabling aspects. We recommend further analysis to combine promising policies in actionable and effective packages.

Improve Statistics and Set Clear Ambitions

Across Nordic countries, we see a number of efforts to publish consumption-based GHG emissions statistics. Sweden has been at the forefront for many years, publishing data on consumption-based GHG emissions as part of its official statistics. Finland and Denmark also publish annually official consumption-based GHG statistics. The Norwegian Environmental Agency published its first estimation of consumption-based emissions in 2024, while Iceland relies on research estimates. Consumption-based emissions accounts of other air pollutants are lacking in most studied countries. The capacity to compare emissions statistics across the Nordic countries is limited, as the consumption-based GHG emissions statistics are

produced using different methods and databases. Better statistics could improve this situation on the EU and international levels and efforts are underway in this direction (Guilhoto et al., 2023).

In all Nordic countries, there are policies in place to reduce the consumption-based emissions of GHGs and other air pollutants. In Sweden, a target has been proposed by the parliamentary Environmental Objectives Committee to have a negative global climate impact by 2045. Similarly, the Danish Council on Climate Change (2023) has proposed setting national benchmarks for reducing consumption-based emissions. Moreover, clear national ambitions could support local targets already being put into place, for instance by Swedish municipalities.

Pursue Nordic Cooperation

Emissions imported to the Nordics, to a high degree, originate from major trading partner countries, including Germany, USA, and China. A non-negligible amount of exported and imported emissions are inter-Nordic (e.g., circa 4% of Sweden's consumption-based GHG emissions originate from Denmark, Finland and Norway combined). In this way, the Nordic climate transitions are interconnected. If production-based emissions in one Nordic country are reduced, it will help the other Nordic countries to reduce their consumption-based emissions. Correspondingly, failure to transition key exporting industries may have repercussions in importing countries. For example, Sweden's steel exports and Denmark's exports of agricultural products are important not only for Sweden and Denmark, but also for the importing countries. Furthermore, if the Nordic countries can uphold a leadership position on climate, increased Nordic trade is also likely to reduce consumption-based emissions, as these imports will be less emissions intensive (e.g., compared to imports from China).

To attain leading positions, ambitious consumption-based climate policies are necessary. These include consumption taxes on high GHG-emitting items including beef and air travel. Implementing these taxes in one country may lead to tax avoidance strategies by consumers or companies, such as purchasing meat or flying from neighbouring countries. However, the impact of such avoidance strategies should not be exaggerated, as they typically require additional time and effort compared to local purchases. Minimizing this issue is possible by aiming for tax harmonization among the Nordic countries.

Take Advantage of the Longlist of Possible and Promising policies

Both the IPCC (2023) and the European Scientific Advisory Board on Climate Change (2024) underscore the need for demand-oriented climate mitigation, supported by the statistics presented in this report. In our mapping, we have identified around one hundred consumption-oriented policy measures that can be used to reduce emissions (see Table 6). This broad spectrum of policies indicates that there is no silver bullet, but ample opportunity to select multiple policies which support each other in broader policy-packages. Circumstances and political priorities vary across and within the Nordic countries, but the wide set of policies shows that there are many ways forward.

Areas of policy measures include informational, regulatory, administrative and economic policies. The debate on sustainable consumption could benefit from acknowledging the wide range of means to reduce demand and consumption-based emissions, which does not limit itself to informational campaigns or raised consumption taxes. Moreover, most of the identified policy measures have been implemented in some form, showing that consumption-based policies are not a new arena for environmental policy-making. Potential policy strategies, including policy packages, would have to be supported by clear conceptions of how policies would interact, and how they should be package.

Using expert rankings and commentary, we have identified particularly promising policies (see method section on the Policy Delphi method). The policy instrument which was awarded the highest overall ranking was regulatory standards. National laws that regulate pollution produced by a particular production process, or product, is a common and well-proven policy approach. Yet, this is an approach which the experts find worth developing further, because it has a high potential to reduce emission and because of its high feasibility. Regulatory standards are also possible to harmonize on a Nordic level. It is an area where the EU is moving ahead with, e.g., the Ecodesign Directive. Public procurement is awarded a similarly high ranking. Policies which target public procurement to achieve sustainability objectives are in place in all the Nordic countries, yet the experts see great potential for emissions reduction in using such instruments more.

Two instruments which are of EU, rather than national, competence was selected for the first round of the Policy Delphi because of their high relevance for decreasing consumption-based emissions. These instruments were also highly ranked by the experts. However, they were excluded in the second round to give space to deepen the analysis of national policy instruments. One of the instruments was *Extension of Product Lifetime,* which is understood as having high public acceptance while also bringing the co-benefit of reducing material demand. The second instrument was the *Carbon Border Adjustment Mechanisms* which, has

gotten a lot of attention in recent years and "will apply in its definitive regime from 2026, while the current transitional phase lasts between 2023 and 2025" (European Commission, no date).

Highlighting the need, not only to implement instruments targeting emissions, but to remove perverse incentives encouraging increased emissions, the experts rank reduced incentives for commuting to work by car highly. Road transport makes up a large portion of the consumption-based GHG emissions, and negatively impact air quality and health in cities.

Furthermore, the experts see a large potential in using subsidies to increase demand for low emission products. Such subsidies could be viewed as "carrots" to choose less emission intensive products. Subsidies can reduce prices of product segments and have the potential to stimulate new markets. For instance, Norwegian EV subsidies to encourage market growth for these products could further benefit other Nordic countries.

Consumption taxes are also among the highest ranked policy measures. Consumption taxes are extensively debated in both the academic literature and political contexts, concerning levels, design and areas of application. We do not engage further in such debates here, our recommendation is limited to the expert's opinions, which firmly establish consumption taxes as potentially very effective and a key part in broader policy strategies.

Table 8. High ranking "promising policies"

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Policy instruments	Mean ranking	Enabling aspects (+) and possible barriers (-)
Regulatory standards	**3.9**	+ same rules for all + generally high feasibility and potential to reduce emissions - works better for few large producers than for many small - risk for production moving to other countries
Public procurement	**3.9**	+ generally high feasibility and potential + substantial indirect effects - "Feasibility depends on the political parties in office"
Reduce incentives for commuting to work by car	**3.7**	+ "it is a weird subsidy that should be removed" - those affected are likely to oppose - low political feasibility in Sweden
Extension of product lifetime	***3.7****	+ has strong public support + possible co-benefits in reducing material use and creating new business opportunities - hard to monitor and enforce bans on planned obsolescence - trade-off with energy-efficiency gains of new products, such as new cars, fridges, etc.
Carbon Border Adjustment Mechanism	**3.7***	+ safeguards EU industries and jobs + incentivises exporting countries to price carbon - potential trade conflicts and negative impacts on the economy of exporting countries
Subsidies to increase demand for low emission products	**3.5**	+ generally high feasibility and potential + removal of fossil subsidies a potentially effective measure - risk of subsidies benefitting affluent consumers and marginally better technologies
Consumption taxes	**3.4**	+ significant potential to reduce emissions - possible unequal distributive effects - low public acceptance (but possible to counteract) - strong opposition from producers

*ranking from the first round

Reduce Barriers to Policy Implementation

The expert comments pinpoint a wide range of possible barriers to policy implementation. In most cases, they give directions towards how these barriers could be overcome. The most significant barrier is simply a lack of effectiveness. Experts comment that certain proposed designs of a particular policy instruments risk having little to no effect. However, in most cases there are alternative "stronger" designs of the same policy which could be effective (for example a high tax on air travel), but risk suffering from lower acceptability. Perceived effectiveness is an important aspect of gaining public acceptance, as information on the effectiveness of an instrument can increase its acceptability (see section 5).

A common theme concerns the lack of public acceptance of certain policies, although such concerns vary considerably between individual experts. Informational measures that are viewed as weak instruments in isolation, are viewed as an important complement to increasing the acceptance of other policy approaches, and therefore imperative to include in broader policy packages.

Concerns are raised in relation to policies which risk disproportionately affecting low-income groups, or other groups such as rural population. This concern echoes the literature on public acceptability, which underlines perceptions of distributional fairness as key. Possible means of compensation and exemptions that would benefit certain groups are proposed. However, as emphasized at several instances in this report, compensatory policies cannot be evaluated in isolation. For example, in Sweden environmental taxes account for 4.4% of total tax revenues, Norway 4.6%, Iceland 4.6%, Finland 5.8%, and in Denmark 5.9% (OECD, no date), all slightly below the OECD average country and pinpointing that such taxes (environmental tax includes resource tax, energy tax, transport tax and pollution tax) play a marginal role in affecting general economic inequalities.

Importantly, the expert comments depart from the typical focus on public acceptance, instead noting the role of political and commercial resistance. Although there are plenty of examples of policies affecting consumer demand in place, targeting consumers is understood as politically sensitive among policymakers (Isenhour & Feng, 2016). Moreover, in several cases experts observed that particular commercial interests stand to lose if demand for their products is reduced. They are therefore likely to resist policies aimed at reducing consumer demand.

It should be noted that both the long and shortlist of high-ranking promising policies include both carrots and sticks. These can be combined in policy packages for increased acceptance and effectiveness. When developing policy packages, a general guideline would be to include:

- Policies that punish the currently worst alternatives.
- Policies that support the currently best alternatives. Care must be taken to make sure that people most impacted by punitive policies can benefit from supporting policies.
- Policies supporting more long-term sustainable solutions.
- Information campaigns and tools that support such policies.

This report provides many suggestions that can be used in such packages.

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Engström, Eskil
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Bradley, Karin
Dotterud Leiren, Merethe
Ejelöv, Emma
Finnveden, Göran
Haugs Langvik, Karen
Heinonen, Jukka
Larsson, Jörgen
Thøgersen, John

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Ved Stranden 18
DK-1061 Copenhagen
Denmark
pub@norden.org

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DK-1061 Copenhagen
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