



Nordic Council
of Ministers

Towards sustainable consumption

in the Nordic Region



Contents

Summary	3
Introduction	5
1 Effects of private consumption	8
2 Potential to decrease negative effects of consumption	38
3 Policy measures to decrease negative effects of consumption	46
4 Conclusion	55
5 References	58
6 Appendix	69
About this publication	78

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Summary



One of the suggestions in this report is to shift from meat to vegetables. Photo: Yadid Levy/norden.org

The purpose of the assignment is to analyze the environmental and social effects that private consumption, also referred to as household consumption, in the Nordic countries, including the Faroe Islands, Greenland and Åland, leads to, and with knowledge of the effects, propose measures that can lead to more sustainable consumption in the Nordic countries. This household consumption includes specific types of personal consumption in housing, mobility, food, and other consumption of goods (such as clothing, furniture, electronics, etc.). The analysis will shed light the Nordic region's environmental "spillover effects" as a result of our consumption, as well as other social effects, in order to define areas for which it will be most appropriate to focus on in order to ensure sustainable consumption in the Nordic region.

The results of the analysis of environmental effects indicate that reveal although significant progress is made in terms of 'decarbonizing' the energy systems the global emissions continue to grow with transport as the biggest source to consumption-based CO₂-e emissions from households in the Nordic countries, followed by food and housing. Nordic households have the highest per-capita energy consumption in the EU, but greenhouse gas emissions are relatively low due to the high share of renewables in the energy supply.

Regarding the social effects, there is a need for improved due diligence, transparency and monitoring. That is the basis for a fair and ethical trade. This is also knowledge needed for companies to be able to communicate to consumers and for consumers to take conscious actions. There is a demand from both consumers and companies on regulation on due diligence. The demand from consumers will continue to be an important measure. But to change the situation, cooperation between and complementary measures from civil society, companies and governments will be required.

Based on the priorities indicated by the size of spillover effects in the thematic areas, further analysis into demand elasticity and externalities showed that it could be more feasible to decrease the negative impacts of consumption in specific areas:

- Food consumption is relatively locked but any changes that we could realize could have significant impact because there is high variation in impact across food types (across meat types and between meat and more vegetable-based diets).
- Demand for short-haul flights within the EU is quite easy to affect, whereas demand for long-haul flights outside the EU is more locked.
- There is limited scope for reducing the demand for travel by private car. Consumers are more willing to switch to cleaner modes of private transportation such as electric vehicles, and less willing to switch to public transportation (in the short term), taking public transportation options as given.
- Luxury consumption is generally found to be quite easy to change.

There is large variation in the demand elasticities (as well as the environmental impacts of products) even within narrowly defined consumption types, and this variation is difficult to observe, e.g. similar products can have different demand profiles that are not easy to observe and impacts that are hard to measure especially up the supply chain. This is a challenge for designing effective policy responses.

Based on reported CO₂-e intensities and other information in this report several shifts may be identified to be supported by policy instruments. The shifts we suggest are:

1. **Shift from beef to other meat consumption.**
2. **Shift from meat to vegetables.**
3. **Reduce food waste.**
4. **Reduce air travel.**
5. **Shift from private cars to public transportation and soft mobility.**
6. **Prolong life of goods.**
7. **Respect human rights.**
8. **Reduce overall private consumption.**

We further recommend caution with applying the results of this study since the quantitative and qualitative data collected for the analyses was limited due to the fact that we have only consulted existing databases which have large variation in underlying calculation methods and categories of products etc., as well as available research reports, thus constraining the possibility to perform additional analyses for verifying and triangulating results. Future studies should consider including more effort for gathering data on countries that are excluded from Eurostat and Exiobase, such as Iceland.

Introduction



One of the suggestions in this report is to reduce air travel, and find other way of transportation. Photo: Ricky John Molloy – norden.org

The purpose of the study is to analyze the environmental and social effects that private consumption, also referred to as household consumption, in the Nordic countries, including the Faroe Islands, Greenland and Åland, leads to, and with knowledge of the effects, propose measures that can lead to more sustainable consumption in the Nordic countries. This household consumption includes all fields of personal consumption in housing, mobility, food, and other consumption (such as clothing, furniture, electronics, etc.). Household consumption in EU stands for approximately 67% of the Gross Domestic Product (GDP) (Eurostat, 2019a). Households are therefore key actors in reaching the objectives under the Paris Agreement. To achieve the Paris Agreement's objectives, global emissions should on average be no more than one tonne per person per year by 2050.

Agenda 2030, with 17 global goals for sustainable development, aims to eradicate poverty and hunger, realize human rights for all, achieve equality and empowerment for all women and girls, and ensure lasting protection for the planet and its natural resources.

According to international rankings, the Nordic countries are far ahead in meeting the global goals compared with other countries. However, there are some goals that stand out as particularly difficult to achieve, especially goal no. 12 Sustainable Consumption and Production (SDG 12 Sustainable Consumption and Production) with its 11 sub-goals. The effects of sustainable consumption can thus to some extent be assessed by looking at target fulfillment of SDG 12, but gives only a limited picture because only certain aspects of sustainable consumption are followed up. The goal also concerns both sustainable consumption and sustainable production, but this task is limited to sustainable consumption. Sustainable consumption means not only environmental benefits but also social and economic benefits such as increased competitiveness, growth in both the local and global markets, increased employment, improved health, and reduced poverty. The transition to sustainable consumption and production of goods is a necessity to reduce our

negative impact on the climate, the environment and human health.

Environmental impact of consumption can be assessed either by a top-down approach or by a bottom-up approach. The top-down approach is carried out via national accounting systems and environmentally extended input-output analysis or processing surveys of consumer expenditure. The bottom-up approach includes multiplying for a given household some physical or monetary unit of consumption by emission factors (Dubois et al., 2019). The Nordic countries have had a different pace, and proceed in different ways to assess the environmental, economic, and social effects of consumption. In Sweden, for example, the environmental impact from consumption from 2019 onwards is part of Sweden's official statistics in the environmental accounts. The statistics include the environmental impact of business, households and public actors' purchases of goods and services. Products that have been produced both in Sweden and abroad are included, as well as products that are exported. The consumption-based emissions are calculated based on so-called environmentally expanded multi-regional input-output analysis (EE-MRIO). The basis for the calculations is the national accounts measuring supply and demand in the economy (Statistics Sweden, 2019). Such insights are needed for the other Nordic countries as well, to understand the effects of both national and international consumption patterns.

Research has shown that there are large variations in the impact of private consumption depending on the inclusion of trade, i.e. impact caused by the production of imported goods and exclusion of impacts caused in the production of exported goods. Negative impacts abroad because of private consumption in studied country, in this case the Nordic countries, are often called spill-over effects. Several types of spill-over effects can be assessed. This study aims to look at all sustainability aspects of private consumption, i.e. both environmental, social, and economic sustainability. However, the emphasis will be on environmental sustainability. Climate impact in the form of greenhouse gas emissions from private consumption is prioritized, but other environmental effects will also be mapped, subject to data availability, such as emissions of air pollutants, land use and water use. This study has investigated all countries in the Nordic region; Denmark, Finland, Iceland, Norway and Sweden. The Faroe Islands, Greenland and Åland have been included when possible.

The focus of the analysis is on four areas of consumption: housing, transport, food, and consumer products. For reasons of finding information and availability of relevant data within the given timeframe of this study, we have limited our search to the following types of consumption within these areas:

- **Housing:** energy use (electricity use for heating/cooling and home appliances), and household waste.

- **Transports:** private car use, international flights, and ferry travel.
- **Food:** meat, dairy products, fruits, and vegetables.
- **Consumer goods and services:** clothes and shoes, home interior and personal appliances incl. textiles.

The analysis will shed light over the Nordic region's environmental "spillover effect" as a result of our consumption, as well as social effects, in order to define focus areas for which it will be most appropriate to focus on in order to ensure sustainable consumption in the Nordic region.

1 Effects of private consumption



One of the suggestions is to reduce overall private consumption. Photo: Unsplash.com

Introduction

Environmental impact, for example Green House Gas (GHG) emissions are typically measured based on 'production', which is sometimes referred to as territorial emissions. The Intergovernmental Panel for Climate Change (IPCC) guidelines on national emissions accounting are based on production-based emissions in contrast to consumption-based emissions. Consumption-based GHG emissions, sometimes called Consumption-Based Carbon Footprint (CBCF) allocates all GHG emissions to the final consumer capturing all GHG emissions along the supply chain. The idea behind is quite simple, if my pair of jeans are manufactured in China the related emissions are allocated to the country I am living in, and not to China. The execution of such an approach is, however, not as simple as flows of resources and products between countries are complex, requiring more complicated ways of accounting and more uncertainty than calculating territorial emissions.

Consumption-based emission accounting commonly uses known GHG intensity relationships, typically based on national expenditure and GHG inventories, to calculate CBCFs on household, national or regional level (Clarke et al., 2017). The approach of using consumption-based emissions rather than traditional, territorial emissions have made it evident that a significant share (between 40–83%) of rich countries' consumption-based emissions are embodied in imported products. Household consumption in EU are in the range of 5–20 tonnes CO₂ emissions per inhabitant (European Commission, 2021). Countries with high economic wealth, fossil-fuel based energy systems and high levels of private vehicle use have amongst the highest emissions (Clarke et al., 2017). A new Oxfam analysis reveals huge carbon inequality in Europe: EU emissions cuts since 1990 have been achieved only among lower- and middle-income EU citizens, while the total emissions of the richest 10% grew (Oxfam, 2020).

Spillover effects, the effects of our consumption abroad, are especially of importance in relation to private consumption as many of the products we consume are produced in other countries which have quite different consequences for the environment than domestic production. A recent report that investigated the Sustainable Development Goals (SDG) in relation to the Covid-19 pandemic, showed that major challenges remain for most OECD countries concerning SDG 12 – consumption and production, when considering spillover effects (Sachs et al., 2020). An international comparison of countries into their compliance with the SDG's without spillover effects gives the first three places on the list for Sweden, Denmark and Finland, and Norway on 6th place, but when spillover effects are included these countries fall back to the lower half of in total 193 countries (Sachs et al., 2020).

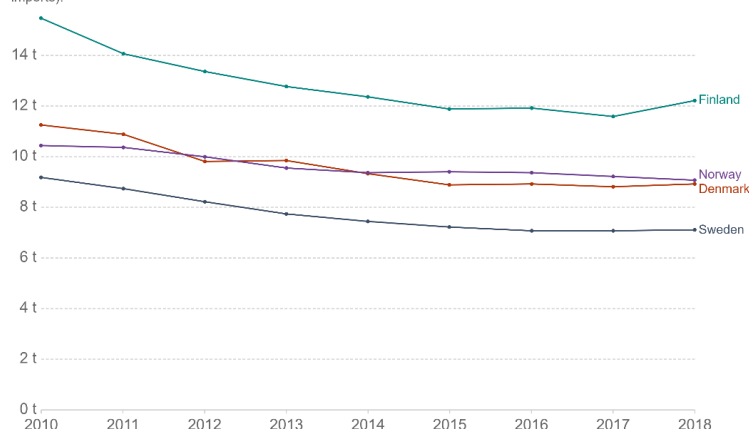
So far, Sweden is the only Nordic country reporting consumption-based emissions within the official statistics as part of the environmental accounts, as a complement to territorial emission accounting. In April 2021, Denmark launched 'Global Afrapportering 2021', the country's first official evaluation of the climate impact caused by Danish consumption, starting from reference year 2019 (Energistyrelsen, 2021). The Swedish approach is the basis for the evaluation where national input-output tables within the national accounts and emissions from different sectors in Denmark, are combined with environmentally extended multi regional input-output table in order to include climate impact related to import of products. There are methodological differences between the Danish and the Swedish approach, such as the division of household consumption into categories, why the calculations cannot be compared without investigating the differences further. In Finland and Iceland, the carbon footprint of household consumption has been investigated on project basis (Nissinen & Savolainen, 2019; Clarke et al., 2017), and this is also the case for Norway (Steen-Olsen et al., 2021). Results have, however, not been used as official statistics. In the Norwegian Climate Plan 2021–2030 it is stated that the Norwegian Environmental Agency will look closer at methodologies enabling consideration of consumption-based emissions (Det kongelige klima- og miljødepartementet, 2020).

According to a compilation carried out by 'Our world in data' all Nordic countries excluding Iceland, due to lack of data, are net importers of CO₂-emissions meaning that they import more CO₂ embedded in goods than they export. In Figure 1 consumption-based CO₂-emissions per capita for Denmark, Finland, Norway and Sweden are presented for 2010–2018. The emissions are not related to households' consumption, but consumption in the countries in general. As can be seen the per capita emissions are in the range of 7–12 tonnes of CO₂ for 2018. Also note that the emissions only include CO₂, and no other GHG emissions. (Ritchie, 2019)

Per capita consumption-based CO₂ emissions

Consumption-based carbon dioxide (CO₂) emissions are national or regional emissions which have been adjusted for trade (i.e. territorial/production emissions minus emissions embedded in exports, plus emissions embedded in imports).

Our World
in Data



Source: OWID based on Global Carbon Project & UN Population

OurWorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY

Figure 1 Consumption based CO₂ emissions per capita. Source: Global Carbon Project, 2020)

Environmental effects of private consumption

Method

Data collection on private consumption in households was performed by reviewing official national statistics from each country, as well as relevant research studies with focus on consumption-based emissions. Here we found that different data collection methods and product categories have been applied by the various countries thus prohibiting meaningful comparison of the data. Therefore, in addition, we have in some cases used Eurostat as a supplementary database because the national statistical sources have been collected for different years and into different categories which made it difficult to perform a comparative analysis. We have searched for the most recent data sources up to 2019, however, we have excluded the year 2020, since private consumption in general has largely been affected by the Corona pandemic.

Data collection on effects of household consumption have been gathered from national statistics of product categories energy and transport, in terms of fuel and electricity usage for living and mobility. When available, consumption-based data has also been retrieved from general studies on consumption-based household emissions.

For the product categories food and consumer goods results from a model developed by the research project "Policy-Relevant Indicators for National Consumption and Environment" (Naturvårdsverket, 2018) which aims to analyze potential environmental impacts linked to Swedish consumption, both in Sweden and abroad. The model includes that all other countries trade multilaterally (i.e. that they

trade with each other), that countries have specific production structures and specific emission intensities per sector. To achieve this, the Prince project has used an international database, Exiobase, which is linked to Sweden's official statistics on national and environmental accounts. The Exiobase database, based on environmental expenditure analyses, was recently updated, which has given a new level to the time series.

In order to acquire comparative numbers on emissions for all Nordic countries on consumption of food and consumer goods, we have done a comparative analysis on all Nordic countries with the Exiobase database, calculating the environmental impact with the input / output method and reports three types of environmental impact: climate impact, emissions of inhalable harmful particles and changes in land use. To perform the analysis, we used data from the multiregional input / output model Exiobase. It contains data based on so-called input / output analyzes of environmental impacts including impacts caused by consumption abroad. The impacts from the selected products originate from Exiobase version 3.8.1, with data from the year 2018 (Stadler et al., 2021).

Available data on consumption-based CO₂-equivalents (CO₂-e) emissions from private consumption in households show the same pattern across the Nordic countries. Households' consumption represents over 60% of the total consumption-based CO₂-e emissions in Denmark, Finland, Iceland, Norway and Sweden. An Icelandic study lists the countries with the highest environmental burden from Icelandic consumption, which at the time for the study was Ecuador, the Dominican Republic, Azerbaijan, the Central African Republic and South Sudan. These five countries were burdened with 25% of the Icelandic household consumption-based carbon footprint (Clarke et al., 2017).

Transportation represents the most significant source of greenhouse gas emissions from households' consumption in all five countries, followed by food and housing (Table 7 in appendix). These results are also coherent with numerous studies, such as Ivanova et al. (2017), and Dubois et al. (2019).

Comparison of data of consumption-based emissions between countries should be made with precaution as different methods and approaches are used, for example allocation into different consumer categories. There is no harmonized standard for the calculation of consumption-based emissions. Available estimates on consumption-based household CO₂-e emissions in the Nordic countries are presented in the Appendix. Sweden has the lowest number of CO₂-e emissions per capita with 4.9, followed by Denmark with 6.7, Norway with 7.1. Iceland and Finland show the highest number of CO₂-e emissions with 10.4 resp. 10.9. The share of consumption is reported for different categories in the countries but is highest for transport for all countries 27–39%, followed by Food (and beverages) between 19–29%. The sources' own allocation into consumer categories have

been used showing that grouping is not carried on in a consistent manner.

Housing with focus on energy consumption in households

General overview

Housing plays a significant role in the total climate impact from households. According to consumption-based emission estimates housing represents 20–30% of households' climate impact. The main share of the emissions take place in the country in focus. In Sweden, for example, 57% of the greenhouse gas emissions from housing takes place in Sweden, and the remaining 43% abroad (Naturvårdsverket, 2021).

The kind of activities that are commonly related to housing might differ from study to study and depends on the methodological details. Using COICOP (Classification of Individual Consumption According to Purpose), an international classification developed by the UN with the purpose to classify and analyze private consumption, housing can further be broken down into different areas. According to this classification housing includes for example rent, expenditures for electricity, district heating, solid fuels, and household textiles (Naturvårdsverket, 2018). The energy use, i.e. heating and use of electricity, are dominating the climate impact of housing (Naturvårdsverket, 2010, Dubois et al., 2019), which is why we have chosen to focus on this in the study. Electric appliances and furniture are looked at separately in section "Consumer Goods".

Household energy consumption has gone through a transition during the 1990s as fossil fuels as sources of energy have continuously been phased out in the energy systems in favor of renewable energy sources. The large consumption of energy in households thus pose challenges as renewable energy sources are needed not only in the residential sector, but also in other sectors in the society, such as for transport. At EU level energy consumption in households accounts for about one quarter of all energy used in the EU (European Environment Agency, 2019). Energy is, up to almost 80%, used for heating, with space heating over 60% and water heating around 15% (Eurostat, 2019b).

What is influencing household energy consumption? The energy consumption in households differs widely between countries due to weather conditions, the state and age of the buildings and household appliances, the heating and cooling systems used, and the level of implementation of energy efficiency measures. Behaviour and lifestyle choices also play an important role such as the number of electrical appliances, the size of the homes, and cooking and washing habits (European Environment Agency, 2019). Improvements in energy efficiency are reducing the energy demand whereas the increasing size of homes and the number of electrical

appliances in use have an opposite effect.

According to Regulation (EC) No 1099/2008 on energy statistics EU member states need to report data on energy consumption in households by type of end-use on an annual basis (Eurostat, 2019a). The per capita final energy consumption in households is shown in Figure 2, divided into electricity and heat. The data refers to the amount of electricity and heat every citizen consumes in their homes for reference year 2018.

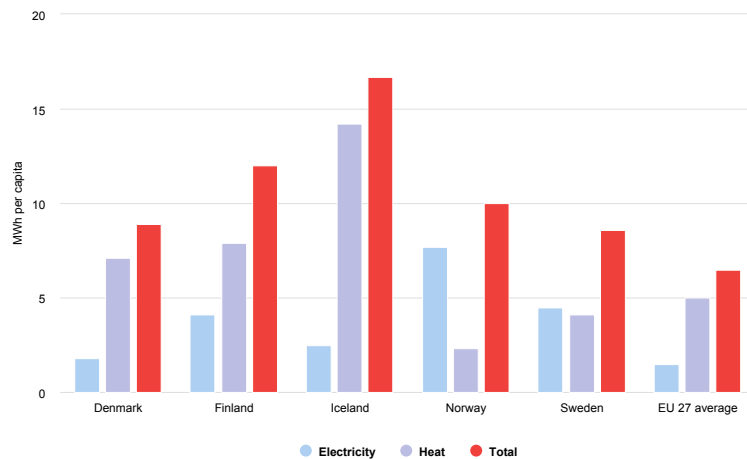


Figure 2 Per capita final energy consumption in Nordic households in MWh (Eurostat, 2021)

It is clear from the statistics that the per capita consumption of energy in households is amongst the highest in the EU (figure 2). Norway, as electricity is used for heating purposes to a large extent, represents the highest electricity consumption in the EU, followed by Sweden and Finland. Electricity consumption for heating is forecasted to grow as heat pumps are expected to replace most oil burners, gas boilers, and direct electric resistance heating systems used to heat private homes (Nordic Energy Research, 2020).

Space heating is the dominating end-use of energy, and some interesting differences in how space heating is produced can be distinguished across the Nordic countries. Derived heat is the foremost used source of energy for space heating in Denmark, Finland, and Sweden while electricity is the dominating heat supply in Norway (Patronen et al., 2017).

Box 1: Household energy consumption in Greenland, the Faroe Islands, and Åland.

Figures for Greenland, the Faroe Islands and Åland are not separately reported to Eurostat but included in the figures for Denmark and Finland respectively. Here we provide examples of gathered data from Greenland, the Faroe Islands and Åland.

Households in Greenland (in 2016) consumed 595 GWh of energy representing nearly 30% of the total energy consumed in Greenland. Over 90% was used for heating and the remaining amount for electrical appliances etc. Combustion of oil is still the dominating source of energy representing over 60% of the energy consumed in households. However, the share is declining (a reduction of 37% since 2004) in favor of district heating and electricity for heating purposes. Insulation of buildings has also increased substantially, decreasing the energy demand for heating purposes (Statistics Greenland, 2017).

The Faroe Islands Statistics has data on the total amount of oil sold to households and associations as well as the oil sold for transport from service stations etc. In 2019, around 81 000 MWh of electricity was used in Faroese households (houses, apartments, summer houses and boat houses) corresponding to approximately 1.7 MWh of electricity per capita (Statistics Faroe Islands, 2021). The company SEV is the main electricity supplier in the Faroe Islands, and operates three thermal power plants, three wind farms and one solar power plant. There is also a biomass plant. In 2018, around 50% of the power generation came from renewable sources, i.e. hydro and wind power (SEV, 2021). Oil provides heat for most households in the Faroe Islands (The Government of the Faroe Islands, 2021).

Most electricity consumed in Åland is imported from Sweden (around 75%), but import also occurs from Finland. The domestic electricity supply primarily comes from wind power, and represents around 20% of the total supply. Households consumed 125 GWh of electricity in 2019 representing around 4 MWh per capita (Statistics and Research Åland, 2021). Oil for heating purposes has declined during the 2000s as winters have become milder and other forms of heat supply have been introduced, such as district heating based on biomass and heat pumps (Ålands landskapsregering, 2017).

Climate impact of energy consumption from households is a result of the actual household energy use per capita, and the way the energy is produced. Electricity, heating, and cooling in the Nordic region is characterized by a large share of renewables (Table 1 below)¹. The relative CO₂ emission intensity of electricity and district heat production has halved over the past 30 years and is estimated to around 60 g CO₂/kWh in the Nordic region by Nordic Energy Research (2020).

Denmark	2019
Percent of renewable energy in electricity, %	65.4
Percent of renewable energy in heating and cooling, %	48.0
Finland	2019
Percent of renewable energy in electricity, %	38.1
Percent of renewable energy in heating and cooling, %	57.5
Iceland	2019
Percent of renewable energy in electricity, %	100.6
Percent of renewable energy in heating and cooling, %	79.4
Norway	2019
Percent of renewable energy in electricity, %	110.8
Percent of renewable energy in heating and cooling, %	35.8
Sweden	2019
Percent of renewable energy in electricity, %	71.2
Percent of renewable energy in heating and cooling, %	66.1
EU	2019
Percent of renewable energy in electricity, %	34.1
Percent of renewable energy in heating and cooling, %	22.1

Table 1. Share of energy from renewable sources by reporting country (Nordic Statistics, 2021).

Heating is for obvious reasons an important energy end-use in the Nordic context. Electric heating, biomass, and district heating (to a large extent produced from biomass) represent the main supplies of

1. Renewable energy includes hydropower, geothermal energy, wind energy, and fuels from biomass. Also renewable municipal waste is included. The renewable share of energy in electricity may exceed 100% due to the definition of the calculation, where the numerator 'gross final consumption of electricity from renewable sources' is defined as the gross electricity production from renewable sources. The denominator 'gross final consumption of electricity' is, defined as gross electricity production from all energy sources plus total imports of electricity minus total exports of electricity.

heat in the Nordic region (Nordic Energy Research, 2020). District heating is an important contributor to heat supply in Denmark, Sweden, Finland, and Iceland. As district heating networks are local the environmental impact from the production, and use, differs between network to network based on the sources of energy used. Different kinds of biomass are currently used extensively for district heating production in all Nordic countries except Iceland, which has vast geothermal resources. About 85% of all houses in Iceland are heated with geothermal energy distributed by district heating systems.

Forest biomass represents around 70% of the total biomass supply in the Nordics. Sweden and Finland have the largest supplies, Norway represents around 10% and Denmark and Iceland have very limited biomass resources. Unlike in Sweden and Finland, a large share of the biomass used in Denmark is imported. Although energy production from biomass play a role in reducing fossil CO₂ emissions, there are other sustainability challenges linked to the use of biomass. The issue is debated and complex. The key conflicts are related to risks for biodiversity and ecosystem services if the biomass is retrieved from natural forests, as well as harm to forest wildlife, effects on water and soil and competition between bioenergy and food production (Tunberg & Hansson, 2020).

Electricity, unlike heat, is traded on a common market since the 1990s including Denmark, Norway, Sweden and Finland (including Åland), apart from The Faroe Islands, and Greenland. Electricity is bought by electricity trading companies on behalf of their customers on a common marketplace called Nord Pool. Final consumers of electricity, such as households, can only buy electricity from their national electricity trading companies. Electricity produced on the market primarily come from hydro power, followed by nuclear power, combined heat and power, and wind power. Electricity produced on Iceland, which is not part of the Nordic electricity market, is almost to 100% derived from renewable energy sources, over 70% from hydropower and almost 30% from geothermal power (Government of Iceland, n.d.).

As the Nordic electricity market knows no national boundaries it can be argued that it is relevant to consider emissions from Nordic electricity production rather than from the national electricity production. A recent study conducted on behalf of the Swedish EPA (Sandgren & Nilsson, 2021) calculated an average emission factor for electricity consumption for Nordic electricity mix of just above 90 g CO₂-e per kWh², considering a life cycle perspective and gross imports and exports of electricity. Emissions from electricity production is on average around 70 g CO₂-e per kWh.³ The latter is higher than the number of 60 g CO₂ per kWh for production, provided by Nordic Energy Research, confirming that calculating CO₂ emissions from electricity and heat production vary depending on assumptions and methodology.

By multiplying the per capita electricity consumption in households

by the average emission factor the climate gas emissions from per capita electricity consumption in the Nordic countries are derived (Table 2 below). Norway stands out as they frequently use electricity for heating purposes.

Annual per capita climate gas emissions from electricity consumed by households in the Nordic countries (kg of CO₂-e) for the year 2018

Denmark	163
Finland	371
Iceland	226
Norway	696
Sweden	407

Table 2. Annual per capita climate gas emissions from electricity consumed by households.

Household waste generation and treatment

The amount of municipal waste generated by each inhabitant in a country reflects consumption patterns and economic wealth, as does the way waste is collected and managed. Municipal waste consists of waste collected by or on behalf of municipal authorities and disposed of through waste management systems. It consists mainly of waste generated by households, although it could also include similar waste from sources such as shops, offices, and public institutions. The municipal waste generation per capita in the Nordic countries, apart from Iceland for which data was not available, are presented in Table 3 below. Comparing country data should, however, be made with precaution. There are differences in municipal waste definitions, reported waste types and data processing. For example, some countries include only waste from households, whereas others include similar wastes from commercial activities and offices (European Environment Agency, 2021). According to Eurostat data, Denmark had the highest generation of municipal waste per capita in the EU in 2019.

Municipal waste generation per capita Kg per capita

Denmark	844
Finland	566
Norway	776
Sweden	449

Table 3. Municipal waste generation per capita in the Nordic countries in 2019. (European Environment Agency, 2021)

2. Only fossil greenhouse gas emissions are included.
3. Commonly called the gross method.

Municipal waste is complex in nature as it consists of different kinds of waste with varying composition. As a result, the management of municipal waste requires a highly complex system including an efficient collection scheme, an effective sorting system and a proper tracing of waste streams, the active engagement of citizens and businesses, an infrastructure adjusted to the specific waste composition, and an elaborate financing system. Examples of waste types included in the umbrella term municipal waste are packaging waste of different materials, food and garden waste, textile waste, bulky waste such as old furniture and mattresses, food and garden waste and textile waste. Bio-waste (for example food waste and garden waste) represents a significant share of municipal waste generation in the EU. In 2017, over 30% of the municipal waste generated in the EU-28 consisted of bio-waste, either separately collected or collected as part of mixed waste fractions (European Environment Agency, 2020).

All waste treatment results in environmental impacts caused by the need for collecting and transporting waste and sorting and processing the waste in different ways. Incineration of waste from fossil resources, such as plastics, produces for example fossil greenhouse gas emissions and residues in the form of fly ash and bottom ash that need to be taken care of in an environmentally sound manner. Landfilling of waste results in loss of resources and landfilling of biodegradable waste in methane production when anaerobically degraded.

Waste prevention by avoided consumption generally gives more climate benefits than incineration or recycling. Preventing food waste, for example, means less use of energy and resources, and less emissions from the production, transport and management of food. The generation of food waste, that could be avoided, always means loss of resources. Results from an analysis evaluating climate impact from 30 different household waste fractions from a life cycle perspective, showed that the largest savings of CO₂ are made through preventing electronics and textiles from entering the waste stream. Other fractions with high climate impact are hazardous waste, e.g. solvent-based paint, and bulky waste, due to the high content of fossil-based material (Miliute-Plepiene et al., 2019).

Conclusions from a Swedish thesis on reducing household waste showed that there is strong norm around recycling and that recycling can be regarded as "good enough". This is believed to prevent reduction of household waste (Bissmont, 2020).

Municipal waste treatment in the Nordic countries is characterised by relatively high levels of incineration of waste and low levels of landfilling. Over 50% in of the municipal waste in all Nordic countries are reported to be incinerated with energy recovery according to national waste statistics.

Another characteristic in Nordic waste management is a high coverage of formal waste collection, and source-separation of waste intended for recycling. Even though the Nordic countries in general have well-established collection and treatment systems for waste the main problem remains, the high generation of waste, which cannot be compensated by an efficient waste infrastructure.

Transport

General overview

Transport is the largest contributor to consumption-based CO₂-e emissions from households in the Nordic countries. Estimates suggest that transport accounts for 30–40% of the total emissions, see Table 8 in appendix for the detailed data.

Transports, incl. international aviation, accounts for around 25% of the total emissions in the EU in 2018 (EEA, 2019). This is mainly due to the continued use of fossil fuels within the transport industry and private transport, as well as the increasing demand of transport (EEA, 2020). Passenger transport has also increased continuously and only shows small setbacks over time, with road transport as the most important mode of transport. The European commission has estimated that passenger transports will increase with more than 50% till 2050 and transport of good with 80% compared to the 2013 levels (EEA, 2016). The energy consumption in transport has increased by 37% from 1990 to 2018, in line with the increase in transport activity. Overall, transport has hardly improved its fuel efficiency.

Although GHG emissions are higher in 2018 compared with 1990, there has been a decreasing trend from 2007 up to 2013. However, currently GHG emissions from transport are back to an increasing trend. Road transport is the largest contributor with close to three quarters of the transport related GHG emissions. International aviation has seen the largest growth over the years by more than doubling its GHG emissions. The annual emissions from air travel in 2017 are about 1.1-ton CO₂-e per Swedish inhabitant which is about five times higher than the global average. The greenhouse gas emissions from Swedish inhabitants' air travel is about equivalent to the Swedish emissions from car use (Kamb and Larsson, 2019).

Road transport

Despite efforts into energy efficiency, travel in general is increasing rapidly thus turning the trend upwards (EEA, 2019). Also, transport for consumption goods has increased significantly in recent years. The principal mode of passenger transport inland is the passenger car for all Nordic countries, with over 80% of inland transport by car, compared by train or bus travels.

The number of passenger cars that are currently in use in Nordic

countries shows no large differences between the countries in total numbers of cars, see Table 8 in Appendix. However, if we consider the share of electric driven vehicles, Norway is clearly leading in this area with almost 10% of the cars stock in 2019 being electricity driven, whereas Iceland is following with almost 4%, and the other countries less than 1%. This could be due to Norway's higher share of new electric vehicles as well as comprehensive planning for economic benefits for driving electrical vehicles.

Specific emissions from newly registered passenger cars have decreased by 15% between 2010, when monitoring under the current regulation started, and 2017. The 2015 target of 130 g CO / km was met in 2013, 2 years before the deadline. However, provisional data show that average emissions slightly increased by 0.4 g CO / km in 2017, the first increase since monitoring started. In 2017, petrol passenger cars became the best-selling vehicles in the EU, constituting almost 53% of sales. Diesel cars made up 45% of new registrations. Transport continues to be a significant source of air pollution, especially of PM and nitrogen dioxide, although these emissions have been reduced in the last decade due to the introduction of fuel quality standards, the Euro vehicle emission standards and the use of cleaner technologies.

Based on calculated data from Exiobase, the emissions from private consumption of vehicles and fuel in 2018 is presented in Figure 3. These are divided up into domestic emissions and emissions in Rest of the World (ROW). Here we see that most of the emissions of fuel is generated outside Nordic countries. Also, most emissions of the production of vehicles are generated in ROW, except for Norway.

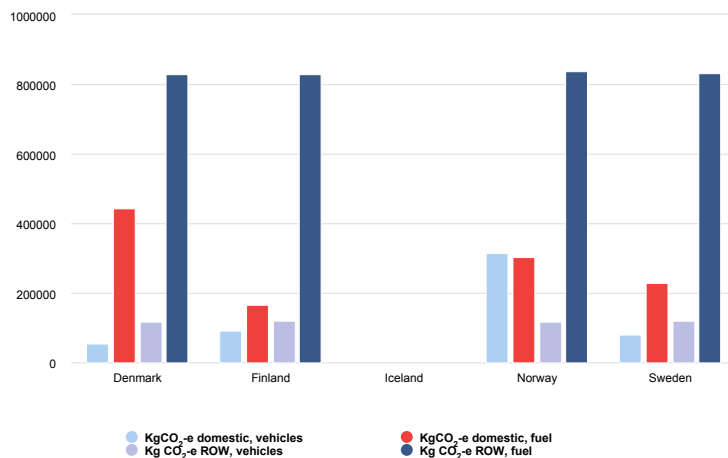


Figure 3 CO₂-e Emissions from private vehicles and fuel in 2018

Air and maritime transportation

Eurostat provides data on the number of passengers for air and maritime transportation. Considering the total number of passengers carried, international transport dominates over domestic flights with passenger numbers in the first quarter of

2020, from 1 million (2.9 per capita in Iceland) to around 5 million (2 per capita in Sweden and 1,16 per capita in Denmark). Here it should be noted that these flights could be related to private or work-related trips. The number of passengers embarking boats in 2019 vary largely between Nordic countries. Iceland has only about 800 passengers, which is likely related to the longer duration of boat trips, being far away from mainland Europe and other continents. The highest number of passengers embark in Denmark (45 000). Again, it should be noted that trips could both be private, or job related.

Emissions from fuel refueled abroad by Danish aircraft amounted to around 2 million tonnes CO₂-e in 2018. There is a slightly increasing trend in emissions, which is primarily driven by more passengers and more goods transportation. The greenhouse gas emissions related to foreign aircraft refueling in Denmark – Danish aircraft as well as foreign ones – amounted to around 3 million tonnes of CO₂-e in 2018. The total emissions from air-travel of Swedish citizens was 10 million-ton CO₂-e in 2017, an increase by 47% since 1990 (Kamb and Larsson, 2019). Emissions from domestic aviation are decreasing and now account for only 7% of the emissions from air travel, whereas the emissions from international trips have increased and now account for 93% of the emissions (ibid.) Here we can conclude that the environmental effects of international air traveling are large and increasing, which is a major focus area for the Nordic countries.

Food

This section focuses on environmental impact of private consumption of meat, dairy products, fruits and vegetables. The consumption of food in the Nordic countries consist of a lot of imported food, approximately 40% (of the weight) of the food is imported. The customer expects a wide range of different foods and international flavors all year round. This causes GHG emissions abroad, just over 50% of the emissions related to food consumption in the Nordic countries is taking place abroad (Wood et al., 2019). In the following section, environmental impact (Global Warming Potential 100 (GWP100), Blue water consumption, Land footprint and Material footprint) from food consumption will be presented. The data, based on environmental expenditure analyses, is from EXIOBASE for the year 2018 (see Method for more details). Unfortunately, EXIOBASE does not provide data for Iceland. All the data can be found in Tables 9–13 in appendix.

The first graph below (figure 4) shows GWP100 (based on environmental expenditure) for the domestic impact in each country, divided into different food categories. The impact from bovine meat in Finland and Norway are high, compared to the other

countries, even though both Denmark and Sweden consume more bovine meat per capita and produces more bovine meat (Table 4 below). The explanation for this is unclear. The impact data (Blue water consumption, Land footprint and Material footprint) for domestic food consumption can be found in the Appendix.

The second graph (figure 5) shows GWP100 for each country, based on the environmental impact of food consumption abroad (Rest of World). The data for each food category are similar between countries, this also applies on the other environmental factors: Blue water consumption, Land footprint and Material footprint (figure 6–8).

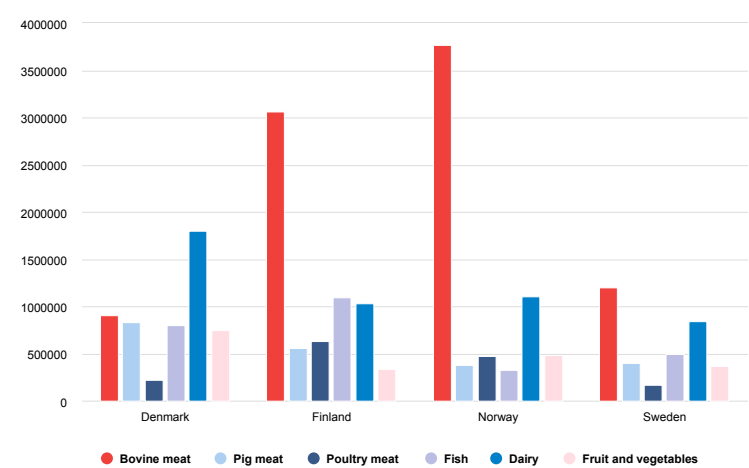


Figure 4 Environmental domestic impact, GWP100, from consumed food in the Nordic countries, divided into different food categories.

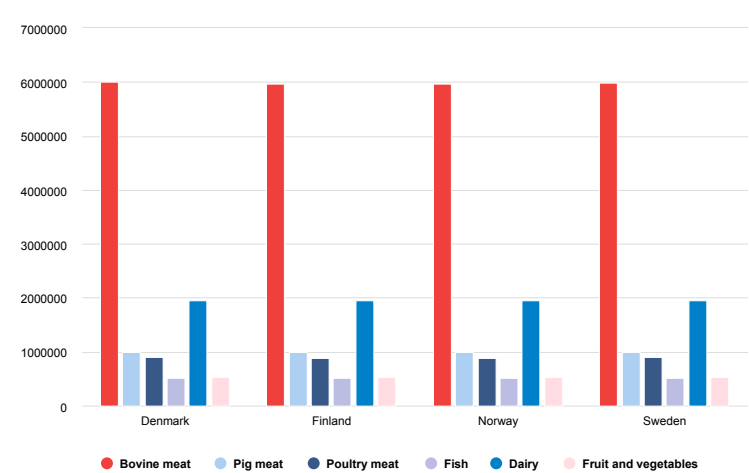


Figure 5 Environmental impact (Rest of World), GWP100, from consumed food in the Nordic countries, divided into different food categories.

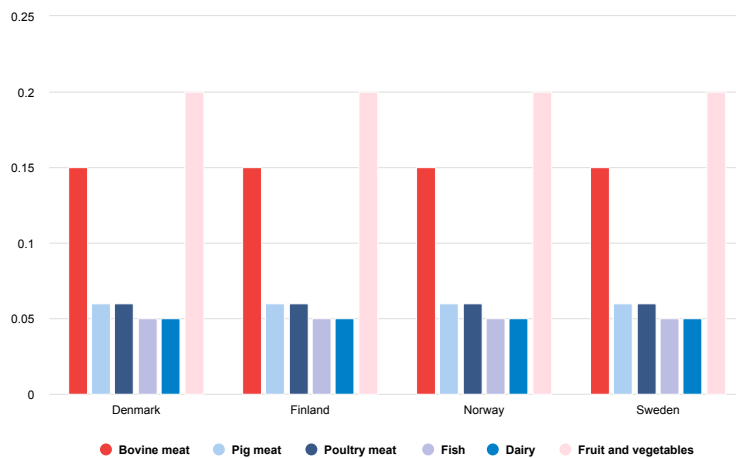


Figure 6 Environmental impact (Rest of World), Blue water consumption, from consumed food in the Nordic countries, divided into different food categories.

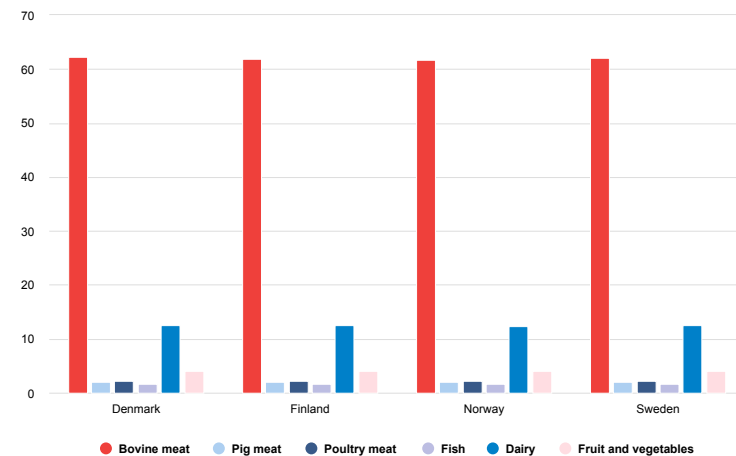


Figure 7 Environmental impact (Rest of World), Land footprint, from consumed food in the Nordic countries, divided into different food categories.

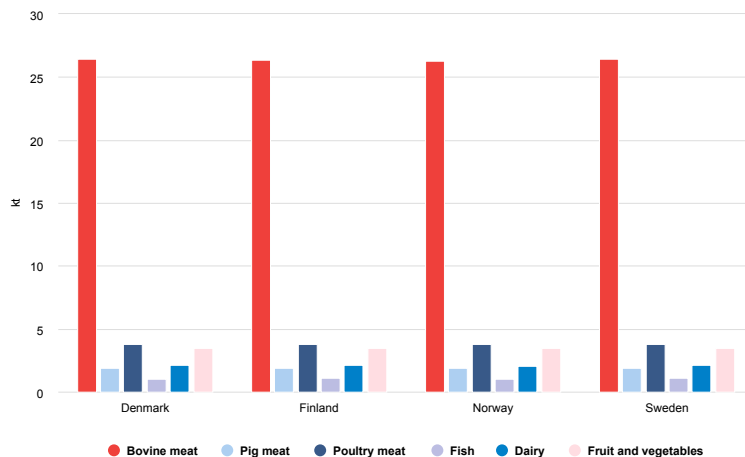


Figure 8 Environmental impact (Rest of World), Material footprint, from consumed food in the Nordic countries, divided into different food categories.

Meat and fish

The amount of consumed meat in the Nordic countries is very similar (Table 4 below). All Nordic countries produce more meat than they import due to a strong heritage of animal production, with the only exception being mutton and goat meat in Denmark. Denmark produces most of their meat, they are also a big exporter

of pig meat. Iceland consumes almost twenty times more mutton and goat than to other Nordic countries. The environmental impact (kg CO₂-e) of meat is bigger for the meat produced abroad. In the graphs above (figure 5, 7 and 8), bovine meat has the biggest impact abroad when it comes to GWP100, Land footprint and Material footprint. For Blue water consumption, bovine meat is the second biggest impact, after fruit and vegetables. Unfortunately, there is no environmental data for mutton and goat meat.

Country	Type of meat	Consumption (kg / person)
Denmark	Bovine	24
	Mutton & Goat	1
	Pig	27
	Poultry	27
Finland	Bovine	19
	Mutton & Goat	1
	Pig	38
	Poultry	19
Iceland	Bovine	15
	Mutton & Goat	22
	Pig	21
	Poultry	31
Norway	Bovine	18
	Mutton & Goat	5
	Pig	23
	Poultry	21
Sweden	Bovine	23
	Mutton & Goat	1
	Pig	31
	Poultry	17

Table 4. Consumption of different types of meat per person in the Nordic countries 2018, and the amount of imported meat based on data from FAOSTAT (see Table 9 in appendix)

Unlike the import of meat, Norway does not import as much fish as they are a big producer and exporter of fish. Even though Norway produces more than they import, the environmental impact (kg CO₂-e) is lower for domestic fish. Contrastingly, Denmark imports more than they produce, but the domestic environmental impact is higher. No other Nordic country produces or exports as much as Norway, even though Iceland is not far behind. This high amount of

produced fish may explain the high consumption per person in Norway and Iceland (all fish included): 50 kg and 91 kg respectively. Corresponding numbers for Denmark, Finland and Sweden are: 20 kg, 28 kg and 31 kg.

Denmark and Sweden export more fish than they produce. It may be that a share of the imported quantities of fish is exported again as part of the value chain, but no information has been found to verify this assumption.

Dairy

Finland is the country that consumes most dairy products (including eggs) per person, followed by Denmark and Iceland. Norway and Sweden consume roughly the same amount. Most of the dairy consumed in the Nordic countries is produced domestically. The share of import is less than a third for most countries, and in Iceland the import is only 1%. Despite that most of the dairy is produced domestically, the environmental impact (kg CO₂-e) is higher for the imported amounts. The Land footprint for dairy is the second highest (figure 7) of all food categories, possibly because a majority is produced domestically.

Fruit and vegetables

The Blue water consumption for fruit and vegetables is high compared to the other categories, only bovine meat also stands out (figure 6). Almost all the consumed fruits and vegetables in the Nordic countries are imported, which may explain the Blue water consumption. Regardless, it explains why the environmental impact (kg CO₂-e) is higher abroad, except for Denmark. Denmark exports more fruit and vegetables than the other countries (Table 12 in appendix). In Table 12 in appendix, all fruits have been aggregated in the category "fruit", but FAOSTAT provides a few subcategories, including citrus fruits (Table 13 in appendix). For instance, Denmark exports 78 000 tonnes of citrus fruits (including lemon, lime, orange, mandarin and grapefruit), but produces only 5 000 tonnes. This may be the reason why GWP100 for fruit and vegetables in Denmark is higher than for the other countries. The reason why Denmark exports large quantities of citrus despite unfavourable climate conditions for producing citrus fruit on an industrial scale is unclear, therefore data for fruit and vegetables should be used with caution.

Consumer goods

In the following section, environmental impact (Global Warming Potential 100 (GWP100), Blue water consumption, Land footprint and Material footprint) from consumer goods will be presented. Like the environmental data for food, the data for consumer goods are similar between countries for Rest of World (figure 9–12). The data

is from EXIOBASE for the year 2018. All the data can be found in tables 14–16 in appendix.

The environmental impact GWP100 (figure 9) is highest for textiles, and electric machinery and apparatus, followed by wearing apparel, furs, leather and leather products and furniture. Textiles has the biggest impact for Blue water consumption as well, which is probably since a lot of water is required to grow cotton. After textiles, wearing apparel; furs and leather and leather products has highest impact.

Leather and leather products have the biggest impact on Land footprint, presumably due to the area needed for the animals (figure 11). Compared with Land footprint for food, bovine meat undoubtedly has the biggest impact (figure 7). Furniture has the second biggest impact on Land footprint. A lot of furniture consists of wood grown on land. Textiles and wearing apparel; furs also has a great impact on the Land footprint, at least compared to electrical equipment.

For Material footprint, electrical machinery and apparatus has the biggest impact and office machinery and computers the lowest.

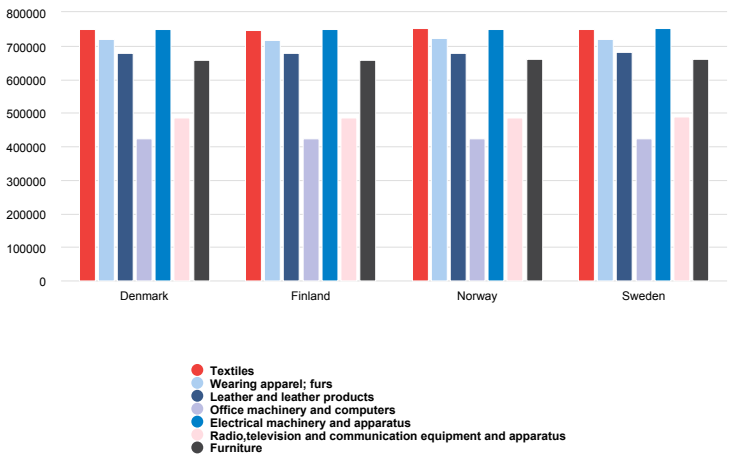


Figure 9 Environmental impact (Rest of World) GWP100, from consumer goods in the Nordic countries, divided into different categories.

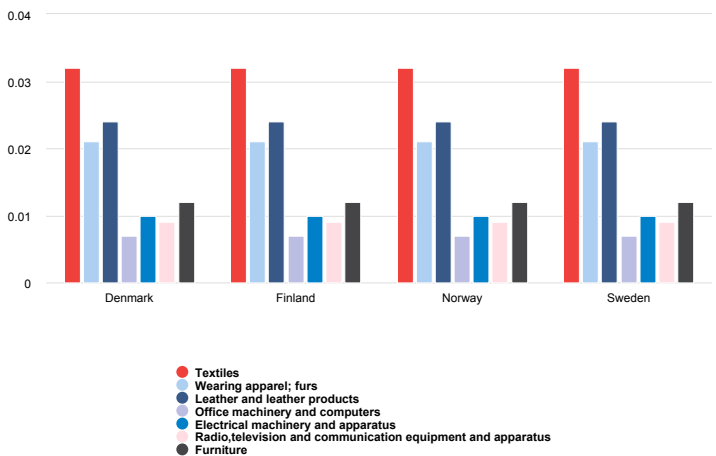


Figure 10 Environmental impact (Rest of World) Blue water consumption, from consumer goods in the Nordic countries, divided into different categories.

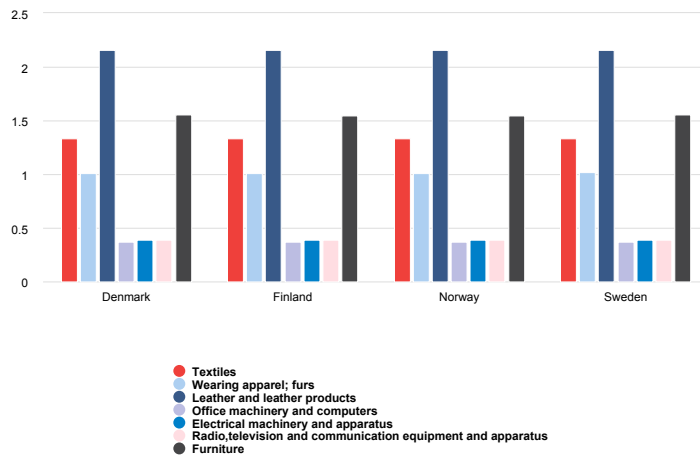


Figure 11 Environmental impact (Rest of World) Land footprint, from consumer goods in the Nordic countries, divided into different categories.

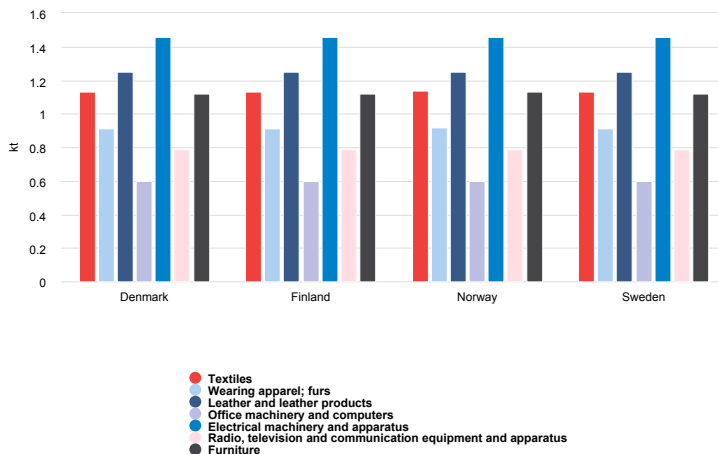


Figure 12 Environmental impact (Rest of World) Material footprint, from consumer goods in the Nordic countries, divided into different categories.

Textiles, clothes, and shoes

The private consumption of textiles in the Nordic countries are similar: 16 kg per capita in Denmark, 13.5 kg in Finland, 15 kg in Iceland, 22 kg in Norway and 15 kg in Sweden. Only Norway stands out, which is due to including textile waste from the industry as well (Palm et al., 2014). All data can be found in tables 14–16 in appendix.

The production of clothes account for 80% of the climate impact of the garment, according to the research program Mistra Future Fashion. Furthermore, looking at Sweden, approximately 80% of the consumed clothes in Sweden are produced outside of Sweden and EU: s borders (Sandin et al., 2019). In 2017 the Swedish textile consumption caused 4.2 million tonnes of CO₂-e, an increase with 30% since year 2000 (Roos & Larsson, 2018). Unfortunately, no data for the other Nordic countries was found.

Denmark has a much lower environmental impact (kg CO₂-e) domestically than the other countries, roughly about ten times lower. Even though Denmark consumes less textiles per person and year, it is not clear why the impact is considerably lower. The impact abroad is similar for respectively category and country (figure 9–12).

Note that Norway includes other textiles than clothes in the amount consumed, but not in the environmental impact since the data is based on private consumption and does not include waste from industries.

Electrical equipment

The Nordic countries are among the highest consuming countries of electronic equipment placed on the market in 2000, according to the EU project ProSUM (Huisman et al., 2017) with Sweden, Norway, Denmark consuming over 25 kg electronic equipment per capita. Also, electronic waste data per capita may give us a hint about consumed quantities (table 15 in appendix). A recent study showed that nearly 2 million functional mobile phones, not older than 4 years, are stored in Swedish households and not used (Miliute-Plepiene, 2021). If this is the case, the amount of waste might be higher if the unused mobile phones, and other unused electrical equipment, were left at the recycling center.

Looking at the lifecycle of a smartphone, the material extraction and manufacturing accounts for 35–92% of the total GHG emissions (Miliute-Plepiene, 2021). The environmental impact (kg CO₂-e) from consumption of different electrical equipment is in all cases higher abroad and similar in between the countries (figure 9). The use phase can account for 10–49% of the total GHG emissions, however in the Nordic countries the use phase may have a low impact on the total GHG emissions due to the large share of green energy in the energy mix (Miliute-Plepiene, 2021). More about energy use can be found in the section Housing with focus on energy consumption in households.

Furniture

Nordic consumers spend around 5% of their income on furniture (table 16 in appendix), but unfortunately no data for the amount of furniture (kg or number of quantity) could be found. The biggest environmental impact (kg CO₂-e) takes place abroad and is similar for the countries (figure 9). Finland stands out with the domestic impact, as Denmark, Norway and Sweden have similar impact.

A recent study on bulky waste at two Swedish recycling centers showed that 23–30% (of the total weight) of the furniture could have commercial reusable value. Another 7% had a functional value and 4–17% could be repaired and reused (Hultén et al., 2018). This result is not applicable for all Nordic countries, but it contributes with an indication of how much furniture is being thrown away unnecessarily.

Social effects of consumption in production phase

Method

This part focuses on the social effects of Nordic households' consumption in the production phase in other countries. The food, electronics and clothing sector offer social benefits in developing countries, with high impact on social aspects such as wealth, employment, transfer of knowledge, innovation and development in the local communities. However, the risk for negative impact is also high because of the high impact on social aspects. Social effects are apparent in the entire value chain, but here we have limited to social effects that are related to the production of imported goods to the Nordic countries. As there are no official accounts of national accounts for social effects such as exist for environmental effects, we have chosen to look at social effects in the production of imported goods consumed in the Nordic region and have gone through reports from NGO's and international organizations such as UN and OECD that have collected and published data, which serves as our main source in this study. We have not in a similar way as we did in the previous section reviewed the organizations' reporting on environmental effects from the production of consumed goods.

There are also several Watchdog organizations (Finnwatch in Finland, Danwatch in Denmark, Swedwatch and Fair action in Sweden) in the Nordic countries that monitor corporate responsibility for production of Nordic countries including consequences of their production abroad. In Norway and Sweden, the Ethical Trade Initiative exists which is a platform for collaboration between companies and the civil society for related questions. Also branch organizations like Amfori and unions regularly provide reports. However, this also implies that non-Nordic companies producing goods for import in the Nordic countries, via for example e-commerce channels, are not monitored via these organizations and remain a blind spot for compliance to regulations and social effects.

The results will be presented as hotspots in relation to social effects in general, as well as for the focus areas of imported goods like food, textile and electronics. In some cases, we provide company names to showcase the connection to Nordic consumption based on the reports, in these cases, we have not followed up potential improvements.

Hotspots

Human rights

Under the UN Guiding Principles on Business and Human Rights companies have a responsibility to undertake human rights due

diligence. Human rights due diligence involves the identification, prevention and managing of risks and negative impacts on human rights that may arise in connection with a company's operations or in its business relationships. However, almost half (46.2%) of the biggest companies in the world evaluated by the Corporate Human Rights Benchmark in 2020 (World benchmarking alliance, 2020) failed to show any evidence of identifying or mitigating human rights issues in their supply chains. In a survey by Global compact 62% of the responding companies conduct an environmental impact assessment, but only 18% for human rights (UN Global compact, 2020).

EU has started the process of creating binding rules for business and human rights. The demand from watch dogs, companies and consumers of laws on making human right due diligence mandatory in business has grown in Sweden (Visa handlingskraft nu, 2021). Mandatory human rights due diligence legislation is also called for by UN Special Rapporteur on toxics and human rights, who call it a necessary tool to secure actual respect for occupational health standards in the workplace. He also stresses that the legislation should encompass upstream supply chains and downstream impacts of use and disposal of chemicals so that a life-cycle approach to due diligence can ensure that no gaps allow human rights abuses to continue (Swedwatch, 2021a).

A tool to support actors to determine the level of risks related to Governance in sourcing countries is the Worldwide Governance Indicators (Worldbank, 1996–2019). It can be used to define priorities in terms of monitoring, capacity building and stakeholders' engagement in the human rights' due diligence approach when it comes to Voice and Accountability (e.g. free elections and media, freedom of expression and association); Political Stability and Absence of Violence/Terrorism; Government Effectiveness (e.g. quality of public and civil services, independence from political pressures, policy implementation); Regulatory Quality (e.g. policies and regulations that permit private sector); Rule of Law (e.g. quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence) and Control of Corruption. The Country Risk Classification (Amfori, 2018) based on the Worldwide Governance Indicators, gives an overview of the level of risks related to Governance in sourcing countries. It clearly shows that there are risks in many of the countries where the production of products consumed in Nordic countries is taking place.

Labor rights

The core principals of the International Labour Organization (ILO) and The labour principles of the UN Global Compact state that businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining; the elimination of all forms of forced and compulsory labor; the

effective abolition of child labor; and the elimination of discrimination in respect of employment and occupation. According to UN Global compacts progress report (UN Global Compact, 2020) 80% of countries violate the right to collective bargaining, 54 countries deny or constrain freedom of speech and assembly and hundreds of millions of people suffer from discrimination in the world of work.

The aspect of living wages is highlighted by many watchdogs as central to fundamentally changing the situation. Living wages are defined as wages suitable to afford a decent standard of living for the worker and her or his family, including food, water, housing, education, health care, transport, clothing, and other essential needs, including provision for unexpected events. Fairtrade Sweden has compiled 18 studies on living wages carried out within the framework of the Global Living Wage Coalition over the past seven years. The average wages in 18 surveys in the agricultural and textile sector in countries with widespread poverty are 65% of the estimated living wages. The incomes of millions of people working in the first link of the supply chains are often so low that people's fundamental rights cannot be met. For example, Sweden is one of the countries that imports most bananas, cacao and coffee per capita, while at the same time for employees on for example banana plantations in the Dominican Republic, wages can be more than 50% under living wage (Fair Trade, 2019).

Vulnerable groups

There are many reports of migrant workers having their rights neglected and getting their passports withheld, needing to work up large sums to get them back which place them in debt slavery. For example migrant workers from Nepal in Malaysia at suppliers to Toshiba and Panasonic (Danwatch, 2019a), migrant workers (from Nepal, Philippines etc.) at hotels in Dubai for Apollo, Fritidsresor and Ving (Swedwatch, 2015) and migrant workers in Thailand from Cambodia and Myanmar in the chicken industry with large imports to Nordic countries (Finnwatch, Swedwatch, 2015).

Following the news from the last years of China's so called re-education camps detaining over 1 million Uyghurs, the Australian Strategic Policy Institute has reported on systematic mass transfers of Uyghurs from Xinjiang to factories across the country under conditions that strongly suggest forced labor. The factories are in the supply chains of at least 82 well-known global brands in the technology, clothing and automotive sectors, including Apple, BMW, Gap, Huawei, Nike, Samsung, Sony and Volkswagen (Xiuzhong Xu et al., 2020).

Refugees are a particular vulnerable group. For example in Turkey the largest clothing exporter to Sweden outside the EU (after China and Bangladesh) supplies to H&M, KappAhl, Lindex, Gina Tricot,

BikBok, Cubus, Carlings, Dressman etc., with few of the refugees working in the industry having work permission. So, they cannot obtain written employment contracts or rights such as health insurance and pension which entails higher risks for refugees (Fair Action and Future in our hands, 2017).

Communities can be affected in several ways by the production of the goods we consume. The establishment can create new jobs – but also can cause displacements or restricting the access to land for living or farming or clean water as described below under focus areas, e.g. in the case of polluted Asian rivers (Danwatch, 2019b), access to clean water due to copper mining in Zambia (Swedwatch, 2019), and water-grown crops in Peru (Swedwatch, 2018, Finnwatch, 2019b).

Conflict areas

There is a higher risk of human rights violations in areas where there is war or conflict or where the state is weak. The trade in minerals used in electronics has added fuel to armed conflict for example in Democratic Republic of Congo, where it is the cause of much poverty and human rights violations, including indiscriminate killings, mass rapes, mutilations, and forced child soldier recruitment (Finnwatch, 2012). According to the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas (OECD, 2016), providing detailed recommendations helps companies respect human rights and avoid contributing to conflict through their mineral purchasing decisions and practices. Severe risks in the mineral supply chain includes: serious human rights abuses, support to armed groups or public or private security forces contracted in the supply chain associated with serious human rights abuses, bribery and fraud, money laundering or Non-payment of dues. They recommend companies to, except in the most harmful circumstances, use their leverage with suppliers to improve conditions on the ground, as many high-risk areas need responsible investment and trade.

Both the US ([Section 1502 of the Dodd-Frank Act](#)) and the EU (Regulation (EU) 2017/821) has stated Conflict Mineral regulations. The yearly report from Responsible Sourcing Network analyzing corporate compliance under Special Disclosure [Section 1502 of the Dodd-Frank Act](#), and companies' efforts to take action and report their practices publicly, concludes that Due diligence by companies with respect to tin, tantalum, tungsten, and gold still falls short from the intent of the law and the expectations of stakeholders (Responsible Sourcing Network, 2019).

The report "Fuel the conflict" examines how Swedish banks and government pension funds have acted on allegations that the activities of Lundin Petroleum has contributed to the killing and displacement of thousands of people in Sudan during the civil war

1997–2003 (Swedwatch, Fair Finance Guide, 2021). Two executives of the Swedish oil company Lundin Energy are being investigated as suspects in a war crimes investigation into alleged involvement in the Sudan civil war (Swedwatch, 2021b).

Suppliers

Many of the problems acknowledged above concerns suppliers of large brands selling to the Nordic market. There is a large need to extend company policy but also action to the supply chain to make progress. According to the global compact progress report (UN Global compact, 2020) only 17% of their signatories extend the Ten Principles of the UN Global Compact on human rights, labor, environment and anti-corruption to suppliers. Reasons for not doing so is: not a priority (40%), lack of knowledge on integrating the principles into procurement practices (32%), no clear link to business value (29%); lack of capacity (26%); lack of financial resources (15%); and corporate responsibility data not being available (12%). Of the companies conducting corporate responsibility due diligence in their supply chain most are only doing so with first-tier suppliers. It is primarily done through self-assessment questionnaires (44%) or reviewing publicly available sustainability reports (36%) rather than by auditing. Audits of suppliers by company staff are conducted by 33% of respondents and only 17% are done by independent third-party auditors. When it comes to the sustainable development goals, 45% of the companies have assessed positive impacts and 31% negative impacts along the value chain. Of those, 57% focused on company operations compared to 13% at suppliers and 10% at raw materials. Internationally, Adidas, Levi Strauss, Nike, Patagonia and Puma are among companies that have been front-runners in being transparent with suppliers (Fair action, 2021, Transparency pledge, 2019).

Transparency

Transparency is key to change, and to make companies accountable, both for consumers to know, but also for factory workers and trade unions to be able to raise malpractices and problems with retailers and international brands. They can also raise the problems with the buyer if they face threats from the employer (Fair action, 2019). According to the International Corporate Accountability Roundtable (2019) adopting supply chain transparency measures can contribute positively to companies' reputation, operational efficiency, improved legal compliance and increased access to capital. Investors often urge companies to be open with information about suppliers. The Corporate Human Rights Benchmark that is supported by many investors include in their scorecard whether companies map their suppliers and disclose the mapping publicly (World benchmarking alliance, 2020). Another tool is the Transparency Pledge developed by nine trade union federations and human rights organisations to

help the garment industry reach a common minimum standard for supply chain disclosures by getting companies to publish standardized, meaningful information on all factories in the manufacturing phase of their supply chains (Transparency pledge, 2021).

Consumers now demand information about production which may be important for implementing change, with 80% of consumers in EU think fashion brands should disclose their manufacturers and 77% think that fashion brands should publish which suppliers they use to source the materials used in their clothing. Two out of three consumers say it is very or somewhat important for fashion brands to share detailed information about wages and working conditions in the supply chain. (Fashion Revolution, 2018). Customs data on exporters and importers of goods, could help to identify European companies involved in human rights violations and give consumers confidence in the products they buy in a global economy. This data is not made available to the public, but European Parliament adopted a resolution 2017 to enable parties having a public interest stake to access the customs data collected from parties trading in products or goods imported into the EU (Finnwatch, 2017).

Focus areas

Consumer goods: Textiles and shoes

The working conditions for textile and leather show the same problems as many other consumer goods, with wages much below living wages, irregular employment with less rights to holiday, maternity leave and social insurances, bonded labor (a form of forced labor), child labor, excessive working hours, lack of trade unions and effective grievance mechanisms, gender and, in India's case, caste discrimination (Finnwatch, 2019a). Furthermore, there are particularly poor conditions for homeworkers often employed in informal subcontract chains (HNSA, 2021).

The clothing industry has worked with the social effects in production for a long time and has been a forerunner for many other industries in setting code of conducts, initiating third-party reviews and being transparent with suppliers. Yet, much remains to be done. Major issues include wages below living wages (Fair Trade, 2019) as well as safety issues at work, such as buildings that risk collapsing, lack fire protection and safety equipment, and unsuitable working environment with high temperatures inside (Clean Cloth Campaign, 2021).

In 2021, the Rana Plaza accord, a fire and building safety agreement developed after the collapse of the Rana Plaza textile factory in Bangladesh in 2013 ended and the signatories has not yet signed a new one, including many Nordic companies like: Stockman Group

Lindex, ICA Special AB, Åhléns, Peak Performance, Intersport, Stadium, Brothers, Polarn O. Pyret, Gekås Ullared, Fristads, Ellos Group, Gina Tricot, New Wave Group, H&M, Sandryds, KappAhl, The Varner Group (Bikbok, Carlings, Cubus, Dressman etc.). The Accord is clearly still needed, in a report from April 2021 looking at 12 leading brands covered by the Accord, it shows that every brand is sourcing from dozens of factories that have failed to install fire alarms, sprinkler systems, and/or adequate emergency exits (Clean Cloth Campaign, 2021).

The shoe industry, compared to the fashion industry has barely started their work with codes of conducts, revisions and measures. The value chain is often long, from development and design in Europe, materials from south or South East Asia, and production in most cases in China. The part of the value chain that is almost completely uncontrolled is the tanneries where the leather is prepared. In the tanneries, large amounts of chemicals are used that create major health problems for the workers and in the local communities as the emissions are rarely purified resulting in that the fish in the waters perish. In Hazaribagh, one of Asia's major tannery clusters in Bangladesh's capital Dhaka, the river is now considered biologically dead due in part to emissions from tanneries. Kanpur in India with around 400 tanneries has a similar situation (Danwatch, 2019b).

The cotton production has been highlighted for a long time both for its negative environment and social impact. Its large water and land use affect freshwater availability and livelihoods, the pesticides have large health implications. In several countries, there is a high risk of forced / child labor in cotton cultivation, which has resulted in companies signing pledges, such as the Turkmen Cotton Pledge and the Uzbek cotton pledge where they guarantee that the cotton does not come from these risk areas (EJF, 2012). The cotton fiber production stands out as the single largest water and land use step in the clothing production value chain (Sandin et.al., 2019), which also affects local communities' access to land and water.

As with many products, the labels are several and differ (Råd & Rön, 2018). Global Organic Textile Standard, GOTS, a certified labeling organization, means that this garment contains organically grown cotton and that no pesticides have been used. The Better Cotton Initiative, BCI, an industry initiative, means that the manufacturer pays for a certain amount of BCI cotton to be produced and can be found in any of their garments. The Better Cotton Initiative trains farmers to use water efficiently, care for soil health and natural habitats, reduce use of the most harmful chemicals and respect workers' rights and wellbeing.

Consumer goods: Electronics

Human rights violations are indicated (Swedwatch, 2021c) for leading smartphone and laptop brands sourcing from the

Philippines, e.g. Apple, Dell, HP, Intel Corporation and Samsung. Workers, mostly female, risk severe health risks from exposure to hazardous chemicals and are afraid to speak up. Reviews of electronics done by watchdog organizations highlight essential problems related to human rights and forced labour, e.g. mass transfers of Uyghurs from Xinjiang to factories across the China under conditions that strongly suggest forced labor at suppliers to several electronic brands e.g. Apple, Huawei, Samsung, Sony and Lenovo and public procurement in Nordic countries (Xiuzhong Xu et al., 2020; Washington post, 2020; Danwatch, 2020). There are also reports of migrant workers getting their passports withheld, needing to work up large sums to get them back, thus placing them in debt slavery, which is the case for migrant workers in Nepal and Malaysia which are suppliers to Toshiba and Panasonic (Danwatch, 2019a).

Electronic devices like smartphones contain more than forty different minerals, including tin, tantalum, gold, platinum, copper, cobalt, and rare earth metals. In Chile, currently the largest copper producer in the world, holding 29% of the world reserves, it has been reported that the large majority of the workers in many mines are subcontractors lacking rights and social protection to the extent that it borders on slave labor (Smart, 2019). In Zambia, another of the largest exporters of copper, the local communities' access to clean water, health and sustention possibilities are diminished (Swedwatch, 2019).

As mentioned under conflict areas the risk of trade in minerals used in electronics feeding conflicts is high (Finnwatch, 2012; OECD, 2016), and action taken does not live up to set standards (Responsible Sourcing Network, 2019).

Electronic waste is still to a large extent exported to countries with less regulation and formal recycling systems. For instance, up to 95% of the mobile phones collected in Sweden go to other European countries for reuse, of which 35% ends up in Africa or Asia (Miliute-Plepiene, 2021). The informal sector of recycling gives income to a lot of people, but usually lacks security equipment and is often done by children and cause severe health problems (Heacock et al., 2016, Perkins et al., 2014).

Food

Food is a complex area with not only huge numbers of different types of food, but also differences in production between similar products which makes the effects of food consumption difficult to assess. Moreover, different degrees of processing food as well as large value chains contribute to the complexity of the effects and causes of it.

Still similar to previous product types, various reports indicate insufficient regulations, exploitation concerning the labor force, including the risk of child labor, as well as overexploitation of the

land or water leading to issues related to health hazards, insufficient local access to resources, as well as environmental hazards.

For the fish industry, the large-scale overfishing has social consequences for local fishing communities and challenges related to employment as well as access to food. Migrant workers are hired as seasonal workers on temporary contract basis and dealing with potentially hazardous working conditions. Similar issues concern the chicken industry, especially in Thailand (Swedwatch 2015, Finnwatch, 2012) where migrant workers are hired from neighboring countries such as Myanmar, Laos, Cambodia, Vietnam. The most critical issue concerns fishing vessels catching 'trash fish' for feed factories: there is evidence from NGOs and human rights coalitions of forced labour, child labour and human trafficking, in particular in South-East Asia (Amfori, 2020).

Concerning fruit and vegetable production, a number of reports point to the use of pesticides in for example banana production in Ecuador and high instances of cancer in banana producing provinces compared to others (Danwatch, 2017), exploitation of migrant workers in production of conserved vegetables by the Finnish company Tokmanni (Finnwatch, 2015), and similar exploitation of worker issues reported for fish and chicken industry are found for avocado production in Mexico. Another issue concern limited local access to water, as a result of water-grown crops such as asparagus in Peru (Swedwatch, 2018). Finnwatch (2019b) report hazards for health as well as exploitation of workers with wages below living wages and deductions made without consent, for tea production in Sri Lanka. Brazil's coffee industry is facing severe problems with working conditions that are analogous to slavery, life- threatening pesticides and scarce protective equipment (Danwatch, 2016; Finnwatch, 2016).

Summarizing the social effects, there is a need for improved due diligence, transparency, and monitoring. That is the basis for a fair and ethical trade. This is also knowledge needed for companies to be able to communicate to consumers and for consumers to take conscious actions. There is a demand from both consumers and companies on regulation on due diligence. The demand from consumers will continue to be an important measure. But to change the situation, cooperation between and complementary measures from civil society, companies and governments will be required.

In conclusion, environmental and social consequences of consumption of Nordic countries, including spillover effects, are substantial. We exceed both the planetary boundaries and our most basic social agreements through our consumption. In the next chapter the potential for mitigating effects will be discussed.

2 Potential to decrease negative effects of consumption



One of the suggestions in this report is to prolong life of goods. Photo: Unsplash.com

Framework and scope

In this section of the report, we discuss an economic framework that can be used to assess these benefits and costs associated with the consumption of various products. What we need is a simple framework to assess the sustainability of consumption choices that are made in the marketplace and identify opportunities where a change in consumption patterns can contribute to sustainability and how consumer choice, regulation, and “externalities” interact. One way to approach this type of analysis is to assess the tradeoffs between what the consumer values and what society values, or the private benefits and social costs of consumption, respectively.

A challenge is that consumption often imposes costs on society that are not considered by the person consuming, and/or that regulation is too weak or ineffective. Reducing the climate damage associated with a certain type of consumption is a desirable objective for society. On the other hand, consumption conveys a private benefit as well and the consumption of some goods has a higher value than the consumption of other goods. The tradeoff between the private benefits and the costs of society of consumption is discussed in this section. The following product groups included:

1. **Food:** meat/fish, dairy, fruits, and vegetables
2. **Transport:** Private transport by car, and travel abroad for pleasure
3. **Housing energy**
4. **Consumer goods such as clothes, electronics**

Consumer surplus and the elasticity of demand

A measure of the “benefit” from consuming a given product is consumer surplus, which is determined in part by the elasticity of demand. Consumer surplus and elasticity of demand are concepts that are often used to characterize and understand consumption choices. Consumer Surplus is the difference between the price that consumers pay and the price that they are willing to pay. Elasticity of demand captures the sensitivity of the consumers choice to changes in the product’s price (figure 13).

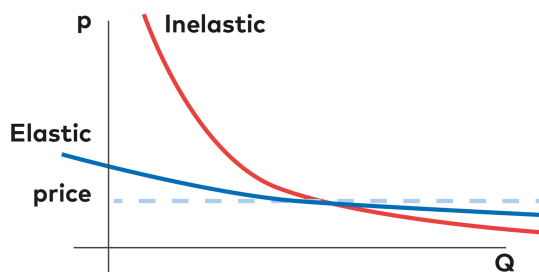


Figure 13 Consumer surplus and the elasticity of demand

An insight from this framework is that consumer surplus is higher for products that have inelastic demand for a given quantity consumed. This makes intuitive sense because products that consumers must have are probably consumed even if the price changes, see figure 13. Inelastic demand means there is little change in the quantities consumed with changes in the price of the good. In contrast elastic demand means quantities change more with a change in the price of the good. Elasticities are often expressed in terms of percentage change: an X% change in the price leads to a Y% change in quantity demanded. For example, an elasticity of demand of -1 means that a 10% increase in the price results in a 10% decrease in the quantity consumed.

We can use the demand elasticities associated with a product to distinguish between high value versus low value consumption, and products for which consumers are price sensitive. We can also use price elasticities to guide our discussion on the policies that could be effective in changing consumption patterns to reduce adverse social impacts.

There is a wealth of research estimates on demand elasticities at the product level and the analysis here will examine what these estimates say about the potential to change consumption patterns. Edgerton (1997) discusses demand elasticity estimation methods in more detail. The analysis is organized around changing consumption at different levels of aggregation, and is presented in the next section.

Changing consumption patterns

A first level of aggregation examines how willing consumers are to adjust their consumption patterns within the product categories considered here.

Low elasticity goods such as basic foods that most people buy regularly like milk, cheeses, eggs and bread, have relatively inelastic demand estimates that typically range between 0 and -1. For example, the (uncompensated unconditional) own price elasticity of beef is often estimated to be low in the Nordics, e.g. -0.27 in Finland (Rickertsen et al., 2013). This means that increasing the price of beef by 10% leads to a decrease in the quantity of beef consumed by 2.7%. In contrast, the elasticity associated with ham is around -1.0 and for eggs around -0.3 (Andreyeva et al., 2010). It is relatively difficult to change the consumption patterns of staples, which is in line with their relatively low elasticities of demand. Products such as vegetables, fruits and nuts, meat, dairy, and fish are examples of staples.

Food consumption – meat

As far as the environmental impact of food is concerned, meat consumption is particularly interesting because of the resources needed to produce meat relative to the comparable quantity of non-meat food. Within the category of meat, there is a wide variety of environmental impacts across different type of meat products. Beef is often singled out as a major contributor to greenhouse gas emissions, as well as other types of meat (see previous chapter).

Another way to reduce the impact of consumption is by switching between product groups. For example, reducing our consumption of high impact meat and increasing our consumption of lower impact meat such as poultry would probably yield a benefit in terms of reduced emissions but how willing are consumers to make this type of switch?

A helpful concept that can be used to shed light on this question is the cross-price elasticity of demand. The concept is similar to own-price elasticities already discussed, except that the cross-price elasticity refers to the change in the demand quantities of a product in response to a change in the price of a different product. For example, an X% increase in the price of meat results in a Y% change in the quantity of vegetables demanded. The cross-price elasticity captures the degree to which consumers substitute between product types and is relevant here because it captures the wider changes in consumption patterns that can result from policy. A positive cross-price elasticity suggests that the goods are substitutes, meaning an increase in the price of beef for example leads to an increase in the quantity of fish demanded, suggesting

consumers switch away from meat and consume more fish instead. On the other hand, a negative cross-price elasticity suggests the goods are complements, meaning an increase in the price of beef could probably lead to a decrease in the quantity of wine demanded, suggesting consumers want to consume meat and wine together and a drop in meat demand leads to a drop in wine demand.

Elasticity estimates of meat and meat consumption reveal that there are fairly important differences across the Nordics in terms of what types of meat product consumers are willing to substitute across. See Table 5 below. For example, Danish consumers are more willing to give up their beef consumption than Norwegian consumers. In contrast, Norwegian consumers are less willing to give up fish than Danish Consumers.

Also interesting are the substitution patterns across different types of meat/fish products. For example, Danish consumers more readily switch away from beef to pork than in Finland. Also note that the estimates (not significant) suggest that Danish consumers consider beef and fish to be substitutes whereas Finnish consumers see beef and fish as complements.

Land	Type of meat	Price elasticity
Denmark	Beef	-0.6
	Pork	-0.71
	Chicken	-0.53
	Fish	-0.77
Finland	Beef	-0.27
	Pork	-0.37
	Chicken	-0.31
	Fish	-0.3
Norway	Beef	-0.58
	Pork	-0.63
	Chicken	-0.59
	Fish	-0.53
Sweden	Beef	-0.35
	Pork	-0.54
	Chicken	-0.78
	Fish	-0.24

Table 5. Uncompensated, unconditional price elasticities for various meats across countries (Rickertsen et al., 2013).

Another strategy for reducing the impact of food is to change towards a more vegetarian diet. Here again, we can see how elasticities capture consumer preferences for meats and fish versus

vegetable-based diets (Häggmark Svensson, 2013). One could suppose that consumers are quite hesitant to change their diets and are locked into eating the same foods that they have eaten in the past. This is probably reflected to a degree by the low cross-price elasticities between meat and vegetables. However, there is evidence that consumer preferences for meat in the Nordics is changing, for instance with Swedes consuming less meat overall (Jordbruksverket, 2021).

Transportation

Vehicle and fuel demand are also generally estimated to be quite inelastic. These longer-run estimates are highly inelastic because consumers often need to travel to shop or get to work regardless of price changes. Rural long-run price elasticities are typically quite low. Urban short-run elasticities are higher, reflecting the options available to people living in areas where public transport for example is more readily available, see e.g. estimated Swedish elasticity of demand for fuel (Sterner, 2006).

Stockholm's congestion tax reflects these general findings in the economics literature. When introduced the congestion tax reduced total road traffic volumes around 18–23% within the inner-city, and substantially reduced congestion and reduced travel times, which is one of the stated objectives of the tax (Börjesson Riviera et al 2011)

Air travel for pleasure (as opposed to business travel) is often considered to be a luxury good. Elasticities associated with air travel for pleasure are often quite high, meaning small price increases can reduce the demand for air travel significantly (Kopsch, 2012). A rule of thumb that is found across studies of air travel demand is that long-haul flights tend to be more inelastic (high private value) than short-haul flights. The price elasticity of air travel varies between 0.4 and -2.0 (IATA 2008). Experience from Norway's aviation tax suggests that it had a significant impact in reducing domestic air travel (Warras, 2020).

An alternative to vacationing abroad via air travel is the stay-at-home vacation. Recent studies have used the COVID pandemic to explore the consumption of more local vacation alternatives (Björk et al., 2021).

Housing services – (renting and energy)

The demand for housing and housing related energy services (electricity) is a topic that has seen extensive research. Given its nature, housing is a fairly distinct type of consumption. Income elasticity of demand (distinct but related to the price elasticity of demand discussed above) for housing/services is usually estimated to be quite high (greater than one), which means that increases in

an individual's income trigger large increases in housing expenditure. This reflects the value that individuals put on having a comfortable home and given the Nordic climate a comfortable home probably carries a higher premium here than in other less harsh climates (Economicsonline, 2021).

Recent experience with the Covid pandemic has provided insight on the degree consumers can adapt to restrictions in travel. One outcome of this state observed in the Nordics is that households have directed resources towards upgrading their housing. Recent statistics from the housing market in Sweden show a significant increase in residential prices (Mäklarstatistik, 2019). The price increases, especially for larger residences such as villas, is similar across the Nordic region.

It is probably difficult to convince consumers to buy smaller homes to reduce energy consumption, or to lower the temperature in their homes. Options to reduce the energy consumption in homes will probably have a better chance of success if the value of consumers place on living space and comfort are taken into consideration. Energy consumption could be reduced holding the level of comfort fixed in the short run. Managing household energy demand is a field of its own, but the upshot is that consumers will probably continue to demand larger and more comfortable living spaces. Reduction in the impact of this type of energy consumption will have to rely on demand management (keeping comfort levels fixed) and/or investments in energy efficiency which is feasible considering the fact that electricity production happens mainly in Nordic countries (which lies outside the scope of this report).

Luxury goods – consumer goods

Luxury goods and services are typically associated with high elasticities of demand. One can think of certain products, in all categories, that fall into this category: luxury leather goods or vehicles. Demand elasticity estimates for luxury goods are generally quite high because consumers readily reduce their purchases of these types of goods when the price increases. Demand elasticity estimates for luxury cars are generally quite high for example.

It is worthwhile noting that there is a large variation of elasticity estimates within product categories as well as across different consumer income groups.⁴ The differences in demand elasticities within product groups can be very large. Product characteristics such as branding can play an important role in determining the elasticity of demand, in fact it is in the interest of companies to provide products with a relatively high elasticity of demand because this allows them to charge a higher price without a corresponding reduction in the quantities of the product they sell. On the other hand, some products are designed to compete on price. One can imagine the difference between a branded product and a generic product in all product categories. The upshot is that there is significant variation in the value different consumers put on consumption, even for narrowly defined categories of goods.

Demand for voluntary Organic/ ecologically labelled goods

A growing segment of many markets includes products that carry an organic/ecological label (not to mention ethical labels like Fairtrade or similar). There is a wide range of voluntary labelling initiatives on the market across consumer good categories, with varying requirements on how these products need to be produced to meet the labelling standards. There is a large academic body of literature investigating consumer demand for environmental impact of labelled versus conventional products and a review of this literature for the Nordic context is beyond the scope of this report. However, overall, it is probably safe to say that there is a growing number of consumers that value labelled products, which suggests that this way of consuming could reduce environmental impact provided the environmental and social impact of labelled products is lower/better than conventional products.

Reducing overall consumption

Finally, we can consider how to reduce overall levels of consumption. One way this can be achieved is by encouraging consumers to save or invest more of their income rather than spend it on consumption. A way to achieve this is to adjust interest rates. A full examination of the impact interest rates has on consumption is a research program in and of itself, but although the conventional logic is that higher interest rates lead to lower consumption, this relationship is more nuanced and complex (Gustafsson et al., 2017).

4. High income consumers tend to be less price sensitive/ low price elasticity of demand, all else equal.

How should we change the way we consume?

Taken together, demand elasticities and externalities provide a basic framework for identifying areas where consumption patterns can be changed to be made more sustainable. The objective is essentially to see where we can reduce low value consumption with high external costs and increase high value consumption with low external cost. The proxy for the value of consumption is the products demand elasticity, whereas the proxy for the external cost is the product's resource intensity associated environmental footprint. With these basic concepts we can proceed to map areas where there may exist potential for various policy measures to change the patterns of consumption in a way that reduce impact.

3 Policy measures to decrease negative effects of consumption



One of the suggestions is to reduce food waste. Photo: Bent Blomqvist/norden.org

Method

In this chapter, the shifts in patterns of consumption suggested in the previous chapter are categorized and possible policy instruments that may be used to promote these shifts are suggested. Clearly, measures are needed to address the fact that we now exceed both the planetary boundaries and our most basic social agreements through our consumption. Note that we only address shifts in consumption patterns, although negative effects of consumption may also be addressed upstream in the process of production.

Possible shifts in consumption may be categorized into 1) decreased consumption; 2) redistributed consumption; and 3) more efficient use of goods and materials. Subcategories of 2) include redistribution within sectors, between sectors and new business models (e.g. new ways of providing the same benefit such as video communication instead of travel). Subcategories of 3) may include circular economy, sharing economy, technical innovation and more. Different shifts are relevant for different sectors. For example, changes in technology may be the most effective in certain areas (e.g. housing), while changes in behavior have a greater impact in other areas (e.g. transport).

Different policy instruments exist or may be suggested that can promote specific shifts in consumption. Based on the suggested shifts, some possible instrument to apply in a Nordic context will be identified both from a conceptual understanding of the problem as well as from existing examples of policy instruments in the Nordic countries or elsewhere.

Shifts in consumption

The CO₂ intensities per financial unit for different goods and services indicate how different patterns of income spending impacts the environment (the climate) and provides useful information for designing policy instruments that may induce consumers to shift their patterns of consumption. In Table 6 below CO₂ intensities (g/SEK) are given for several consumption categories.

Consumption category	CO ₂ intensity (g/SEK)	Reference
Beef	140–160	Grabs (2015); Carlsson-Kanyama et al. (2019)
Pork	67–110	Grabs (2015); Carlsson-Kanyama et al. (2019)
Food	69–82	Grabs (2015); Carlsson-Kanyama et al. (2019)
Transportation	78	Grabs (2015)
Package international holiday	204	Carlsson-Kanyama (2019)
Train ticket	0.5	Carlsson-Kanyama (2019)
Bus ticket	80	Carlsson-Kanyama (2019)
Taxi	7	Carlsson-Kanyama (2019)
Housing	44	Grabs (2015)
Consumables	30	Grabs (2015)
Leisure and culture	27–28	Grabs (2015); Carlsson-Kanyama et al. (2019)
Clothes and shoes	27–39	Grabs (2015); Carlsson-Kanyama et al. (2019)
Furniture	23–24	Grabs (2015); Carlsson-Kanyama et al. (2019)
Healthcare	4–18	Grabs (2015); Carlsson-Kanyama et al. (2019)
Restaurant visits	4–11	Grabs (2015); Carlsson-Kanyama et al. (2019)
Services	8	Grabs (2015)
Private consumption	32	Steinbach et al. (2018) + own calculations
Public consumption	13	Steinbach et al. (2018) + own calculations

Table 6. CO₂ intensity (g/SEK) for different categories of consumption in Sweden

There are uncertainties in the numbers, as indicated by the intervals and differences between data sources but some messages are clear

and familiar. Important messages include high CO₂-e intensities for meat and especially beef, large differences within transportation with very high CO₂ emissions in international package travel which is supposedly dominated by aviation. Another message is that private consumption is almost three times more CO₂ intensive than public consumption basically reflecting that public consumption is dominated by welfare services with very low climate impact while private consumption is more diverse including a variety of goods and services.

Based on reported CO₂-e intensities and other information earlier in this report several shifts are identified to be supported by policy instruments. The shifts we suggest are

1. **Shift from beef to other meat.** Beef is clearly more greenhouse gas intensive than other meat, and cross-price elasticities (see also previous chapter) suggest that consumers may be quite willing to substitute other meat (especially pork) for some of their beef consumption.
2. **Shift from meat to vegetables.** Although there is large variation in vegetable food the climate impact of a vegetarian diet is clearly lower than animal diets.
3. **Reduce food waste.** This is an apparent no-brainer where over-consumption of food in general is reduced with little negative impact on people's welfare.
4. **Reduce air travel.** Aviation seems to have the highest CO₂-e intensity among all reported categories of consumption, implying that if consumers can spend their income on any other type of consumption it is preferable from a climate perspective. As indicated in the previous chapter demand for short-haul flights within the EU is quite easy to affect (elastic) whereas demand for long-haul flights outside the EU is more locked (inelastic).
5. **Shift from private cars to public transportation and soft mobility.** As indicated by CO₂-e intensities they are low for trains and taxi, and of course even lower for so-called soft mobility, *i.e.* cycling, walking and other non-motorized transport. The reason for the higher CO₂-e intensity in bus travel is likely due to the low price of bus tickets in Sweden, meaning that emissions are relatively high per monetary unit. An important and ongoing shift is also the composition of the car fleet in favor of electric cars.
6. **Prolong life of goods.** This can be achieved both through design and quality which is made to last or to repair or upgrade, as well as through extending the time we use the products we have by taking good care of them, repairing them, upgrading them and sharing them with others.
7. **Respect human rights.** For consumers, companies, and governments to do so there is a need for due diligence, transparency and monitoring at all supplier levels. That is the basis for fair and ethical trade and there is a demand from

both consumers and companies for regulation.

8. **Reduce overall private consumption.** Assuming that people in general will spend their income on a variety of goods and services and that the potential is limited for reducing the total climate impact by redistributing consumption between categories – both due to low elasticities and weak policy instruments – an alternative to consider is a reduction of total private consumption.

Policy instruments

Meat consumption

Shifting food consumption from beef to other meat, or from meat to vegetables are primarily instances of redistribution within the food sector, although shifting to cheaper food alternatives may also facilitate other consumption in addition to food as consumers reduce their financial spending on nutrition. Several policy instruments are possible to stimulate these shifts.

Economic instruments include excise duty on meat, adjusted VAT rates for different types of food and removal of certain subsidies. Excise duties are already common for e.g. alcohol and tobacco and could be levied specifically on beef or on meat in general. There are examples of excise duties on food in other countries such as sugar in Mexico (Röös et al., 2020). There are several studies discussing possible design and outcome from climate taxation on food (e.g. Wirsenius et al., 2011; Säll & Gren, 2015; Säll et al., 2020). In a recent report a consumption tax on all food corresponding to the Swedish carbon dioxide tax (SEK 1.15 per kg CO₂) was analyzed (Röös et al., 2021). The results showed that such a tax would have the potential to reduce greenhouse gas emissions from food consumption by just over 10%. The price of average beef increases by 18% with such a tax, while the price of vegetables only increases by a few percent.

Röös et al. (2020) suggest that adjusted VAT rates is more likely to gain acceptance among consumers. Within the EU it is allowed to differentiate between three different rates of VAT and also to exclude certain goods and services from VAT. Norway, Sweden and Finland currently have reduced VAT for all foodstuffs without differentiation. In Great Britain candy, ice cream and soft drinks are excluded from VAT reduction. The VAT directive (Directive 77/388/EEC) regulates how VAT can be applied in the EU. On removing harmful subsidies Röös et al. (2020) note that during a three-year period the EU spent €71m promoting meat, despite climate goals (EU Observer, 2019).

Information about climate impact and the possibility to shift food consumption is another option. One obvious possibility to do this is

by eco-labeling. EU rules on food labelling (Regulation No 1169/2011) ensure consumers receive correct information to enable informed choices about the food they buy and could be expanded to include for example information on the environmental footprint of specific products (BIO Intelligence Service, 2012). Health related labeling have been shown to have a certain effect on consumer behavior (Shangguan et al., 2019) that may be relevant also for climate labeling which has been investigated for dairy products (Elofsson et al., 2016). Food labeling can be both positive or negative, i.e., indicating either eco-friendly or harmful alternatives (Röös et al., 2020).

A further possibility is to work with shifting norms regarding food consumption, which for example can be supported by public procurement and information campaigns. Public institutions such as schools and hospitals can promote shifts from meat-based to vegetarian diets in their menus and thereby influence citizens which may be of particular importance for changing norms of young people. Several examples of campaigns for meat-free days in Europe are reported by BIO Intelligence Service (2012). Visible information campaigns may come also from NGOs.

Reduce food waste

Reducing overconsumption of food is an example of a strategy focusing on more efficient use of goods and materials. Food waste occurs along the whole food chain and counteractions may be applied also on the production side. Policies to reducing food waste at the consumption side of the chain include introduction of targeted awareness-raising and information campaigns and education programmes, e.g. the provision of general information in schools. One successful example reported by BIO Intelligence Service (2012) is the WRAP's 'Love Food Hate Waste' campaign in the UK seeking to raise awareness among households of the need to reduce food waste and help residents save money. It is estimated that due to the campaign 8 million more UK households have taken steps to cut back on the amount of food they throw away, preventing 137 000 tonnes of food being thrown away which would have emitted 600 000 tonnes of greenhouse gases and saving £296 million a year.

The Swedish National Food Administration ran a campaign against food waste in 2017–2019 which is so far a rare example of a governmental initiative in Sweden, but small-scale campaigns have been carried out by private initiatives (Röös et al., 2020). Another possible measure is to reduce the size of plates in restaurants (Kallbekken & Sælen, 2013).

Transportation

Reduce air travel

Air travel within the EU is included in the EU's emissions trading system (ETS). This means that CO₂ emissions from intra-EU flights together with emissions from other activities are required to stay below the maximum cap set by the system. In addition to the EU member states Norway, Iceland and Liechtenstein participate in EU-ETS. Flights to and from the Schengen area are excluded from the system at least until 2023.

In addition to the ETS several European countries have introduced aviation taxes, including Germany, France and the United Kingdom. Among the Nordic countries Sweden has a tax on aviation, and Norway has an air passenger tax. The Swedish aviation tax is differentiated based on distance with lower rates for flights within Sweden and Europe (SEK 63), and higher rates for longer distances (SEK 262 if less than 6 000 km and SEK 418 over 6 000 km). The Norwegian air passenger tax is levied on passengers departing from a Norwegian airport on board commercially operated flights with the rate depending on final destination – NOK 76.50 within Europe and NOK 204 for final destinations outside of Europe. Denmark had an aviation tax before 2008 and in Finland a citizens' initiative for the introduction of an aviation tax has gathered more than 50 000 signatures which implies that it will be considered in the parliament. Alternative forms of taxation for aviation activities could include taxing aviation fuel or airport taxes, as well as personal carbon trading (BIO Intelligence Service, 2012).

It has been argued that taxing aviation does not in principle reduce CO₂ emissions for flights included in the EU-ETS since any reductions in emissions from flights would increase available allowances in the market (Trafikverket, 2020). However, aviation contributes more to climate warming than other CO₂ emitting activities due to high altitude effects. Moreover, the ETS only covers flights within the ETS. Taxation policies may also consider elasticities discussed in the previous chapter indicating relatively high elasticities for private travel, and relatively higher elasticities for short-haul flights.

In addition to shifting the mode of transportation, shifting the composition of the car fleet in favor of electric cars is an important ongoing transformation supported by the EU carbon dioxide standard for new cars (95 g CO₂ / km 2021) and different taxes and subsidies such as the Swedish bonus-malus system and generous economic policies in Norway (Holtmark & Skonhoft, 2014).

Shift from private cars to public transportation and soft mobility

Among the options available for shifting from private cars to public transportation and soft mobility are economic instruments,

spending on public transport and spatial planning.

Economic instruments include taxes on private travel such as a general CO₂ tax including emissions from fuels and congestion taxes. Subsidizing public transport through VAT reductions is done to different degrees in all Nordic countries. Removing existing subsidies stimulating private cars is another possibility. Diesel subsidies are common as well as tax reductions for commuting, and company car arrangements (Christensen et al., 2007).

Making public transportation more attractive by redirecting infrastructure funding away from motorized transport to public infrastructure (BIO Intelligence Service, 2012) such as railways and bicycling is an obvious way to stimulate a shift in transportation modes. Funding of public transport has a long tradition while measures to stimulate bicycling have a more recent development. For example, Belgium has a cycling compensation scheme where employers may reward employees commuting with bicycle funded through tax reductions (Green Budget Europe et al., 2019), and many cities have bike sharing programmes such as the Paris Velib Programme and some towns promote themselves as being cycle-friendly (Christensen et al., 2007).

Urban and spatial planning measures to support public transportation and soft mobility may include stopping urban sprawl that may induce car transportation and working with parking policies discouraging unnecessary car use.

Prolong life of goods

Sustainable consumption is not only about shifting to alternative options but can also be achieved by taking consumption of certain goods as a given and instead focus on how consumers can use them more efficiently, assuming sufficient conditions of product quality. For instance, by re-using, sharing or upgrading during their lifetime so as to prolong the life of goods. Doubling the life of the goods halves the negative footprint (Sandin et.al 2019).

Today there are many actors on the second hand market, both non-profit and commercial and peer-to peer services, but there is a lack of infrastructure for scaling up reuse. There are also many initiatives for people in the Nordic countries to share cars, tools, clothes etc., but certainly these endeavors can be improved and extended to have a larger positive effect on sustainability. Here, rebound effects should be considered as a risk when consumers because of savings invest in other consumption types.

Respect human rights

A review of 1,000 European companies' sustainability reports shows that only one-fifth report how they work with human rights due diligence (HRDD), despite the fact that over 80% have a human rights policy (Alliance for Corporate Transparency, 2020). The European Commission's Working Group on Responsible Business has also concluded that voluntary action has not sufficiently made the businesses to identify, address and prevent its negative impact on human rights in the supply chain (European Parliament's Responsible Business Conduct Working Group, 2020)

In Sweden, both the the Swedish Agency for Public Management and the Agenda 2030 delegation have recommended the government to investigate the possibility of Swedish HRDD legislation. And the demand from watch dogs, companies and consumers of making human right due diligence mandatory in business has grown in Sweden (Visa handlingskraft nu, 2021). In Finland, the government has undertaken to present national HRDD legislation. Processes for the development of national HRDD legislation are also ongoing in Switzerland and Germany with strong support from companies.

In several other European countries, there are already laws and legislative proposals on mandatory HRDD. In France, the law "Duty of Vigilance" was adopted in 2017, which requires HRDD. In the Netherlands, an HRDD law was adopted in 2019, with a special focus on child labor, and in the United Kingdom there has been a law since 2015 that requires transparency in supply chains. EU has started the process of creating binding rules for business and human rights and will present a suggestion during 2021. Mandatory human rights due diligence legislation is also called for by UN Special Rapporteur on toxics and human rights.

Reduce private consumption

Active measures to reduce private consumption rather than shifting consumption towards more environmentally friendly alternatives have hardly ever been employed by governments while the opposite, i.e., stimulating consumption is more in line with traditional growth oriented economic policy. Reducing consumption hence requires some innovation.

One measure that has been suggested is increasing the rate of VAT which would make goods and services more expensive (Persson et al., 2015). This would essentially increase the level of taxation and stimulate public consumption at the expense of private consumption. Such a general tax on consumption, however, would be regressive by nature putting a burden on low income groups. An alternative may be progressive taxation of income which may be

designed to distribute the burden away from the lower income brackets.

Adjusting interest as discussed in the previous chapter may also be considered to encourage consumers to save more and spend less. More radical policies discussed in the literature include working time reductions and a universal basic income. Working time reductions would primarily affect production volumes but also result in lower wages and hence reduced private consumption (e.g. Hoffmann, 2015). A basic income would be a means to obtain the same end namely counteracting unsustainable engines of growth as a means for job creation and consumption by satisfying the basic needs of citizens through other means (MacNeill & Vibert, 2019).

A remark on economic theory

Economists generally recommend broad policy instruments taxing emissions close to the source. In other works, directly taxing CO₂ is preferred before taxing certain activities that generate CO₂ emissions. This advice is apparently not always followed in the policies discussed in this chapter where we rather discuss policy instruments directed towards consumer choices and behavior. The difficulty of obtaining economically optimal instruments and the urge to rapidly shift towards more sustainable consumption and lifestyles justify a broader arsenal of instruments and our proposals should be seen as possible contributions to a policy for such a transition.

4 Conclusion



The shift to public transportation from private car is one of the suggestions. Photo: Ricky John Molloy / norden.org

This report presents an analysis of the effects of private consumption of households in the Nordic countries, with focus on four thematic areas of housing, transport, food and consumer goods, and has proposed priority areas as well as policy measures for reducing these effects. The analysis has quantified the environmental spillover effect of consumption as well as described some typical social effects in other countries.

The results of the analysis of environmental effects indicate that in general:

- There is no harmonized methodology for consumption-based emission accounting making comparisons between countries and studies difficult.
- Sweden is the only Nordic country that includes consumption-based emissions in the official environmental accounts. There are, however, on-going discussions and initiatives in the other Nordic countries to include consumption-based accounting as a complement to traditional, territorial accounting.
- Considering consumption-based emissions reveals that although significant progress is made in terms of 'decarbonizing' the energy systems the global emissions continue to grow.
- Transport is the biggest source to consumption-based CO₂-e emissions from households in the Nordic countries, followed by food and housing.
- Nordic households have the highest per-capita energy consumption in the EU, but greenhouse gas emissions are relatively low due to the high share of renewables in the energy supply.

Considering each thematic area, results are:

- For housing, heating and cooling requires most energy which cause most spillover effects in installations which require fossil

fuels. When using electricity as fuel source, spillover effects are limited to the large share of green energy in the energy mix in Nordic countries.

- For transport, spillover effects are mostly exceeding domestic emissions due to the production of cars as well as fuel abroad. Consumption of transport have increased in general in recent years in Nordic countries, despite efforts to mitigate effects by energy efficiency of transport means. Electric vehicles are on the rise but do need to become available for a broader market segment, and even electrical cars need to be manufactured, which often happens abroad. International flights are dominant in air travel and cause most emissions, including the use of fossil fuels.
- For the different food categories, meat consumption is particularly interesting because of the resources needed to produce meat relative to the comparable quantity of non-meat food. Within the category of meat, there is a wide variety of environmental impacts across different type of meat products. Beef is often singled out as a major contributor to greenhouse gas emissions, as well as other types of meat.
- For all consumer goods the material extraction and production phase in general cause higher emissions abroad since most products are manufactured outside the Nordic countries. For electrical products the use phase in general causes less emissions due to due to the large share of green energy in the energy mix in Nordic countries.

When considering social effects, based on the Worldwide Governance Indicators, which gives an overview of the level of risks related to Governance in sourcing countries it is clearly shown that there are risks in many of the countries where the production of products consumed in Nordic countries is taking place. Major issues in production of goods are that wages are so low that they cannot be lived on, as well as inappropriate or life-threatening working conditions. Consumers demand information about production which may be important for implementing change. For consumers, companies, and governments to respect human rights and the core principals of the International Labour Organization there is a need for due diligence, transparency, and monitoring at all supplier levels. That is the basis for fair and ethical trade and there is a demand from both consumers and companies for regulation.

Based on the priorities indicated by the size of spillover effects in the thematic areas, further analysis into demand elasticity and externalities showed that it could be more feasible to decrease the negative impacts of consumption that consumers are more willing to give up, or where demand is highly elastic:

- Food consumption is relatively locked but any changes that we could realize could have significant impact because there is high variation in impact across food types (across meat types and between meat and more vegetable-based diets).
- Demand for short-haul flights within the EU is quite easy to affect (elastic) whereas demand for long-haul flights outside the EU is more locked (inelastic).
- There is limited scope for reducing the demand for travel by private car. Consumers are more willing to switch to cleaner modes of private transportation such as electric vehicles, and less willing to switch to public transportation (in the short term), taking public transportation options as given.
- Luxury consumption is generally found to be quite easy to change (elastic).

There is large variation in the demand elasticities (as well as the environmental impacts of products) even within narrowly defined consumption types, and this variation is difficult to observe, e.g. similar products can have different demand profiles that are not easy to observe and impacts that are hard to measure especially up the supply chain. This is a challenge for designing effective policy responses.

Based on reported CO₂-e intensities and other information earlier in this report several shifts may be identified to be supported by policy instruments. The shifts we suggest are:

1. **Shift from beef to other meat consumption.**
2. **Shift from meat to vegetables.**
3. **Reduce food waste.**
4. **Reduce air travel.**
5. **Shift from private cars to public transportation and soft mobility.**
6. **Prolong life of goods.**
7. **Respect human rights.**
8. **Reduce overall private consumption.**

We further recommend caution with interpreting and applying the results of this study since the quantitative and qualitative data collected for the analyses was limited. This is due to the fact that we have only consulted existing databases which have large variation in underlying calculation methods and categories of products etc., as well as available research reports, thus constraining the possibility to perform additional analyses for verifying and triangulating results. Future studies should consider including more effort for gathering data on countries that are excluded from Eurostat and Exiobase, such as Iceland.

5 References



One of the suggestions in this report is to respect human rights. Photo: Unsplash.com

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6 Appendix



The shift from red meat to white meat is one of the suggestions in this report. Photo: Unsplash.com

Energy

Table 7. Available consumption-based CO₂-e emissions from private consumption in households across the Nordic region.

	Consumption-based CO ₂ -e emissions from households, total (tonnes)	Consumption-based CO ₂ -e emissions from households, per capita (tonnes)*	Share of consumption-based CO ₂ -e emissions (%)
Denmark Energistyrelsen (2021).	39 million (2019)	6.7 (2019)	• Transport: 27% • Food and beverages: 24% • Electricity, heat, water and renovation: 18% • Leisure and vacation: 9% • Electronics and home appliances: 6% • Housing: 5% • Clothes: 4% • Service: 4% • Other: 3%
Finland (2016) Nissinen & Savolainen (2019).	48.6 million (2016)	10.9 (2016)	• Transport: 30% • Housing and energy: 24% • Food and non-alcoholic beverages: 19% • Recreation and culture: 7% • Restaurants, hotels: 4% • Furnishing, household equipment and services: 4% • Clothing and footwear: 2% • Other products and services: 10%

Iceland (average 2010–2012) Clarke et al., 2017.	3.3 million (average 2010–2012)	10.4 (average 2010–2012)	• Transport: 38% • Food: 20% • Goods: 16% • Shelter: 13% • Clothing: 4% • Services: 9%
Norway Steen-Olsen et al., 2021.	37.2 million (2017)	7.1 (2017)	• Transport: 39% • Food and drinks: 24% • Clothing and footwear: 3% • Dwelling: 10% • Energy: 10% • Manufactured goods: 4% • Services: 3% • Other: 7%
Sweden Statistics Sweden, 2021.	49.7 million (2018)	4.9 (2018)	• Transport: 34% • Food: 26% • Housing: 22% • Clothes and shoes: 5% • Furniture, household appliances etc: 5% • Other: 8%

* Population data retrieved from Eurostat when not available in the references.

Transport

Table 8. Emissions from private vehicles and fuel in 2018, Source Exiobase

Countries	Consumption cars/1000 inhabitants in 2018	Kg CO ₂ -e domestic, vehicles	Kg CO ₂ -e domestic, fuel	Kg CO ₂ -e ROW, vehicles	Kg CO ₂ -e ROW, fuel
Denmark	447	55 020	443 254	118 553	827 742
Finland	629	92 396	165 238	118 614	829 590
Iceland	658	N/A		N/A	
Norway	516	315 148	303 903	116 764	837 491
Sweden	476	79 185	228 465	118 852	832 767

Meat and fish

Table 9. Consumption of different types of meat per person in the Nordic countries 2018, and the amount of imported meat based on data from FAOSTAT. Environmental data from EXIOBASE (global warming potential, land footprint, material footprint and blue water consumption both domestic and "rest of world").

Country	Type of meat	Con- sump- tion (kg / person)	Con- sump- tion all meat (kg / person)	Product- ion (1000 tonnes)	Import (1000 tonnes)	Export (1000 tonnes)	GWP100 (Kg CO ₂ -e domestic)	GWP100 (Kg CO ₂ -e RoW)	Land Footprint (m ² domestic)	Land Footprint (m ² RoW)	Material Footprint (kt domestic)	Material Footprint (kt RoW)	Blue Water Con- sump- tion (Mm ³ domestic)	Blue Water Con- sump- tion (Mm ³ RoW)
Denmark	Bovine	24	78	129	124	107	904.990	5.996.218	4,46	62,18	3,21	26,46	0,05	0,15
	Mutton & Goat	1		2	4	1	N/A	N/A	N/ A	N/ A	N/ A	N/ A	N/ A	N/ A
	Pig	27		1583	148	1445	830.799	993.246	1,15	1,96	1,01	1,90	0,02	0,06
	Poultry	27		156	141	142	224.757	894.934	0,42	2,25	0,58	3,78	0,01	0,06
Finland	Bovine	19	77	87	27	4	3.066.801	5.967.583	39,74	61,84	10,82	26,34	0,08	0,15
	Mutton & Goat	1		2	2	0	N/A	N/A	N/ A	N/ A	N/ A	N/ A	N/ A	N/ A
	Pig	38		169	42	23	555.804	992.972	1,32	1,96	0,61	1,89	0,01	0,06
	Poultry	19		135	17	11	636.592	892.855	3,51	2,24	1,19	3,78	0,02	0,06
Iceland	Bovine	15	89	5	1	0	N/A	N/A	N/ A	N/ A	N/ A	N/ A	N/ A	N/ A
	Mutton & Goat	22		10	0	3								
	Pig	21		7	1	0								
	Poultry	31		9	1	0								
Norway	Bovine	18	66	89	13	0	3.770.327	5.964.573	74,18	61,79	26,56	26,31	0,10	0,15
	Mutton & Goat	5		27	1	1	N/A	N/A	N/ A	N/ A	N/ A	N/ A	N/ A	N/ A
	Pig	23		137	6	5	373.893	993.788	1,05	1,96	2,42	1,89	0,02	0,06
	Poultry	21		98	2	0	478.193	893.261	1,01	2,25	0,58	3,77	0,02	0,06
Sweden	Bovine	23	72	137	113	12	1.196.376	5.992.104	8,93	62,12	3,31	26,45	0,03	0,15
	Mutton & Goat	1		6	10	0	N/A	N/A	N/ A	N/ A	N/ A	N/ A	N/ A	N/ A
	Pig	31		249	111	29	396.906	995.849	1,11	1,96	0,77	1,89	0,02	0,06
	Poultry	17		161	81	26	169.064	896.795	0,64	2,25	0,35	3,79	0,01	0,06

Table 10. Consumption of different types of fish per person in the Nordic countries 2018, and the amount of imported fish, based on data from FAOSTAT. Environmental data from EXIOBASE (global warming potential, land footprint, material footprint and blue water consumption both domestic and "rest of world").

Country	Type of fish	Con- sump- tion (kg / person)	Con- sump- tion all fish (kg /person)	Product- ion (1000 tonnes)	Import (1000 tonnes)	Export (1000 tonnes)	GWP100 (Kg CO ² -e domestic)	GWP100 (Kg CO ² -e RoW)	Land Footprint (m ² domestic)	Land Footprint (m ² RoW)	Material Footprint (kt domestic)	Material Footprint (kt RoW)	Blue Water Con- sump- tion (Mm ³ domestic)	Blue Water Con- sump- tion (Mm ³ RoW)
Denmark	Pelagic	5	20	339	443	694	798.843	520.915	1,38	1,58	1,24	1,06	0,02	0,05
	Demersal	6		500	323	773								
	Freshwater	2		36	249	272								
	Crustaceans	7		13	187	161								
Finland	Pelagic	6	28	151	35	52	1.099.914	523.879	4,61	1,60	1,69	1,07	0,03	0,05
	Demersal	3		0	17	0								
	Freshwater	18		54	64	21								
	Crustaceans	2		0	9	0								
Iceland	Pelagic	44	91	472	35	487	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Demersal	21		682	4	616								
	Freshwater	10		20	0	17								
	Crustaceans	16		6	23	24								
Norway	Pelagic	6	50	829	1130	1005	323.958	521.250	2,11	1,59	0,73	1,06	0,02	0,05
	Demersal	23		1359	49	846								
	Freshwater	11		1304	2	1204								
	Crustaceans	10		181	382	49								
Sweden	Pelagic	5	31	165	119	200	499.878	524.785	1,17	1,60	0,87	1,07	0,08	0,05
	Demersal	9		51	299	255								
	Freshwater	9		24	550	486								
	Crustaceans	8		4	85	14								

Dairy

Table 11. Consumption of dairy products (including eggs) per person in the Nordic countries 2018, and the amount of imported dairy products, based on data from FAOSTAT. Environmental data from EXIOBASE (global warming potential, land footprint, material footprint and blue water consumption both domestic and "rest of world").

Country	Con- sump- tion (kg / person)	Production (1000 tonnes)	Import (1000 tonnes)	Export (1000 tonnes)	Share of import	GWP100 (Kg CO ² -e domestic)	GWP100 (Kg CO ² -e RoW)	Land Footprint (m ² domestic)	Land Footprint (m ² RoW)	Material Footprint (kt domestic)	Material Footprint (kt RoW)	Blue Water Con- sump- tion (Mm3 domestic)	Blue Water Con- sump- tion (Mm3 RoW)
Denmark	260	5787	834	3056	23%	1.795.013	1.949.683	3,03	12,44	1,51	2,10	0,02	0,05
Finland	360	2473	751	199	25%	1.031.960	1.953.989	2,96	12,46	0,81	2,10	0,01	0,05
Iceland	218	162	1	8	1%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Norway	180	1664	128	98	8%	1.109.919	1.950.478	23,58	12,38	1,47	2,09	0,02	0,05
Sweden	184	2888	974	384	28%	839 738	1 957 502	3.65	12.46	1.14	2.10	0.02	0.05

Fruit and vegetables

Table 12. Consumption of fruit and vegetables per person in the Nordic countries 2018, and the number of imported products, based on data from FAOSTAT. Environmental data from EXIOBASE (global warming potential, land footprint, material footprint and blue water consumption both domestic and "rest of world").

Country	Type	Con- sump- tion (kg / person)	Production (1000 tonnes)	Import (1000 tonnes)	Export (1000 tonnes)	GWP100 (Kg CO ₂ -e domestic)	GWP100 (Kg CO ₂ -e RoW)	Land Footprint (m ² domestic)	Land Footprint (m ² RoW)	Material Footprint (kt domestic)	Material Footprint (kt RoW)	Blue Water Con- sump- tion (Mm ³ domestic)	Blue Water Con- sump- tion (Mm ³ RoW)
Denmark	Fruit	63	56	575	168	744.599	528.600	2,50	3,97	5,80	3,44	0,02	0,20
	Vegetables	104	324	412	85								
Finland	Fruit	71	27	419	19	340.112	528.849	1,53	3,97	1,80	3,44	0,01	0,20
	Vegetables	84	249	259	7								
Iceland	Fruit	91	0	31	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Vegetables	74	4	22	0								
Norway	Fruit	78	31	401	2	481.164	528.497	1,12	3,97	1,50	3,44	0,01	0,20
	Vegetables	71	180	239	2								
Sweden	Fruit	59	49	824	97	366.300	529.260	3,95	3,97	3,20	3,44	0,02	0,20
	Vegetables	83	307	690	48								

Table 13. Production, import and export of citrus fruits 2018 (including lemon, lime, orange, mandarin and grapefruit) in the Nordic countries. Data from FAOSTAT.

Country	Production (1000 tonnes)	Import (1000 tonnes)	Export (1000 tonnes)
Denmark	5	170	78
Finland	0	102	1
Iceland	0	6	0
Norway	0	108	0
Sweden	0	231	15

Textiles, clothes and shoes

Table 14. Consumption and emissions of textiles per person 2018. Consumption of textiles in the Nordic countries and climate impact for textiles, wearing apparel; furs and leather and leather products (Global warming potential, land footprint, material footprint and blue water consumption both domestic and "rest of world". Consumption data from Palm et al. 2014 and environmental data from EXIOBASE.)

Countries	Con- sumption per person and year (kg)	Type	GWP100 (Kg CO ² -e domestic)	GWP100 (Kg CO ² -e RoW)	Land Footprint (m ² domestic)	Land Footprint (m ² RoW)	Material Footprint (kt domestic)	Material Footprint (kt RoW)	Blue Water Consump- tion (Mm ³ domestic)	Blue Water Consump- tion (Mm ³ RoW)
Denmark	16	Textiles	48.303	749.018	0,05	1,33	0,10	1,13	0,00	0,03
		Wearing apparel; furs	18.321	719.212	0,02	1,01	0,02	0,91	0,00	0,02
		Leather and leather products	35.635	679.035	0,09	2,16	0,07	1,25	0,00	0,02
Finland	13,5	Textiles	449.144	747.368	0,70	1,33	0,77	1,13	0,01	0,03
		Wearing apparel; furs	284.921	718.001	0,40	1,01	0,39	0,91	0,01	0,02
		Leather and leather products	181.487	678.871	0,55	2,16	0,27	1,25	0,00	0,02
Iceland	15	Textiles	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Wearing apparel; furs								
		Leather and leather products								
Norway	22	Textiles	234.590	752.912	0,32	1,33	0,37	1,14	0,01	0,03
		Wearing apparel; furs	165.225	718.001	0,45	1,01	0,24	0,92	0,01	0,02
		Leather and leather products	157.504	678.871	1,44	2,16	0,26	1,25	0,01	0,02
Sweden	15	Textiles	373.567	749.198	0,56	1,33	0,89	1,13	0,01	0,03
		Wearing apparel; furs	283.556	719.302	0,36	1,02	0,36	0,91	0,02	0,02

Electrical equipment

Table 15. Consumption of electronic equipment per capita 2018. Collected electronic waste per capita in the Nordic countries and climate impact for office machinery and computers, electrical machinery and apparatus and radio, television and communication equipment and apparatus. (Global warming potential, land footprint, material footprint and blue water consumption both domestic and "rest of world". Waste data from Eurostat and environmental data from EXIOBASE.)

Countries	Collected electronic waste per capita 2018 (kg)	Type	GWP100 (Kg CO ₂ -e domestic)	GWP100 (Kg CO ₂ -e RoW)	Land Footprint (m ² domestic)	Land Footprint (m ² RoW)	Material Footprint (kt domestic)	Material Footprint (kt RoW)	Blue Water Consumption (Mm ³ domestic)	Blue Water Consumption (Mm ³ RoW)
Denmark	12	Office machinery and computers	278.648	422.624	0,34	0,37	0,55	0,60	0,00	0,01
		Electrical machinery and apparatus	357.318	750.021	0,33	0,39	0,68	1,46	0,00	0,01
		Radio, television etc.	297.664	486.215	0,32	0,39	0,47	0,79	0,00	0,01
Finland	10	Office machinery and computers	359.191	422.629	0,26	0,37	0,32	0,60	0,00	0,01
		Electrical machinery and apparatus	421.148	748.805	0,26	0,39	0,71	1,46	0,00	0,01
		Radio, television etc.	460.151	485.951	0,34	0,39	0,36	0,79	0,00	0,01
Iceland	8	Office machinery and computers	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Electrical machinery and apparatus								
		Radio, television etc.								
Norway	11	Office machinery and computers	416.790	422.265	0,32	0,37	0,52	0,60	0,01	0,01
		Electrical machinery and apparatus	354.966	749.119	0,25	0,39	0,57	1,46	0,00	0,01
		Radio, television etc.	541.521	485.445	0,31	0,39	0,29	0,79	0,00	0,01
Sweden	12	Office machinery and computers	172.589	423.942	0,18	0,37	0,31	0,60	0,00	0,01
		Electrical machinery and apparatus	283.152	751.199	0,20	0,39	0,76	1,46	0,00	0,01
		Radio, television etc.	193.994	487.797	0,19	0,39	0,40	0,79	0,00	0,01

Furniture

Table 16. Share of income spent on furniture in the Nordic countries and environmental impact 2018. (Global warming potential, land footprint, material footprint and blue water consumption both domestic and "rest of world". Income data from Eurostat and environmental data from EXIOBASE.)

Countries	Share of income spent on furniture for private consumption (%)	GWP100 (Kg CO ² -e domestic)	GWP100 (Kg CO ² -e RoW)	Land Footprint (m ² domestic)	Land Footprint (m ² RoW)	Material Footprint (kt domestic)	Material Footprint (kt RoW)	Blue Water Consumption (Mm3 domestic)	Blue Water Consumption (Mm3 RoW)
Denmark	5,5	277.636	658.393	0,35	1,56	0,48	1,12	0,00	0,01
Finland	4,6	461.437	657.539	0,80	1,55	0,68	1,12	0,00	0,01
Iceland	5,2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Norway	6,1	311.567	660.384	0,74	1,55	0,44	1,13	0,01	0,01
Sweden	5,9	275.071	659.590	1,00	1,56	0,61	1,12	0,00	0,01

About this publication

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Anna Fråne, Maja Dahlbom, Mark Sanctuary, Mikael Malmaeus, Liv Fjellander, Annelise de Jong

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Nordic co-operation

Nordic co-operation is one of the world's most extensive forms of regional collaboration, involving Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland, and Åland.

Nordic co-operation has firm traditions in politics, the economy, and culture. It plays an important role in European and international collaboration, and aims at creating a strong Nordic community in a strong Europe.

Nordic co-operation seeks to safeguard Nordic and regional interests and principles in the global community. Shared Nordic values help the region solidify its position as one of the world's most innovative and competitive.

Nordic Council of Ministers

Nordens Hus

Ved Stranden 18

DK-1061 Copenhagen

www.norden.org

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