

Policy Brief

# The use of economic instruments in Nordic environmental policy

1990-2017



Nordic Council  
of Ministers

Policy brief: The use of economic instruments in Nordic environmental policy 1990-2017  
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1990-2017



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# SUMMARY

Economic instruments in environmental policy have generally been applied to correct negative externalities by altering the final prices of goods and services, so that they more clearly reflect all costs and benefits associated with the consumption of specific goods and services.

Economic instruments have become increasingly popular since the late 1980's where command-and-control regulation were the primary instruments of Nordic environmental policy. While economic instruments have rarely substituted existing command-and-control regulation, they have become complementary to command-and-control approaches in combating certain environmental problems and even the main instrument in mitigating other environmental challenges, such as climate change.

A wide range of economic instruments have been used to varying degrees across five sectors in the Nordic countries. The various uses of economic instruments are

attributable for example to country and sector characteristics as well as to national policy regulation. The use of economic instruments has largely followed the same trend across all Nordic countries and sectors.

- We can observe an increased use of economic instruments from the early 1990's up to the early-mid 2000's. Since then, the number of instruments used have been more or less constant.
- Denmark has seen the strongest increase during the period, and today has the highest number of economic instruments in use, of the five countries.
- Iceland has implemented the lowest number of economic instruments, which is partly due to the country's wide use of renewable energy sources, such as hydropower and geothermal energy. But there has been a steady increase in the number of instruments during the whole period.

- The share of environmental tax revenue out of total tax revenue in the Nordic countries is approximately at the level of the European average. The environmental tax revenue per capita is, however, generally higher.
- Denmark generates the highest environmentally related tax revenue per capita, while Iceland generates the lowest revenue per capita.
- Generally, the use of economic instruments has been most common in the *Energy and air pollution* sector. Two-thirds of Finland's environmentally related tax revenue in 2014 came from the *Energy and air pollution* sector. Sweden is the only country with a higher share, namely 79%. This sector is also responsible for a large share of the total environmental impact, and historically, the sector that has been the focus of regulation.
- Norway and Sweden have the highest use of economic instruments in the *Transport* sector.

Norway and Sweden are the only countries that levy road congestion charges in cities.

- The lowest number of economic instruments are used in the *Water* sector. Given the diffuse sources of water pollution, the application and implementation of any economic instrument is challenging.

It is fair to say that the intention behind using economic instruments in environmental policy is to reduce a given negative environmental impact in the most efficient way, which may be considered a prerequisite for sustainable development and green growth in general. The Nordic countries are globally recognised as leaders in sustainable development (Bertelsmann Stiftung & Sustainable Development Solutions Network, 2017) and when looking at the extensive use of economic instruments in the Nordic countries and individual indicators for the UN SDG goals, the following similarities and differences, depending on sector and country characteristics, emerge:

- The Nordic countries emit more greenhouse gases than the European Union average, but also have a higher share of renewable energy sources in final energy consumption than the average. In all countries but Iceland, schemes designed to promote the use of renewable energy have been identified. These cover both grants to research into more energy efficient methods and subsidies for e.g. biofuels and wind turbines. The Nordic countries are generally considered quite ambitious when it comes to using renewable energy. For example, Denmark is considered a leading country in wind power while Iceland and Norway obtain nearly all their electricity and heat from hydro and geothermal power.
- Economic instruments can make a big difference to society and they can be used to steer towards more sustainable development, if used properly. Economic instruments can together with other incentives strongly influence the development in a market, such as the Norwegian new car market where electric vehicles now account for a significant share.





# INTRODUCTION

The objective of this policy brief is to present a high-level overview of the use of economic instruments in environmental policies in the Nordic countries from the 1990's up to 2017. This overview is based on the previously published reports on the use of economic instruments in Nordic environmental policy by the Nordic Council of Ministers' Working Group on Environment and Economy (MEG). Focus is on the development in use of economic instruments in each of the five Nordic countries, and the region as a whole. More specifically, the policy brief presents:

- An overview of number of economic instruments by country and by sector
- The revenue from the use of economic instruments by country and by sector
- Discussion of the use of economic instruments in relation to the transition to a green economy.

The results of the mapping of economic instruments are discussed

in the context of the general trend in the Nordic countries towards green growth to examine the potential of economic instruments to promote green growth and sustainable development. However, the policy brief does not analyse the effectiveness of the individual economic instruments and how they have influenced the overall progression towards sustainable development and green growth in the Nordic countries. Instead, the policy brief presents a discussion of factors that have influenced the design and use of economic instruments in relation to the transition to a green economy.

For more details on the contribution to the transition, see for example *Greening the Economy* (Skjelvik & Bruvoll, 2011). A main conclusion in *Greening the Economy* is that economic instruments could enhance and promote greener growth by providing incentives to reduce emissions over time, finding more efficient ways of curbing emissions, and developing new technologies.

The report is structured in the following way. The report covers two main parts:

- An overview of the use of economic instruments within countries and sectors in the period 1990–2017 (Chapter 2)
- A discussion of the use of economic instruments in the Nordic countries and the transition to a green economy (Chapter 3)

Chapter 2 maps the development in the use of economic instruments in environmental policy in the Nordic countries from the 1990's to 2017. The chapter also provides an overview of the development in the overall tax revenue from environmental taxes, share of GDP and environmental tax revenue by sector. Chapter 3 discusses the use of economic instruments in the context of the general trend towards sustainable development in the Nordic countries.

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*September 2018*

# THE USE OF ECONOMIC INSTRUMENTS IN THE PERIOD 1990 TO 2017

It is of interest to examine the development in the use of economic instruments in environmental policy, as understanding and evaluating past policies can provide vital information for the development of new policy designs that will increase the effectiveness of environmental policy. The Nordic Council of Ministers (NCM) has since the early 1990's published reports listing and detailing the use of economic instruments in the five Nordic countries; Denmark, Finland, Iceland, Norway and Sweden. These reports serve as a detailed catalogue of previous practice and have been published with the aim of generating knowledge and inspiring future policymaking.

Up to late 1980's Nordic environmental policy was largely based on command-and-control regulation (Andersen, Dengsøe, & Pedersen, 2001), where environmental targets/standards were set by the government and non-compliance of the industry implied sanctions. From the late 1980's economic instruments such as taxes and subsidies were to an increasing extent used to

regulate environmental externalities, by providing incentives to the industry and general population to reduce their environmental harmful activities.

Command-and-control policy instruments still play a vital role today. Economic instruments have rarely substituted existing command-and-control regulation, and subsequently more command-and-control approaches have been applied in new or existing areas. Command-and-control policy instruments are also the main type of policy instrument applied on a wide range of different areas.<sup>1</sup> Since their introduction, economic instruments have become supplemental to command-and-control approaches for most traditional environmental problems. The use of economic instruments has however become more popular, and these instruments play a key role for some environmental problems such as climate change (Skjelvik & Bruvoll, 2011).

The contribution of this policy brief is to provide an overview of the use of economic instruments in the Nordic

<sup>1</sup> Land use, nature conservation, biodiversity, reducing use of toxic substances, emissions to the environment from large industrial sources.

countries within five specific sectors; *Energy and air pollution, Waste, Water, Transport and Agriculture and natural resources*,<sup>2</sup> during the period 1990's to 2017. Looking at a longer time perspective than the period considered in the reports which typically has been between one and four years, facilitates a view of the long term trends regarding the use of economic instruments in environmental policy across the Nordic countries and the five selected sectors.

### **Economic instruments and their significance for the environment**

A relevant question to ask is how the use of economic instruments over time have benefitted the environment. This has to some extent been a purpose in previous reports from the Nordic Council of Ministers, see for example *Greening the economy: Nordic experiences and challenges* (Skjelvik & Bruvoll, 2011). The focus in this policy brief is how the use of economic instruments, measured by the number implemented, has developed over time. This in itself is a weak indicator of the impact on the environment. The impact depends not just on the number of instruments, but also on features such as the scope of each instrument, the taxation level and

several other factors. A number of relevant parameters could be considered in the evaluation of the effectiveness, efficiency and impact of economic instruments, see (OECD, 2008):

- Characteristics of the specific environmental problem, such as size of the market, pollution source and whether the pollution is local, regional or global in nature. As an example, it is difficult to regulate the often diffuse sources of water pollution, which arises from many different sources that do not have an obvious discharge point as opposed to point source pollution such as CO<sub>2</sub>. Furthermore, the scale of the environmental problem, e.g. whether it is local, national, regional or of global nature, also plays a significant role. Transboundary pollution such as acid rain and climate change require international cooperation in order to efficiently target the environmental pollution, and in such large-scale cooperation efforts, the use of economic instruments might be difficult due to national sovereignty and trade law.

<sup>2</sup> This characterisation of sectors follow the one used in the quadrennial reports issued by the Nordic Council of Ministers, *The use of economic instruments in Nordic environmental policy*. For reference, see the latest published version, "The use of economic instruments in Nordic environmental policy 2009-2013".

- The effectiveness of the economic instruments depend on their design. For example the chosen tax rate, demand elasticities, and included exemptions/ rebates. The level of exemptions and rebates directly influences the environmental impact of a given economic instrument and furthermore, changes in the targeted pollution source also influence the performance of an economic instrument. An example of this can be seen in the Danish tax on pesticides, which in 2012 was changed from an ad-valorem tax, to a tax based on how harmful the particular substance included in the pesticide actually was. This change in the design of the pesticide tax targets the pollution source more directly, and also entails a higher substitution elasticity, thus theoretically providing a greater incentive to develop less environmentally harmful pesticide products. Likewise would a low demand elasticity indicate that other policy instruments might be more effective than a tax in terms of reducing harmful use of a substances or products, due to the limited effect on demand.
- The use of economic instruments might entail a more flexible scheme for consumers and businesses than other regulatory instruments. Consumers and businesses can to a higher extent determine how to best reduce the environmental damage e.g. either through driving less and biking more or by changing to a more fuel efficient vehicle (OECD, 2011).
- Administrative cost of implementing the economic instrument may exceed the environmental benefit. For some environmental problems, a given type of economic instrument might be deemed too costly to administer in relation to the environmental benefit obtained. As an example, the Danish Ministry of Taxation proposes in a recent report, evaluating excise duties, to cancel the tax on PVC's and phthalates, based on exactly this argument (Danish Ministry of Taxation, 2017).
- Other regulatory instruments within the specific area might either reduce or increase the effect of economic instruments. This is often referred to as an instrument mix, which has been a topic of the 2006-2009 quadrennial report (NCM, 2009), as well as in other publications (Barde, 1994; Braathen, 2007; Gunningham & Sinclair, 1999; OECD, 2007). However, in some cases economic instruments have to be combined in a policy mix to address certain issues (OECD, 2011).

- Furthermore, the use of economic instruments could give rise to implications on both competitiveness, unintended distributional impacts (OECD, 2011) and behavioral biases (Hepburn, Duncan, & Papachristodoulou, 2010).

In essence, it is very difficult to measure the significance of economic instruments in terms of ensuring an effective environmental policy. Proper and reliable evaluation of the effectiveness of policy instruments require other, different methods, tools and figures or estimates.

### **The role of international environmental policy**

In all five Nordic countries, the development of environmental policy has been and continues to be influenced both by international co-operation on transboundary environmental policy areas and by EU environmental policy. In general, international cooperation on environmental policy involves the signing of treaties that obligate signatories to formulate and implement specific policy goals. At the European level, EU law is typically based on direct regulation, such as emission targets or technical

standards that specify the technical solutions or equipment that the sectors concerned must use to reduce a given environmental impact (Skjelvik & Bruvoll, 2011). Due to the nature of cooperation within the EU, tax policy is a national domain (the principle of subsidiarity), which more or less excludes the use of economic instruments in EU policy.<sup>3</sup>

The influence of international cooperation on environmental policy is for example reflected by the introduction of CO<sub>2</sub> taxes in the Nordic countries during the 1990's. In 1992, the United Nations formulated the United Nations Framework Convention on Climate Change (UN, 1992), but by then (in 1990) Finland had already introduced the world's first carbon tax on energy consumption, followed by Norway and Sweden that introduced CO<sub>2</sub> taxes in 1991 and Denmark in 1992.<sup>4</sup> Throughout the 1990's, all four countries increasingly introduced CO<sub>2</sub> taxes, which can be explained to a certain extent by the growing international focus on greenhouse gases and climate change.

Another early example of how the policy agenda in the Nordic countries has been driven by international cooperation is the OECD and

<sup>3</sup> At the overall level, the EU is a proponent for the use of economic instruments, see *Green paper on market based instrument for environmental and related policy purposes* (EU Commission, 2007)

<sup>4</sup> CO<sub>2</sub> taxes were introduced in Iceland in 2009.

UNECE collaboration to mitigate acid rain in the 1980's, which led to the formulation of the Convention on Long-Range Transboundary Air Pollution (CLRTAP) and other adjacent protocols that were gathered and strengthened in the Gothenburg Protocol (UNECE, 1999).

European policy is both a driver of new policy initiatives in the Nordic countries and a reinforcer of existing policy goals in the Nordic countries, since the member states are able to influence to policy agenda within the EU. In particular, the long-term policy goals within the EU are important drivers of the EU countries progress towards a green economy (EEA, 2013). An example of EU policy as a driver of market-based instruments is the establishment of the European Emission Trading Scheme (EU ETS) in 2005, which has been covered in previous quadrennial reports (NCM, 2009 og 2014).

## Overview of the use of economic instruments

The purpose of this section is to provide a high-level overview of the long-term trends in the use of economic instruments in environmental policy across the

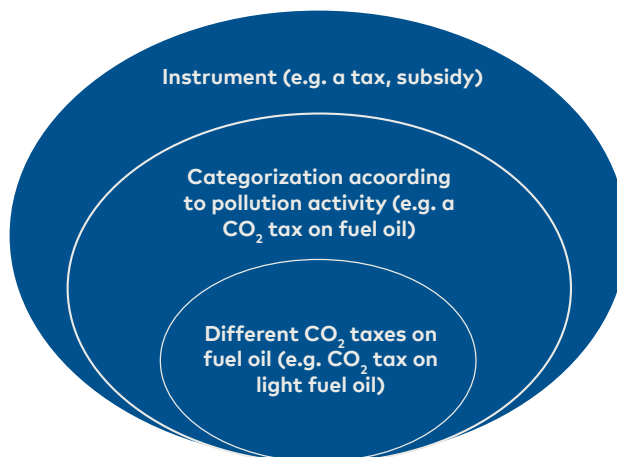
Nordic countries and to highlight sectors where the use of economic instruments are more prevalent. It is important to remember that a change in the number of instruments can be offset by changes to tax rates or changes in command-and-control approaches (e.g. a tax on highly polluting cars in the city centres can be replaced with a ban). As such, it is difficult to assess an environmental impact from a change in the use of economic instruments at the overall level. Likewise, individual tax rates have also been changed over the period, also changing the potential environmental impact.

To generate an overview of economic instruments, we have grouped and categorized the economic instruments according to pollution activity/aim in the individual sectors, see Table 1. This follows the general approach utilised in the NCM report series.<sup>5</sup> The specific level of detail is chosen since a wide variety of economic instruments have been applied both over time and across the Nordic countries. In order to meaningfully assess the development, it is necessary to group instruments that target the same pollution activity.

<sup>5</sup> See e.g. Table 3 Overview of the use of economic instruments in the Nordic countries in 2013 in *The use of economic instruments in Nordic environmental policy 2009-2013 (NCM, 2014)*.



**Figure 1: Example of three layers of categorization**



Source: NCM 2014, COWI, 2018a

As seen in the example in Figure 1, the CO<sub>2</sub> tax on *fuel oil* can be further detailed or differentiated according to the type of fuel oil considered. An overview of individual taxes categorised as a CO<sub>2</sub> tax on fuel oil for Denmark and Norway is presented in Table 3 in the Appendix.

The following subsections present the development in the use of economic instruments over time. The overview is generated on the basis of the level "categorization according to pollution activity", to facilitate a comparison of instruments across time. Table 1 presents an overview of the different economic instruments according to pollution activity for each sector analysed.

The most commonly used instrument across the five sectors is by far taxes or fees, which usually address the usage or consumption of specific goods. However, there are also examples of taxes on the emission of pollutants (in DK e.g. NO<sub>x</sub> and SO<sub>2</sub>). Taxes used as instruments are found in all sectors. Grants and subsidies are found in all sectors, except for Waste. Usually, the subsidies are targeted towards promoting greener and more sustainable energy and car use.

A number of different deposit-refund systems and other collection systems are in place in the Waste sector. The systems cover both small items, such as plastic bottles and aluminium cans,

**Table 1: Categorization of economic instruments according to pollution activity, per sector**

Energy and air pollution	Water	Waste	Transport	Agriculture and natural resources
CO <sub>2</sub> tax on fuel oil	Grants / subsidy schemes	Charges to finance collection and treatment, or deposit-refund systems for products: ELVs, batteries, tyres, lubrication, oil, pesticides or hazardous waste	Annual vehicle tax	Fishing fee, tradable fishing quotas, hunting fee
CO <sub>2</sub> tax on transportation fuels*	Water effluent tax	Packaging taxes (bottles, paper/plastic bags and disposable cutlery)	Environmental related or noise charges on aviation	Subsidy schemes
Excise tax on electricity consumption	Water supply tax**	Tax on incinerated waste	Road charges for trucks	Tax on biocides and pesticides
Excise tax on fuel oil products etc		Tax on PVC, phthalates and chlorinated solvents	Toll road	Tax on extraction of raw materials
Excise tax on transportation fuels*		Tax on waste put in landfills	Subsidy schemes for vehicle purchase	Tax on fertilizer use
Inclusion of GHG-intensive sectors in the EU ETS		Taxes, deposit-refund systems or other collection systems on beverage)	Tax on boat engines	Tax on growth promoters
NOx tax			Vehicle registration tax or sales tax	Tax on phosphorus (in animal feed)
SO <sub>2</sub> tax				
Subsidy schemes for renewable energy, energy efficiency etc.				
Tax on CFCs and certain greenhouse gases				

Source: The report series on *The use of economic instruments in Nordic environmental policy* published by the Nordic Council of Ministers (from 1991 to 2018), and adjustment by COWI (2018).

Note: \*Energy and CO<sub>2</sub> taxes applied to transportation are grouped in the *Energy and air pollution* sector.

\*\*For most of the Nordic countries, the tax on water supply and waste water services is levied to fund the services required, and is not used as an emission-related charge on water services. However, these taxes are included in this overview, due to the specific nature of them, e.g. reducing water consumption.

and large items, such as end-of-life-vehicles.

### Instruments by country

When comparing the development in the number of instruments, aggregated across all sectors within a country, an overall increasing trend is observed for all countries since 1990, see Figure 2 and Figure 3. Throughout the period, Iceland has applied the lowest number of instruments, and in most of the period Denmark has had the highest number of instruments.

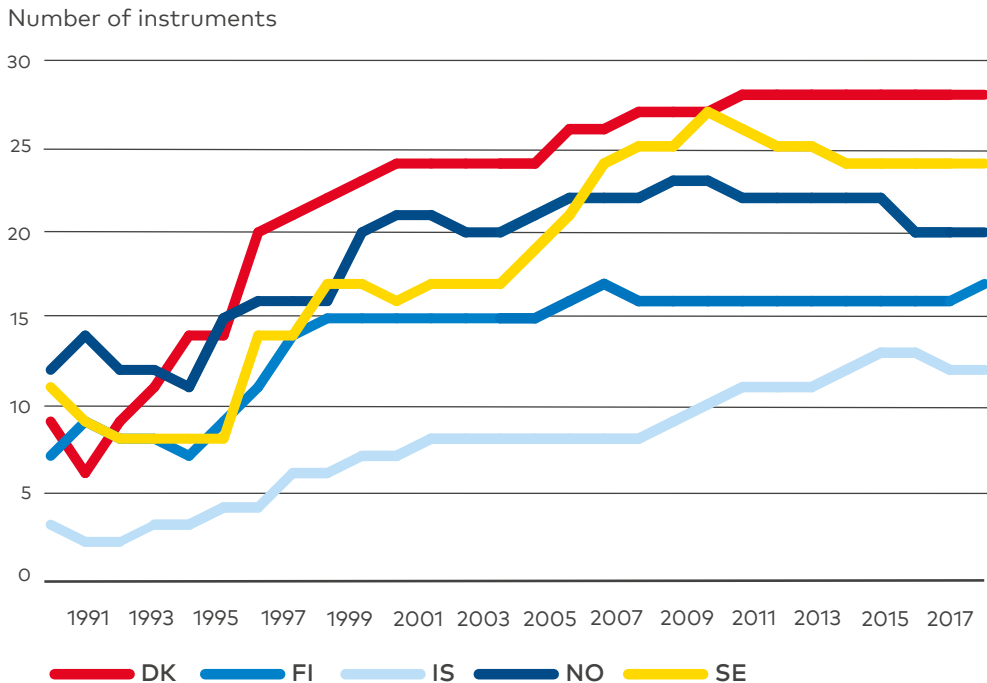
As mentioned previously, the use of economic instruments differs widely across the Nordic countries. Similarly, economic instruments targeting the same environmental issue may have very different impacts depending on the policy mix, tax rates, demand elasticities and exemptions/rebates chosen. An interesting example is the vehicle registration tax in Denmark and Norway. In Norway, the decision to exempt electric vehicles from vehicle registration tax coupled with other incentives has increased electric car sales, so that they now account for 20% of the share of new cars (NCM, 2017). In Denmark, the registration tax exemption for electric cars was rolled back by the

Danish parliament in 2015, with a gradual phasing out of the tax break until 2022 where it will cease to exist. The phasing out of the tax exemption has apparently affected the electric car sales in Denmark, since the market has stalled after 2015 (Skatteministeriet, 2017). For a more detailed discussion on the taxation of passenger cars in the Nordic countries, see (NCM, 2017).

Since the turn of the millennium, the number of instruments applied have been more or less stable in all countries, except for Iceland and especially Sweden, where a rather significant increase was followed by a corresponding decrease. The general tendency towards stagnation in the number of applied instruments since the year 2000 should likely be attributed to several factors. One factor could be that a general saturation occurred, meaning that all the relevant economic instruments were used to regulate environmental problems.<sup>6</sup> More diffuse environmental problems, such as pollution with micro plastics and water pollution, are more difficult to regulate using economic instruments. Furthermore, general resistance to economic instruments by the regulated polluters and sectors is also a relevant factor that potentially

<sup>6</sup> In relation to the question of whether the optimal number and level of economic instruments was applied, the Danish Ministry of taxation has in a recent report discussed exactly this issue by looking at the structure of the Danish taxation system in general (Danish Ministry of Taxation, 2017).

**Figure 2: Development in the number of instruments by countries (Aggregated for all sectors), 1990-2017**



Source: The report series on The use of economic instruments in Nordic environmental policy published by the Nordic Council of Ministers (1991–2018) and adjustments by COWI (2018).

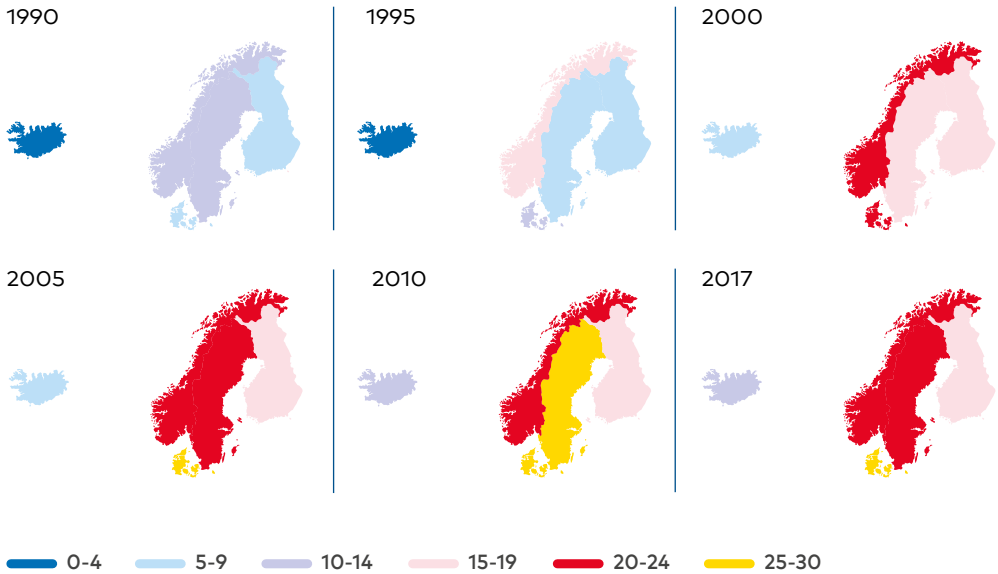
could have led to the use of direct regulation instead of economic instruments.

### Instruments by sector

When comparing the development in the number of instruments aggregated across countries for each sector, it is observed that most sectors have seen an overall increase in the number of instruments since 1990, with a tendency towards stagnation from the early 2000's.

In all countries, except Iceland, the Energy and air pollution sector accounts for the largest number of instruments. Looking at Figure 4, it is seen that the number of instruments in the Energy and air pollution sector in 2017 is double that of the Transport, Waste and Agriculture and natural resources sectors, and that the Water sector has the lowest number, i.e. eight instruments in use by 2017. The high number of instruments in the Energy and air pollution sector is

**Figure 3: Development in the number of instruments by countries (Aggregated for all sectors), 1990, 1995, 2000, 2005, 2010 and 2017**



Source: COWI (2018).

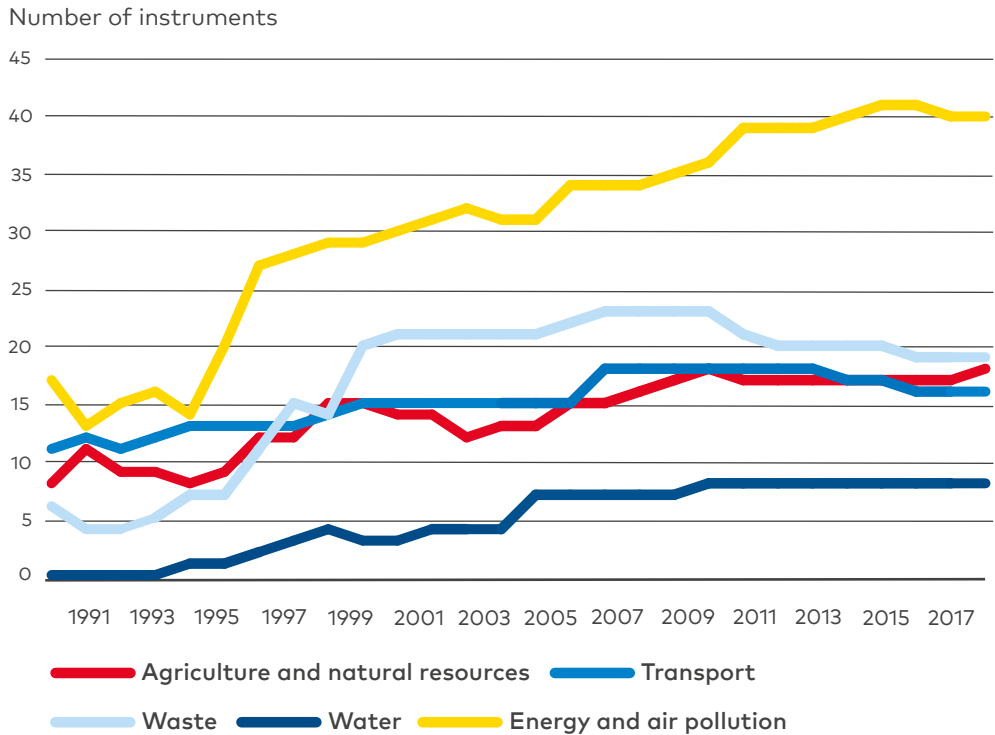
Source: The report series on The use of economic instruments in Nordic environmental policy published by the Nordic Council of Ministers (from 1991 to 2018) and adjustments by COWI (2018).

probably due to the fact that this sector accounts for a large share of the total environmental impact. Another reason is the fact that the sector have a long history of being subjected to economic instruments. For a sector such as the Water sector, the diffuse sources of water pollution (typically agriculture) are close to impossible to regulate with economic instruments. Therefore, they are typically regulated by imposing restrictions directly on farming activities and production

inputs (Skjelvik & Bruvoll, 2011).

The development of instruments in the *Energy and air pollution* sector, aggregated for all countries, saw a large increase in the mid to late 1990's that was followed by a steadily increasing trend, although not with the same speed as in the mid 1990's. Whereas the use of instruments in the *Agriculture and natural resources* sector has been steadily increasing, the *Transport* and *Waste* sectors have seen a decrease in the use of instruments since 2009.

**Figure 4: development in the number of instruments by sectors (aggregated for all countries), 1990-2017**



Source: The report series on *The use of economic instruments in Nordic environmental policy* published by the Nordic Council of Ministers (1991-2018) and adjustments by COWI (2018).

As mentioned earlier, such changes may be driven by introduction or changes to existing command-and-control measures, e.g. due to new EU regulation.

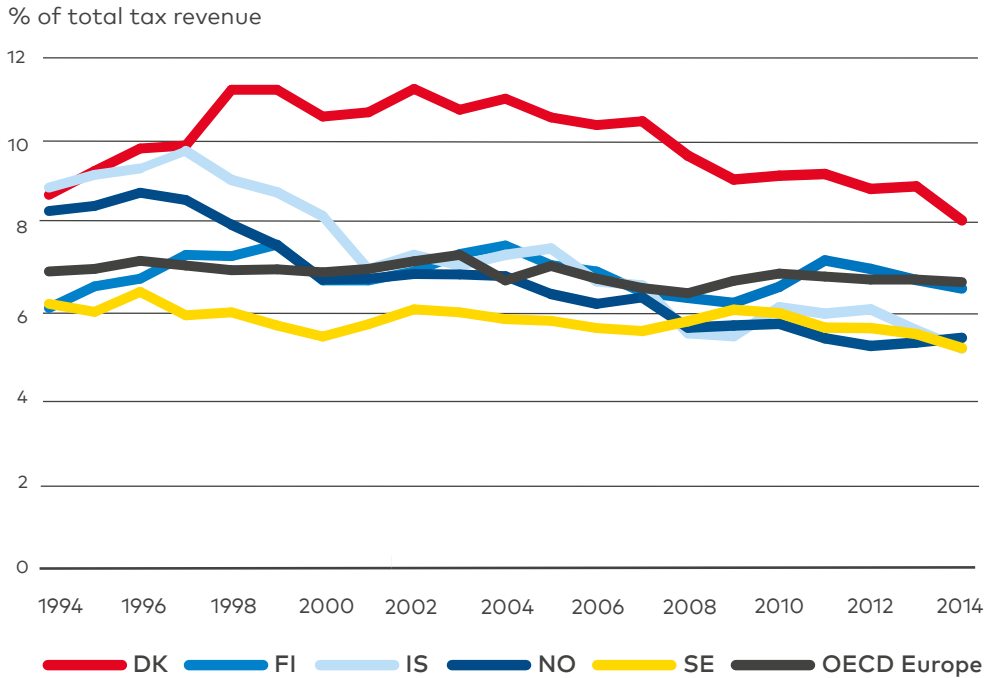
## Tax revenues

In this section, the revenue from environmentally related taxes is

presented. The first part provides an overview of the aggregated environmentally related tax revenue. The second part highlights the sectors that are most relevant in terms of revenue. To generate the overview of tax revenues, we use data extracted from OECD Statistics, which mostly coincide with the sectors used in this policy brief.<sup>7</sup>

<sup>7</sup> There are however instances where the sectoral definition used in the OECD database, and the one used in the Nordic Ministers quadrennial report, do not correspond. Throughout this subsection, the policy brief will use the sectoral definition from the OECD, which is explained in Box 1.

**Figure 5: Share of enviromental tax revenue of total tax revenue, 1994-2014**



Source: OECD (2018).

See Box 1 for a list of the tax bases as defined by OECD and the areas covered.<sup>8</sup>

The revenue from environmentally related taxes as a share of the total tax revenue has been relatively stable for Finland and Sweden, as can be seen in Figure 5.<sup>9</sup> Iceland and

Norway have seen a decrease over the period from 1994 to 2014. The share increased in Denmark in the mid-1990's, but has since 2010 been more or less constant. Since 2000, all countries except Denmark have had the same or a slightly smaller share than the OECD Europe average.

<sup>8</sup>The time period considered is limited to the data available in the OECD database, which covered, the period 1995-2014 at the time this policy brief was prepared.

<sup>9</sup>Taxes related to Agriculture and natural resources are not included in Figure 7, which especially for Iceland skews the overall picture, since the sector, and especially taxes related to fisheries, constitutes a substantial revenue source.

## Box 1: List of environmentally related tax bases

### Environmentally related tax bases as defined by OECD

The tax bases used by the OECD are based on the *Policy Instrument for the Environment (PINE)* database maintained by the OECD. In the database, the environmentally related tax bases used are classified into the following four main categories: *Energy product, Transport, Pollution and Natural resources*.

The specification level at which it is possible to extract data for environmentally related tax bases in OECD Statistics is: *Energy, Motor vehicle and transport, Ozone-depleting substances, Water and wastewater, Waste management, Mining and quarrying and Unallocated*.

**Energy:** Energy products (fossil fuels and electricity), including products used in transportation (petrol and diesel). This includes all CO<sub>2</sub> related taxes.

**Motor vehicle and transport:** One-off import or sales taxes on transport equipment, recurrent taxes on ownership, registration or road use of motor vehicles, and other transport-related taxes.

**Ozone-depleting substances:** Taxes on specific substances, such as chlorofluorocarbons (CFCs), carbon tetrachloride, chlorofluoromethanes (HCFCs) and other ozone-depleting substances.

**Water and wastewater:** Taxes on water extraction, piped water, discharge of wastewater, and other water-related taxes. Fees and charges related to water supply are not included.

**Waste management:** Taxes on final disposal of solid waste, on packaging (e.g. plastic bags) and other waste-related taxes (e.g. batteries, tyres).

**Mining and quarrying:** Mining royalties, excavation taxes (e.g. sand and gravel).

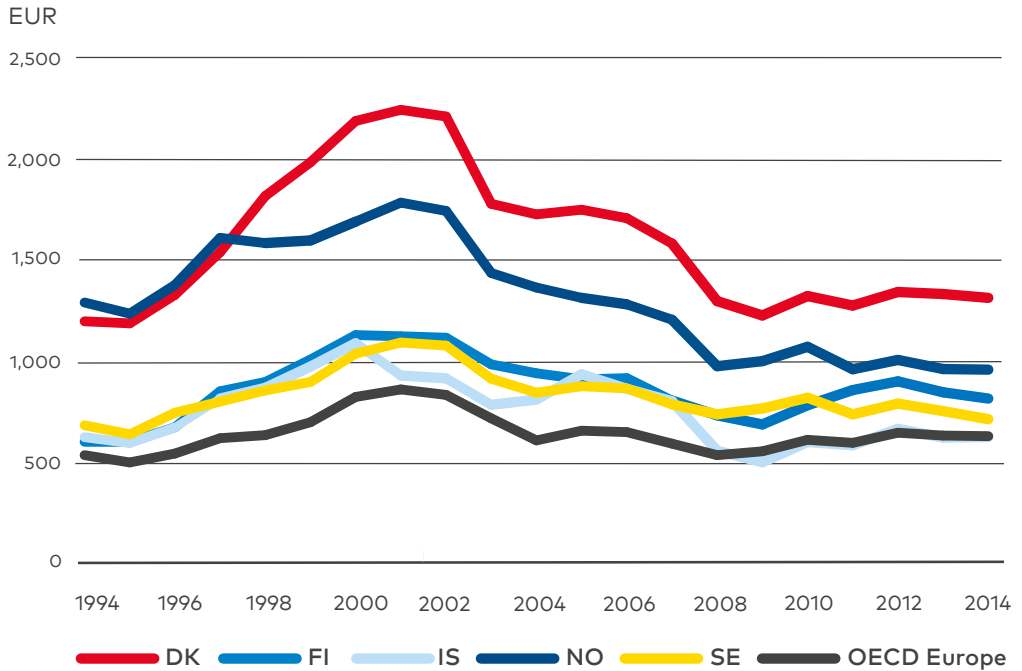
**Unallocated**

Source: OECD (2018), EUROSTAT (2018a) and calculations by COWI (2018).

Note: Revenue is converted to EUR from 2010 USD PPP.



**Figure 6: Total revenue per capita from environmental taxes, 1994-2014**



Source: OECD (2018), EUROSTAT (2018a) and calculations by COWI (2018).

Note: Revenue is converted to EUR from 2010 USD PPP.

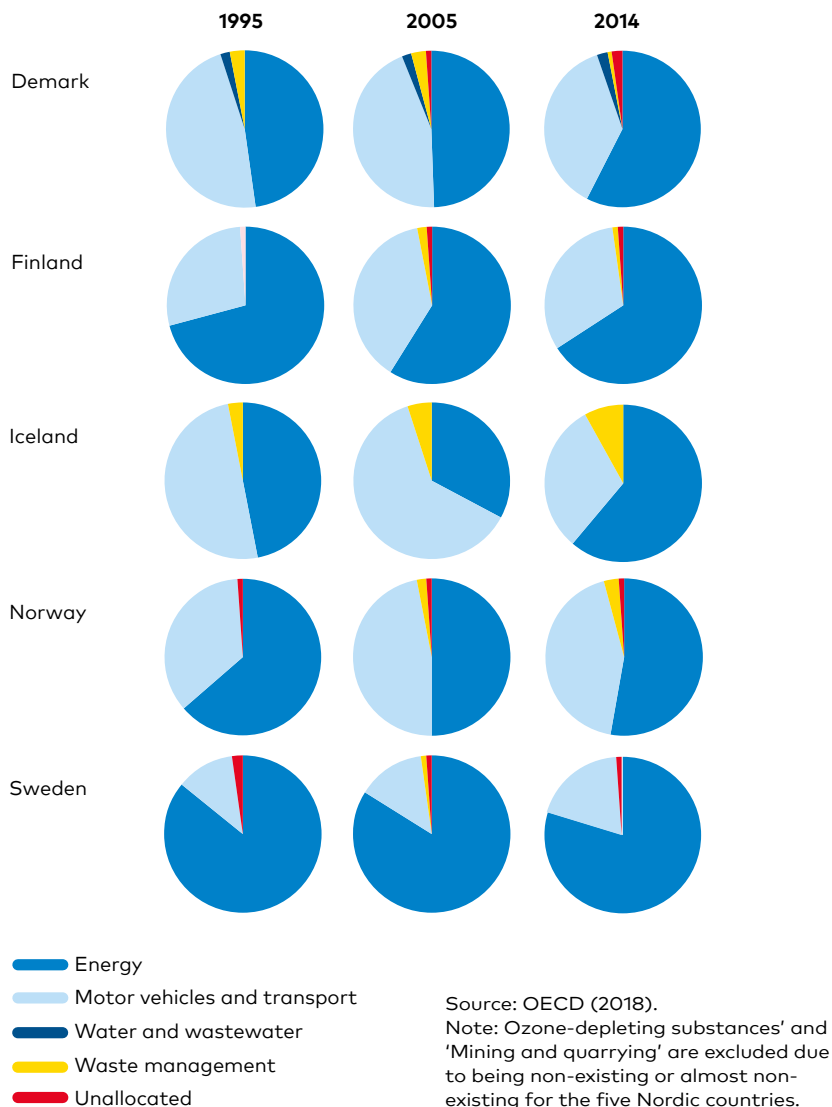
From Figure 6 it can be seen that the total tax revenue per capita from environmentally related taxes generally decreased across the Nordic countries from the early 2000's to 2010, after which date the revenue has remained more or less stable. Denmark generates the highest revenue per capita from environmentally related taxes, while Iceland generates the lowest total

revenue per capita. A peak is observed in the early 2000's for all countries.

In Figure 7, sectoral shares of the total environmental tax revenue are presented for the years 1995, 2005 and 2014 to give an overview of the development in the revenue composition.<sup>10</sup>

<sup>10</sup> Taxes related to Agriculture and natural resources are not included in Figure 7, which especially for Iceland skews the overall picture, since the sector, and especially taxes related to fisheries, constitutes a substantial revenue source.

**Figure 7: Sector shares of the total environmental related tax revenue, 1995, 2005 and 2014**



Over time, across all five Nordic countries, the majority of environmental tax revenue is collected from the energy and transportation sectors (European Environment Agency, 2016). As seen in

Figure 7, the revenue share from energy taxes increased from 1995 to 2014 in Denmark, Finland and Iceland, whereas the share decreased in Sweden and Norway.

# SUSTAINABLE DEVELOPMENT AND GREEN GROWTH IN THE NORDIC COUNTRIES

This chapter combines the identified development in the use of economic instruments in the Nordic countries from the 1990's to 2017 with the development in selected indicators of sustainable development and green growth. The purpose is to examine if the use of economic instruments may have contributed to the overall progress towards sustainable development and green growth in the Nordic countries. It is important to stress that this chapter does not attempt to establish causal relationships, but solely focuses on the possible trends linking the use of economic instruments to sustainable development.

The concept of sustainable development has been present in international policy forums for some time, with the UN Conference on Environment and Development in Rio de Janeiro 1992 and the declaration of Agenda 21, being the typical reference year for the emergence of the concept (UN, 2018). In 2015, the UN General Assembly adopted the 2030 Agenda for Sustainable Development

(UN, 2015). The resolution lists 17 goals and targets (referred to as Sustainable Development Goals, SDGs) in different sectors that, if fulfilled, will contribute towards achieving global sustainable development. The SDGs have been integrated into policy development in many countries, and private companies and civil society also increasingly integrate them into their strategies and work programmes (Bertelsmann Stiftung & Sustainable Development Solutions Network, 2017).

In recent years, several institutions have begun measuring national performance both on SDGs, sustainable development and more generally on green growth.<sup>11</sup> Since 2015, the SDG Index and Dashboard have published yearly reports that measure UN member states' progress towards fulfilling the UN SDGs, and in the latest report from 2018, Sweden, Denmark and Finland hold positions one to three on the international ranking of countries on their path to fulfilling the UN SDGs, while Norway and Iceland rank 6th and

<sup>11</sup> The OECD conducts work on both SDGs and green growth OECD (2015, 2017b), while EUROSTAT (2017b) publishes work related to sustainable development.

## Box 2: Definition of Sustainable Development and Green Growth

### Sustainable Development and Green Growth

Although used interchangeably throughout this report, the two concepts are set distinct from each other.

The most popular definition of sustainable development originates from the Brundtland Report: "*Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs*" (Brundtland, 1987), while green growth is defined as: "*fostering economic growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies*" (OECD, 2017a).

Green growth can be seen as a subset of sustainable development, in the sense that the latter is an all-encompassing paradigm that sets the boundaries and direction for development, while green economic growth can be seen as a tool to achieve the overall goal of sustainable development.

10th on the list (Bertelsmann Stiftung & Sustainable Development Solutions Network, 2018). The results of this ranking suggest that, overall, the Nordic countries are well on the way to achieving the UN SDGs.

Previous work examining sustainable development specifically in the Nordic countries can be found in the recent NCM report, *Bumps on the Road to 2030: An overview of the common challenges for the Nordic countries in achieving the Sustainable Development Goals (SDGs)* (Alslund-Lanthén & Larsen,

2017). The report synthesizes several studies that look into indicators of sustainable development in the Nordic countries. Another NCM publication, *Greening the economy: Nordic experiences and challenges* (Skjelvik & Bruvoll, 2011) examines some of the same questions through the concept of green growth. Throughout this policy brief, reference to both green growth and sustainable development will be made interchangeably, although it is recognized that these two concepts are distinct, see Box 2.



## Selected sustainability development goals and indicators

In order to compare the historical trends in the use of economic instruments and the general trend towards sustainable development in the Nordic countries, this section highlights the development in specific indicators for selected SDGs and the development in the use of economic instruments targeting the SDGs by means of two examples.

This policy brief focuses on two environmental SDGs that have been selected for their explicit focus on

environmental issues, data availability across the Nordic countries and relevance to the analysis of economic instruments in the Nordic countries. The two SDGs are listed in the first column of Table 2<sup>12</sup>. The selection of indicators for each of the SDGs, relies on indicators used for the SDG Index and Dashboard (Bertelsmann Stiftung & Sustainable Development Solutions Network, 2017), data available in Eurostat and OECD Statistics, more specifically data on the EU Sustainable Development Strategy (EU SDS)<sup>13</sup> and on the OECD green growth indicators.<sup>14</sup>

**Table 2: Selected UN SDG GOALS, indicators and sectors**

SDG goal	Indicator	Sector
 <b>7. Affordable and clean energy</b>	Share of renewable energy in total final energy consumption	Energy and air pollution
 <b>13. Climate action</b>	CO <sub>2</sub> -emissions	Energy and air pollution Transport

Source: Bertelsmann Stiftung & Sustainable Development Solutions Network, (2017), COWI (2018).

<sup>12</sup> Initially SDG 6. Clean water and sanitation was also selected, but it proved difficult to find sufficient data for the related indicator across the five Nordic countries. Therefore, this SDG was excluded from the comparison. Furthermore, only a limited number of economic instruments are applied across the different Nordic countries, and for most of the Nordic countries the taxes on water supply and waste water services are in place to fund the relevant services.

<sup>13</sup> From May 2017, the EU SDS were replaced with the UN SDGs in the EUROSTAT database. However, since the time period considered in this policy brief is delimited to the period 1990's to 2017, indicators of sustainable development are assessed according to the EU SDS, which are then linked to the UN SDGs.

<sup>14</sup> <http://www.oecd.org/environment/indicators-modelling-outlooks/green-growth-indicators/>

## Energy and air pollution (and Transport)

The two sectors *Energy and air pollution* and *Transport*, are linked to SDG goals 7 "*Affordable and clean energy*" and 13 "*Climate action*", as seen in Table 2.

### Affordable and clean energy

For the SDG goal "*Affordable and clean energy*", the selected indicator is "*Share of renewable energy in final energy consumption*", for which the trend can be observed in Figure 8. This indicator was chosen as a large share of the instruments applied in the sector target precisely greenhouse gas emissions, which indirectly encourage increased uptake of renewable energy.

For all five Nordic countries and the European Union as a whole, it is clear that their share of renewable energy have increased during the last 10-15 years, but also that the share of renewable energy in the Nordic countries is larger than the EU average. For the period 2004-2016, Denmark had the lowest share of renewable energy in the gross final energy consumption, standing at 32% in 2016. In the same year, Iceland had the highest share, standing at 73%, more than double the share of Denmark. Some of the differences across the countries can be attributed e.g. to the different available energy sources.

All five Nordic countries have aimed at increasing their share of renewable energy and all have taken the initiative to promote renewable energy sources, through e.g. subsidies and relatively favourable tax schemes for renewable energy, and, reversely, energy taxes on fossil fuels.

Since 1992, Denmark has introduced different subsidies schemes to promote renewable energy and is today considered to be leading in wind power.<sup>15</sup> The production of electricity from renewable energy sources, such as wind power, solar cells and biogas, has been subsidised to promote the use of renewable energy.

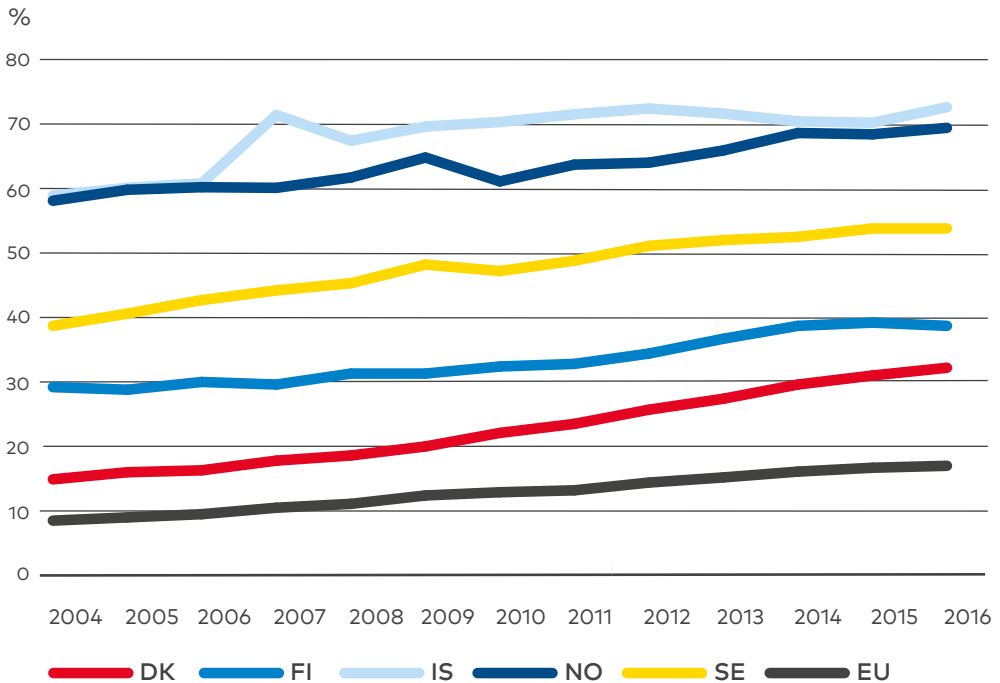
Finland's national target for renewable energy share of the gross final consumption is 38%, which was reached in 2014. Finland provides subsidies to investments and research in renewable energy and introduced feed-in-tariffs for renewable energy in 2011. They target wind, biogas, timber chips and wood-fuelled power plants.

Iceland's large share of renewable energy can be attributed to nearly all power generation and household heating being based on geothermal and hydropower sources.<sup>16</sup> No subsidies to further promote the use of renewable energy sources were identified in Iceland.

<sup>15</sup> <https://www.bloomberg.com/news/articles/2018-01-11/naysayers-caught-in-losing-bet-against-wind-power-denmark-warns>

<sup>16</sup> <https://nea.is/hydro-power/electric-power/hydro-power-plants/>

**Figure 8: Share of renewable energy in gross final energy consumption in the five Nordic Countries from 2004 to 2016**



Source: EUROSTAT (2018b)

In 2001, Norway established the public agency Enova to promote increased production of electricity from renewable sources. In 2012, a certificate scheme for renewable energy was introduced, through which electricity certificates can be sold at market price.

In Sweden, there are different incentives designed to promote renewable energy in place. In 2003, a certificate scheme was introduced but

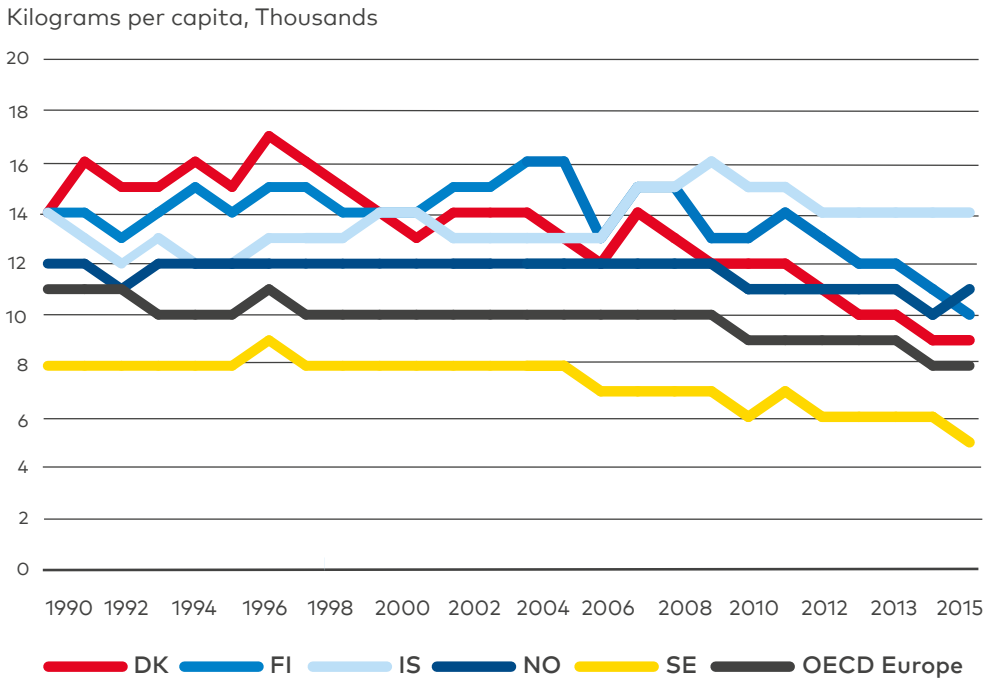
also energy sources such as solar heat and biogas are being subsidized.

### Climate action

The selected indicator for the SDG goal "Climate action", is "CO<sub>2</sub> emissions", which falls under both the *Energy and air pollution* sector and the *Transport* sector. Figure 9 and Figure 10 show the development in greenhouse gas emissions per capita for total emissions and for transport respectively.<sup>17</sup>

<sup>17</sup> Note that greenhouse gas emissions not only cover CO<sub>2</sub> emissions.

**Figure 9: Total Greenhouse gas emissions, kg per capita (Thousands)**



Source: OECD (2018).

All Nordic countries have seen an increasing awareness of the link between greenhouse gas emissions and climate change since the beginning of the early 1990's, but the development in greenhouse gas emissions in kg per capita from energy industries has varied somewhat across the countries.

The overall trends in total greenhouse gas emissions for Denmark and Finland have been decreasing, albeit with some fluctuations over the period. Iceland and Norway have seen minor changes over the period while the emission level for

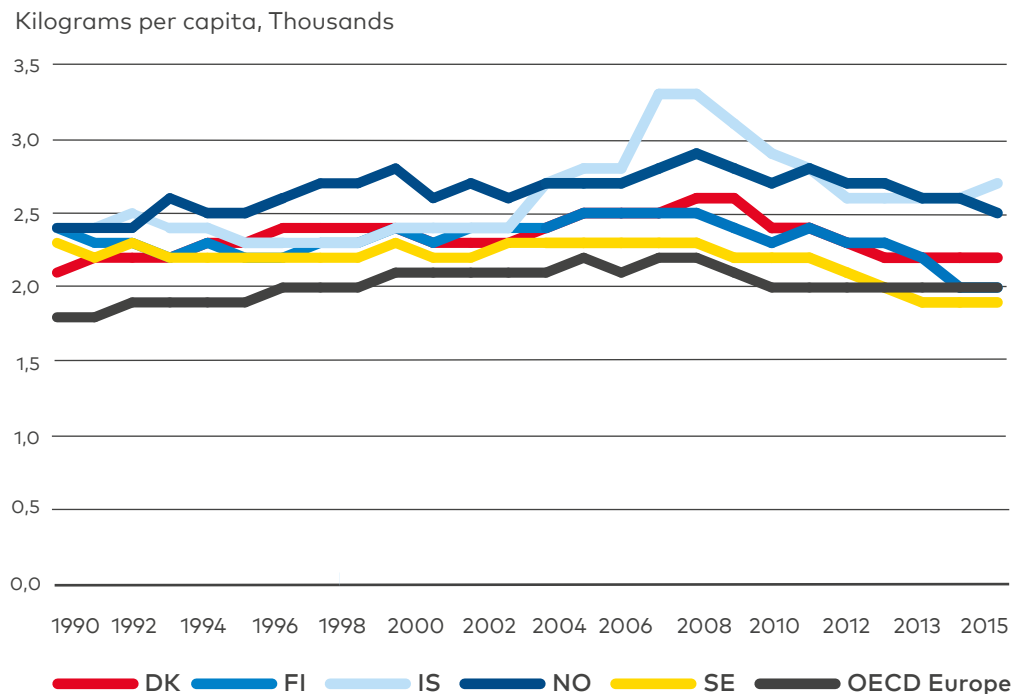
Sweden has been decreasing over the period.

As of 2017, all five countries levy CO<sub>2</sub> taxes on either fuels for energy purposes, transportation, electricity or all, targeting both the CO<sub>2</sub> in energy and transportation uses.

Denmark, Finland, Norway and Sweden all introduced a CO<sub>2</sub> tax between 1990 and 1992, being among the first countries in the world to do so. Increases in the taxation rate have been modest for most of the Nordic countries, except



**Figure 10: Greenhouse gas emissions from transport, kg per capita (Thousands)**



Source: OECD (2018), United Nations, Department of Economic and Social Affairs (2017) and calculations by COWI (2018).

for Finland which has experienced a substantial increase. When first introduced in 1990, the tax rate was 1.19 EUR per ton CO<sub>2</sub> but in 2017 the tax rate had increased to 58 EUR per ton CO<sub>2</sub>. In Iceland, a CO<sub>2</sub> tax was first introduced in 2009, in the wake of the financial crisis, for both fiscal and environmental purposes.

The level of greenhouse gas emissions from transport does not differ much across the five Nordic countries. Emissions have been more or less stable throughout the period, although from the

late 2000's a decreasing trend is seen. Iceland experienced quite an increase in emissions from transport in the mid-2000's. The sector is also one of the most challenging issues in the government's climate change mitigation efforts.

Besides targeting transportation fuels, through excise taxes and CO<sub>2</sub> taxes, all Nordic countries also levy taxes on vehicles, often based on the fuel efficiency and the emissions from the vehicle. A method to increase the share of low emission cars could be to differentiate taxes according to fuel

consumption or the emission of CO<sub>2</sub> per mileage. Taxes differentiated according to CO<sub>2</sub> emissions have a positive effect on the share of energy efficient vehicles (NCM, 2017).

In Norway, as mentioned above in Section 2, the changes to the vehicle taxation has in combination with other measures significantly increased the sales of electric cars.

In Denmark, a vehicle registration tax calculated according to the fuel efficiency and value of the car is levied as a one-off payment when the vehicle register for the first time at the national motor registration office. Up until 2016, electric cars were fully exempt from the registration tax. The tax rate on electric cars depends on the value of the car.

Car owners in Finland must pay both a registration tax and an annual vehicle tax. The registration tax has been in place since the 1950's and is based on the value of the vehicle and the amount of CO<sub>2</sub> emissions. Also based on CO<sub>2</sub> emissions, the annual tax was increased significantly in 2015.

Taxes based on weight and CO<sub>2</sub> emissions are also collected in Iceland, twice a year. Since 2013, a reduced VAT rate has been levied on purchases of electric vehicles, hydrogen vehicles and hybrid vehicles.

A registration tax based on different components, including weight, engine

effect and CO<sub>2</sub> emissions is in place in Norway. In 2012, NOX emissions were added to the list to encourage the take-up of cars with low NOX emissions. An annual tax, also based on different components, is paid by vehicle owners. To this should be added the Norwegian public transport subsidies intended to make public transport more competitive.

Sweden collects an annual tax, which among other components, are based on CO<sub>2</sub> emissions. A tax exemption is offered for vehicles with a relatively low environmental impact in the first five years, and since 2012 a subsidy has been in place for new cars with very low CO<sub>2</sub> emissions. Both Sweden and Norway have road charging schemes in cities to among other reduce congestion, and the first European toll rings were implemented in Norway, e.g. Bergen (1986), Oslo (1990), Trondheim (1991).

## **Economic instruments and sustainable development**

Establishing a causal link between the use of economic instruments and sustainable development in general is not a straightforward task. Although economic instruments arguably can be used in the effort to guide societal development in a more green direction, several other factors such as ones identified in section 2.1 influence the actual impact of economic instruments. For example, the effect of an economic instrument depends on the specific tax design and the incentives that it

provides. It would require an in-depth assessment to determine the specific contribution from economic instruments to greening of the economy. The purpose of this policy brief has been to present an overview of the relatively long history of using economic instruments in Nordic environmental policy. There are examples of economic instruments promoting a specific change – for example the Norwegian case of increased sale of electric vehicles due to a change in the tax design and other incentives. Such an example points to the relevance of using economic instruments as an element in the policies for sustainable development and greening of the economy.

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## APPENDIX

# METHODOLOGY FOR CREATING AN OVERVIEW OF THE USE OF ECONOMIC INSTRUMENTS

The overview of the use of economic instruments in the Nordic countries is based mainly on the series of published reports on economic instrument in environmental policy by NCM, as well as recently gathered data for the forthcoming report in the series covering the period 2014-2017.

The main focus area has been to obtain knowledge of the number of instruments in effect over the period 1990 to 2017 to present an overview of main trends. Information on the individual instruments in effect in the Nordic countries has been entered into a spreadsheet. For each instrument, the reviewer has entered the following data if available; sector, instrument type and rate/value. So a given category can consist of several different economic instruments targeting a certain good, consumption or with the same pollution activity/specific aim in one of the five sectors (*Energy and air pollution, Waste, Water, Transport, and Agriculture and natural resources*). As an example, a CO<sub>2</sub> tax on fuel oil might cover many different CO<sub>2</sub> taxes e.g. CO<sub>2</sub> tax on natural gas or crude oil, see Table 3.

Instruments which differentiate on tax rate according to e.g. fuel source is

therefore only counted once. Instruments are categorized according to the headings provided in Table 1.

Some of the reports only contain data for a single year even though the report covered a longer period. Similarly, not all instruments may in effect be reported for a given report. The initial results therefore showed significant gaps in data, especially for certain periods, potentially highlighting the differences in reporting between the individual reports. These data gaps are usually due to either the instrument not being reported or the instrument being discontinued. In general, the reports covering the latest periods from 2001 are the most complete, and likewise the reports covering the period before 1997 the least consistent. Some data gaps have been filled with information about implementation year for a given type of instrument, e.g. a vehicle registration tax has been in effect since the 1950's in Finland. Remaining data gaps were filled using simple interpolation between the two endpoints based on a set of data handling rules.

- Data gaps covering up to four years are filled using simple interpolation, with one exemption:
  - Data gaps covering the entire period of a report have been filled by sampling for a single year
  - Data gaps covering more than four years are either filled by sampling for a single year or left blank
  - Data gaps before 1997 are left blank.
- Finally, a smoothing procedure was performed after the data fill to even out the last abrupt movements in data. Smoothed data are highlighted in the figures. The reporting of subsidies is a main denominator here, since these might only be reported for a single year.

**Table 3: Example of categorization of economic instruments according to pollution activity (CO<sub>2</sub> emissions from fuel oil) for Denmark and Norway**

Type of instrument	Denmark		Norway	
	Tax name	Specific tax	Tax name	Specific tax
CO <sub>2</sub> tax on fuel oil	CO <sub>2</sub> tax	Light fuel oil, øre/litre	CO <sub>2</sub> tax for fossil fuel consumption (mainland)	Light fuel oil, eurocent/litre
CO <sub>2</sub> tax on fuel oil	CO <sub>2</sub> tax	Heavy fuel oil, øre/litre	CO <sub>2</sub> tax for fossil fuel consumption (mainland)	Heavy fuel oil, eurocent/litre
CO <sub>2</sub> tax on fuel oil	CO <sub>2</sub> tax	Motor fuel, øre/litre	CO <sub>2</sub> tax for fossil fuel consumption (mainland)	Coal, eurocent/kg
CO <sub>2</sub> tax on fuel oil	CO <sub>2</sub> tax	Natural gas, øre/Nm <sup>3</sup>	CO <sub>2</sub> taxes, NOK per litre/Sm <sup>3</sup> /kg/tCO <sub>2</sub>	Gasoline
CO <sub>2</sub> tax on fuel oil	CO <sub>2</sub> tax	Pit coal, DKK/tonne	CO <sub>2</sub> taxes, NOK per litre/Sm <sup>3</sup> /kg/tCO <sub>2</sub>	Jet fuel
CO <sub>2</sub> tax on fuel oil	CO <sub>2</sub> tax	Electricity, øre/kWh	CO <sub>2</sub> taxes, NOK per litre/Sm <sup>3</sup> /kg/tCO <sub>2</sub>	Jet fuel, reduced rate
CO <sub>2</sub> tax on fuel oil	CO <sub>2</sub> tax	Crude oil, øre/kg	CO <sub>2</sub> taxes, NOK per litre/Sm <sup>3</sup> /kg/tCO <sub>2</sub>	Mineral oil
CO <sub>2</sub> tax on fuel oil	CO <sub>2</sub> tax	Lignite, øre/kg	CO <sub>2</sub> taxes, NOK per litre/Sm <sup>3</sup> /kg/tCO <sub>2</sub>	Light fuel oil diesel
CO <sub>2</sub> tax on fuel oil			CO <sub>2</sub> taxes, NOK per litre/Sm <sup>3</sup> /kg/tCO <sub>2</sub>	Heavy fuel oil
CO <sub>2</sub> tax on fuel oil			Special tax provisions for various industrial sectors (fish processing, wood processing, paper and pulp), CO <sub>2</sub> tax	Natural gas (petroleum sector, continental shelf)
CO <sub>2</sub> tax on fuel oil			New taxes, 1998	Extension of CO <sub>2</sub> tax to include North Sea supply fleet

# OVERVIEW OF THE USE OF ECONOMIC INSTRUMENTS, DISTRIBUTED ON SECTOR AND COUNTRY

## Energy and air pollution

As can be seen from our categorization in Table 1, there are 10 instruments targeting the *Energy and air pollution* sector, ranging from excise taxes on fuels and electricity, CO<sub>2</sub> taxes and subsidies schemes. The *Energy and air pollution* sector has the highest number of instruments.

Across the five Nordic countries, there has been an overall increasing trend in the number of instruments used in the *Energy and air pollution* sector for the period 1990-2017, as can be observed in Figure 13. Denmark and Sweden have had the highest number of instruments for most of the period, and Iceland has had the lowest number of instruments. Iceland is able to cover the main part of its energy demand by geothermal energy and renewable sources. From the same period onwards, the number of instruments have been more or less constant in the other four Nordic countries.

In all countries, a CO<sub>2</sub> tax on fuel oil and transportation fuels is collected, covering a wide range of individual taxes. This can be attributed to a common desire in the countries to replace fossil fuels with

renewable energy and wholly or partly reduce greenhouse gas emissions.

In terms of tax revenue, instruments targeting the Energy and air pollution sector accounted for around half of the environmentally related tax revenue in Denmark, Finland and Sweden and were the second largest revenue source in Norway and third largest share in Iceland (NCM, 2014).

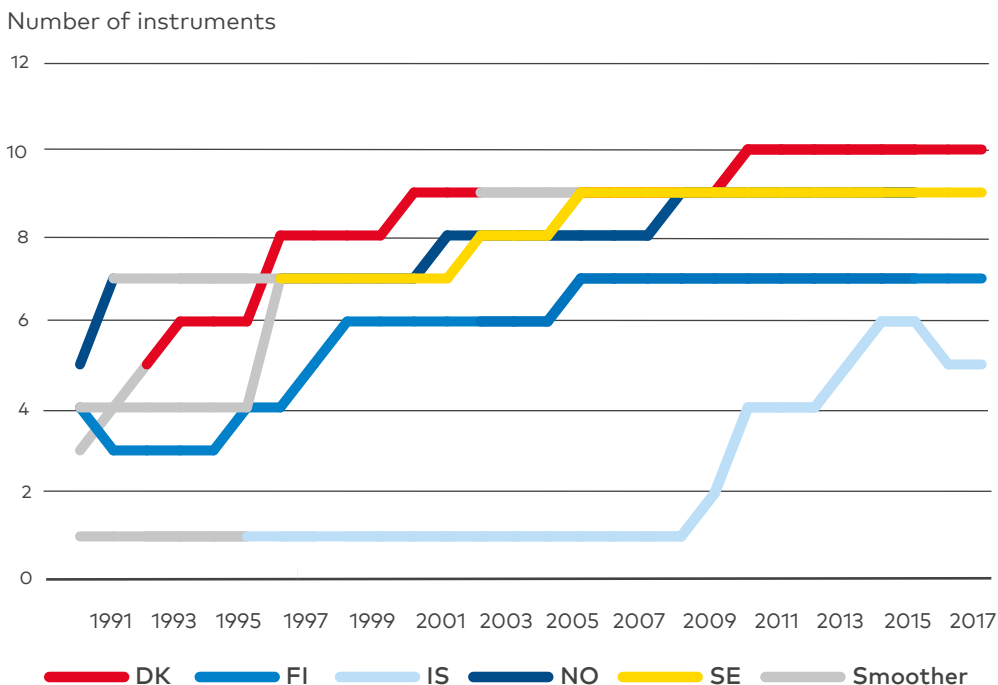
## Water

In the *Water* sector, up to three different instruments are applied over the period, making it the sector with the lowest number of instruments. The sector also differs in that the instruments are mainly used to finance water management, since most of the instruments generally are not considered a green tax. Most of the Nordic countries levy a tax on water supply and wastewater services to fund the services required, but it is not used as an emission-related charge on water services.

Denmark is the only country that charges water supply and waste water services separately and levies additional green taxes to protect the groundwater and to reduce water consumption in households.



**Figure 13: Development in the number of instruments in the energy and air pollution sector, 1990-2017**



Source: The report series on *The use of economic instruments in Nordic environmental policy* published by the Nordic Council of Ministers (1991 – 2018) and adjustments by COWI (2018).

Note: The grey line is a smoother to level sudden increases and decreases in the data.

In 2009, Sweden introduced a subsidy scheme aimed at reducing eutrophication in the sea, reducing environmentally hazardous substances from recreational boating and collecting lost fishing gear. See Figure 14.

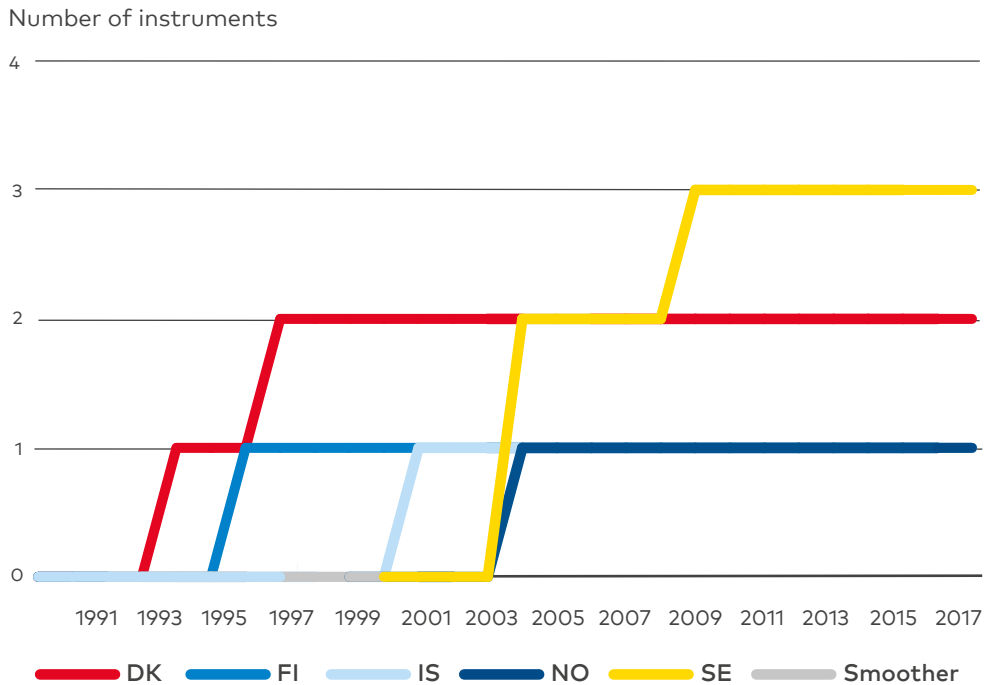
## Waste

As can be seen from the categorisation in Table 1, six possible instruments target the Waste sector. These range from taxes

on management of waste and chemicals to deposit-refund systems for beverages, end-of-life vehicles, etc.

As of 2017, all Nordic countries operate a tax scheme, deposit-refund system or another collection system for beverage containers or packaging. Charges to finance collection and treatment or deposit-refund systems for products, such as batteries, tyres, end-of-life

**Figure 14: Development in the number of instruments in the Water sector, 1990-2017**



Source: The report series on *The use of economic instruments in Nordic environmental policy* published by the Nordic Council of Ministers (1991-2018) and adjustments by COWI (2018).

Note: The grey line is a smoother to level sudden increases and decreases in the data.

vehicles, etc., are in place in all countries, either for one product or for several of them.

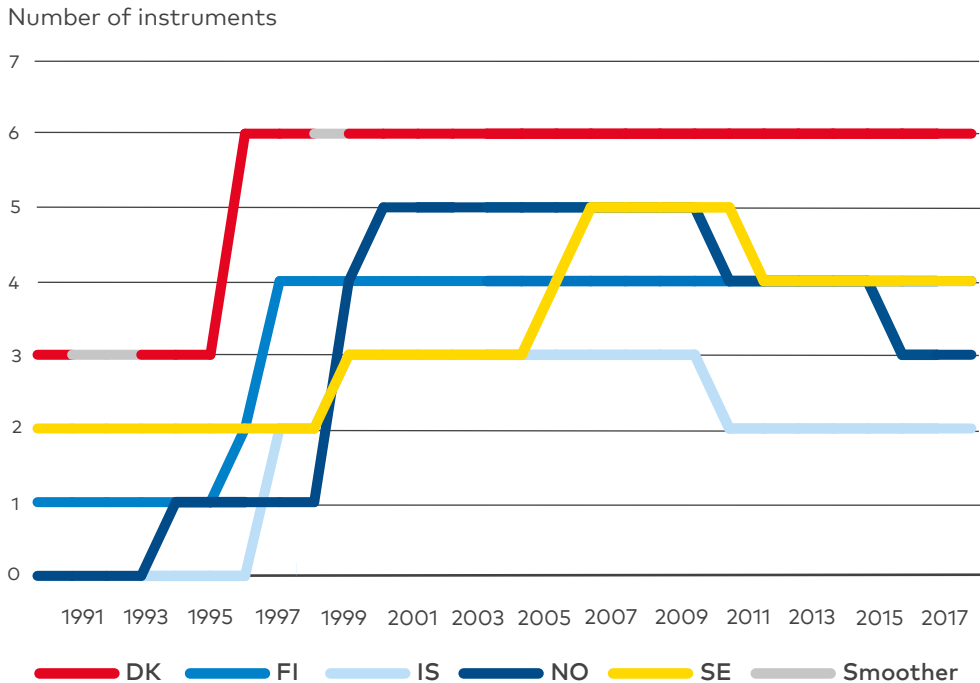
Also as of 2017, Denmark has the largest number of instruments targeting waste. Recently, most of the Nordic countries have seen minor decreases in the number of different instruments, as can be seen in Figure 15. This is partly due to the

removal of taxes on waste incineration, which in some cases has been replaced with a different instrument.

### Transport

The *Transport* sector covers seven different instruments, ranging from vehicle registration taxes to charges on aviation.

**Figure 15: Development in the number of instruments in the Waste sector, 1990-2017**



Source: The report series on *The use of economic instruments in Nordic environmental policy* published by the Nordic Council of Ministers (from 1991 to 2014) and adjustments by COWI (2018).

Note: The grey line is a smoother to level sudden increases and decreases in the data. Until 2009 there was a tax on incineration in Denmark, which was replaced by a tax based on energy content of the waste. However, this tax is included in this overview, due to the specific aim of the instrument. The change was done in order to make waste incineration more cost-effective

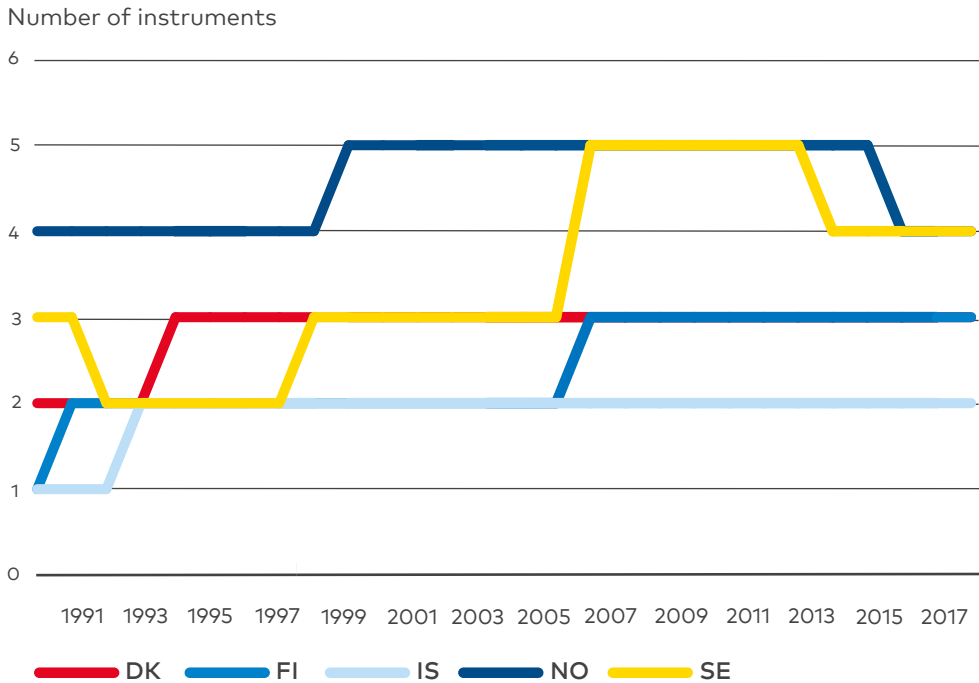
All Nordic countries have a taxation scheme for vehicles, be it a vehicle registration and sales tax or an annual or semi-annual vehicle tax.

In 2012, the number of instruments in Sweden dropped from five to four due to aviation being included in the EU ETS leading to withdrawal of a

national economic instrument targeting aviation, which had been in effect since 1998.<sup>18</sup> However, a new aviation tax to passenger flights departing the country was introduced on 1 April 2018 (Swedish Ministry of Finance, 2017). Norway similarly saw a drop in the number of instruments when a tax on boat engines were discontinued in 2014. This

<sup>18</sup> Exhaust gas-related landing charges (NOx).

**Figure 16: Development in the number of instruments in the Transport sector, 1990-2017**



Source: The report series on *The use of economic instruments in Nordic environmental policy* published by Nordic Council of Ministers (from 1991 to 2014) and adjustments by COWI (2018).

change was implemented to promote a faster shift towards new and more environmentally friendly boats.

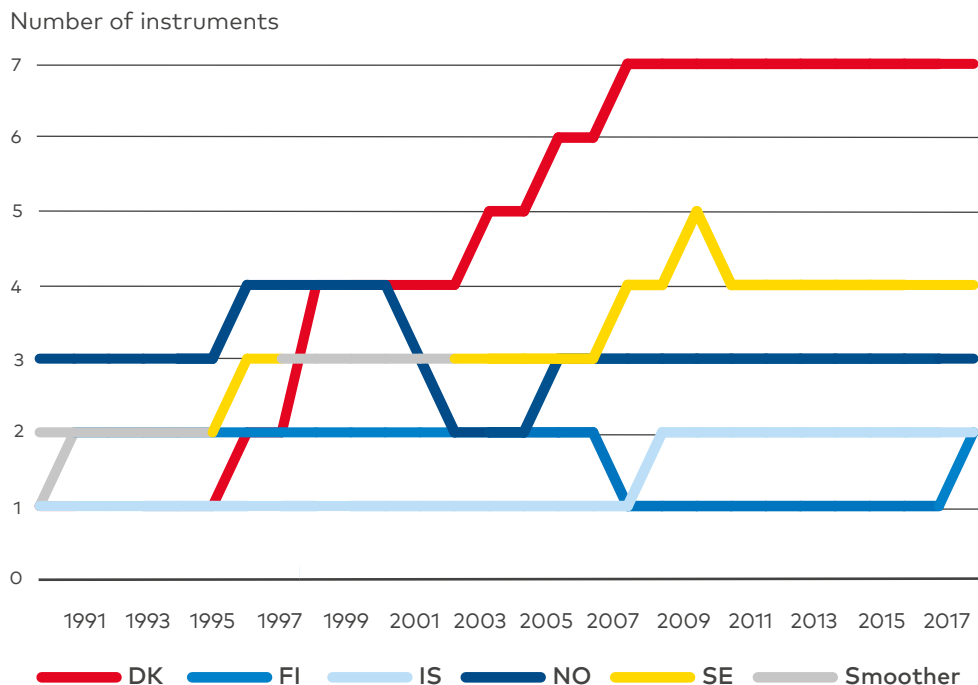
As of 2017, Sweden and Norway have the largest number of instruments targeting transport, and Iceland the lowest number of instruments. The development in number of instruments is illustrated in Figure 16 above.

### **Agriculture and natural resources**

The *Agriculture and natural resources* sector has seven possible instruments, mostly focusing on chemicals and fishing quotas.

As of 2017, Denmark has the highest number of instruments targeting *Agriculture and natural resources*, and Finland and Iceland has the lowest number of instruments. The development

**Figure 17: Development in the number of instruments in the Agriculture and natural resources sector, 1990-2017**



Source: The report series on *The use of economic instruments in Nordic environmental policy* published by Nordic Council of Ministers (from 1991 to 2014) and adjustments by COWI (2018).

in number of instruments is illustrated in Figure 17 above.

Even though Iceland only has two instruments targeting the *Agriculture and natural resources* sector, the sector accounts for a relatively large share of Iceland's environmentally related tax revenue, mainly due to fishing taxes. In the four other Nordic countries, the revenue share from this sector is fairly small.







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The objective of this policy brief is to present a high-level overview of the use of economic instruments in environmental policies in the Nordic countries from the 1990's up to 2017. This overview is based on the previously published reports on the use of economic instruments in Nordic environmental policy by the Nordic Council of Ministers' Working Group on Environment and Economy (MEG). Focus is on the development in use of economic instruments in each of the five Nordic countries, and the region as a whole.

More specifically, the policy brief presents:

- An overview of number of economic instruments by country and by sector
- The revenue from the use of economic instruments by country and by sector
- Discussion of the use of economic instruments in relation to the transition to a green economy.

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