

# The Use of Economic Instruments in Nordic Environmental Policy 2014–2017



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# Preface

This is the eighth overview report published by the Nordic Council of Ministers on the use of economic instruments in Nordic environmental policy. The report has been commissioned by the Nordic Working Group for Environment and Economics (NME, previously known as MEG). The previous editions of the report have been published in 1994, 1997, 1999, 2002, 2006, 2009 and 2014. In addition to the overview of the use of economic instruments in 2014–2017, a second part of the report contains an overview of voluntary environmental agreements in use in the Nordic countries in the same period.

The report has been prepared by COWI A/S, in cooperation between COWI A/S offices in Sweden, Norway and Denmark, and Nordic external experts. The core team consisted of Michael Munk Sørensen (project leader), Lea Skræp Svenningsen, Liv Lærke Hansen, Hanne Søiland, Emelie von Bahr and Troels Hansen (COWI), Kennet Christian Uggeldahl, and Hrafnhildur Bragadóttir (Environice). Comments and inputs to the report have been provided by Members of the Nordic Working Group for Environment and Economy (NME) as well as other Nordic experts; Jørgen Schou and Øyvind Lone. The authors of the report are responsible for the content as well as the assessments and recommendations, which do not necessarily reflect the views and the positions of the governments in the Nordic countries.

The Nordic countries have been among the frontrunners in the use of economic instruments in environmental policy. This report reveals that there is a continuous development in this field, but no dramatic changes. The changes in instrument application reflect the general development of environmental policy in the Nordic countries as well as a general strive for more cost-efficient policy implementation. In climate policy in particular, emissions trading and taxes have become the main instruments in all Nordic countries. In parallel with this report, the authors have also prepared a Policy Brief on “The use of economic instruments in Nordic environmental policy 1990–2017”. The Policy Brief was published in September 2018.

The second part of the report provides an overview of voluntary environmental agreements, with an emphasis on approaches that can be categorized as voluntary public schemes. Such schemes are initiated and designed by public authorities, and private companies are then invited to participate.

February 2019

Bent Arne Sæther

Chair of the Nordic Working Group for Environment and Economics



# Executive Summary

## Abstract

The report contains two parts. Part 1 summarizes the most significant developments in the use of economic instruments in the environmental policies in the Nordic countries. It provides an overview of new instruments or major changes to existing instruments from 2014 to 2017<sup>1</sup>, a detailed country-by-country description of these developments and a cross-country comparison and assessment. Part 1 also provides “raw data” for further analysis by policy-makers and other stakeholders, and presents other findings, including policy priorities and good practices. Part 2 provides an overview of the use of voluntary environmental agreements in recent years in different environmental sectors across the Nordic countries. It also contains an overview and synthesis of studies that have evaluated the effects of voluntary environmental agreements.

A wide range of economic instruments have been used across the sectors in the Nordic countries. Differences in the use of economic instruments are attributable to country and sector characteristics as well as national policy regulation. Across the Nordic countries, a continued focus on climate considerations has been a common theme in the use of economic instruments. There are generally few changes in terms of new or discontinued instruments in the period 2014–2017 and most changes relate to alterations in tax rates or tax exemptions. The largest changes are seen within the sectors of transport and energy and air pollution. Noteworthy changes across the Nordic countries are increased CO<sub>2</sub> taxes, a subsidy for low carbon emission vehicles, and an introduction of new taxation schemes on aviation and a tax rebate for reparation and maintenance of certain goods to reduce material use. It should also be noted that the tax revenue per capita from the economic instruments has seen a minor increase in the period from 2014–2016.<sup>2</sup>

Voluntary agreements are identified for all five Nordic countries, with the far largest number of agreements being identified in Denmark (15). Finland, Norway and Sweden all have a similar number of agreements (5–9), whereas there are few examples of voluntary agreements in Iceland (2).

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<sup>1</sup> The report focuses on the period 2014–2017. Information on changes to existing economic instruments or new instruments implemented in 2018 and forward may be mentioned.

<sup>2</sup> Data for 2017 were not available at the time of completing this report.

## Background and objectives

Every three to four years, the Nordic Working Group for Environment and Economy (NME, formerly known as MEG) of the Nordic Council of Ministers publishes an overview of the use of economic instruments in environmental policies of the Nordic countries. This report is part of the series.

The report is structured as the previous reports in the series. The first part includes an assessment of changes to the use of economic instrument in the period 2014–2017. Economic instruments are defined broadly and include taxes, charges and subsidies which provides an economic incentive to change behaviour. The assessment in Part 1 compares the use of economic instruments across sectors and countries. The changes in the use of economic instrument in the environmental policies are seen in light of issues that have been on the international agenda. Following the overview section, Part 1 include a detailed assessment of each Nordic country organised by sector. The sector definition aligns with the definition used on the previous reports. It means that the sectors comprise: Energy and pollution, Water, Waste, Transport and Agriculture and natural resources.

Part II of this report identifies, describes and compares the use of voluntary agreements in recent years in the different environmental sectors across the Nordic countries. Voluntary agreements are, based on OECD, defined as: “Arrangements between firms and regulators in which firms voluntarily commit to actions that improve the natural environment. The regulator encourages and/or supervises these actions.” (OECD, 2003). Voluntary agreements may be alternatives to, forerunners of or complementary to economic instruments or command-and-control regulation. For example, voluntary agreements may be used as instruments at an early stage in a new policy area, where economic instruments are not yet feasible.

## Key findings and conclusions

### *Most significant changes within transport and energy and air pollution*

In the period 2014–2017, the Nordic countries have focused on economic instruments in the field of transport, energy and air pollution, except in Iceland where there have been few changes to the application of economic instruments regardless of the sector. The climate change agenda and the associated need to reduce CO<sub>2</sub> emissions explains many of the changes to the applied economic instruments.

For transport, a key objective has been to decrease the use of fossil fuels. The use of specific economic instruments differs among the countries, some countries have increased the CO<sub>2</sub> tax while other have implemented subsidy schemes for cars with low carbon emissions. Furthermore, both Sweden and Norway have implemented a tax on aviation. In both countries the tax is levied on air passengers travelling on flights departing national airports. Within the energy sector, Finland, Norway and Sweden have increased the tax rates.

### *The use of economic instruments in Denmark*

For the period 2014–2017 Denmark has seen minor changes to its tax system. Most of these changes have occurred within the energy sector, where many tax rates have been increased. However, the opposite has happened in the transport sector, where tax rates have been reduced. The registration tax is a progressive value-based tax with an adjustment linked to CO<sub>2</sub> emissions of the vehicle. In 2017 the rate of the base tax was lowered from 105% to 85%, and the progression point was raised from DKK 106,600 (EUR 41,331) to DKK 185,100 (EUR 24,884). In 2015, the tax rate on the value above the progression point, was lowered from 180% to 150%.<sup>3</sup> A noteworthy change in the taxes aimed at transportation is that electric cars from 2016 and onwards are no longer fully exempt from the registration tax. As part of an energy agreement from 2012, it was decided to analyse the tax and subsidy structure in the energy sector. This analysis was completed in 2017 and updated in 2018, concluding that in its current state, marginal taxes and subsidies on energy differ depending on technology and end use of energy. A more uniform structure would result in socioeconomic gains in terms of reduced costs of fulfilling Danish national and international climate commitments, and energy-related environmental targets. Climate considerations have been a significant topic in the period. In June 2018, the Danish government signed an energy agreement with the support of all parties in the Danish parliament. The aim of the agreement is to ensure a market-driven green transition. In October 2018, the Danish government presented a proposal for a new air- and climate strategy with the aim of ensuring that Denmark fulfils the EU's climate target for 2030. Among the proposed initiatives is a ban on selling diesel- and petrol cars after 2030, a tax reduction on green vehicles, a higher scrap premium on old diesel cars, and a new scrap premium on old wood-burning stoves.

### *The use of economic instruments in Finland*

During the period 2014–2017 changes have mainly been made to existing instruments.

Within the energy sector, rates of energy related taxes have been increased several times. From 2016 the subsidy to wind power decreased to the same level applied to biogas and wood fuel plants. However, the capacity limit for the wind power subsidy was reached in November 2017, and a new technology neutral subsidy scheme for renewable energy is currently being discussed. The economic instruments related to vehicles have also seen changes since 2013. In general, the annual car tax has increased significantly for all cars, regardless of emissions. The annual car tax consists of a basic rate according to the vehicles CO<sub>2</sub> emissions, and a driving power tax whereby petrol passenger cars are subject only to the basic tax. However, in 2015 it was decided that the registration tax paid on new vehicles would be lowered for cars emitting less than

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<sup>3</sup> In 2015, the progression point for a passenger car was DKK 81,700 (EUR 10,983), so the tax rate was 105% up to this value and 180% of the value above the point.

140 g CO<sub>2</sub> per km. Further, a refund system for end-of-life vehicles was put in place from the start of January to the end of August 2018.

Finally, one of the main policy tools for waste management and prevention, the waste tax, has also been increased a number of times since 2013.

### *The use of economic instruments in Iceland*

Apart from minor rate adjustments, economic instruments in Iceland have for the most part remained unchanged in the period 2014–2017. However, increased use of economic instruments appears to be on the horizon in the coming years; the government has, for example, expressed intentions to impose a new landfill tax and to raise carbon taxes to support its climate policy. Furthermore, a parliamentary resolution adopted in 2017 envisages increased utilisation of economic instruments in the period 2017–2021 to accelerate the transition from fossil fuel to renewable energy in land-based transport and shipping.

### *The use of economic instruments in Norway*

The environmental profile of many taxes has been strengthened since 2014. The CO<sub>2</sub> tax has been gradually increased and expanded, through a reduction in the number of sectors being exempted from the tax. However, some sectors still face different tax levels. The tax on CO<sub>2</sub> emissions from jet fuel on domestic flights was increased in 2015 and in 2017, and the CO<sub>2</sub> tax on airborne emission from natural gas from the petroleum continental shelf was increased. The road usage tax on bioethanol, LPG and biodiesel has been gradually increased, to the same levels as petrol and auto diesel (2016).

Further noteworthy changes are that the waste disposal tax was abolished in 2015, as it was considered to have a limited impact on the environment. An air passenger tax was introduced on 1 June 2016, covering all flights departing Norwegian airports. In 2017, the rate was NOK 82 (EUR 8.80) for each passenger.

### *The use of economic instruments in Sweden*

In the period of 2014–2017, several changes have been made in existing instruments and a number of new instruments have been implemented, especially within energy and transport.

Within the energy sector, both energy and carbon dioxide taxes on fossil fuels are now subject to adjustments for inflation (consumer price index). From 2017 and onwards, the energy tax on gasoline and diesel is to be increased by 2% annually. Likewise, the energy tax on consumption of electricity for households and businesses was subject to a small increase in 2017. Other noteworthy changes in economic instruments related to energy and reduction of greenhouse gas emissions are an increase in the green certificate system and an implementation of a new subsidy scheme for local climate investments (Climate leap or *Klimatklivet* in Swedish) in 2015.

Within the transport sector a tax and subsidy scheme (so called bonus malus) on vehicles was decided upon in 2017 and implemented in 2018. It replaced a previous programme and aimed to increase the share of cars with low carbon emissions. Further, a subsidy on the purchase of electric bicycles and a new tax on aviation were implemented in 2017. Market based regulatory instruments are generally not applied to harmful substances which are otherwise subject to administrative instruments. In 2017 this was changed through the implementation of the so-called *Chemical tax* which is a tax levied on flame retardants in electronic products.

Finally, a decision from 2017, that most likely will have a significant effect on climate policy and related economic instruments in the years to come, regards the Climate Act through which Sweden commits to several actions with the aim of decreasing greenhouse gas emissions.

### *Voluntary agreements*

The success of Voluntary Agreements (VA) depends on the specific conditions in each case. Generally, a VA initiative should be based on a prior positive assessment of the existence of such criteria/conditions. Where VA agreements are deemed to be a cost-effective solution, they may afford flexibility to private operators (industry organisation, companies and citizens), and provide synergy effects within the given policy framework.

The literature review suggest that a successful outcome of VAs depends on several factors, most notably: 1) a well-developed VA setup with a supporting legal framework and a capacity to manage and follow-up on the VA for both public authorities and private operators; 2) motivation for the private operators; 3) high levels of trust and confidence amongst the parties (efficient monitoring, reporting and compliance mechanisms), and; 4) the use of a VA should be cost-effective.

An overview of voluntary environmental agreements, active in the period 2014–2017, were generated through a literature study, interviews with relevant stakeholders and environmental experts. Voluntary agreements (VAs) were identified in all five Nordic countries, with the largest number of agreements being identified in Denmark (15), more moderate uses are found in Finland, Norway and Sweden (5–9). The use of VA's in Iceland (2) is very limited. The use of VAs has been prevalent within the Waste sector, while only one VA was identified in the Transport sector. All five countries have VAs in the *Waste* sector that date to the 1990s. Few new voluntary agreements have been implemented since the previous evaluation in 2011, and only in Denmark and Finland. It proved difficult to obtain detailed information on all individual agreements and their origin. However, most of the identified VAs are negotiated between the relevant public authority and the affected industries, or in some cases individual companies.

15 evaluations or reports covering the VAs were identified. The identified reports and evaluations have diverging focuses, themes and methodologies, making it difficult to draw broad conclusions from the evaluations. The success of the evaluated voluntary agreements has been mixed, as not all VAs have reached or are predicted to reach their

targets. The differences in effectiveness across VAs might be attributed to the capacity of the regulatory body in terms of monitoring the agreements and sanctioning when necessary. The individual case and market complexities also play a part in each VA's effectiveness and success. A general finding is the need for an increased focus on monitoring and evaluating the agreements, which is in alignment with the findings from the earlier report from the Nordic Council of Ministers "Voluntary agreements and environmental labelling in the Nordic countries". A future focus area could be ensuring the use of a common methodology for evaluating voluntary agreements in the early design phase.

# Introduction

## Objective

The Nordic Council of Ministers authors a quadrennial report series on the use of economic instruments in the Nordic countries. The report series serves to document and highlight lessons from the use of economic instruments in the five Nordic countries, to inform and inspire policymakers around the world.

This report is part of a series and comprises two parts. The objective of *The Use of Economic Instruments in Nordic Environmental Policy 2014–2017* is to present an overview of the use of economic instruments in environmental policy in the Nordic countries for the period 2014–2017 (Part I) along with a topical part (Part II).

- Part 1: An overview of the use economic instruments and changes in the use of these instruments during the period 2014–2017.
- Part 2: An overview of voluntary environmental agreements in use in the Nordic countries during the period 2014–2017.

The report has been prepared by COWI A/S in cooperation between COWI A/S offices in Sweden, Norway and Denmark, and Nordic external experts. The core team consisted of Michael Munk Sørensen (project leader), Lea Skræp Svenningsen, Liv Lærke Hansen, Hanne Søiland, Emelie von Bahr and Troels Hansen (COWI), Kennet Christian Uggeldahl, and Hrafnhildur Bragadóttir (Environice). Comments and inputs to the report have been provided by Members of the Nordic Working Group for Environment and Economy (NME) as well as other Nordic experts; Jørgen Schou and Øyvind Lone.

The focus area has been the use of economic instruments within the period 2014–2017. Significant changes or alterations to economic instruments after 2017 are also mentioned where relevant. National currencies have been converted to Euro using national exchange rates (yearly average, 2017) collected from the central banks of Denmark and Iceland.<sup>45</sup>

## Definition of economic instruments

The purpose of applying economic instruments in an environmental policy context is to correct for market failures by internalizing externalities i.e. to incorporate non-

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<sup>4</sup> <http://nationalbanken.statistikbank.dk/statbank5a/default.asp?w=1344>

<sup>5</sup> <https://www.cb.is/?Pageld=6909b7bd-5189-45dd-bf5b-c76ea33496ef>

monetized environmental cost and benefits into the price of goods, services and activities. As the market prices on using natural resources and environmental assets do not reflect the actual costs to society, these resources become overexploited. Through internalisation of these external costs, economic instruments provide incentives for agents to change behaviour. Several economic instruments can be introduced to correct for market failures e.g. taxes or charges, subsidies, and quotas (tradable permits or emission allowances) (Tietenberg, 1990):

- An environmental tax or charge is a payment for using a certain resource or negatively affecting the environment. The unregulated market price does not reflect the cost to society associated with environmental deterioration. The environmental tax aims to correct the market failure by covering the gap between the market price and the social cost to society. An optimal tax should reflect the marginal social costs. An additional function of taxation is to raise revenue for the government, although this should not be the primary goal of an environmental tax. The tax should ideally be placed on the point source responsible for environmental harm. In practice this can be administratively impractical, or technical impossible, and an activity or product can instead be taxed through a proxy. A tax can be an efficient form of regulation because each actor can adjust to the regulation according to his or her own cost function. Environmental taxes do not, however, guarantee a certain level of environmental quality. Environmental taxes are best suited for regional and global environmental problems where it is the total emission or resource use that matters, and not the location of the emission-sources.
- Unlike a tax, the allocation of quotas ensures that a predefined pollution level is met. This could be particularly relevant in cases where there is a risk that a change in pollution levels would lead to large damage cost to society; for example if there is an irreversible tipping point. When quotas are made tradeable, producers who can reduce their pollution at a low cost will have an incentive to sell emission permits, while the producers facing a high cost of abatement will have an incentive to buy emission permits. It ensures abatements are made where the marginal costs are lowest. Hence, the emission reduction is achieved in the most efficient way.
- Subsidies are used to support production sectors or activities which would otherwise be underprovided by the market. Subsidies are used to pay for positive externalities, or they are used as an incentive for producers to change to a more environmentally friendly form of production. Subsidies might overcompensate producers and can lead to overproduction. Subsidies also increase public spending and the need for tax revenue. This can lead to distortions in other parts of the economy.

### Definition of voluntary environmental agreements

Part 2 of this report focuses on the use of voluntary environmental agreements in the five Nordic countries. Voluntary agreements (VAs) were an especially popular tool in the 1990s, but subsequent research has questioned both their environmental and economic efficiency (OECD, 2003). A previous report from the Nordic council of ministers, "Voluntary agreements and environmental labelling in the Nordic countries" (NCM, 2011), focused on examining existing evaluations of voluntary agreements, covering the period 2005–2010. The main finding of this study was to highlight the lack of national strategies concerning the use of VAs in environmental policy and to point towards the need for systematic monitoring and evaluation of the outcomes of the VAs. With this background, the objective of Part 2 of this report is to provide an updated overview of how voluntary agreements are used in Nordic environmental policy.

An environmental voluntary agreement is based on the premise of agents freely entering into an agreement with the aim of fulfilling a determined environmental target. The OECD has defined it as: "Arrangements between firms and regulators in which firms voluntarily commit to actions that improve the natural environment. The regulator encourages and/or supervises these actions" (OECD, 2003).

VAs are a subgroup of general voluntary approaches which can be categorised according to Table 1, adapted from Croci (2006). In Part 2 of this report, the focus is primarily on generating an overview of VAs that can be characterised as voluntary public schemes. Other relevant VAs, characterised as either negotiated agreements or unilateral commitments, are also considered. It should be noted, that due to the lack of detailed information it can however be difficult to exactly categorise the different agreements.

**Table 1: Categorisation of voluntary approaches**

| Type                    | Description                                                                                                                                                                                                                               |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Voluntary public scheme | Initiated and designed by public authorities, intended for individual companies. Obligations for individual companies.                                                                                                                    |
| Negotiated agreements   | Negotiated between public regulators and individual companies or association of firms. Initiated by either public regulators or companies. Obligations apply to both public regulators and companies.                                     |
| Unilateral commitments  | Initiated by companies or association of companies, no public authority involved. Public authority can be invited to perform monitoring or define guidelines for the implementation, in order to give more credibility to the commitment. |
| Third-party initiatives | Initiated and designed by third parties, like NGO's. Individual companies are invited to participate.                                                                                                                                     |
| Private agreement       | Initiated and negotiated between polluters and pollutees. An example is private agreements between companies and trade unions concerning the health of the company workers.                                                               |

Source: Croci (2006)

*Voluntary public schemes* are initiated and designed by public authorities, where private companies are then invited to participate. The voluntary public scheme involves some level of commitment in the direction of fulfilling the environmental target, typically in exchange for some degree of benefit received from the public authority (reduced taxation level, subsidy scheme, less frequent inspections etc.). Monitoring of the

performance of the individual companies in achieving the terms of the scheme can be done by the authority, the company itself or by an independent third-party. An example of a voluntary public scheme is the Swedish agreement on energy efficiency in energy intensive industries, where companies commit to the voluntary agreement in exchange for tax exemptions.

*Negotiated agreements* can be initiated by either the public authorities or by companies and involve setting an environmental target through negotiations between the participating parties. As in the voluntary public scheme, participating companies are obliged to conform to the negotiated target, but the public authority is also obliged to provide some form of benefits to participating companies. Negotiated agreements are examples of agreements that may have been initiated through circumstances that question the voluntariness (Fischer-Bogason, 2011). The Norwegian agreement on collection of discarded insulating glass units containing PCBS, is an example of public authorities and associated companies negotiating terms.

*Unilateral commitments* are initiated by companies and do not involve public regulators. In this type of voluntary approach, an association of companies decide on a common approach to reach a given environmental target. The participating companies can ask public regulators to recognise the commitment in order to increase their public credibility. An example of this is the Danish industry agreement on selective demolition, from 1996.

Like a voluntary public scheme, a *third-party initiative* involves pre-set environmental target and conditions, typically initiated and designed by a NGO or international organization. Companies are invited to participate in the initiative, but the third-party is not typically able to offer anything but image benefits or improved management procedures in return for the company's commitment to the environmental target.

*Private agreements* are negotiated directly between the polluter and pollutees, without involvement of a public authority.

# **Part 1: The Use of Economic Instruments in the Nordic countries 2014–2017**



# 1. International policy and central developments in Nordic environmental policy

This chapter presents relevant international policy trends in the period and provides an overview of key developments in Nordic environmental policies. Major changes in each country and in certain sectors are discussed.

## 1.1 Relevant international policy in 2014–2017

On an international level, the introduction of the UN SDGs has probably been the most influential policy initiative in recent years. 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) that, if fulfilled, will contribute towards achieving global sustainable development. The SDGs are being integrated into national policies globally, and private companies and civil society also to an increasing extent integrate them into their strategies and work programmes (Bertelsmann Stiftung and Sustainable Development Solutions Network, 2017).

Furthermore, with the Paris Agreement in 2015, the worlds' nations agreed to limit the global temperature increase to well below 2 degrees Celsius, and committed to producing "nationally determined contributions", that specify how emissions reductions are going to be implemented (UNFCCC, 2015). The Nordic countries will implement the Paris agreement through their contributions to the joint EU commitment. Iceland and Norway are negotiating with EU with the intention to be part of the EU commitment

In addition to the international agenda, the long-term policy goals within the European Union are relevant in relation to the trends in Nordic environmental policy seen in the period 2014–2017. Not all the five Nordic countries are members of the European Union. Denmark, Finland and Sweden are members and thus subject to EU legislation and directives. However, Iceland and Norway are part of the European Economic Area (EEA) and thus subject to most EU environmental directives. Policies for nature management and biodiversity protection are not part of the EEA agreement.

The Seventh Environment Action Programme came into effect in January 2014 and will guide EU environmental policy until 2020. The programme focuses on three thematic objectives:

1. To protect, conserve and enhance the Union's natural capital
2. To turn the Union into a resource-efficient, green, and competitive low-carbon economy
3. To safeguard the Union's citizens from environment-related pressures and risks to health and well-being.

In a recent report tracking the success of member states in meeting the Seventh Environment Action Programme of the European Union, the European Environment Agency has identified that it will be problematic to meet the first objective, whereas the outlook is better for the two remaining policy objectives (EEA, 2017a).

For the energy and air pollution sector, the EU 2020 strategy for growth and jobs is particularly relevant (EC, 2010). It contains goals for climate change and energy and was passed in 2010. The 2020 strategy set targets detailing that greenhouse gas emissions should be 20% lower than the level in 1990 and that 20% of energy should come from renewable energy sources. In addition to the 2020 strategy, during the period 2014–2017, the European Commission has presented policy objectives for the period 2020–2030, and these are expected to influence the climate and energy policies of EU member states (EEA, 2018c). The EU ETS, which was extensively covered in the previous quadrennial report (NCM, 2014), is currently in phase 3, which has introduced an EU cap on total emissions from sectors included in the EU ETS, and also introduced auctioning as a default for allocating emissions allowances. In the area of air pollution, the 2016 update of the NEC directive (National Emission Ceiling) aim to limit emissions of key air pollutants such as NO<sub>x</sub>, SO<sub>2</sub>, NMVOC's and NH<sub>3</sub> (EU, 2016).

The Waste Framework Directive, introduced in 2008, is the main EU directive that regulates the waste sector. The directive introduced the EU waste management hierarchy, the polluter pays principle, and extended producer responsibility. In addition to this directive, the agenda of the circular economy represented by the Circular Economy Action Plan (EC, 2015) and directives focused on specific waste streams such as the WEEE directive (Waste Electrical and Electronic Equipment), influence the waste policies of the Nordic countries. Table 2 shows the share of recycled EEE products in the Nordic countries in 2015.

**Table 2: Share of recycled EEE in the Nordic countries in 2015**

| Country | Share of recycling in tonnes EEE products put on the market, % |
|---------|----------------------------------------------------------------|
| Denmark | 39.4                                                           |
| Finland | 49.0                                                           |
| Iceland | 27.4                                                           |
| Norway  | 49.0                                                           |
| Sweden  | 46.9                                                           |

Source: (EEA, 2018d).

For the water sector, the most relevant piece of EU legislation is the Water Framework Directive, which came into force in 2000, requiring EU member states to achieve a good status of all water bodies (surface water and groundwater) by 2015. EU member states

are submitting River Basin Management Plans (RBMPs) every sixth year that specify how each country plans to fulfil the environmental objectives of the Water Framework Directive. The EU countries have by 2015 submitted their second RBMP's. Iceland is not reporting the status of their water bodies under the WFD, although they adopted the WFD in 2007, whereas Norway is in the process of reporting data for their first RBMP (EEA, 2018b). According to the second RBMPs, a large number of surface water bodies in Denmark, Finland and Sweden are failing to achieve good status (EEA, 2018a).

**Table 3: Overview of relevant environmental policy within EU for the period 2014–2017**

| Sector                            | EU Policy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Energy and air pollution          | <ul style="list-style-type: none"> <li>• EUROPE 2020. A strategy for smart, sustainable and inclusive growth (EC, 2010)</li> <li>• EU ETS phase 3 (2013–2020) (EC, 2018)</li> </ul>                                                                                                                                                                                                                                                                                                          |
| Water                             | <ul style="list-style-type: none"> <li>• National Emission Ceilings (NEC) Directive (EU, 2016)</li> <li>• Water Framework Directive 2000</li> <li>• Second round of RBMPs under the Water Framework Directive. EU member states have since 2015 submitted their second RBMPs</li> </ul>                                                                                                                                                                                                      |
| Waste                             | <ul style="list-style-type: none"> <li>• Waste Framework Directive 2008</li> <li>• Circular Economy Action Plan (EC, 2015)</li> </ul>                                                                                                                                                                                                                                                                                                                                                        |
| Transportation                    | <ul style="list-style-type: none"> <li>• European Commission's Transport White Paper and accompanying impact assessment (EC, 2011b)</li> <li>• The Renewable Energy Directive (EC, 2009a)</li> <li>• Fuel Quality Directive (EU, 2015a)</li> <li>• Regulations on CO<sub>2</sub> emissions from new cars and vans (EC, 2009b; EU, 2011)</li> <li>• EU regulation 2015/757, monitoring, reporting and verification of CO<sub>2</sub> emissions from maritime transport (EU, 2015b)</li> </ul> |
| Agriculture and natural resources | <ul style="list-style-type: none"> <li>• Greening measures under the Common Agricultural Policy (EU, 2013)</li> <li>• EU Forest Strategy (EC, 2013)</li> </ul>                                                                                                                                                                                                                                                                                                                               |

Source: COWI (2018).

In the EU, the environmental impact from the transportation sector is regulated by four main documents (EEA, 2017b); the European Commission's Transport White Paper and accompanying impact assessment (EC, 2011b), the Renewable Energy Directive (EC, 2009a), Regulations on CO<sub>2</sub> emissions from new cars and vans (EC, 2009b; EU, 2011) and the Fuel Quality Directive (EU, 2015a). The greenhouse gas emissions from transportation in the EU has increased, and in 2016 they were reported as being 25% higher than in 1990, while air pollution of SO<sub>2</sub> and NO<sub>x</sub> and PM have decreased in the period 2000–2015, due to the introduction of fuel quality standards, cleaner technologies and euro-norms (EEA, 2017b). In the period 2014–2017, the Fuel Quality Directive was updated and a system for monitoring, reporting and verification of CO<sub>2</sub> emissions from maritime transport was established, starting in 2018.

The agricultural sector within EU member states is regulated by the Common Agricultural Policy. The legislation underwent a major reform in 2013, which among other things included "greening measures", that ensure direct payment to farmers that manage their land in a more sustainable manner, while also managing and protecting natural resources (EC, 2011a; EU, 2013).

## 1.2 The use of Economic instruments

The use of economic instruments across the Nordic countries and sectors has remained relatively unchanged during the period 2014–2017. A continued focus on climate and climate related issues has however influenced the use of economic instrument in a number of ways within the fields of transport and energy and air pollution. There are generally few changes in terms of new or discontinued instruments and most changes relate to alterations in tax rates or exemptions/rebates.

Table 4 presents an overview of the use of economic instruments in the five Nordic countries and how they have changed (nominal) in the period 2014–2017.

**Table 4: Overview of the use of economics instruments in the Nordic countries in 2017**

| Sector                            | Type of instrument                                                                                                                                          | DK | FI | IS | NO | SE |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|
| Energy and air pollution          | CO <sub>2</sub> tax on fuel oil                                                                                                                             | ↑  | ↑  | ↑  | ↑  | ↑  |
|                                   | CO <sub>2</sub> tax on transportation fuels                                                                                                                 | ↑  | ↑  | ↑  | ↑  | ↑  |
|                                   | Excise tax on electricity consumption                                                                                                                       | ↑  | ↑  |    | ↑  | ↑  |
|                                   | Excise tax on fuel oil products etc.                                                                                                                        | ↑  | ↑  |    | ↑  | ↑  |
|                                   | Excise tax on transportation fuels                                                                                                                          | ↑  | ↑  | ↑  | ↑  | ↑  |
|                                   | Inclusion of GHG-intensive sectors in the EU ETS                                                                                                            | →  | →  | →  | →  | →  |
|                                   | NO <sub>x</sub> tax                                                                                                                                         | ↓  |    |    | ↑  | →  |
|                                   | SO <sub>2</sub> tax                                                                                                                                         | ↑  |    |    | ↑  | →  |
|                                   | Subsidy schemes for renewable energy, energy efficiency etc.                                                                                                | →  | →  | →  | →  | ↑  |
|                                   | Tax on CFCs and certain greenhouse gases                                                                                                                    | →  |    |    |    |    |
| Water                             | Grants/Subsidy scheme                                                                                                                                       |    |    |    |    | →  |
|                                   | Water effluent tax                                                                                                                                          | ↑  |    |    |    | ↑  |
|                                   | Water supply tax                                                                                                                                            | ↑  | →  | →  | →  | ↑  |
| Waste                             | Charges to finance collection and treatment, or deposit-refund systems for products: ELVs, batteries, tyres, lubrication oil, pesticides or hazardous waste | ↑  | ↓  | ↑  | ↑  | ↑  |
|                                   | Packaging taxes (bottles, paper/plastic bags and disposable cutlery)                                                                                        | →  | →  |    | ↑  | →  |
|                                   | Tax on PVC, phthalates and chlorinated solvents                                                                                                             | →  |    |    |    |    |
|                                   | Tax on waste put in landfill                                                                                                                                | →  | ↑  |    |    | ↑  |
|                                   | Taxes, deposit-refund systems or other collection systems on beverage containers/packaging                                                                  | →  | →  | →  | →  | →  |
|                                   |                                                                                                                                                             |    |    |    |    |    |
| Transport                         | Annual vehicle tax                                                                                                                                          | ↑  | ↑  | ↑  | ↓  | →  |
|                                   | Environmental related or noise charges on aviation                                                                                                          |    | →  |    | →  | ↑  |
|                                   | Road charges for trucks                                                                                                                                     | →  |    |    |    | →  |
|                                   | Toll road / congestion taxes                                                                                                                                |    |    |    | ↑  | ↑  |
|                                   | Subsidy scheme for vehicle purchase                                                                                                                         |    |    |    |    | ↑  |
|                                   | Tax on boat engines                                                                                                                                         |    |    |    |    |    |
|                                   | Vehicle registration or sales tax                                                                                                                           | ↓  | ↓  | →  | ↑  |    |
| Agriculture and natural resources | Fishing fee, tradable fishing quotas and hunting fee                                                                                                        | →  | ↑  | →  | →  | →  |
|                                   | Subsidies schemes                                                                                                                                           | ↑  | →  | ↑  | →  | →  |
|                                   | Tax on biocides and pesticides                                                                                                                              | →  |    |    | →  | ↑  |
|                                   | Tax on extraction of raw materials                                                                                                                          | →  |    |    |    | ↑  |
|                                   | Tax on fertiliser use                                                                                                                                       | →  |    |    |    |    |
|                                   | Tax on growth promoters                                                                                                                                     | →  |    |    |    |    |
|                                   | Tax on phosphorus in animal feed                                                                                                                            | →  |    |    |    |    |

Notes: The instruments are divided according to the sectors they target. To visualize the dynamic changes in the use of economic instruments during the whole period, we have used three shades of blue. Economic instruments that have been present during the whole period are marked in blue. Instruments that have been discontinued in the period are marked in darker blue, while new instruments introduced in the period are marked in a lighter blue. Upward arrows indicate an overall increase in the nominal level of the specific tax/fee/charge or base, downward arrows illustrate that the level of the tax/fee/charge or base have been lowered and a horizontal arrow indicate that no changes to the level have occurred during the years 2014–2017. As the type of instrument can cover multiple taxes or fees, the direction of the arrow does not necessarily indicate that all taxes/fees/tax bases have changed.

For most of the Nordic countries, the tax on water supply and waste water services is levied to fund the service required and is not used as an environment-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.

Source: COWI (2018).

The highest number of different applied instruments is observed in the *Energy and air pollution* sector, with a total of 10 instruments and spanning over a wide range of instruments from excise taxes on transportation fuels to subsidy schemes for renewable energy and energy efficiency. The tax rates or tax bases targeted at oil products for transport activities have seen an increase across all five Nordic countries. The *Energy and air pollution* sector has mainly experienced increases in tax levels across instruments. However, Denmark reduced its tax on NO<sub>x</sub> emissions from DKK 26.6 (EUR 3.58) in the first half of 2016 to DKK 5.1 (EUR 0.69) in 2017. All Nordic countries have subsidy schemes for renewable energy, energy efficiency and others. In the period, Sweden introduced new subsidy schemes such as the climate leap (Klimatklivet) and Industry leap (Industriklivet). During the period, an excise tax on electricity consumption was abolished in Iceland.

In the *Water* sector we have observed only three types of instruments. Denmark is the only country that levies environment-related charges for specific material content on water service through the waste water tax.

Six different types of instruments are observed in the *Waste* sector, where Denmark is the sole country applying all six types. In 2016, the Danish refund rate for both tyres and end-of-life vehicles increased from their previous levels. In Sweden a tax on harmful flame retardants in electronic products was introduced in 2017. During the period, a tax on waste put in landfills was abolished in Norway. No subsidy schemes were observed in the *Waste* sector.

Besides targeting transportation fuels, all the Nordic countries also levy annual taxes on vehicles, often based on fuel efficiency and CO<sub>2</sub> emissions. In Finland, the annual vehicle tax has increased significantly during the period, while the registration tax remained unchanged or reduced slightly. In Norway the highest annual tax was reduced by 12%, as a compensation for increased tax on transportation fuels. All countries but Sweden also have some form of registration or sales tax on vehicles. Both Norway and Sweden introduced a tax on aviation or aviation related noise. During the period, a tax on boat engines was abolished in Norway.

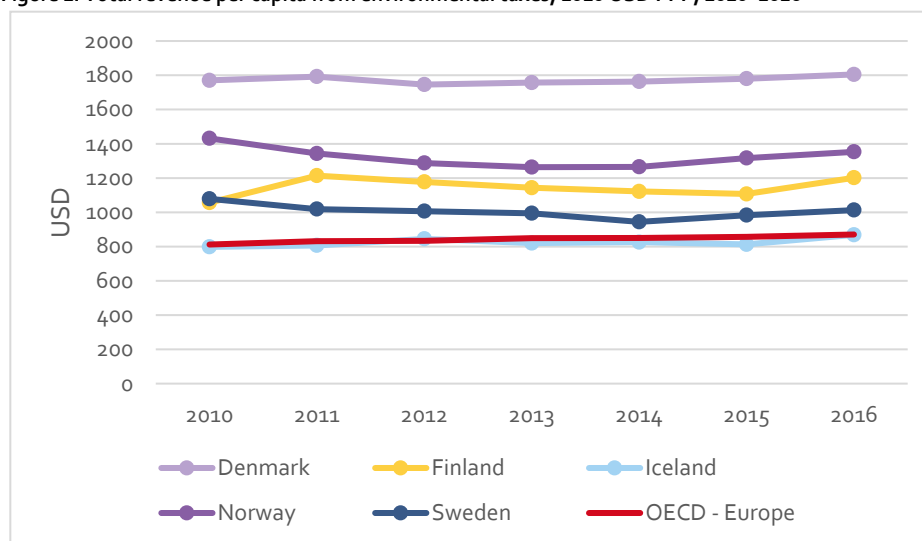
Seven different types of economic instruments are observed in the *Agriculture and natural resources* sector. Denmark is the only country using all instruments. Most instruments in the agricultural sector remained mainly unchanged. A relevant change

to mention is the national implementation of the European Common Agricultural Policy (CAP)<sup>6</sup> for the period 2014 to 2020. The new CAP includes: “greening” of farm payments, more equality in the distribution of support and better targeted income support (farmers most in need).

Denmark is the country with the largest number of different instruments, having instruments that fall under 26 different classifications out of a possible 32, while Iceland has the lowest number of instruments with 13. Finland, Norway and Sweden have 17, 22, and 23 instruments, respectively. Denmark is the only country having taxes on the following; CFCs and certain greenhouse gases, PVC, phthalates and chlorinated solvents, fertiliser use, growth promoters and phosphorous in animal feed. Grants and subsidy schemes are especially used in Sweden, where a relevant subsidy scheme is identified in all sectors, excluding the *Waste* sector.

The tax revenue per capita from environmentally related taxes has seen a minor increase in the period from 2010 to 2016, see Figure 1.<sup>7</sup> Denmark generated the highest revenue, while Iceland generated the lowest total revenue per capita. The share of environmental tax revenue out of total tax revenue has also been relatively stable for the Nordic countries. During the period, all countries except Denmark have had the same or a slightly smaller share of environmental tax revenue than the OECD Europe average, see Figure 2. *The use of economic instruments in Nordic environmental policy 1990–2017* (NCM, 2018) provides an overview of the development in the use of economic instruments during the period 1990–2017.

**Figure 1: Total revenue per capita from environmental taxes, 2010 USD PPP, 2010–2016**

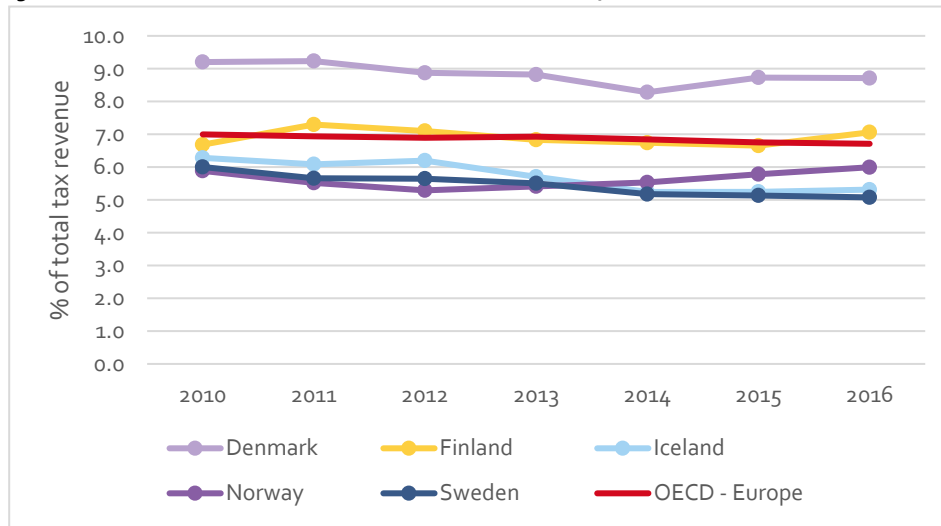


Source: OECD (2019).

<sup>6</sup> <https://www.consilium.europa.eu/da/policies/cap-reform/>

<sup>7</sup> Data for 2017 were not available at the time of completing this report.

Figure 2: Share of environmental tax revenue of total tax revenue, 2010–2016



Source: OECD (2019).

## 2. Denmark

Denmark is generally regarded as being one of the more ambitious countries when it comes to environmental policies and the use environmentally related instruments for all five of the covered sectors. In 2014 the parliament passed the so-called “Danish Climate Law”, with the purpose of establishing an overall strategic framework for Denmark’s climate policy in order to transition to a low-emission society by 2050 (Danish Energy Agency, 2014). As part of the law, three main actions are prescribed:

- The Danish Council on Climate Change, an independent and academically-based council, was established in 2015;
- An annual energy policy report must be submitted to the parliament by the Minister for energy, utilities and climate, and every five years the minister must propose national climate targets with a ten-year perspective;
- As part of the Government platform of 2015, a target to be independent of fossil fuels by 2050 was set.

In October 2018, the Government presented a proposal for a new air- and climate strategy with the aim of ensuring that Denmark fulfils the EU’s climate target for 2030. Among the proposed initiatives are a scrap premium of around DDK 2,000 on old wood-burning stoves.

For the period 2014–2017 there has been minor changes in the Danish tax system. Most of these changes have been tax increases within the energy sector. In 2016 an agreement to phase out the Public Service Obligations (PSO) rate was reached. The phase-out will happen gradually until 2022. A tax on environmentally harmful biomass has been debated during the period. With biomass being an important part of Denmark’s goal for CO<sub>2</sub> emissions, the current government has no plans to implement the tax.

As part of an energy agreement from 2012, it was decided to analyse the tax and subsidy structure in the energy sector. One purpose was to describe how a socioeconomically optimal tax and subsidy system could be designed to achieve Denmark’s climate commitments. The fourth part of the analysis was completed in 2017 and updated in 2018, concluding that in its current state taxes and subsidies on energy differ depending on technology and end use of energy. Making taxes and subsidies more uniform would create incentives for climate gas mitigation and produce socioeconomic gains in terms of lower costs of reaching Danish climate commitments.

Denmark is the only Nordic country that taxes water with an environmental purpose. Both water use and waste water management are taxed, and have been since the 1990s. No noteworthy changes have been enforced in the water sector during the period. The same can be said for the agriculture and natural resources sector.

The Danish government publishes a national waste strategy every four year, however none was published during the period 2014–2017, due to the authorities anticipating new EU waste directives. The next strategy is thus expected to be published in 2020. However, a new set of deposit refund rates, that will reduce overall fees by 10%, was agreed upon in 2017 and is expected to take effect in mid-2018.

Vehicles are subject to both a registration tax, a vehicle excise tax based on fuel efficiency, and in some cases weight, and they are subject to taxes on transportation fuels. A noteworthy change in the taxes aimed at transportation is that electric cars are no longer exempt from the registration tax from 2016 onwards. There is a gradual phase-in of the registration tax for electric cars. The phase-in has been subject to changes and with the most recent change, electric cars will pay the full registration tax by 2023.

Taxes, charges and fees regarding energy, environment and motor vehicles raised a total of around DKK 74 (EUR 9.95) billion in 2017. The different taxes on energy made up the largest share, with DKK 34 (EUR 4.57) billion and the single largest source of revenue was the motor vehicle registration tax. See Table 5 for the ten highest revenue-generating taxes, fees and charges.

**Table 5: Revenue from environmental taxes and fees in 2017, DKK (EUR)**

| Tax, fee or charge                                       | Million               |
|----------------------------------------------------------|-----------------------|
| Motor vehicle registration tax                           | 20,162 (2,710)        |
| Tax on electricity                                       | 11,978 (1,610)        |
| Motor vehicle weight tax and Green tax on passenger cars | 10,468 (1,407)        |
| Tax on certain mineral oil products                      | 9,840 (1,323)         |
| Tax on petrol                                            | 7,497 (1,008)         |
| Tax on CO <sub>2</sub>                                   | 3,678 (494)           |
| Tax on natural gas                                       | 3,064 (412)           |
| Tax on coal                                              | 2,007 (270)           |
| Tax on piped water                                       | 1,582 (213)           |
| Tax on motor vehicle compulsory insurance                | 1,519 (204)           |
| <i>Total</i>                                             | <i>71,795 (9,652)</i> |

Note: Selection based on the ten highest revenue-generating taxes and fees. The total revenue is larger than the sum of these.

Source: Danish Ministry of Taxation (2017g).

## 2.1 Energy and air pollution

Denmark continues to have strong policies for renewable energy and climate change, and is world leading in system integration of variable renewable energy (VRE) and in using energy-efficient technologies (IEA, 2017). There is broad political consensus on the country's long-term energy goal to achieve independence from fossil fuels by 2050. In June 2018, the 2020–2030 Energy Agreement were agreed, building on the earlier

agreements on the shape of the energy policy, with the latest being from 2012<sup>8</sup>. The Energy agreement have allocated funding that sets a course towards a renewable energy share of approximately 55% by 2030. Other key elements of the agreement include new funds for wind and solar energy, targeted energy savings and a strengthening of energy and climate research.

Economic tools in the form of taxes and other charges are an important part of Danish environmental policy. The taxes on energy are amongst the highest in the EU compared to energy consumption, and many fuels types are covered by both an energy tax and charges on other pollutants, such as CO<sub>2</sub>, NO<sub>x</sub> and SO<sub>2</sub> (Danish Ministry of Taxation, 2016a).

### 2.1.1 *Energy tax on fossil fuels*

An energy tax on fossil fuels was introduced in 1977 following the oil crises of the 1970s. It has since been expanded to include different types of fuel and has increased in recent years. Different energy tax rates apply for the use of fossil fuels depending on the energy content of the product. This is used as a way to provide incentives to decrease the energy consumption and to promote renewable energy and green technologies. At first, the energy tax was only levied on oil products: A key objective was to reduce the balance of payments deficit resulting from the import of oil products and reduce the dependency of oil products (in the beginning of 1970 about 90% of DK energy consumption was based on oil); another objective was to stimulate the use of natural gas and coal. However, the energy tax scheme was expanded to cover coal in 1982 and natural gas in 1996 (NCM, 2014).

From 2014 until 2017 the increase in energy taxes has been modest. As part of the 2009 tax reform it was decided to index the energy taxes from 2016 and onwards with the development in the net price index, so that the real value for the tax would remain more or less unchanged. Before 2016 the rate was indexed at 1.8% a year (Danish Ministry of Taxation, 2018a). However, between 2014 and 2015 the energy tax on both natural gas and pit coal fell with approximately 30%, due to e.g. a discontinuation of the *Forsyningssikkerhedsafgiften* (Folketingstidende, 2014). See Table 6 for tax rates on a selection of energy sources.

### **Exemptions**

The energy taxes on fossil fuel consumption differ across households and business sectors. This is in compliance with the EU Energy Taxation Directive (Danish Ministry of Taxation, 2016a), and a large number of exemptions have been adopted in order to ensure that the competitive power of Danish companies is not significantly weakened. Industries using fossil fuels for certain high energy intensive industrial processes can normally receive a tax rebate for mineral oil products not used for heating or as transportation fuel (NCM, 2014).

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<sup>8</sup> <https://efkm.dk/ministeriet/aftaler-og-politiske-udspil/energi aftalen/>, <https://en.efkm.dk/media/12307/energy-agreement-2018.pdf>

### 2.1.2 *Energy tax on waste*

In 2010 the tax on waste incineration was altered from taxing the amount to taxing the energy and CO<sub>2</sub> content. However, the tax on CO<sub>2</sub> content is exempted if the waste is biodegradable (Danish Ministry of Taxation, 2015b). The change was made in order to make waste incineration more cost effective. Under the previous tax structure for waste and fossil fuels, waste was often disposed of improperly and not optimally managed to harness its energy content.

In 1999, a heat tax on waste was introduced in response to increasing taxes on fossil fuels. This was done to avoid creating incentives to incinerate waste as opposed to recycling it. In 2017 the heat tax on waste was DKK 46.0 (EUR 6.18) per GJ, having increased slightly from the year before. See Table 6 for the tax based on the energy content.

### 2.1.3 *CO<sub>2</sub> tax*

With increased awareness of the connection between greenhouse gases emissions and climate change in the early 1990s, the Danish Parliament introduced a CO<sub>2</sub> tax on burning of fossil fuels in 1992. This was done to increase incentives to transition to less CO<sub>2</sub>-intensive fuels. When the CO<sub>2</sub> tax scheme was introduced in 1992 companies were fully exempt from paying the tax, so as not to increase taxes levied on the energy-intensive industries and thereby affect the competitiveness of Danish enterprise.

The current CO<sub>2</sub> tax scheme covers most of the same energy types covered by the energy tax scheme. CO<sub>2</sub> taxes have only seen modest increases over recent years, and follow the same indexing as described in the section above. As of 1 January 2014, the former CO<sub>2</sub> tax on electricity consumption was abolished due to CO<sub>2</sub> from electricity-production being covered by the EU ETS. For fiscal reasons, the tax on electricity was increased accordingly. The reasoning for this is that electricity production is quota-weighted (Danish Ministry of Taxation, 2016a). See Table 6 for different energy sources covered by the CO<sub>2</sub> tax.

**Table 6: Energy tax and CO<sub>2</sub> tax burden of different energy sources**

|                                                          |                                                  | 2014                         | 2015                         | 2016                         | 2017                         |
|----------------------------------------------------------|--------------------------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Motor fuel<br>DKK øre (eurocent)<br>per litre            | Energy tax<br>CO <sub>2</sub> tax                | 294.4 (39.58)<br>44.3 (5.96) | 299.7 (40.29)<br>45.1 (6.06) | 302.1 (40.61)<br>45.5 (6.12) | 303.9 (40.85)<br>45.7 (6.14) |
| Natural gas<br>DKK øre (eurocent)<br>per nm <sup>3</sup> | Energy tax<br>CO <sub>2</sub> tax                | 284.5 (38.25)<br>37.7 (5.07) | 215.8 (29.01)<br>38.4 (5.16) | 217.5 (29.24)<br>38.7 (5.20) | 218.8 (29.41)<br>38.9 (5.23) |
| Pit coal<br>DKK (EUR) per GJ                             | Energy tax<br>CO <sub>2</sub> tax<br>(per tonne) | 71.8 (9.65)<br>444.1 (59.70) | 54.5 (7.33)<br>452.1 (60.78) | 54.9 (7.38)<br>455.7 (61.26) | 55.3 (7.43)<br>458.4 (61.62) |
| Waste<br>DKK (EUR) per GJ                                | Energy tax<br>CO <sub>2</sub> tax<br>(per tonne) | 31.8 (4.27)<br>166.9 (22.44) | 31.8 (4.27)<br>170.0 (22.85) | 31.8 (4.27)<br>171.4 (23.04) | 31.8 (4.27)<br>172.4 (23.18) |
| Electricity<br>DKK øre (eurocent) per<br>kWh             | Energy tax<br>CO <sub>2</sub> tax                | 83.3 (11.20)<br>-            | 87.8 (11.80)<br>-            | 88.5 (11.90)<br>-            | 91.0 (12.23)<br>-            |

Note: Energy tax on coal sources is based on the energy content/weight unit and charged as DKK per GJ. For companies which do not measure the energy content of the fuel, the tax is levied on the weight. Tax on CO<sub>2</sub> measured as DKK (EUR) per tonne CO<sub>2</sub>. The energy tax on electricity is the tax on "other use of electricity".

Source: Danish Ministry of Taxation (2011, 2015b, 2017f).

### Exemptions

The first CO<sub>2</sub> taxation scheme was created primarily to ensure fulfilment of the Danish CO<sub>2</sub> reduction targets under the Kyoto Protocol. Secondly, the tax scheme was designed to ensure that the competitive power of Danish enterprise in energy-intensive industries was not significantly weakened – companies were fully exempted from paying the tax when it was first introduced in 1992. It was later revised such that energy consumption in light processes was given a smaller tax rebate, while consumption in heavy industrial processes was given the largest tax rebates. Renewable energy is assumed carbon neutral and is exempt from taxation. For a more complete overview of exemptions see (Danish Ministry of Taxation, 2016a).

With the introduction of the EU emissions trading system (EU ETS) in 2004, the sectors covered by it were exempted from paying CO<sub>2</sub> tax. Denmark was one of the first countries to introduce tradable carbon emission allowances, and the EU ETS replaced an existing system covering the period 2000–2003.

Phase I of the EU ETS covered the period 2005–2007 and Phase II the period 2008–2012. For more details on the two first phases, see "The use of economic instruments in Nordic environmental policy 2010–2013". Phase III started in 2013 and will run until 2020. In Denmark, the EU ETS covers approximately 375 production units in electricity and heat production and energy intensive industrial units, accounting for about half of Danish CO<sub>2</sub> emissions. As of 2013, most of the CO<sub>2</sub> emission allowances will be auctioned. Across the EU, 57% of allowances to industry and nearly 100% of allowance to electricity generation will be auctioned. During Phase III Denmark will receive 75 million allowances for free allocation and is expected to auction some 97

million allowances. Almost 9 million were allocated in 2017. The allocation of free allowances in the manufacturing industry depends on whether units are considered to be exposed to carbon leakage. The proportion for non-exposed units will be reduced from 80% in 2013 to 30% in 2020 (Danish Ministry of Taxation, 2016a). Auctions are held by the individual member countries using a common EU platform.

Phase IV starting in 2021 and running until 2030 was adopted on 27 February 2018.

#### 2.1.4 *Taxes on transportation fuels*

Taxes on transportation fuel were first introduced in 1917 (NCM, 2014), and were mostly imposed for fiscal reasons up until the late 1980s.

They were also seen as an instrument to limit oil imports. Excise taxes on transportation fuels have also been seen as a deliberate means to regulate the environmentally harmful effects of fuel consumption, which are significantly higher than those of fuels used for heating.

The differences between petrol and diesel owes to the fact that diesel is significantly more sensitive to trade across borders due to cross-border traffic of heavy vehicles. There is no differentiation for transportation fuels being used by the industry or households. Tax rates on transportation fuels for the period 2014–2017 are illustrated in Table 7.

**Table 7: Excise taxes on transportation fuels, DKK øre (eurocent) per litre**

|                               | Petrol        |                   | Diesel        |                   |
|-------------------------------|---------------|-------------------|---------------|-------------------|
|                               | 2017          | Change since 2014 | 2017          | Change since 2014 |
| Basic excise charge, leaded   | 498.6 (67.03) | 2%                | 302.1 (40.61) | 3%                |
| Basic excise charge, unleaded | 423.2 (56.89) | 2%                | -             | -                 |
| CO <sub>2</sub> tax on petrol | 41.4 (5.57)   | 3%                | 45.7 (6.14)   | 3%                |

Note: To follow EU rules, the basic excise charge is for 15 degrees Celsius.

Source: Danish Ministry of Taxation (2011, 2014b).

#### 2.1.5 *Tax on electricity consumption*

In response to the oil crises in the 1970s, a tax on electricity consumption was introduced in 1977 for fiscal reasons, and to provide minor incentives to reduced electricity consumption. Taxes on electricity are levied on all electricity consumption in Denmark regardless of origin, but with differentiated tax-rates for user category or purpose.

The excise tax on electricity consumption was revised in 1999 due to the electricity market opening to international trade in the late 1990s. The so-called Public Service Obligations (PSO) (DKK/kWh) rate was introduced, to be paid over the electricity bill. The purpose of the PSO was to subsidise new green energy technologies that could not yet compete on market terms. In 2016, an agreement was reached to gradually phase out the PSO from 2017–2022, moving it to the state budget. For a more detailed description, see the agreement on the removal of PSO (Danish Ministry of Energy, 2016).

The Energy Agreement from June 2018 includes a reduction of taxes on electricity (electrical heating tax and electricity tax) and a restructuring of the regulations for surplus heat to encourage a shift to more green solutions such as heat pumps and a better utilisation of surplus heat<sup>9</sup>.

#### 2.1.6 Sulphur tax on fossil fuels

Fossil fuels containing more than 0.05% are subjected to the sulphur tax, which applies to the sulphur content of fuels or to the emissions of sulphur dioxide (Danish Ministry of Taxation, 2015c). If the emissions are not measured, the tax is then based on the S-content of the fuel. The tax was introduced in 1996 with the intent of incentivising a transition to energy products containing less sulphur. In 2017 the level of the sulphur tax was DKK 23.3 (EUR 3.13) per kg of sulphur content, while the tax rate applied to emissions of sulphur dioxide was DKK 11.7 (EUR 1.57) per kg (Danish Ministry of Taxation, 2017k). A tax-free allowance is in place for companies with a fuel use of at least 0.1 PJ per annum, see (Danish Ministry of Taxation, 2016a).

#### 2.1.7 Tax on nitrous oxides (NO<sub>x</sub>)

By requirement of the NEC directive (last revision in 2016), Denmark is obliged to reduce its emissions of NO<sub>x</sub> in 2020, by 56% in reference to emissions in the base year 2005 (European Commission, 2016). The NO<sub>x</sub> tax has been (and is) an important instrument in relation to the fulfilment of the Danish obligation. The tax on NO<sub>x</sub> has been in place since 2010 and applies to the NO<sub>x</sub> content in energy products or emissions of NO<sub>x</sub> in the same way as for the sulphur tax. The NO<sub>x</sub>-tax is primarily targeted at the energy-and industry sectors. Since its inception, the NO<sub>x</sub> tax rate has varied substantially, as seen in Table 8.

**Table 8: Development of tax on nitrous oxides (NO<sub>x</sub>), DKK (EUR) per kg**

|          | 2010        | 2011        | 2012                                | 2013            | 2014            | 2015           | 2016                               | 2017          |
|----------|-------------|-------------|-------------------------------------|-----------------|-----------------|----------------|------------------------------------|---------------|
| Tax rate | 5<br>(0.67) | 5<br>(0.67) | 5.20<br>(0.70)<br>/ 25.0*<br>(3.36) | 25.50<br>(3.43) | 25.90<br>(3.48) | 26.4<br>(3.55) | 26.6<br>(3.58)<br>/ 5.0*<br>(0.67) | 5.1<br>(0.69) |

Note: \* denotes that the tax rate changed in July during the year considered.

Source: Danish Ministry of Taxation (2018b).

<sup>9</sup> <https://en.efkm.dk/media/12307/energy-agreement-2018.pdf>

Companies within these sectors are required to monitor and report their emissions of NO<sub>x</sub> if they have a yearly input effect above 10 MW. Their NO<sub>x</sub> tax is then calculated based on the tax rates in Table 8 multiplied by their actual registered emissions of NO<sub>x</sub>. Companies below this limit, are not required to monitor their actual emissions, and therefore pay according to standard taxation rates that vary according the type of fuels utilized (Danish Ministry of Taxation, 2017h).

#### 2.1.8 *Tax on chlorofluorocarbons (CFC)*

The tax on CFCs<sup>10</sup> (which causes ozone depletion and a climate gases) also covers certain other greenhouse gases (the so call industrial greenhouse gases). When first introduced in 1989 the tax was only levied on CFCs with the intent to reduce consumption of CFCs. In 2001 HFCs, PFCs and SF<sub>6</sub><sup>11</sup> was added to the list covered by the tax. As part of the 2009 tax reform, an increase was made that came into effect in 2011.

The tax on CFCs is set at DKK 30 (EUR 4.03) per kg of the substances net weight. The tax on HFCs, PFCs and SF<sub>6</sub> is set between DKK 15 (EUR 2.02) and DKK 600 (EUR 80.66) per kg, depending on the specific substance's CO<sub>2</sub> equivalent. A tax is added on imported goods which are not taxable themselves but contain one or more of the CFCs taxable substances (Danish Ministry of Taxation, 2017e).

#### 2.1.9 *Subsidies to renewable energy sources*

In Denmark, since 1992, different subsidy schemes have been in place to promote renewable energy use (NCM, 2014) (Danish Ministry of Taxation, 2016a). The utilization of renewable energy sources is promoted today in Denmark through different channels: 1) Subsidy schemes; 2) Differentiated taxes; 3) Quota schemes; and, 4) Other instruments (e.g. Prohibition, injunctions, information campaigns).

The subsidy schemes include:

- Subsidies for electricity generating power plants, decentralized CHP plants, and waste-fired CHP plants
- Subsidies for biogas for uses other than power generation
- Subsidies for Renewable Energy for process
- Subsidy scheme for electricity intensive companies
- Subsidies for environmental technology
- Utility companies' savings efforts.

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<sup>10</sup> CFCs are phased out as they are banned under the Montreal protocol. The tax today also covers other industrial greenhouse gasses.

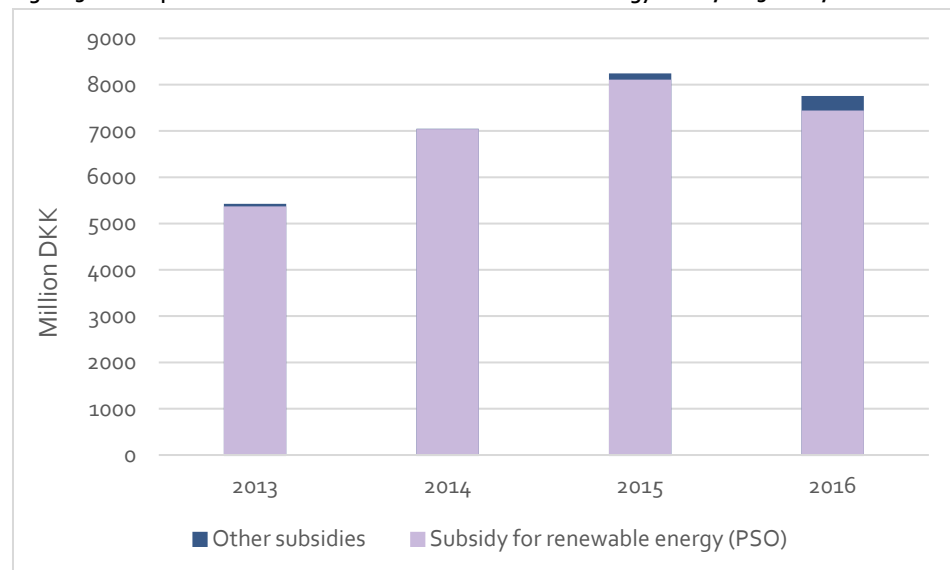
<sup>11</sup> The gasses are among other things used as heat-transfer agent in air-conditioning, heat pumps and cooling systems. All three groups of compounds are very potent climate gasses with a warming potential of up to 23,500 times CO<sub>2</sub>.

The production of electricity from renewable energy sources such as windmills, solar cells, biogas, biomass, and wave energy is subsidised in order to promote the use of renewable energy sources that lower CO<sub>2</sub> emissions from energy and heat production. Many of these subsidies were financed by the Danish PSO charge, which was mentioned in sub-section 2.1.5. The development in subsidies allocated to energy in the period 2013–2016 can be seen in Figure 3 below. From this it is visible that a drop in the PSO-financed subsidy in 2016 caused the overall level of subsidies to energy to drop between 2015 and 2016.

In order to achieve renewable energy goals, the subsidy schemes are organised such that renewable energy sources receive subsidies when they cannot compete on market terms. However, as various types of renewable energy sources are becoming cheaper and more competitive, the need for support decreases over time. The subsidy schemes are therefor designed to be adapted to the conditions and development of each technology. This means that subsidy levels will decline over time, and it will gradually be the market that governs the development of a particular technology. For a more detailed description of the subsidy schemes and subsidy types (e.g. feed-in-premium) and the four different channels see (Danish Ministry of Taxation, 2016a).

From January 2018, the administration of subsidies schemes for renewable energy was moved from Energinet to the Danish Energy Agency.

**Figure 3: Development in environmental subsidies allocated to energy sector, 2013–2016, million DKK**



Source: Statistics Denmark (2018).

## 2.2 Water

Economic instruments applied to the water sector target both the consumption of drinking water and the generation of waste water.

### 2.2.1 Supply tax

The supply of drinking water is taxed at the water company, which is typically owned by a municipality. The taxation has been in full effect since 1998 (NCM, 2014). In 2017, the rate was DKK 5.86 (EUR 0.79) per m<sup>3</sup>, with an additional charge of DKK 0.39 (EUR 0.05) per m<sup>3</sup>, designed as a general contribution towards the protection of groundwater.<sup>12</sup> VAT liable companies can obtain a refund of the paid tax (Danish Ministry of Taxation, 2018c).

### 2.2.2 Waste water tax

The charge on waste water has, like the taxation of the supply of drinking water, been in place since 1998 (NCM, 2014) and is related to the material content in waste water, as seen in Figure 9 below. The charge was increased by 1 October 2014 to the current level (Danish Ministry of Taxation, 2016d).

Figure 9: Taxation of waste water by material content, DKK (EUR) per kg

| Material content | 2014–2017   |
|------------------|-------------|
| Nitrogen         | 30 (4.03)   |
| Phosphorous      | 165 (22.18) |
| Organic material | 16.5 (2.22) |

Source: Danish Ministry of Taxation (2016d).

If the material content in the waste water is not measured, the tax is based on the amount of m<sup>3</sup> water and the water purification technology. In 2017 the tax ranged from DKK 0.75 (EUR 0.10) per m<sup>3</sup> to DKK 5.70 (EUR 0.77) per m<sup>3</sup> depending on the technology.

### Exemptions

Output from separate systems are not taxable. Industry with waste water-heavy processes or productions, handling fish, crustaceans, molluscs, the manufacture of cellulose or produces cane and beet sugar, can be reimbursed for the part of the tax which exceeds DKK 30,000 (EUR 4,033) annually.

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<sup>12</sup> The charge to protect groundwater was introduced in 2012 and is designed to be phased out by 2020.

## 2.3 Waste

The Danish government issues goals for waste generation and management in its national strategies that are published every 4th year. The last strategy was issued in December 2013 (Danish Government, 2013), and the next strategy is expected to be published primo 2020, thus leaving 7 years between each strategy. This lag between strategies is mainly due to the Danish authorities awaiting six new EU waste directives, which are expected to be negotiated and passed by 2018 (Danish Environmental Protection Agency, 2018b).

The economic instruments targeting generation and management of waste are separated into three categories:

- Taxes levied on treatment of generated waste (Waste treatment taxes)
- Taxes levied on content of certain materials in products on the market (Product taxes)
- Taxes designed to change the waste generating behaviour of consumers (Waste behaviour taxes)

### 2.3.1 Waste treatment taxes

All waste in Denmark is either sent for recycling, incinerated or put in landfills. In 2015, around 46% of the waste generated by households was recycled, while 52% was incinerated and 1% was placed in landfills (Statistics Denmark, 2015).

A tax is levied on the amount of waste put into landfills. The owner of the landfill is charged DKK 475 (EUR 63.86) per tonne waste, and the owner passes this cost on by charging a fee for accepting waste into their landfill. This rate has been constant in the period 2014–2017 (Danish Ministry of Taxation, 2017a). Hazardous waste, intended both for incineration and landfill, has been taxed since 2010 (NCM, 2014), at a rate of DKK 160 (EUR 21.51) per tonne in 2014, a rate which increased to the level of that of non-hazardous waste in 2015, effectively taxing hazardous waste at a rate of DKK 475 (EUR 63.86) (Danish Ministry of Taxation, 2017a).

As mentioned in the previous report, a tax was levied on the incineration of waste (NCM, 2014) until 2009, when it was replaced by a tax based on energy content in the waste (See section 2.1 for this exact tax rate).

### 2.3.2 Product taxes

#### Batteries

Batteries containing nickel-cadmium have been taxed at a constant rate since 1996, where a tax of DKK 6 (EUR 0.81) per battery and DKK 36 (EUR 4.84) per pack of round joined cells was introduced (Danish Ministry of Taxation, 2017b).

## Packaging

Packaging taxes are levied on producers and import of certain goods such as beverage containers, plastic and paper bags, and disposable cutlery. The main intention behind packaging taxes is to encourage producers of a good containing packing to consider both the amount of packing and the materials used to produce the packaging.

For beverage containers such as bottles for spirits, beer and soft drinks, the level of per unit tax has remained constant in the period 2014–2017. The levels can be seen in Table 10 and Table 11.

**Table 10: Beverage containers containing spirits, wine or fruit wine, DKK (EUR) per unit (containers which are not included in the Danish deposit system)**

| Size       | Cardboard/laminate | Other materials (e.g. glass, plastic) |
|------------|--------------------|---------------------------------------|
| < 10 cl    | 0.08 (0.01)        | 0.13 (0.02)                           |
| 10–40 cl   | 0.15 (0.02)        | 0.25 (0.03)                           |
| 40–60 cl   | 0.25 (0.03)        | 0.40 (0.05)                           |
| 60–110 cl  | 0.50 (0.07)        | 0.80 (0.11)                           |
| 110–160 cl | 0.75 (0.10)        | 1.20 (0.16)                           |
| > 160 cl   | 1.00 (0.13)        | 1.60 (0.22)                           |

Source: Danish Ministry of Taxation (2016b).

**Table 11: Beverage containers containing beer, soft drinks, cider, 2014–2017, DKK (EUR) per unit (containers included in the Danish refund system)**

| Size       | All materials (cardboard, glass, plastic and metal) |
|------------|-----------------------------------------------------|
| < 10 cl    | 0.05 (0.01)                                         |
| 10–40 cl   | 0.10 (0.01)                                         |
| 40–60 cl   | 0.16 (0.02)                                         |
| 60–110 cl  | 0.32 (0.04)                                         |
| 110–160 cl | 0.48 (0.06)                                         |
| > 160 cl   | 0.64 (0.09)                                         |

Source: Danish Ministry of Taxation (2016b).

As part of the agreement on business and entrepreneurial initiatives of November 2017, it was decided to abolish the packing tax on beverage containers in the Danish deposit refund system by July 2019 (The Danish Government, 2017).

The weight-based packaging tax was discontinued in January 2014 (Danish Ministry of Taxation, 2014a), on grounds that it was too burdensome for companies to administer (Danish Ministry of Taxation, 2013).

For paper and plastic paper bags, as well as disposable dishes and cutlery, a weight-based fee remains with the levels indicated by Table 12.

**Table 12: Taxes for plastic bags, disposable dishes and cutlery 2014–2017, DKK (EUR) per kg**

| Material                      | Tax rate     |
|-------------------------------|--------------|
| Paper bags                    | 10.00 (1.34) |
| Plastic bags                  | 22.00 (2.96) |
| Disposable dishes and cutlery | 19.20 (2.58) |
| PVC for food products         | 20.35 (2.74) |

Source: Danish Ministry of Taxation (2016b).

### PVC and phthalates

Since 2000, products containing PVC and phthalates have been subjected to taxation. After 2004 only soft PVC products have been subject to the tax (Danish Ministry of Taxation, 2017c). The product tax is intended to lower the use of phthalates as plasticisers, and reduce the amount of PVC that is either incinerated or placed in landfills (Danish Ministry of Taxation, 2017k). Thus, products that utilise other plasticisers than phthalates faced a lower rate of taxation. The tax rate varies according to the type of good, ranging from DKK 0.25–3.60 (EUR 0.03–0.48) per kg for goods containing phthalates and between DKK 0.10–1.08 (EUR 0.01–1.15) per kg for goods containing other plasticisers (Danish Ministry of Taxation, 2017c). In addition to the tax on PVC and phthalates a tax on PVC folio used for food wrapping is in place. The tax is DKK 20.35 (EUR 2.7).

The two PVC taxes are not considered by government to have a considerable behavioural effect anymore. As part of the agreement on business and entrepreneurial initiatives of November 2017 it was decided to abolish the two taxes by January 2019 (The Danish Government, 2017).

#### 2.3.3 Solvent tax

Certain chlorinated solvents have been taxed since 1996. The solvent tax is set at DKK 2 (EUR 0.27) per kg solvent and has not changed since its introduction in 1996. The tax is also paid when the solvent is included in an otherwise tax free product with a concentration exceeding 1% by weight (Retsinformation, 2017).

#### 2.3.4 Waste behaviour taxes

##### Beverage containers

The main intention behind the Danish deposit refund scheme for beverage bottles is to promote the recycling of beverage containers. The scheme is managed by Dansk Retursystem, which is a private non-profit company founded in 2000 (NCM, 2014). Producers and importers of beverage containers that fall under the deposit refund scheme are charged a fee depending on the type of beverage container they sell on the market. The current deposit refund rates can be found in Table 13 below.

Table 13: Deposit-refund rates for refillable and non-refillable beverage containers, DKK (EUR) per unit

|                                      | Size of container | Deposit    |
|--------------------------------------|-------------------|------------|
| Glass - refillable                   | Under 0,5 l       | 1.0 (0.13) |
|                                      | Over 0,5 l        | 3.0 (0.40) |
| Plastic - refillable                 | Under 0,5 l       | 1.5 (0.20) |
|                                      | Over 0,5 l        | 3.0 (0.40) |
| Plastic bottles (single use)         | Under 1 l         | 1.5 (0.20) |
| Other bottles and cans (single use)  | Under 1 l         | 1.0 (0.13) |
| Other bottles and cans (singles use) | Over 1 l          | 3.0 (0.40) |

Source: Danish Ministry of Environment and Food (2017b) and Dansk Retursystem (2015).

Each year the Danish Environmental Protection Agency (Danish EPA) controls the financial statements of Dansk Retursystem. In 2017 Dansk Retursystem and the Danish EPA agreed on a new set of deposit refund rates that will reduce the overall fees by 10%. Implementation of the new rates is expected to start in June 2018 (Dansk Retursystem, 2017).

#### **Waste electric and electronic equipment (WEEE)**

The prevention and reduction of waste generated by electric and electronic equipment was introduced as a policy area at the EU level in 1998, with the first directive issued in 2002 (Danish Producer Responsibility, 2014). As a response, a WEEE system was established in Denmark in 2006, managed by the DPA – Danish Producer Responsibility. By Danish law, producers or importers of electric and electronic goods are required to register the quantity of new electric goods sold, as well as the quantities that are taken back and treated in recycling facilities. The data is collected in the DPA-system, administered by the Danish EPA (Danish Ministry of Environment and Food, 2014; Danish Producer Responsibility, 2014).

#### **End-of-life vehicles and tyres**

The idea behind the end-of-life refund schemes for used car tyres, is to promote the recycling of the raw materials originally used to produce the tyres. The refund scheme is managed by *Dækbranchens Miljøfond*. The refund rate, which depends on the type of tyre, increased in 2016 from the previous level, to the current interval of DKK 1.55–2.10 (EUR 0.21–0.28) per kg tyre collected (Danish Ministry of Environment and Food, 2016b).

The end-of-life refund scheme for vehicles is managed by *Miljøordningen for biler* and applies to vehicles de-registered after June 2000 that are returned to an authorised car breaker. The refund rate was initially lowered in 2014 (compared to the level in the previous report (NCM, 2014), but then increased in 2016 and presently constitutes DKK 2,200 (EUR 296) (Danish Ministry of Environment and Food, 2016a).

## **2.4 Transport**

Environmental externalities originating from the transportation sector are targeted both through the energy and CO<sub>2</sub> taxes mentioned in section 2.1, but also through taxes related directly to the purchase of a car and car ownership.

### **2.4.1 Registration tax**

The registration tax is only paid once, at the first time a car is registered in the national vehicle registration offices. As of October 2017, the registration tax is 85% of the value of a passenger car up to a value of DKK 185,100 (EUR 24,884) and 150% of any remaining amount from DKK 185,100 (EUR 24,884) to the actual purchase price of the

passenger car (Danish Ministry of Taxation, 2017j).<sup>13</sup> The vehicle registration tax has gradually been lowered over the period. In 2015, the high tax rate applied to the value above DKK 81,700 (EUR 10,983) was lowered from 180% to 150%. Another significant change took place in 2017, where the base tax rate was lowered from 105% to 85% and the progression point where the tax rate change from the base rate to the high rate was increased from DKK 106,600 (EUR 14,331) to DKK 185,100 (EUR 24,884).

Since 2007, the above registration tax includes an adjustment component determined by the fuel efficiency of the car (NCM, 2014). The adjustment principles are indicated in Table 14. In November 2017 the extra charge levied on fuel inefficient cars increased from DKK 1,000 (EUR 134) to DKK 6,000 (EUR 807) (for both petrol and diesel cars), along with the efficiency limit, which was increased from 16 km/l to 20 km/l for petrol cars, and from 18 km/l to 22 km/l for diesel cars (Danish Ministry of Taxation, 2017i).

**Table 14: Registration tax deduction and extra charge for fuel (in) efficiency by 14 November 2017**

| Unit        | Reduction for fuel efficiency    | Increase for fuel inefficiency   |
|-------------|----------------------------------|----------------------------------|
| Petrol cars | 4,000 DKK per km/l above 20 km/l | 6,000 DKK per km/l under 20 km/l |
| Diesel cars | 4,000 DKK per km/l above 22 km/l | 6,000 DKK per km/l under 22 km/l |

Note: The registration tax deduction or extra charge is also levied on electric cars and plug-in hybrids.

Source: Danish Ministry of Taxation (2017j).

Up until 2016, electric cars had been exempted from the registration tax, but since 2016 owners of electric cars have been subject to registration taxes according to the levels in Table 15. There has been much discussion on the registration tax for electric cars and the latest change was made in 2018<sup>14</sup>, where the phase-in of the registration tax was delayed one year. Also, the deduction in the actual amount paid in registration tax was increased. It means that electric cars below a price of 400,000 DKK do not actually pay any registration tax as the deduction offsets the tax value. Hydrogen vehicles are exempt from paying registration tax.

**Table 15: Registration tax for electric cars in the period 2016–2023, DKK (EUR)**

| Period    | Tax rate (levied on value of the car) | Deduction in tax payment |
|-----------|---------------------------------------|--------------------------|
| 2016–2018 | 20%                                   | 10,000 (1,344)           |
| 2019      | 20%                                   | 40,000 (5,376)           |
| 2020      | 40%                                   | 77,500 (10,417)          |
| 2021      | 65%                                   | -                        |
| 2022      | 90%                                   | -                        |
| 2023      | 100%                                  | -                        |

Source: Danish Ministry of Taxation (2017j) and Webpage of SKAT<sup>15</sup> (downloaded January 2019).

<sup>13</sup> The registration tax is also levied on motorcycles, vans and busses, but for the two latter some exemptions exist.

<sup>14</sup> Though the report covers only the changes in the period 2014 to 2017, the latest adjustments in the tax on electric vehicles have been included. The changes indicate that its area is subject to much discussion. The phase-in of the registration tax works against increased sales of electric vehicles so the latest delay in this phase-in is important.

<sup>15</sup> <https://skat.dk/SKAT.aspx?oid=2234529>

### 2.4.2 Vehicle tax

In addition to the registration tax, passenger car owners are subject to a biannual ownership fee, which is differentiated according to the fuel efficiency, and a weight-based fee.<sup>16</sup>

The upper and lower limit of the biannual ownership fee in 2017 is visible from Figure 16, with varying levels between these two limits depending on the fuel efficiency of the specific car. In addition to the tax, diesel cars are subjected to an additional fee of DKK 1,000 (EUR 134) if they do not have an approved filtration system for fine particular matter (Danish Ministry of Taxation, 2017d).

Figure 16: Vehicle excise tax - upper and lower limit of the fee for passenger cars, 2017, DKK (EUR)

| Unit        | Limit - high efficiency above (km/l) | Fee      | Limit - high efficiency above (km/l) | Fee            |
|-------------|--------------------------------------|----------|--------------------------------------|----------------|
| Petrol cars | 20.0                                 | 310 (42) | 4.5                                  | 10,830 (1,456) |
| Diesel cars | 32.1                                 | 130 (17) | 5.1                                  | 16,100 (2,164) |

Source: Danish Ministry of Taxation (2017d).

The excise tax for passenger cars registered before 1 July 1997 and delivery vans registered before 18 March 2009 is based on weight.

The weight-based fee is differentiated according to the weight of the car, the fuel-unit (petrol or diesel) and category (passenger car, delivery van, lorry, bus, taxi. (Danish Ministry of Taxation, 2017l).

### 2.4.3 Road charges for trucks

Denmark has since 1994 participated in a partnership with other EU member states (from 2017: Luxembourg, Netherlands and Sweden), where trucks with a total weight of 12 tons and above pay an identical road charge (Danish Ministry of Taxation, 2018d). The road charge for trucks registered in Denmark varies between DKK 5,591 (EUR 750) and DKK 11,555 (EUR 1,550) per year depending on exhaust class and the number of axles. The tariff structure will be differentiated further from non-Euro to Euro VI standard (Danish Ministry of Taxation, 2018e).

Table 17: Annual road charges, 2018, DKK (EUR)

| Number of axles | Exhaust class     | Road charge    |
|-----------------|-------------------|----------------|
| Max. three      | Non Euro          | 7,156 (960)    |
| Max. three      | Euro 1            | 6,336 (850)    |
| Max. three      | Euro 2 or cleaner | 5,591 (750)    |
| Four or more    | Non Euro          | 11,555 (1,550) |
| Four or more    | Euro 1            | 10,437 (1,400) |
| Four or more    | Euro 2 or cleaner | 9,318 (1,250)  |

Source: (Danish Ministry of Taxation, 2018e).

<sup>16</sup> The ownership fee is levied on both passenger cars and delivery vans, whereas the weight-based fee is levied on both passenger cars, delivery vans, taxis, buses and trucks (Danish Ministry of Taxation, 2017d).

## 2.5 Agriculture and natural resources

### 2.5.1 Fertilizer and phosphorus

Fertilizers are used in agricultural production to increase crop yields, but they also generate environmental impacts, such as contamination of the aquatic environment (nitrogen) and air pollution (ammonia mainly from storage and application of manure). The use of fertilizer has thus been regulated in Denmark for around 30 years (Danish Economic Councils, 2018).

In connection with the second aquatic plan, a tax on nitrogen content in fertilizers was introduced in 1998,<sup>17</sup> at a constant rate of DKK 5 (EUR 0.67) per kg nitrogen (Retsinformation, 2018). In practice, the tax only applies for use outside of the agriculture industry. For agricultural production, the use of fertilizer is regulated by a quota system, where individual, non-tradeable quotas are allocated to the individual farmer based on several criteria such as the type of crop and yield, among others (Danish Ministry of Environment and Food, 2017a). The basis for quota allocations is that farmers are required to provide a record of their fertilizer use, and to submit these records to the Danish Agricultural Agency. Only farmers with a turnover of more than DKK 50,000 (EUR 6,721) per year from agricultural production are required to generate this documentation. Smaller farms (with a turnover between DKK 20,000–50,000 (EUR 2,688–6,722) can voluntarily register their fertilizer use (Danish Ministry of Environment and Food, 2017b).<sup>18</sup> Farmers face an economic incentive to report their fertilizer use, as they are exempt from the nitrogen tax. If farmers exceed their allocated quotas, they are subjected to a fine that is proportional to the violation of the quota restriction (Danish Ministry of Environment and Food, 2017b).

The content of mineral phosphorus in animal feed, except in pet food, has been subjected to taxation since 2005, with the taxation rate being DKK 4 (EUR 0.54) per kg in 2017 (Danish Ministry of Taxation, 2016c), thus not changing since 2013 and the previous quadrennial report (NCM, 2014).

### Pesticides and biocides

The use of pesticides (containing glyphosate and other active chemicals), has been subjected to taxation since 1996. The tax policy underwent a reform in 2012, effective since 2013 (Danish Ministry of Taxation, 2012). In the reform, the taxation rate is differentiated according to the inherent properties of the active substances in each pesticide. The tax for each pesticide product is calculated on the basis of risk factors for health and the environment, as well as the amount of active ingredient in the specific pesticide. The total tax rate is calculated according to four sub-components, and the tax rates ascribed to each of these four sub-components has not changed since 2012 (Danish Ministry of Taxation, 2015a). A main motivation behind the 2012 reform was to

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<sup>17</sup> Only fertilizer products with a nitrogen content above 2% are subjected to the tax.

<sup>18</sup> In addition to the turnover requirements, there is also specified additional requirements pertaining to the number of livestock units and their production of nitrogen.

reduce the use of pesticides that had high impact on both environment and health by making such products more heavily taxed. A recent study shows that the environmental impact from pesticides has been reduced after the implementation of the 2012 tax reform (Ørum et al. 2018).

For chemical and microbiological biocides, it is not possible to calculate environmental and health effects, so for this group the tax rate is *ad valorem*, differentiated according to the intended use of the product. In 2017 the effective tax rates for biocides varied between 3–40% *ad valorem* (Danish Ministry of Taxation, 2015a).

#### 2.5.2 *Growth promoters*

Since 1998, a tax on antibiotics and growth promoters used as additives in animal feed has been in place. The tax aims to reducing their use and thereby protect the welfare of animals in livestock production. The rate of the tax varies between DKK 0.83–1.00 (EUR 0.11–0.13) per gram depending on the additive, and has remained unchanged since its introduction in 1998 (Danish Ministry of Taxation, 2017m).

#### 2.5.3 *Raw materials*

Extraction of raw materials such as limestone, clay, rock and gravel has since 1990 been taxed at a constant rate of DKK 5 (EUR 0.67) per m<sup>3</sup> of extracted raw material (Danish Ministry of Taxation, 2017a). In addition to the extraction of raw materials on Danish soil, imported raw materials have been subjected to the tax as well since January 2006 (Danish Ministry of Taxation, 2017a; NCM, 2014).<sup>19</sup>

#### 2.5.4 *Tradable quotas for fish*

The fishery sector in Denmark is regulated by the EU's Common Fisheries Policy (CFP), which underwent a major update in 2013, having taking effect in January 2014 (European Commission, 2013). A key instrument in the CFP is tradeable quotas or total allowable catch (TACs), which sets a quantity limit on total allowed catch for each fish species. Every year each European country is given a certain allowance of TAC's, which is determined through negotiation between the European fishery ministers. In Denmark TACs have been used to regulate the fishery sector since 2003 (NCM, 2014). In Denmark, the quotas are differentiated according to species, and whether the species is demersal (living close to the seabed) or pelagic (living in open waters). Fishermen are allocated a yearly quantity of quotas that they can use themselves or trade amongst each other. Dansk Puljefiskeri is a closed marked, where fishermen that are members can trade or lease their allocated quotas directly to other fishermen (Dansk Puljefiskeri, 2018).

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<sup>19</sup> Companies that extract or import less than 200 m<sup>3</sup> of raw material per year, are exempt from the tax.

#### 2.5.5 *Subsidies in agriculture*

In line with the Danish implementation of the European Common Agricultural Policy (CAP), subsidies are available for farmers, companies and the population through the Danish Rural Development Program (Landdistriktsprogrammet 2014–2020 [LDP]). Following the first CAP and LDP period of 2007–2013, Denmark implemented a reformed LDP in 2014 which is valid until 2020 (The Danish Agricultural Agency, 2018).

The Danish LDP is divided in four main categories, with the aim of promoting agricultural competitiveness and green transition:

1. *Growth and competitiveness.* The rural program provides grants to invest in technologies that reduce the impact of agriculture on the environment, improve animal welfare, and increase productivity;
2. *Ecology.* The rural program supports the government's ecological goals with Ecology Denmark. This is done by supporting agriculture that transforms into ecology, and through support for the development of organic farming;
3. *Nature, environment and climate.* A large part of the Rural Development Program provides grants for land-use and natural areas in the open country, which has a great potential for pre-building and adapting nature and the environment e.g. establishing new forests, and caring for grassland areas and wetlands;
4. *Rural Development (LAG).* The Ministry of Business and Growth has given local action groups direct influence on prioritizing development projects in their immediate area with grants from the Rural Development Program.



### 3. Finland

Economic instruments have a long history in Finnish environmental policy. Since 2013, many instruments have been revised, for example by raising the applied tax rates to strengthen the environmental steering effect.

After the 2011 energy tax reform, taxes on energy have been based on energy content, carbon dioxide emissions and local emissions (particles) of fuels. Since 2013, the rates of energy related taxes have been increased a number of times.

Feed-in tariffs were introduced in 2011 to support the production of renewable energy. From 2016, the subsidy to wind power decreased to the same level applied to biogas and wood-fuelled plants. The capacity limit for the wind power subsidies was reached in November 2017, and a new technology-neutral subsidy scheme for renewable energy is going to be introduced in 2019. A new type of investment aid for renewable energy and new energy technologies was also introduced from 2016.

The economic instruments related to vehicles have also seen changes since 2013. In 2015 it was decided that the registration tax paid on new vehicles would be lowered for cars emitting less than 140 g CO<sub>2</sub> per km. Since 2013, the annual car tax has increased significantly for all cars, regardless of emissions. During 2015 a refund system for end-of-life vehicles was successfully piloted, and as a result another refund system is in place from the start of January to the end of August 2018.

One of the main policy tools for waste management and prevention, the waste tax, has also been increased a number of times since 2013.

With the reform of the EU Common Agricultural Policy, the subsidies to agriculture were revised in 2015. Support for sustainable forestry was also changed in 2015, aligning it with the new EU guidelines for state aid. In 2014, the voluntary forest conservation programme, the METSO programme, was extended to 2025.

A new economic instrument was adopted in 2017, with the introduction of transferable quota system for Baltic herring, sprat and salmon.

The revenue generated by the environmental taxes and fees in 2017 was close to EUR 7 billion. This has been around 7% of Finland's total tax revenue (Statistics Finland, 2017). Around half of the environmental taxes and fees are paid by households. Revenue generated by auctioning of emissions allowances in the EU ETS has grown since 2012, due to auctioning playing a key part in the third phase of the EU ETS in 2013–2020.

The majority of the environmental taxes are related to energy, either as taxes on electricity and fuels and taxes paid on carbon dioxide emissions. About one-third of environmental taxes are transport taxes levied from different kinds of vehicles. For 2017, the revenue from environmental taxes, fees and charges is presented in Table 18.

**Table 18: Revenue from environmental taxes, fees and charges, 2017**

| Tax, fee or charge                             | EUR million  |
|------------------------------------------------|--------------|
| Energy taxes                                   | 4,591        |
| Motor vehicle tax (annual)                     | 1,169        |
| Motor vehicle tax (registration)               | 977          |
| EU Emissions Trading Scheme allowance auctions | 95           |
| Resource taxes (hunting and fishing licences)  | 26           |
| Packaging tax (Beverages)                      | 16           |
| Waste tax                                      | 12           |
| Oil waste charge                               | 4            |
| <i>Total</i>                                   | <i>6,890</i> |

Note: Selection based on the ten highest revenue-generating taxes, fees and charges. The total revenue is larger than the sum of these.

Source: State Treasury (2018) and Finnish Energy Authority (2017).

### 3.1 Energy and air pollution

Energy taxes are by far the largest revenue generating environmental taxes, generating more than half of the tax revenue. In 2011 the Finnish energy taxation framework was reformed, and the fuel taxes were based on the energy content, carbon dioxide and local (particle) emissions of the fuel (NCM, 2014). The base of the taxes has since remained the same, but the rates have been changed a number of times since 2013. Changes to the energy content tax for fossil fuels for energy purposes include natural gas being charged the same rate as other fuels from 2015, and a general increase in the energy content tax in 2017. The CO<sub>2</sub> tax has increase in 2015, 2016 and 2017.

For transportation fuels, the energy content tax was raised in 2015 and 2017, and the CO<sub>2</sub> tax in 2014 and 2017.

The excise tax on electricity consumption was increased in 2014 and 2015. Changes also include the mining and minerals industry paying a higher (category I) tax for electricity consumption in 2015 and 2016 but being moved back to the lower (category II) tax bracket from 2017. Since 2014, data centres have also been taxed according to the lower rate.

Changes to the feed-in tariffs for renewable energy production, introduced in 2011, include the subsidy for wind power being lowered to the same rate as biogas and wood-fuelled power production, and the subsidy to timber chip power plants being increased. For wind power, the capacity limit for the subsidy scheme was reached in November 2017 and a new subsidy scheme is going to be introduced.

The Government of Finland also provides grants for investments in renewable energy production facilities and research projects related to it. A new type of grant has been available since 2016, which aims to promote investment in new energy technology and the production of biofuels for transportation.

### 3.1.1 *Excise taxes on fossil fuels for energy purposes*

Fuel taxes in Finland consist of an energy content tax, a CO<sub>2</sub> tax, and a strategic stockpile fee. The energy content tax reflects the volumetric energy content of the fuel, based on the calorific values specified in the RES Directive (2009/28/EC). These are levied on all fuels based on the same criteria (EUR/MJ). However, until the end of 2014, the energy content of natural gas was lower than the other fuels. The lower level was due to the decision to let the energy content tax on natural gas gradually adjust to the same level as the other fuels, after the energy tax reform in 2011 which significantly increased the tax on natural gas (NCM, 2014). In 2017, the tax based on energy content was increase from EUR 6.65 per MWh to EUR 7.05 per MWh (Finlex, 2016).

Finland was the first country to introduce carbon-based energy taxation in 1990. The tax rate has increased a number of times since its introduction and has been increased three times in the four-year time period considered in this report. In 2013, the tax rate was set a EUR 35 per tonne for fossil fuels for energy purposes. This has been raised in 2015, 2016 and 2017, and now stands at EUR 58 per tonne (Finlex, 2016).

Table 19 illustrates how the tax rate per tonne of CO<sub>2</sub> has developed for fossil fuels for energy purposes.

**Table 19: Development of the CO<sub>2</sub> tax rate, EUR per tonne CO<sub>2</sub>**

| Year                     | 1990 | 2009 | 2011 | 2013 | 2015 | 2016 | 2017 |
|--------------------------|------|------|------|------|------|------|------|
| CO <sub>2</sub> tax rate | 1.19 | 20   | 30   | 35   | 44   | 54   | 58   |

Source: NCM (2014), Finlex (2014a), Finlex (2015a) and Finlex (2016a).

For coal, natural gas, bio-oil, light and heavy oil used in combined heat and power (CHP), the CO<sub>2</sub> tax is halved (NCM, 2014). This has been done to improve the competitiveness of CHP and to avoid overlaps with the ETS and CO<sub>2</sub> taxation (Finlex, 2016). As almost all taxable coal and natural gas is used in CHP, in practice the CO<sub>2</sub> tax rate for these fuels is halved. This support to CHP amounted to roughly EUR 100 million in 2016 and plans of removing it were included in government program. However, the plans were abandoned after a report indicated that the removal would not reach its intended goals, and instead the tax rate per tonne of CO<sub>2</sub> increased to EUR 58 per tonne (Ministry of Finance, 2016). The government plans to abolish the tax rebate as part of changes in energy taxation to be made in 2019.

In 2016, liquid petroleum gas was added to the taxable fuels, having previously been tax exempt. The tax is based on the same components as other fuels: energy content tax, a CO<sub>2</sub> tax, and a strategic stockpile fee (Finlex 2016b).

On top of the aforementioned taxes, a strategic stockpile fee is levied. The purpose of the fee is to ensure functions essential to the livelihood of Finland's population, the country's economy and national defence can be maintained in an emergency (Finnish Tax Administration, 2016).

Table 20 presents the taxes and fees levied on fossil fuels for heating in Finland.

**Table 20: Taxes and fees levied on fossil fuels for energy purposes, EUR**

| Product              | Tax                     | 2014   | 2015   | 2016   | 2017   |
|----------------------|-------------------------|--------|--------|--------|--------|
| Light oil, c/l       | Energy content tax      | 9.30   | 9.30   | 9.30   | 9.70   |
|                      | CO <sub>2</sub> tax     | 9.34   | 11.74  | 14.4   | 15.47  |
|                      | Strategic stockpile fee | 0.35   | 0.35   | 0.35   | 0.35   |
|                      | Total tax               | 18.99  | 21.39  | 24.05  | 25.52  |
| Heavy fuel oil, c/kg | Energy content tax      | 7.59   | 7.59   | 7.59   | 8.05   |
|                      | CO <sub>2</sub> tax     | 11.34  | 14.25  | 17.49  | 18.78  |
|                      | Strategic stockpile fee | 0.28   | 0.28   | 0.28   | 0.28   |
|                      | Total tax               | 19.21  | 22.12  | 25.36  | 27.11  |
| Coal, EUR/t          | Energy content tax      | 47.10  | 47.10  | 47.10  | 49.93  |
|                      | CO <sub>2</sub> tax     | 84.43  | 106.14 | 130.26 | 139.91 |
|                      | Strategic stockpile fee | 1.18   | 1.18   | 1.18   | 1.18   |
|                      | Total tax               | 132.71 | 154.42 | 178.54 | 191.02 |
| Natural gas, EUR/MWh | Energy content tax      | 4.45   | 6.65   | 6.65   | 7.05   |
|                      | CO <sub>2</sub> tax     | 6.93   | 8.71   | 10.69  | 11.48  |
|                      | Strategic stockpile fee | 0.084  | 0.084  | 0.084  | 0.084  |
|                      | Total tax               | 11.46  | 15.444 | 17.424 | 18.614 |

Source: Finlex (2014a), Finlex (2015a) and Finlex (2016a).

When the energy taxation was revised in 2011, an energy tax on peat also entered into force. In 2016 the tax on peat was lowered to the current level of EUR 1.90 per MWh and is not based on energy content or CO<sub>2</sub> emissions, as the tax for the other fuels. If peat was taxed based on the same principles as the other fuels, the tax would be approximately EUR 20 per MWh. Peat is used in biomass mixtures, which has been mentioned as a reason for the lower tax rate on peat (Finlex, 2014).

Energy-intensive companies can since 1998 get a refund of the excise taxes on energy (fuels, district heating, process steam and electricity), if the taxes exceed 0.5% of the value added for the given company. The refund scheme was revised in 2012, increasing the number of companies that can apply for the refund. The company can apply for a refund of up to 85% of the taxes paid exceeding EUR 50,000. In 2016 the refunds amounted to about EUR 210 million (Ministry of Finance, 2018). In 2014 the refunds on energy taxes to agriculture was revised, and now only include refunds on the energy content tax, not the CO<sub>2</sub> tax.

While the aim for the scheme is to safeguard the international competitiveness of these firms, no link between receiving the refund and competitiveness has been found (VATT, 2016).

### 3.1.2 *Excise taxes on electricity consumption*

Electricity is taxed solely on a consumption basis. All fuels for electricity production have since 1997 been exempt from all taxes in line with the EU directive on energy taxation (NCM, 2014). This did not change with the energy tax reform in 2011, however, the reform significantly increased the tax levels for electricity consumption.

The electricity tax on consumption has been divided into two categories; the lower (category II tax) is paid by industry and professional greenhouses, and the higher

(category I tax) is paid by other consumers. The category I tax has been raised in 2014 and 2017. The categorization has been introduced to promote the competitiveness of the industrial sector. The mining and minerals industry was during 2016 and 2017 taxed according to category I, but as of 2017, the lower category II tax is paid by the industry (EY Finland, 2016). From 2014, data centres have also been taxed according to the lower, category II, rate (Finlex, 2013b).

Table 21 shows the development in the electricity tax between 2014 and 2017.

**Table 21: Excise taxes on electricity consumption, EUR**

| Product         | Tax                     | 2010  | 2011  | 2014  | 2015  | 2016  | 2017  |
|-----------------|-------------------------|-------|-------|-------|-------|-------|-------|
| Electricity     | c/kWh                   |       |       |       |       |       |       |
| Tax category I  | Tax                     | 0.87  | 1.69  | 1.89  | 2.24  | 2.24  | 2.24  |
|                 | Strategic stockpile fee | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 |
|                 | Total tax               | 0.883 | 1.703 | 1.903 | 2.253 | 2.253 | 2.253 |
| Tax category II | Tax                     | 0.25  | 0.69  | 0.69  | 0.69  | 0.69  | 0.69  |
|                 | Strategic stockpile fee | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 |
|                 | Total tax               | 0.263 | 0.703 | 0.703 | 0.703 | 0.703 | 0.703 |

Source: NCM (2014) and Finlex (2014a).

### 3.1.3 *Excise taxes on transportation fuels*

The components of the energy taxes on transportation fuels are the same as the ones for fuels for energy: energy content tax, a CO<sub>2</sub> tax, and a strategic stockpile fee. However, the price of CO<sub>2</sub> used to calculate the CO<sub>2</sub> tax differs from heating fuels, being EUR 62 per tonne in 2017. The higher rate is due to the need for a stronger steering effect for the transport sector. The energy content tax for transportation fuels has been raised in 2015 and 2017, and the CO<sub>2</sub> tax in 2014 and 2017.

The taxation of light-fuel oil and diesel oil is also differentiated based on their Sulphur content, and for biofuels fulfilling certain sustainability criteria, a lower CO<sub>2</sub> tax is levied. To lower the costs for operation of trucks, and thus the export industry, as well as bus transport, the energy content tax for diesel oil is set at a lower rate (EUR 0.0088 per MJ) compared to what the environmental criteria of the tax would require (EUR 0.016 per MJ). However, a vehicle tax component for driving power is used to adjust the total tax burden for diesel powered passenger vehicles (Finlex, 2016). The vehicle tax component for driving power is differentiated according to weight and levied on passenger cars, vans, and lorries that are fuelled by either diesel or other fuels (not gasoline).

Table 22 shows the development in taxes and fees levied on fossil fuels for transport between 2014 and 2017.

**Table 22: Taxes and fees levied on fossil fuels for transport, EUR**

| Product                | Tax                     | 2014  | 2015  | 2016  | 2017  |
|------------------------|-------------------------|-------|-------|-------|-------|
| Motor gasoline, c/l    | Energy content tax      | 50.36 | 51.20 | 51.20 | 52.19 |
|                        | CO <sub>2</sub> tax     | 16.25 | 16.25 | 16.25 | 17.38 |
|                        | Strategic stockpile fee | 0.68  | 0.68  | 0.68  | 0.68  |
|                        | Total tax               | 67.29 | 68.13 | 68.13 | 70.25 |
| Diesel oil, c/l        | Energy content tax      | 30.70 | 31.65 | 31.65 | 32.77 |
|                        | CO <sub>2</sub> tax     | 18.61 | 18.61 | 18.61 | 19.90 |
|                        | Strategic stockpile fee | 0.35  | 0.35  | 0.35  | 0.35  |
|                        | Total tax               | 49.66 | 50.61 | 50.61 | 53.02 |
| Jet fuel, c/l          | Energy content tax      | 54.76 | 55.68 | 55.68 | 56.76 |
|                        | CO <sub>2</sub> tax     | 17.99 | 17.99 | 17.99 | 19.24 |
|                        | Strategic stockpile fee | 0.35  | 0.35  | 0.35  | 0.35  |
|                        | Total tax               | 73.10 | 74.02 | 74.02 | 76.35 |
| Aviation gasoline, c/l | Energy content tax      | 49.88 | 50.72 | 50.72 | 51.70 |
|                        | CO <sub>2</sub> tax     | 16.10 | 16.10 | 16.10 | 17.21 |
|                        | Strategic stockpile fee | 0.68  | 0.68  | 0.68  | 0.68  |
|                        | Total tax               | 66.66 | 67.5  | 67.5  | 69.59 |

Source: Finlex (2013a), Finlex (2014a) and Finlex (2016a).

### 3.1.4 *Economic instruments for renewable energy sources*

The EU has set a target of reaching 20% final energy consumption from renewable sources by 2020, and 27% by 2030. Finland's national target is a renewable energy share of the gross final consumption of 38% (EC Directive 2009/28), which was reached for the first time already in 2014 (Parliament of Finland, 2017). To reach the goal, feed-in-tariffs for renewable energy were introduced in 2011. Furthermore, subsidies to investments and research aiming to increase and develop power generation based on renewable energy also exist (NCM, 2014; Ministry of Economic Affairs and Employment, 2018a). Guaranteed minimum prices though feed-in-tariffs are set for:

- New wind power plants (the nominal capacity of the generator must at least 500 kVA)
- New biogas power plants (gas produced by digestion, the nominal capacity of the generators must at least 100 kVA)
- New wood-fuelled power plants, which also produce heat for utilisation (The nominal capacity of the generator must be between 100 kVA and 8 MVA)
- Timber chip power plants (the nominal capacity of the generators must at least 100 kVA).

For wind, biogas and wood-fuelled power plants, the subsidy guarantees a price of EUR 83.50 per MW, meaning that the level of the subsidy is the difference between EUR 83.50 per MWh and the market price for power. The price is guaranteed for a period of 12 years. Until the end of 2015, the guaranteed price for wind power was EUR 105.3 per MWh. For wood-fuelled plants, the subsidy is ceased if the plant has produced gains of more than EUR 750,000 in four consecutive obligation periods. Biogas and wood-

fuelled power plants further received an additional heat premium of EUR 50 per MWh and EUR 20 per MWh, respectively, on top of the basic subsidy (Finnish Energy Authority, 2016).

For the timber chip power plants, the tariff changes according to the price of the emission allowance in the EU ETS and the energy peat tax. In 2013 and 2014 the basic subsidy was between EUR 0–13.13 per MWh, between EUR 0–15.87 per MWh from January 2015 to the end of February 2016, and from March 2016 between EUR 0–18 per MWh. A gasifier premium between EUR 0–6.46 per MWh in 2013 and 2014, and between EUR 0–2.27 per MWh from January 2015 to the end of February 2016 was set on top of the basic subsidy (Finnish Energy Authority, 2016). From 2019 the feed-in-tariff for timber chip plants is 60% of the basic subsidy, if wood chips are made of roundwood obtained from a logging site of large-sized timber suitable for processing (Finnish Energy Authority, 2016).

Before the feed-in-tariffs, timber chip, wind power, small hydro, biogas and recycled fuel plants received refunds from power generation, but with the introduction of the feed-in-tariffs, these were abolished (NCM, 2014).

In November 2017 the capacity limit for the tariff of 2,500 MVA for wind power was reached, and no new wind power plants will be accepted to the tariff system. Biogas and wood-fuelled plants will still be eligible for support until the end of 2018. A new temporary support scheme will be introduced, which will rely on tendering, with the aim of ensuring that only the most cost-effective and competitive investments in renewable electricity production will receive a subsidy (Parliament of Finland, 2017).

A financial support related to the renewable energy production is also provided by the so called KEMERA laws (Finnish Forest Centre, 2016), which provides financial incentives for thinning in young forest stands, with the aim of increasing the amount of first-thinning wood used in energy production.

While feed-in-tariffs are the main policy instrument in increasing renewable energy use, the Government of Finland also provides grants for investments in renewable energy production facilities and research projects related to it. The “energy aid” grant is available to companies, municipalities and other communities, for projects which promote the use or production of renewable energies, advance energy efficiency and reduce the environmental effects caused by energy production and use. The size of the grant varies based on the project but can make up of 30% of the overall cost for energy production facilities, and 40% of the project in case it involves new technology. Research projects should be related to different environmental and energy projects, such as energy audits, analysis of the new methods and development of services. At least 25% of the total project costs have to be financed from non-state funding (RES Legal, 2017).

The second grant type, available from 2016 to 2018, is “Investment Aid for Renewable Energy and New Energy Technologies”. The aim of the grant is to promote investment in new energy technology and the production of biofuels for transportation. Aid is granted against fixed assets investment with eligible costs exceeding EUR 5 million. The grant is available to companies, municipalities and other entities, excluding housing companies, residential properties and farms, and the grant can be up to 40%

of the project's costs (RES Legal, 2017). The Government of Finland has allocated EUR 100 million for Investment Aid for Renewable Energy and New Energy Technologies for the period 2016–2018 (Ministry of Economic Affairs and Employment, 2018a).

### 3.1.5 *Economic instruments for energy efficiency*

In general, energy efficiency in Finland is promoted through actions such as energy efficiency agreements, energy surveys, providing energy guidance and communications to consumers, encouraging ecological product design, and granting energy labels. The voluntary energy efficiency agreements are a major tool for fulfilling the obligations of the European Energy Efficiency Directive (Finnish Energy Authority, 2018).

Projects which advance energy efficiency are eligible for so called “energy-aid”, which is also granted for renewable energy investments and research. The subsidy levels and conditions are thus the same as discussed in the previous section on renewable energy.

Energy surveys are mandatory for larger companies. Smaller companies and municipalities can get support through the energy-aid to conduct an energy survey (Ministry of Economic Affairs and Employment, 2018b).

### 3.1.6 *Emissions trading*

The European Union's Emissions Trading Scheme (EU ETS) is one of the main economic instruments to reduce CO<sub>2</sub> emissions in Finland and covers about 40% of the CO<sub>2</sub> emissions in Finland (Ministry of Economic Affairs and Employment, 2018c). During the first phase of the EU ETS (2005–2007), the total volume of emission allowances allocated to energy production and industry was approximately 136.5 million tonnes and the total verified emissions 120.28 million tonnes.

During the second phase (2008–2012), the scope of the scheme was broader, and allowances totalling 187.6 million tonnes were allocated for free to installations covered by the EU ETS. The total emissions during the second phase were 176.5 million tonnes. No auctioning of allowances was applied in the period 2008–2012 (NCM, 2014).

In the third phase of the EU ETS (2013–2020), the national caps on emissions have been abolished and an EU-wide cap on emissions is applied. Auctioning of the allowances plays a key part in the third phase of the trading scheme. In 2013, Finland's auctioned allowances amounted to 15.2 million, generating a revenue of EUR 67 million (Finnish Energy Authority, 2017). In 2017 the auctioned allowances were 16.5 million and generated a revenue of EUR 95.3 million.

In the period 2013–2020, 450 installations in Finland are given allowances for free (Ministry of Economic Affairs and Employment, 2018d), totalling 22.9 million in 2013 and 17.9 million in 2017. Total verified emissions in 2013 were 31.5 million and 25.1 million in 2017 (European Environmental Agency, 2018). The high share of free allowances is due to Finland's industrial structure.

The aviation sector was included in the EU ETS in 2012, and additional sectors and gases were included in 2013, increasing the number of Finnish operators in the EU ETS (NCM, 2014). In the end of 2017, flights to and from third countries were exempted from the EU ETS until 31 December 2023.

### 3.2 Water

In Finland, municipalities have the primary responsibility for water supply and wastewater treatment. The water utilities are owned by the cities and municipalities and have politicians in the steering committee who decide on the water fees. The fees are set according to the full cost principle, meaning that the service should be fully financed by the user fees.

The fee consists of a consumption component, which is based on both drinking water and wastewater use, a fixed monthly fee varying based on the type of service provided (e.g. both drinking water and wastewater or only drinking water) and the type of property. The fixed fee is intended to cover the fixed costs of the water utility. A connection fee is also paid when the property is connected to the network (HSY, 2016a).

The total fees paid vary based on municipality. For a detached house the average fee was EUR 6.17 per m<sup>3</sup> in 2017 (Finnish Environment Institute, 2018). The variation in the fee can be quite large between municipalities, ranging from EUR 3.53 per m<sup>3</sup> to EUR 9.5 per m<sup>3</sup> in 2016 (YLE, 2016).

Finland does not apply any emission-related charges on water services (NCM, 2014).

### 3.3 Waste

The main economic instrument for waste management and prevention is the waste tax, which is levied on waste deposited at landfills. The tax has been increased in 2015 and 2016.

A voluntary agreement (Green Deal) has also been signed by the state and the Federation of Finnish Commerce. This agreement, referred to as the Plastic Carrier Bag Agreement, is in force until 2025, and aiming to reduce the consumption of plastic carrier bags. The target is to reduce the use of plastic bags to 40 bags per person per year in 2025.

In 2017 a new National Waste Plan to 2023 was adopted. The new plan has four key areas: construction and demolition waste, biodegradable waste, municipal waste, and electrical and electronic equipment waste. Detailed targets have been set for these key areas and measures to reach the targets are suggested in new plan (Ministry of the Environment, 2018a).

### 3.3.1 *Municipal waste charges*

Municipal waste charges cover the cost of municipal waste management. This includes costs incurred by waste transportation, the establishment, maintenance, decommissioning and after-care of treatment facilities and the costs of register maintenance and waste guidance.

Waste charges also aim to reduce the amounts of waste generated and the consequent risks, and to encourage waste recovery. In many municipalities, a smaller fee is charged for waste that is sorted and fit for use, as opposed to mixed municipal waste that is unfit for practical applications.

The waste charge is collected from the property holder or some other holder of the waste. Grounds for determining the waste charge can be found in the waste tariff approved by the municipality (Ministry of the Environment, 2018b).

As an example, for the city of Helsinki, the yearly charge for a 140-litre container was between EUR 97.37 and EUR 376.48 in 2017, depending on the emptying frequency (once every fourth week, or once every week, for the charges quoted here) (HSY, 2016b).

From 2019 a new Waste Act will come into force, which will slightly change the municipalities' waste responsibilities (Association of Finnish Local and Regional Authorities, 2018).

### 3.3.2 *Waste tax*

Finland's Waste Tax Act came into force in 1996. In 2011 it was revised, which increased the tax base. The tax is levied on waste deposited at landfills, provided that:

- Its utilisation is technically feasible and environmentally justifiable; and
- By imposing the tax, waste can be made more commercially exploitable (Ministry of the Environment, 2018b).

Tax is paid both at public and private landfills, with the owner of the landfill being tax liable, and able to pass on the tax through fees charged for the reception of the waste.

In 2014 the tax rate was EUR 50 per tonne. This was raised to EUR 55 per tonne in the start of 2015, and to EUR 70 per tonne in 2016. The revenue generated by the waste tax has fallen in the last four-year period, due to an increase in incineration of municipal waste.

Hazardous waste deposited at landfills by households is tax exempt, and free of charge. Companies are charged a fee at the waste treatment centres according to the type and weight of the waste (HSY, 2016b)

### 3.3.3 *Oil waste charges*

The oil waste charges have stayed unchanged since 2009, at 5.75 eurocent per kilo, which is included in the price of lubrication oils. The income from these charges is used to cover the costs of managing oil waste and cleaning up soil and groundwater contaminated with oil (Ministry of the Environment, 2018b).

### 3.3.4 *Beverage packaging tax*

Beverage packaging taxes are currently paid on packaging for alcoholic beverages, beer and soft drinks. Bottled water and certain other drinks packages are also subject to the tax. This form of taxation aims to further encourage the re-use of drinks packages, to reduce the quantities of such materials ending up in landfill, and to prevent litter. The taxation level has since 2005 amounted to EUR 0.51 per litre (Ministry of the Environment, 2018b).

The beverage packaging taxes does not apply to packaging covered by approved returnable deposit systems that involve the collection of packaging for refilling or material recycling. For certain glass bottles a deposit-refund system has been in place since the 1950s, with return rates for these types of bottles now being close to 100% (PALPA, 2018a). The system includes certain types of refillable glass and plastic bottles, as well as aluminium cans. In 2017, the return rates for all glass bottles, plastic bottles and aluminium cans covered by the system were 87%, 91% and 94%, respectively (PALPA, 2018a).

The refund rates are presented in Table 23.

**Table 23: Refund rates for glass, plastic and aluminium can beverage containers and crates in 2017**

| Containers                  | EUR per unit |
|-----------------------------|--------------|
| <b>Glass, re-use</b>        |              |
| Under 1 litre               | 0.10         |
| Crates (24 * 0.33 litre)    | 2.20         |
| <b>Glass, recycling</b>     |              |
| All sizes                   | 0.10         |
| <b>Plastic, recycling</b>   |              |
| 0.35 litre or less          | 0.10         |
| Over 0.35 but under 1 litre | 0.20         |
| 1 litre or over             | 0.40         |
| <b>Cans</b>                 |              |
| Any size                    | 0.15         |

Source: PALPA (2018b).

### 3.3.5 *Producer responsibility in waste management*

Producer responsibility refers to companies' obligation to handle the waste management of products they have imported or manufactured when the products are discarded. It pertains to companies that import or manufacture the following products:

- Cars, vans and comparable vehicles
- Tyres from motor vehicles, other vehicles and equipment as well as vehicles or equipment supplied with tyres (including tyre re-trading companies)
- Electronic and electrical appliances
- Batteries and accumulators
- Printing paper and paper for manufacturing other paper products

- Packaging where the producer responsibility pertains to the packers of the products and importers or packaged products but excluding the packaging producers.

Producer responsibility can be fulfilled by joining, or starting, a producer organisation, which handles the obligations provided in the Waste Act on behalf of the producer, or by registering to the producer database, in which case the producer itself handles the collection, recycling and waste management of the products falling under producer responsibility (Ministry of the Environment, 2018c).

The economic instruments used for some product categories in complying with producer responsibility are fees and refunds.

### Tyres

The systematic recycling of used vehicle tyres in Finland started in 1996. The producers of tyres have to ensure that the reuse and recycle rate of vehicle tyres is 95%.

The system is financed by a recycling fee paid by the consumer on buying a new tyre. The profits are passed on from the retailer to the producer or the importer, who will pass on the funds to Finnish Tyre Recycling Ltd to cover the associated treatment and disposal costs (NCM, 2014). The fees are determined by the size of the tyre, and examples of tyre charges and its development is presented in Table 24.

**Table 24: Examples of tyre recycling charges for different types of tyre, EUR per unit**

| Products                   | 2004 | 2009 | 2013 | 2017 |
|----------------------------|------|------|------|------|
| Moped and motorcycle tyres | 1.85 | 1.85 | 1.97 | 1.74 |
| Car tyres                  | 1.85 | 1.85 | 2.17 | 1.92 |
| Delivery van tyres         | 1.85 | 1.85 | 2.17 | 1.92 |
| Lorry and coach tyres      | 8.30 | 8.65 | 10.6 | 9.49 |
| Tractor tyres              | 2.45 | 2.45 | 2.68 | 2.42 |
| Re-traded lorry tyres      | 2.45 | 5    | 6.39 | 5.13 |

Note: EUR per unit includes 22% VAT in 2004 and 2009 and 24% VAT in 2013 and 2017.

Source: NCM (2014) and Finnish Tyre Recycling (2018).

### End-of-life vehicles (ELVs)

The producer responsibility legislation for ELVs entered into force in September 2004. The regulation is based on the ELV Directive (2000/53/EC). It applies to passenger cars, vans and special vehicles such as recreational vehicles. Vehicle owners can return ELVs without charge to authorised collection points. The system is coordinated by the Finnish Car Recycling Ltd.

During 2015 a refund system for ELV was piloted, where owners of vehicles older than 10 years would receive a EUR 1,000 refund, if the vehicle was replaced with a low emission (less than 120 g/km) one. The scheme was very successful; initially EUR 3 million was allocated to the program, but an additional EUR 5 million was added, which also had been spent by November 2015 (Finlex, 2017). A new refund system was in place from the start of January to the end of August 2018, where the refund was either

EUR 1,500 or EUR 2,500, depending on the type of new replacement vehicle (TRAFI, 2018a). The new scheme was partly financed by the car industry, and EUR 8 million was allocated to the system by the Government of Finland. The aim of the refund system has been to renew the relatively old car fleet in Finland with more environmentally friendly and safer cars.

### Electrical and Electronic Equipment (EEE)

In Finland, the WEEE Directive has been enacted into national legislation by the Government Decree on Electrical and Electronic Waste (852/2004). The target of the legislation is to prevent the generation of waste from electrical and electronic equipment and promote the reuse, recycling and other methods of utilisation of waste in order to decrease the amount of waste ending up in final treatment (NCM, 2014).

If a company's product range includes EEE intended for consumers (B-to-C), it should join a producer organisation, which handles the obligations on behalf of the company. There are five approved producer organisations for EEE producers: ERP Finland, SERTY ry, SELT Association, ICT Producer Co-operative and FLIP Association. If a company's product range includes EEE intended only for professional use (B-to-B), the company may either join a producer organisation or submit an application to registering to the producer database (Ministry of the Environment, 2017a).

## 3.4 Transport

Motor vehicles in Finland are charged with both a one-time registration tax and an annual tax. Both tax rates have been revised since 2014. In 2018 a subsidy for the purchase of new electric vehicles will be available (TRAFI, 2018b).

### 3.4.1 Registration tax

The registration tax, or car tax, is a one-time tax levied when vehicles, such as passenger cars, delivery vans and motorcycles, are registered in Finland for the first time. This tax was introduced in the 1950s to raise state revenue (NCM, 2014).

The tax is based on the retail value of the vehicle, but the rate is differentiated based on the CO<sub>2</sub> emissions declared by the car manufacturer for a combination of city and road driving. The tax is independent from the driving force of the vehicle, and solely based on emissions, meaning that a fully electric car is taxed according to CO<sub>2</sub> emissions of 0 g/km. Where emissions data are not available, the tax rate is based on the weight and the driving force used by the vehicle.

In 2015 it was decided to lower the registration tax for cars with CO<sub>2</sub> emission of less than 140 g/km (Finlex, 2015). The reduction will be implemented linearly in the period 2016–2019. The aim of the tax, and the reduction, is to guide consumers towards choosing more energy-efficient car models while speeding up the renewal of the vehicle stock to introduce cars with better fuel efficiency and lower emissions. While the

maximum tax rate remains unchanged, the minimum will be reduced from 5% in 2015 to 2.7% in 2019.

Table 25 below shows the development of the car tax, based on examples of the emission levels.

**Table 25: Examples of the development of the registration tax (car tax) rate**

| CO <sub>2</sub> emissions of the car (g/km) | 2014  | 2016  | 2017  | 2018  |
|---------------------------------------------|-------|-------|-------|-------|
| 0                                           | 5.0%  | 4.4%  | 3.8%  | 3.3%  |
| 90                                          | 14.9% | 13.6% | 12.3% | 11.0% |
| 120                                         | 20.1% | 19.3% | 18.5% | 17.7% |
| 140                                         | 23.8% | 23.7% | 23.6% | 23.5% |
| 150                                         | 25.8% | 25.8% | 25.8% | 25.8% |
| 170                                         | 29.7% | 29.7% | 29.7% | 29.7% |
| 200                                         | 35.1% | 35.1% | 35.1% | 35.1% |
| 230                                         | 39.8% | 39.8% | 39.8% | 39.8% |
| over 360                                    | 50.0% | 50.0% | 50.0% | 50.0% |

Source: Finlex (2015b).

### 3.4.2 Annual car taxes

Besides the registration tax, motor vehicles in Finland are also subject to an annual tax (the motor vehicle tax). The tax may consist of a basic tax, a driving power tax or a combination of these. Petrol passenger cars are subject only to the basic tax, while diesel and electric passenger cars are subject to both the basic tax and the driving power tax. Diesel lorries are only subject to the driving power tax (TRAFI, 2017).

The basic tax is based on the CO<sub>2</sub> emissions declared by the car manufacturer for a combination of city and road driving. Where emissions data are not available, or for passenger cars first registered before 2001 (or 2002 if the weight of the cars is over 2,500 kg) and vans registered before 2008, the tax rate is based on the weight of the vehicle.

The basic tax has been raised significantly since 2013. It was first raised in 2014 (with the new rates taking effect in 2016). While the registration tax rate has remained unchanged or was reduced, the car tax was raised by EUR 36.5 per year for all vehicles in the 2015 reform (with the new car tax rates taking effect in 2017). For examples see Table 26.

Table 26: Examples of the basic tax for passenger cars

| CO <sub>2</sub> emissions of the car (g/km) | Tax rate (EUR/365 days) |        |        |
|---------------------------------------------|-------------------------|--------|--------|
|                                             | 2013                    | 2016   | 2017   |
| 0                                           | 43.07                   | 69.71  | 106.21 |
| 90                                          | 85.05                   | 117.16 | 153.66 |
| 120                                         | 101.84                  | 147.82 | 184.32 |
| 140                                         | 122.64                  | 173.74 | 210.24 |
| 150                                         | 134.69                  | 188.70 | 225.20 |
| 170                                         | 162.43                  | 221.55 | 258.05 |
| 200                                         | 213.89                  | 279.59 | 316.09 |
| 230                                         | 275.58                  | 344.19 | 380.69 |
| over 400                                    | 606.27                  | 617.94 | 654.44 |

Source: Finlex (2014b) and Finlex (2015b).

For vehicles taxed based on weight, the rates have increased from EUR 125.93–535.46 per year in 2013 to EUR 222.65–632.18 per year in 2017 for vehicle with a mass of less than 1,300 kg to a mass of 3,401 kg or more.

A driving power tax is levied on vehicles that are powered by some force or fuel other than petrol. The tax rate has since 2013 been 5.5 eurocents per day for every 100 kilograms of weight for passenger cars power by diesel, 4.9 eurocents per day for electric, and 0.5 eurocents per day for electric and petrol hybrids. For lorries the driving power tax is based on the weight, number of axles and whether it is used for towing a trailer and varies between 0.6–2.2 eurocents per day for every 100 kilograms of weight (TRAFI, 2017).

### 3.4.3 Aviation noise charge

A noise charge is collected from jet aircraft which depart and land at Helsinki Airport between 23.00–06.00 LMT. The charge is calculated from noise levels indicated in the aircraft noise certificate on the basis of take-off noise measurements in accordance with the International Civil Aviation Organisation (ICAO). Aircraft which are unable to show certificated noise levels will be charged at the highest noise rate for the same aircraft type. Charges of less than EUR 10 will not be collected. The maximum noise charge is limited to EUR 3,000 (FINAVIA, 2017).

## 3.5 Agriculture and natural resources

The Finnish agricultural support system is based on the support schemes of the EU's Common Agricultural Policy (CAP). The EU CAP was reformed in 2015, changing the way in which farmers receive support. The system is now based direct payments by EU and the partially EU-funded natural constraint payments and environment payments. In addition, EU support schemes also promote animal welfare and organic production.

The support package is complemented with the Finnish national aid system to account for the special circumstances in Finland (Ministry of Agriculture and Forestry, 2018a).

For the period 2015–2020, the total amount of direct payments in Finland is EUR 524 million, out of which 254 million is basic payments, 157 million greening payments, 10 million payments for young farmers and 103 million as coupled support (Ministry of Agriculture and Forestry, 2018b).

The national agriculture and horticulture support was budgeted at EUR 325.4 million in 2018. Since 2015, Finland's national aid system consists of two main elements: national aid for farmers in Southern Finland and Nordic aid. Nordic aid, which is paid out to the Northern part of Finland, accounts for 90% of the national payments. The key objective of Nordic aid is to maintain production in the region, to develop the production structures, ensure products' access to market and to support environmental protection and the preservation of the countryside (Ministry of Agriculture and Forestry, 2018c).

The aim of the natural constraint payments is to ensure that agricultural production continues in Finland, by helping to close the gap in cultivation costs compared to other production areas in Europe. Farmers receiving natural constraint payments sign up for a five-year period, in which they agree to implement general environment protection schemes on their farms. Additionally, farmers can sign up for voluntary environmental agreements which increase the natural constraint payments. The aim of these agreements is to improve the conditions of the aquatic environment, as well as improving biodiversity.

In 2015, the Finnish Government approved the National Forest Strategy 2015–2025 with the goals of 1) creating a competitive operational environment for forest business, 2) renewing the forest sector, and its structure in order to diversify forest products, and 3) continuing to use forests according to the principles of sustainable forest management (LUKE, 2017).

In June 2015 the revised Act on the Financing of Sustainable Forestry (KEMERA) entered into force. The aim of reforming the act was to align it with the new EU guidelines for State aid in the agricultural and forestry sectors and in rural areas 2014 to 2020 (2014/C 204/01). Government subsidies through the KEMERA act are available for safeguarding sustainable wood production, maintenance of forest biodiversity and improvement of the health of forests.

The Forest Biodiversity Programme for Southern Finland (METSO) was first piloted in 2003–2007 and has since been extended for the periods 2008–2016, and in 2014 it was decided to extend the program until 2025. The program is designed to halt the ongoing decline in the biodiversity of forest habitats and species, and thus to supplement the National Forest Strategy in objectives concerning ecological sustainability. The METSO program is largely based on the voluntary participation of landowners willing to safeguard biodiversity in their own forests, by offering their forests either for permanent or temporary protection against compensation by the Government.

The targets of the METSO program is to have sites covering about 96,000 hectares that will be voluntarily offered by landowners to be established as private nature reserves or that will be acquired by the State. In addition, about 82,000 hectares of

valuable forest habitats will be protected in commercially managed privately owned forests (Ministry of the Environment, 2015). As of 2017, 67% of the target for nature reserves, and 52% of the commercially managed forest area target had been reached (Ministry of the Environment, 2018d). Funding for the METSO programme varies between EUR 30–40 million per year (Ministry of the Environment, 2015).

Finland does not have a mining tax, or any other fee related to extracting minerals or natural resources, apart from fees related to extraction permits. In the official statistics, the hunting and fishing license fees are counted as resource taxes (Statistics Finland, 2017).

In 2017 a transferable quota system for Baltic herring, sprat and salmon was introduced in Finland. The aim of this reform was to better align the Finnish and EU fisheries policies, as well as to improve the profitability of the Finnish fishing industry (Finlex, 2016c).



## 4. Iceland

While Iceland has a long history of employing economic instruments in fields such as fisheries management and waste treatment, such instruments were, until recently, only to a limited extent relied upon in other areas of environmental and natural resource management. A fundamental shift occurred in the period 2009–2011 when several new economic instruments were introduced in relation to new climate and energy policies. These instruments, which were mainly targeted at the transport sector, include carbon tax, vehicle and fuel taxation based on CO<sub>2</sub> emissions and tax discounts for low or zero emission vehicles. Shortly after this, in 2012 and 2013, aviation and industrial activities in Iceland became subject to the EU ETS. Today, a majority of man-made GHG emissions in Iceland (not including LULUCF) is covered by a carbon pricing instrument, either a carbon tax or an emissions trading system.<sup>20</sup>

Apart from minor rate adjustments, economic instruments in Iceland have for the most part remained unchanged in the period 2014–2017. However, increased use of such instruments appears to be on the horizon in the coming years; the government has, for example, expressed intentions to impose a new landfill tax and to raise carbon tax to support its climate policy. Furthermore, a parliamentary resolution adopted in 2017 envisages increased utilisation of economic instruments in the period 2017–2021 to accelerate the transition from fossil fuel to renewable energy in land-based transport and shipping.

Table 27 illustrates state revenue generated by taxes, fees and charges related to the environment in Iceland during 2016. The majority of the revenues stem from the transport sector, in which excise taxes on cars and fuels represent the largest share. Revenues from carbon tax increased by roughly 15% between 2014 and 2016. It should be noted that in line with the climate policy of a new government that came to power in 2017 the carbon tax was increased by 50% from 1 January 2018 for all fuel types. The government envisages raising the tax further in the coming years to support its expected climate action plan (Government Offices of Iceland, 2017).

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<sup>20</sup> Unless otherwise stated, the information provided in this chapter is based on acts and legislative proposals from Althingi (The Icelandic Parliament) and regulations adopted in accordance with Icelandic law. A list of relevant acts is provided in References.

**Table 27: Revenue from environmental taxes, fees and charges, 2016, ISK (EUR)**

| Tax, fee or charge                             | Million             |
|------------------------------------------------|---------------------|
| Carbon tax                                     | 3,464 (29)          |
| General excise on petrol and oil products      | 4,690 (39)          |
| Special excise on petrol (petrol charges)      | 7,503 (62)          |
| Excise on gas oil, diesel oil and kerosene     | 9,226 (77)          |
| Recycling fees                                 | 3,818 (32)          |
| Excise on motor vehicles                       | 8,293 (69)          |
| Vehicle tax based on CO <sub>2</sub> emissions | 6,797 (56)          |
| Kilometre fee                                  | 986 (8)             |
| Fishing fees                                   | 8,501 (71)          |
| <i>Total</i>                                   | <i>53,278 (442)</i> |

Source: The Financial Management Authority (2017).

## 4.1 Energy and air pollution

Nearly all power generation in Iceland and over 90% of household heating is based on geothermal and hydropower sources. Overall, over 85% of total energy use in Iceland is based on domestic renewable sources, which is a higher share than in most other countries (Ministry for the Environment and Natural Resources, 2018). Due to a recent surge in tourism and rapid economic growth, energy use has increased considerably in some sectors in the last few years, including transportation and construction. As a result, GHG emissions in these sectors are rising. For example, emissions from land-based transportation increased by 9% between the years 2015 and 2016. In total, GHG emissions in the transport sector have increased by 57% between 1990 and 2016, making the sector one of the most challenging issues of the government's climate change mitigation efforts (Ministry for the Environment and Natural Resources, 2018).

In 2017, Althingi (the Icelandic Parliament) adopted the Energy Transition Resolution, outlining the government's agenda for the period 2017–2021 to replace fossil fuels by renewable energy. One of Iceland's goal is to achieve a 10% share of renewable energy in 2020 and a 40% share in 2030 in land-based communications. Today, the share is around 6% (Althingi, 2017a). Economic instruments are one of the backbones of the Energy Transition Resolution, including the continued use of tax incentives to encourage consumers to buy low and zero emission vehicles.

### 4.1.1 Carbon Tax

Carbon tax was first introduced in Iceland in 2009, in the wake of the financial crisis in 2008. While the tax was primarily imposed for fiscal reasons, its stated purpose was also to encourage the use of environmentally friendly vehicles, promote energy savings, curb GHG emissions and increase the use of domestic energy sources. Initially, the tax rate was based on the CO<sub>2</sub> content of each fuel type and aligned to the price of emission allowances in the EU ETS market. The rate was, however, soon decoupled from EU ETS prices, which fell steadily while the carbon tax gradually increased. The carbon tax is currently levied on imports and sales of gas, diesel, petrol, fuel oil, petroleum gas and

other gaseous hydrocarbons. Minor rate changes were made for all fuel types in the period 2014–2017. See Table 28.

The carbon tax affects all users of the covered fuel types in Iceland, including private car owners, fishing vessels, and domestic transportation on land and sea. Fuel used in aviation is not subject to the tax. The revenues go toward state general funds and are thus not earmarked for environmental or climate purposes.

**Table 28: Carbon tax on fuel, 2014–2017, ISK (eurocents)**

|                                                                       | 2014        | 2015        | 2016        | 2017        |
|-----------------------------------------------------------------------|-------------|-------------|-------------|-------------|
| Gas and diesel<br>ISK (eurocent) per litre                            | 5.90 (4.89) | 5.84 (4.85) | 6.00 (4.98) | 6.30 (5.23) |
| Petrol<br>ISK (eurocent) per litre                                    | 5.15 (4.27) | 5.10 (4.23) | 5.25 (4.36) | 5.50 (4.56) |
| Fuel oil<br>ISK (eurocent) per kg                                     | 7.30 (6.06) | 7.23 (6.00) | 7.40 (6.14) | 7.75 (6.43) |
| Petrol gas and other gaseous<br>hydrocarbons<br>ISK (eurocent) per kg | 6.50 (5.39) | 6.44 (5.34) | 6.60 (5.48) | 6.90 (5.72) |

Source: Althingi, Act No 129/2009 on Environmental and Resource Taxes (and later amendments).

#### 4.1.2 *Taxes on fuels for transport purposes*

Excise taxes on fuels replaced an older system of customs and import taxes in 1993. Two types of excise taxes are imposed on petrol in Iceland: a general excise tax and a special excise tax, also called petrol charge. Excise tax has moreover been levied on gas oil, diesel oil and kerosene since 2004. As illustrated in Table 29 and Table 30, the rates of both excise taxes on petrol and oils have increased slightly in the period 2014–2017.

Since 2011, fuels of non-fossil origin have been exempted from excise taxes, including non-fossil additives that have been blended with petrol and oil. Revenues from general excise taxes on petrol are channelled to the general state funds, but the revenues from the petrol charge and the excise tax on gas oil, diesel oil and kerosene are used to fund road construction.

**Table 29: Excise taxes on petrol, 2014–2017, ISK (eurocents)**

|                                                                | 2014          | 2015          | 2016          | 2017          |
|----------------------------------------------------------------|---------------|---------------|---------------|---------------|
| General excise tax<br>ISK (eurocent) per litre                 | 25.20 (20.91) | 24.96 (20.71) | 25.60 (21.24) | 26.80 (22.23) |
| Special excise tax / petrol charge<br>ISK (eurocent) per litre | 40.70 (33.77) | 40.30 (33.43) | 41.30 (34.26) | 43.25 (35.88) |

Source: Althingi, Act No 29/1993 on Excise Duties on Vehicles, Fuels, etc. (and later amendments).

**Table 30: Excise taxes on oils, 2014–2017, ISK (eurocents)**

|                                                              | 2014          | 2015          | 2016          | 2017          |
|--------------------------------------------------------------|---------------|---------------|---------------|---------------|
| Gas oil, diesel oil and kerosene<br>ISK (eurocent) per litre | 56.55 (46.92) | 56.00 (46.46) | 57.40 (47.62) | 60.10 (49.86) |

Source: Althingi, Act No 87/2004 on Oil and Kilometres Charge (and later amendments).

#### 4.1.3 *The EU Emissions Trading System*

Iceland has been a part of the EU ETS since 2012, when aviation activities were added to the system. Following further expansion of the system in 2013, large industrial installations in Iceland also became subject to its rules, including three aluminium plants. Over 40% of total GHG emissions in Iceland are currently regulated by the EU ETS, which makes it the most important single instrument to reduce GHG emissions in Iceland (Ministry for the Environment and Natural Resources, 2018). To limit the administrative burden of the system, small emitters can request to be excluded from its scope. Excluded installations are however charged a special fee, called emission charge, which is intended to reflect the price of each tonne of emitted GHGs within the EU ETS. In 2017, the price of the emission charge, which is adjusted annually, was ISK 968 (EUR 8.03) per tonne of GHG emission.

Under the Agreement on the European Economic Area (EEA Agreement), Iceland is entitled to a certain share of revenues from auctioned allowances in the EU ETS. When the rules on the system were incorporated into Icelandic law in 2012, it was decided that half of Iceland's auction revenues would be used to finance various climate related projects through a special fund, the Climate Fund. However, by a legislative amendment in 2014, the earmarking of the revenues for the Climate Fund was abolished. Iceland has to date not received any revenues from auction in the EU ETS, but any future revenues will go toward general government budgets and will not be earmarked for climate purposes (Althingi, 2017b).

#### 4.1.4 *Taxes on sales of electricity and geothermal water*

Since 2010, a 2% tax has been levied on sales of geothermal water to end users. A charge of ISK 0.129 (0.11 eurocent) was furthermore imposed on the sale of each kilowatt-hour (kWh) of electricity, but the charge was abolished 31st December 2015. Due to the abundance of both hot water and electricity from renewable sources in Iceland these taxes were not based on environmental considerations, but merely intended to increase general tax revenues.

#### 4.1.5 *Taxation of hydrocarbon activities*

Under Icelandic law, various fees are imposed on companies involved in hydrocarbon extraction activities. In addition to fees intended to cover administrative costs of issuing licenses, companies are charged an annual fee for exploration activities, called area fee.

If exploration leads to production, a production levy and a special hydrocarbon tax are also imposed. In addition, licensees pay an annual fee to an educational and research fund which awards grants to various projects to strengthen the development of research and scientific knowledge of hydrocarbon resources (National Energy Authority, 2013).

In 2013, three licenses were issued for exploration and production of hydrocarbons in the Dreki Area, an ocean area within the Icelandic exclusive economic zone. To date, all three licenses have been relinquished and no decision has been made on whether Icelandic authorities will start a new licensing round.

#### **4.1.6 Subsidies to install heat pumps**

A system of subsidies is in place to lower heating costs of inhabitants in so-called cold spots in Iceland, *i.e.* areas where geothermal district heating is unavailable. The system includes grants to purchase environmentally friendly energy and to take measures that improve energy efficiency of space heating. Inhabitants in cold spots are moreover entitled to a refund of VAT when switching from fossil-fuel or electric heating to heat pumps.

### **4.2 Water**

Over 95% of Iceland's drinking water is untreated groundwater from springs and wells. In urban areas, provision of water to homes and companies falls within the responsibility of municipalities. Municipalities also carry out wastewater services. To cover the cost of both water supply and wastewater services, municipalities charge fees from their users. Since the primary goal of the fee collection is to fund the relevant services, the prices are based on the cost that municipalities incur from providing the service, even though the usage by each household or company can to some extent be estimated based on property size and other factors.

### **4.3 Waste**

Waste generation in Iceland has increased substantially over the last few years (Statistics Iceland, 2018). GHG emissions related to waste have, at the same time, gradually decreased, mainly due to efforts to enhance recycling (Ministry for the Environment and Natural Resources, 2018; Ministry for the Environment and Natural Resources, 2013). Waste treatment currently accounts for approximately 5% of Iceland's total GHG emissions (excluding LULUCF) (Ministry for the Environment and Natural Resources, 2018). A national waste prevention programme for the period 2016–2027 with an overall objective to improve the economy through better resource utilization, efficiency and education to prevent waste (European Environment Agency, 2016).

Several fee systems are in place in the waste sector, which are either intended to finance waste treatment or encourage consumers to dispose of waste in a proper manner, see further discussion below. No major changes have been made to these instruments in the period 2014–2017. It should be noted however that in 2013 the government announced its goal to impose tax on landfills by 2016, but to date no such tax has been adopted by the parliament (Ministry for the Environment and Natural Resources, 2013).

#### **4.3.1 *Fee for treatment of waste***

Municipalities are responsible for collection, handling and treatment of municipal waste and shall ensure that waste treatment facilities are available. To cover the cost of disposal, including the building and operation of treatment facilities, municipalities and operators of disposal sites collect service fees from users. Methods to calculate the fee vary between municipalities, but the fee can never exceed the actual collective cost incurred by the municipality related to waste treatment.

#### **4.3.2 *Recycling fees and refund systems***

Importers and producers of certain types of products have since 2002 been charged a recycling fee which is intended to cover the cost of waste treatment in relation to these products, including their collection, transportation, recycling, recovery and disposal. Examples of products that are subject to the fee include cars, single-use beverage packages, oil products, organic solvents, batteries, paint, car tires and electrical and electronic equipment. As a general rule, the fee is levied on each kilogram and is intended to reflect the actual cost of waste treatment related to the product. Prices were adjusted for all products in 2017. Some were raised, and others lowered. For some products, including batteries, the fees were more than doubled.

Refund systems are in place for two of the products that are subject to the recycling fee. A deposit-refund system for single-use beverage packages has been operated since 1989. The refund price is currently ISK 16 (13.27 eurocent) for all bottles and cans (Endurvinnslan, 2018). A deposit system for end-of-life vehicles has been in place since 2003. Car owners are eligible for a payment of ISK 20,000 (EUR 166) for returning a vehicle for recycling or disposal.

### **4.4 Transport**

#### **4.4.1 *Excise taxes on vehicles***

Since 2011, an excise tax on cars has been based on registered CO<sub>2</sub> emission of the vehicle, calculated as grams per driven kilometre. For most passenger cars, the tax rate depends on the classification of the car in question within the so-called main category. See Table 31. The rates in the main category range from 0%, for cars emitting between

0 and 80 grams CO<sub>2</sub>, to 65%, for cars emitting 250 grams CO<sub>2</sub> or more. As a result, vehicles with zero or very low emissions are exempt from the excise tax.

Certain types of vehicles fall under a special exemption category and are subject to reduced tax rates. Vehicles in the exemption category include taxis and specially equipped vehicles used in the tourism industry. The same applies to rental cars. However, in the years 2016 and 2017 the maximum reduction for each rental car was limited to ISK 500,000 (EUR 4,148) and the reduction is further limited to ISK 250,000 (EUR 2,074) in 2018.

Vehicles that use methane as a primary energy source have since 2011 been eligible for a discount from excise tax up to the amount of ISK 1,250,000 (EUR 10,370). Since 1st January 2018, the same applies for vehicles that are fuelled by methanol. Furthermore, vehicles that have been modified to use methane instead of petrol or diesel have since 2011 been eligible for a refund of a maximum of ISK 100,000 (EUR 830). Such refund will however only be awarded to a maximum of 1,000 vehicles.

**Table 31: CO<sub>2</sub> excise tax for vehicles, 2014–2017**

| Registered CO <sub>2</sub> emission (g/km) | Main category (%) | Exemption category (%) |
|--------------------------------------------|-------------------|------------------------|
| 0–80                                       | 0                 | 0                      |
| 81–100                                     | 10                | 0                      |
| 101–120                                    | 15                | 0                      |
| 121–140                                    | 20                | 0                      |
| 141–160                                    | 25                | 5                      |
| 161–180                                    | 35                | 10                     |
| 181–200                                    | 45                | 15                     |
| 201–225                                    | 55                | 20                     |
| 226–250                                    | 60                | 25                     |
| Over 250                                   | 65                | 30                     |

Source: Althingi, Act No 29/1993 on Excise Duties on Vehicles, Fuels, etc. (and later amendments).

#### 4.4.2 *Vehicle tax*

A vehicle tax, called vehicle fee, is collected twice a year. Since 2011 the tax has been based on the vehicle's CO<sub>2</sub> emissions. The tax rate increased slightly in the period 2014–2017. In 2017, the tax collected for each six-month period for vehicles weighing 3,500 kg or less was ISK 5,810 (EUR 48.20) for cars emitting up to 121 g of registered CO<sub>2</sub> emission, but ISK 139 (EUR 1.15) for each additional g of registered CO<sub>2</sub> emission. For vehicles weighing more than 3,500 kg, the rate was ISK 54,420 (EUR 451), plus ISK 2.32 (1.92 eurocent) for each additional kg of registered weight of the vehicle. The vehicle tax for vehicles weighing more than 3,500 kg could however not exceed ISK 85,660 (EUR 711) in each period. A minimum tax is levied on cars that use methane as a primary fuel instead of petrol or diesel. Since 2018, this minimum tax has also applied for cars that use methanol as a primary fuel.

Private vehicles and camping trailers weighing 10,000 kg or more, and vehicles and camping trailers for special use weighing 5,000 kg or more are furthermore charged a vehicle tax based on distance, called kilometre fee. The tax rate is based on the weight of the vehicle or the camping trailer and the number of kilometres driven, measured with equipment which is installed in the vehicle or the camping trailer. The prices of the

kilometre fee only changed slightly in the period 2014–2017. The tax rate in the year 2017 is shown in Table 32 and Table 33.

**Table 32: Weight distance tax for motor vehicles in excess of 5 tonnes, 2017, ISK (eurocent)**

| Weight in kg    | Tax per km    |
|-----------------|---------------|
| 5,000–6,000     | 9.10 (7.55)   |
| 6,001–7,000     | 9.84 (8.16)   |
| 7,001–8,000     | 10.60 (8.79)  |
| 8,001–9,000     | 11.35 (9.42)  |
| 9,001–10,000    | 12.08 (10.02) |
| 10,000–11,000   | 13.16 (10.92) |
| 11,001–12,000   | 14.57 (12.09) |
| 12,001–13,000   | 15.96 (13.24) |
| 13,001–14,000   | 17.35 (14.39) |
| 14,001–15,000   | 18.75 (15.56) |
| 15,001–16,000   | 20.14 (16.71) |
| 16,001–17,000   | 21.53 (17.86) |
| 17,001–18,000   | 22.94 (19.03) |
| 18,001–19,000   | 24.02 (19.93) |
| 19,001–20,000   | 25.10 (20.82) |
| 20,001–21,000   | 26.21 (21.74) |
| 21,001–22,000   | 27.30 (22.65) |
| 22,001–23,000   | 28.37 (23.54) |
| 23,001–24,000   | 29.46 (24.44) |
| 24,001–25,000   | 30.55 (25.35) |
| 25,001–26,000   | 31.64 (26.25) |
| 26,001–27,000   | 32.72 (27.15) |
| 27,001–28,000   | 33.82 (28.06) |
| 28,001–29,000   | 34.91 (28.96) |
| 29,001–30,000   | 36.00 (29.87) |
| 30,001–31,000   | 37.06 (30.75) |
| 31,001 and over | 38.17 (31.67) |

Source: Althingi, Act No 87/2004 on Oil and Kilometres Charge (and later amendments).

**Table 33: Weight distance tax for motor vehicles in excess of 10 tonnes, 2017, ISK (eurocent)**

| Weight in kg    | Tax per km    |
|-----------------|---------------|
| 10,000–11,000   | 0.30 (0.25)   |
| 11,001–12,000   | 0.95 (0.79)   |
| 12,001–13,000   | 1.60 (1.33)   |
| 13,001–14,000   | 2.25 (1.87)   |
| 14,001–15,000   | 2.90 (2.41)   |
| 15,001–16,000   | 3.55 (2.95)   |
| 16,001–17,000   | 4.19 (3.48)   |
| 17,001–18,000   | 4.83 (4.01)   |
| 18,001–19,000   | 5.48 (4.55)   |
| 19,001–20,000   | 6.11 (5.07)   |
| 20,001–21,000   | 6.78 (5.62)   |
| 21,001–22,000   | 7.41 (6.15)   |
| 22,001–23,000   | 8.07 (6.70)   |
| 23,001–24,000   | 8.71 (7.23)   |
| 24,001–25,000   | 9.35 (7.76)   |
| 25,001–26,000   | 9.99 (8.29)   |
| 26,001–27,000   | 10.65 (8.84)  |
| 27,001–28,000   | 11.30 (9.37)  |
| 28,001–29,000   | 11.95 (9.91)  |
| 29,001–30,000   | 12.58 (10.44) |
| 30,001–31,000   | 13.23 (10.98) |
| 31,001 and over | 13.87 (11.51) |

Source: Althingi, Act No 87/2004 on Oil and Kilometres Charge (and later amendments).

#### 4.4.3 *Reduced VAT for low and zero emission vehicles*

Since 2013, VAT discounts have been offered for purchases of electric vehicles, hydrogen vehicles and hybrid vehicles. The discount amount is ISK 1,440,000 (EUR 11,947) for electric vehicles and hydrogen vehicles and ISK 960,000 (EUR 7,964) for hybrid vehicles. Sellers of these vehicle types can furthermore deduct a certain amount from their taxable turnover. The discount is limited to 10,000 vehicles of each eligible type. These discounts were renewed on a yearly basis for the years 2014, 2015 and 2016. In 2017 they were extended to the end of 2020, to increase predictability for importers and buyers and thus encourage investments in low and zero emission vehicles.

### 4.5 *Agriculture and natural resources*

#### 4.5.1 *Tradable fishing quotas and fishing fees*

Fishing is one of the key pillars of the Icelandic economy. Since the early 1990s fisheries management in Iceland has been based on the allocation of transferable quotas to individual fishers and fishing companies. The quotas represent defined shares in the total allowable catch of each fish stock and have successfully created incentives for sustainable harvesting (OECD, 2017a).

Fishing companies have for nearly two decades been subject to a general fishing fee which main purpose is to finance public research, control, surveillance and supervision of fisheries and seafood product processing. In 2012 an additional fee on profits, called special fishing fee, was introduced with a view to ensure that the Icelandic nation gets its share of the profit created by the exploitation of marine resources. The special fishing fee applies to the difference between the sales value of the output and production costs, including a fair rate of return on capital (OECD, 2014).

#### 4.5.2 *Subsidies for agriculture*

The level of public support to agriculture in Iceland has increased in the past few years and is around 56% of gross farm receipts, which was more than three times the OECD average in 2014–2016. The support is mostly in the form of market price support, including high tariffs and payments to farmers (OECD, 2017b).

#### 4.5.3 *Public support of forestry and revegetation*

Forestry and revegetation projects in Iceland have historically been subsidised in various ways, for example through grant schemes, collaborative projects and direct financial assistance (Icelandic Forest Service, 2017, Soil Conservation Service of Iceland, 2018). After a drastic cut following the financial crisis in 2008, public funding for forestry and soil conservation projects has increased slightly in the past years, partly due to the role that land use and forestry activities have been awarded in relation to Iceland's

international climate obligations. Examples of projects that are funded through government agencies are afforestation projects in each region of the country, a project aiming at a 100,000 ha restoration of natural birch forest in South Iceland and wetland restoration activities undertaken by individual landowners (Ministry for the Environment and Natural Resources, 2015).

## 5. Norway

Norway has extensive experience with environmental taxation. As part of the Norwegian taxation system, economic instruments have been introduced to reduce environmentally harmful emissions to air. With substantial energy and environmental taxation already in place, increases in tax rates have been generally modest over recent years.

Norway taxes electricity, mineral oils, motor vehicles and other environmentally harmful products and emissions. Taxes on fuels and motor vehicles account for a large portion of the environmental taxes.

The environmental profile of many taxes has been strengthened since 2014. The CO<sub>2</sub> tax has been gradually increased and expanded, while the number of sectors being exempted from the tax has been reduced. As part of the revisions of the CO<sub>2</sub> taxes, the tax on CO<sub>2</sub> emissions from jet fuel on domestic flights was increased in 2015. In 2017, the CO<sub>2</sub> tax on airborne emission from natural gas from the petroleum continental shelf was increased to NOK 7.16 (EUR 0.77).

Charges are levied on emissions of sulphur and nitrous oxides (NO<sub>x</sub>), although very few emitters pay the NO<sub>x</sub> charge, since sources responsible for more than 90% of emissions liable to the charge have signed up to the voluntary agreements, and instead pay a reduced fee to the NO<sub>x</sub> fund.

During the period 2014–2017 there have been several changes related to taxes on vehicle procurement and consumption. The road usage tax on bioethanol meeting the blending requirements has been gradually increased to the same level as petrol and the road usage tax on biodiesel fulfilling the blending requirements have been gradually increased to the same level as auto diesel (2016). Norwegian drivers have experienced an increase in taxes on fuel use, while the registration tax has been restructured. The engine effect component of the registration tax was reduced in 2016 and then abolished, while the CO<sub>2</sub> emissions rate was increased. The NO<sub>x</sub> component of the registration tax has increased. There have also been several changes in the weight limit component, including an increase in threshold level for the lowest rate from 0 to 500.

On 1 June 2016 the air passenger tax was introduced. The tax covers all flights departing Norwegian airports. In 2017, the rate was NOK 82 (EUR 8.80) for each passenger.

Water use or water pollution is not taxed in Norway. However, consumers pay fees to the local municipality which cover costs for water and sewage treatment. There is an increasing trend among municipalities towards metering and volumetric pricing of water use by households and other consumers.

In 2015, the waste disposal tax was abolished as it was considered to have a limited environmental effect.

Taxes related to transport and electricity consumption generate the most revenue for the Norwegian government. Of the roughly NOK 66 billion (EUR 7 billion) which environmental taxes, fees and charges brought to the Norwegian government in 2015, NOK 45 (EUR 4.83) billion came from vehicle and transport fuel taxes. The motor vehicle registration tax generated over NOK 18 (EUR 1.93) billion and is by far the largest individual source of revenue among environmental taxes, fees and charges. See Table 34.

**Table 34: Revenue from the ten highest revenue-generating environmental taxes, fees and charges, 2017, NOK (EUR)**

| Tax, fee or charge                                                                | NOK million           |
|-----------------------------------------------------------------------------------|-----------------------|
| Motor vehicle registration tax                                                    | 18,533 (1,988)        |
| Road usage tax on auto diesel                                                     | 10,551 (1,132)        |
| Annual tax on motor vehicles (Total weight below 7 500 kg)                        | 9,975 (1,070)         |
| Electricity consumption tax                                                       | 7,538 (809)           |
| Road usage tax on petrol                                                          | 6,011 (645)           |
| CO <sub>2</sub> -tax on mineral products                                          | 5,206 (558)           |
| Tax on CO <sub>2</sub> emissions in petroleum activities on the continental shelf | 4,576 (491)           |
| Basic tax on mineral oil                                                          | 1,777 (191)           |
| Basic tax on disposable packaging                                                 | 1,418 (152)           |
| Annual weight-based tax on motor vehicles (Total weight above 7,500 kg)           | 359 (39)              |
| <i>Total</i>                                                                      | <i>66,868 (7,175)</i> |

Note: Selection based on the ten highest revenue-generating taxes, fees and charges. The total revenue is larger than the sum of these.

Source: OECD/EEA database on environmentally related taxes.

## 5.1 Energy and air pollution

The Norwegian government has committed to the Paris agreement and has set a goal to reach a 40% reduction in greenhouse emissions.<sup>21</sup> Economic instruments are important for achieving these targets.

Norway has had a national emission trading system since 2005, which is now part of the international EU ETS tax system. The system has been revised several times, and the environmental profiles of many taxes have been strengthened.

### 5.1.1 Electricity tax

An excise tax on electricity was introduced in 1951 to finance grid investments and was earmarked up to 1971 to support development of the electricity supply. Today, the tax is mainly fiscally justified but also supports energy efficiency. The ordinary rate applies to households, the service industry and the public sector and administration buildings in manufacturing. In 2014, the ordinary rate was 12.39 NOK öre (1.33 eurocent) per kWh, increasing to 16.32 NOK öre (1.75 eurocent) in 2017. See Table 35.

<sup>21</sup> <https://www.regjeringen.no/no/aktuelt/norge-har-ratifikert-parisavtalen/id2505365/>

**Table 35: Electricity tax, 2014–2017, NOK øre (eurocent) per kWh**

|              | 2014         | 2015         | 2016        | 2017         |
|--------------|--------------|--------------|-------------|--------------|
| General rate | 12.39 (1.33) | 13.65 (1.46) | 16 (1.72)   | 16.32 (1.75) |
| Reduced rate | 0.45 (0.05)  | 0.45 (0.05)  | 0.48 (0.05) | 0.48 (0.05)  |

Source: Government tax proposals 2014–2017 (St. prp. nr. 1 Skatte- avgifts- og tollvedtak).

Manufacturing, petroleum extraction, mining and quarrying and distinct heating pay a reduced electricity tax. This rate also applies to industries in Finnmark County and seven municipalities in northern Troms. The rate was 0.45 NOK øre (0.05 eurocent) per kWh in 2014 and 2015, increasing to 0.48 NOK øre (0.05 eurocent) per kWh in 2016 due to a weak currency. The reduced rate is considered to be in line with the ETS agreement as long as it is larger or equivalent to the minimum rate stipulated by the EU Directive 2003/96/EF concerning restructuring of EU regulation of taxation on energy products and electricity.

Electricity used for the purpose of chemical reduction, electricity used in electrolytic, metallurgical and mineralogical processes, in greenhouses, rail transports and households in Finnmark County and seven municipalities in northern Troms are totally exempted from the electricity tax. Moreover, the supply of electricity for household purposes is exempted from the value added tax in Northern Norway (Finnmark, Troms and Nordland counties) (NCM, 2014).

### 5.1.2 *Base tax on mineral oils*

An excise tax on heating oil was introduced in the 1970, removed in 1993, and then re-introduced in 2000 based on the argument that increases in the tax on electricity should not lead to an increase in demand for environmentally harmful oil for heating purposes (NCM, 2014). The general rate applies to kerosene, fuel oils, marine gas oils and diesel oil exempt from road usage tax. International shipping, fishing and catching in domestic and close by seas, fish oil and meals industry, domestic flights and petroleum extraction on the continental shelf are all exemptions from the base tax.

In year 2000 the tax was increased to the same level as the electricity tax. Households and most industries also face a surcharge on the grid tariff which is allocated to the Climate- and Energy Fund (returns on the fund finance Enova, which supports energy efficiency and conversion efforts). In 2011 the base tax was raised equivalently. Since then, the ordinary tax rate has increased with price levels. The reduced rate has been nominally unchanged for several years, until it was increased in 2016 to balance a weak currency. See Table 36.

**Table 36: Base tax on mineral oils, 2014–2017, NOK (EUR)**

|              | 2014         | 2015         | 2016         | 2017        |
|--------------|--------------|--------------|--------------|-------------|
| General rate | 1.557 (0.17) | 1.59 (0.17)  | 1.63 (0.17)  | 1.60 (0.17) |
| Reduced rate | 0.126 (0.01) | 0.126 (0.01) | 0.147 (0.02) | 0.15 (0.02) |

Source: Government tax proposals 2014–2017 (St. prp. nr. 1 Skatte- avgifts- og tollvedtak).

Considering mainland Norway, there are less exemptions from the base tax on mineral oil than those for the electricity tax. The pulp and paper industry was exempt from the tax until 2008, but has since then been charged a reduced rate. Users in Finnmark and northern Troms are subject to the ordinary rate, unlike the electricity tax. Thus, there is a considerable tax incentive to substitute heating oil with electricity in Norway. From 2020, it will be prohibited to use mineral oils as household heating and heating of buildings. This will include both use of fuel oils as base load and top load (NCM, 2014).

### 5.1.3 *CO<sub>2</sub> tax*

#### **CO<sub>2</sub> tax on mineral oil products**

In 1991, the CO<sub>2</sub> tax on mineral oil products was introduced. The objective of the tax is to contribute to cost-effective reductions of CO<sub>2</sub> emissions. Mineral oil, petrol, natural gas and LPG are all included in the tax. From 2003, all use of coal and coke became exempted from the CO<sub>2</sub> tax as part of the adaptation process to new regulations set out by ESA (EFTA Surveillance Authority).

Since 2009, the CO<sub>2</sub> tax has been modified in several ways. As of 1 September 2010, the tax includes the domestic use of natural gas and LPG, and it was raised for petroleum activities on the continental shelf as of 2013. Also, in 2013, a reduced tax rate on mineral oil used for fishing and catching in inshore waters was introduced.

In 2012 CO<sub>2</sub> emissions from aviation were included and the rate was increased in 2015. Several CO<sub>2</sub> tax rates have been increased nominal. From 1 January 2018 a tax of NOK 500 (EUR 54) per tonne CO<sub>2</sub> was set as a general rate for emissions not covered by the CO<sub>2</sub> emissions trading system. See Table 37.

#### **Tax on CO<sub>2</sub> emissions from the continental shelf**

As with the CO<sub>2</sub> tax on mineral oil products, a tax on CO<sub>2</sub> emissions from petroleum activities on the continental shelf was introduced in 1991. CO<sub>2</sub> emissions from these activities were included in the emissions trading system in 2008, and the installations have had to buy all their allowances. This means that the petroleum sector is charged with both the CO<sub>2</sub> tax and the prices of CO<sub>2</sub> emissions allowances. To ensure that the sector kept the incentives to minimize CO<sub>2</sub> emissions, it was decided to maintain the CO<sub>2</sub> tax which still today is much higher than the price of CO<sub>2</sub> emissions allowances (NCM, 2014). In 2017, a sub scheme in the CO<sub>2</sub> tax on the continental shelf on airborne emissions from natural gas was introduced at NOK 7.16 (EUR 0.77) per SM<sub>3</sub>.

**Table 37: CO<sub>2</sub> tax rates, 2014–2017, NOK (EUR) per litre/Sm<sup>3</sup>/kg/tCO<sub>2</sub>**

|                                             | 2014        | 2015        | 2016         | 2017         |
|---------------------------------------------|-------------|-------------|--------------|--------------|
| Gasoline                                    | 0.93 (0.10) | 0.95 (0.10) | 0.97 (0.10)  | 1.04 (0.11)  |
| Jet fuel                                    | 0.84 (0.09) | 1.05 (0.11) | 1.08 (0.12)  | 1.10 (0.12)  |
| Jet fuel, reduced rate                      | 0.56 (0.06) | 1.05 (0.11) | 1.08 (0.12)  | 1.10 (0.12)  |
| <b>Mineral oil</b>                          |             |             |              |              |
| Light fuel oil diesel                       | 0.88 (0.09) | 0.90 (0.10) | 0.92 (0.10)  | 1.20 (0.13)  |
| Heavy fuel oil                              | 0.88 (0.09) | 0.90 (0.10) | 0.92 (0.10)  | 1.20 (0.13)  |
| <b>Mineral oil reduced rate</b>             |             |             |              |              |
| Light fuel oil diesel                       | 0.31 (0.03) | 0.31 (0.03) | 0.31 (0.03)  | 0.32 (0.03)  |
| Heavy fuel oil                              | 0.31 (0.03) | 0.31 (0.03) | 0.31 (0.03)  | 0.32 (0.03)  |
| <b>Domestic use of gas</b>                  |             |             |              |              |
| Natural gas                                 | 0.66 (0.07) | 0.67 (0.07) | 0.84 (0.09)  | 1.35 (0.14)  |
| Natural gas, reduced rate                   | 0.05 (0.01) | 0.05 (0.01) | 0.057 (0.01) | 0.057 (0.01) |
| LPG                                         | 0.99 (0.11) | 1.01 (0.11) | 1.26 (0.14)  | 1.35 (0.14)  |
| <b>Continental shelf</b>                    |             |             |              |              |
| Light fuel oil diesel                       | 0.98 (0.11) | 1.00 (0.11) | 1.02 (0.11)  | 1.04 (0.11)  |
| Heavy fuel oil                              | 0.98 (0.11) | 1.00 (0.11) | 1.02 (0.11)  | 1.04 (0.11)  |
| Natural gas (from 2017: airborne emissions) | 0.98 (0.11) | 1.00 (0.11) | 1.02 (0.11)  | 7.16 (0.77)  |

Source: Government tax proposals 2014–2017 (St.prp. nr. 1 Skatte- avgifts- og tollvedtak).

#### 5.1.4 *The CO<sub>2</sub> emissions trading system*

Norway became part of the EU ETS at the start of Phase II in 2008. Prior to joining the EU ETS, Norway managed its own emissions trading scheme (which mirrored the EUs) from 2005 to 2007. During Phase II of the EU ETS (2008–2012), half of the Norwegian allowances were auctioned and 39% were freely allocated.

Phase III started in 2013, and here 100% of allowances must be purchased through auction or on secondary markets. Beginning with Phase III around 50% of Norway's emissions are covered by the EU ETS. Some sectors, such as the petroleum sector, are covered by both the ETS and taxes on CO<sub>2</sub>. Therefore, taxes and EU ETS prices must be adjusted accordingly (NCM, 2014).

In 2015 the Norwegian minister of Climate and Environment signed a declaration to reform the EU ETS CO<sub>2</sub> emissions trading system for the next phase (Phase IV 2021–2030). The changes are mainly considering the total quota between industries, sectors and countries within the EU. There will be no major changes in the system structure, the different sectors and greenhouse gases stays the same.

#### 5.1.5 *Sulphur tax*

The tax on sulphur in mineral oil was introduced in 1970, marking the start of the introduction of taxes for purely environmental purposes. The introduction of the tax aimed to reduce sulphur emissions and fulfil various international protocols on sulphur emissions reduction that had been signed over the years. Oils with less than 0.05% sulphur today have a zero tax rate.

The tax rate was nominally unchanged in the period 1991–2007 but has since then been adjusted in line with expected inflation. In 2017 the sulphur was NOK 0.136 (1.46 eurocent) per litre. See Table 38 for the development from 2014–2017.

**Table 38: Sulphur tax, 2014–2017, NOK øre (eurocent) per litre**

|             | 2014        | 2015        | 2016        | 2017        |
|-------------|-------------|-------------|-------------|-------------|
| Sulphur tax | 7.90 (0.85) | 8.10 (0.87) | 13.3 (1.43) | 13.6 (1.46) |

Source: Government tax proposals 2014–2017 (St. prp. nr. 1 Skatte- avgifts- og tollvedtak)

When the emissions of sulphur are less than the sulphur content in the products, the tax is reduced, i.e. because of cleaning of the emissions or when the sulphur is contained in the final product (NCM, 2014).

#### 5.1.6 *Tax on NOx emissions*

In 2007, the tax on NOx emissions was introduced to contribute to cost- effective reductions in NOx emissions and alongside other policy measures to contribute to fulfilling of Norway’s obligations in the Gothenburg Protocol (Nordic Council, 2009).

The tax comprises the following components:

- Propulsion of machinery with total installed engine effect of more than 750 kW
- Engines, boilers and turbines with a total heating effect of more than 10 MW
- Flaring at offshore and onshore installations.

The tax is covering both the Norwegian mainland and the continental shelf. An exemption is made on the excise tax for emissions of NOx for vessels travelling between Norwegian and foreign ports, vessels used for fishing and catching in distant waters, aircraft travelling between Norwegian airports and foreign airports and mission units covered by an environmental agreement signed with the Norwegian government for initiating measures to reduce NOx that are implemented in accordance with established national environmental goals.

In May 2008, the Ministry of Environment and 14 trade organisations agreed on implementation of NOx reducing interventions in accordance with a fixed goal. Shortly after, the ESA approved the agreement. A NOx fund was established with the purpose to finance emission reductions where abatement costs are lowest. The affiliated companies are entitled to be exempted from the NOx tax. Very few emitters pay the NOx charge, since sources responsible for more than 90% of emissions liable to the charge have signed up to the voluntary agreements, and instead pay a reduced fee to the NOx Fund (NCM, 2014). The previous agreement ran from 2010 to 2017. In Table 39 it is seen that the NOx charge in 2017 was NOK 21.59 (EUR 2.32) per kilogram. The new agreement for 2018–2025 has been approved by ESA (March 2018), and industries had to sign by 1 April 2018 to be entitled to an exemption from the NOx tax.

**Table 39: Nitrous oxide tax, 2014–2017, NOK (EUR) per kg**

|                   | 2014         | 2015         | 2016         | 2017         |
|-------------------|--------------|--------------|--------------|--------------|
| Nitrous oxide tax | 17.33 (1.86) | 19.19 (2.06) | 21.17 (2.27) | 21.59 (2.32) |

Source: Government tax proposals 2014–2017 (St. prp. nr. 1 Skatte- avgifts- og tollvedtak).

### 5.1.7 *Road usage tax on petrol and auto diesel*

As early as 1931, a tax on petroleum consumption was introduced and was up until 1964 earmarked for road construction. This was the first energy-related tax to be introduced in Norway. The current road usage tax was introduced in 1993. The purpose of these taxes is to ensure that users meet external costs connected with accidents, congestion, noise, road wear and tear and harmful local emissions to air (NCM, 2014).

In 2010, the road usage tax was extended to include biodiesel and in 2016 natural gas and LPG were included, however the tax on natural gas was removed in 2017. Hydrogen used for transportation purposes is still fully exempted from the road usage tax. In 2017 the road usage tax on auto diesel and petrol was increased as part of “the green tax shift” initiated by the Government. See Table 40.

**Table 40: Petrol and auto diesel tax, 2014–2017, NOK (EUR) per litre/Sm<sup>3</sup>/kg**

|                                     | 2014        | 2015        | 2016        | 2017        |
|-------------------------------------|-------------|-------------|-------------|-------------|
| Petrol (<10 ppm)                    | 4.87 (0.52) | 4.87 (0.52) | 4.99 (0.54) | 5.19 (0.56) |
| Auto diesel (<10 ppm)               | 3.82 (0.41) | 3.82 (0.41) | 3.44 (0.37) | 3.8 (0.41)  |
| Biodiesel (sustainability criteria) | 1.91 (0.20) | 1.91 (0.20) | -           | -           |
| Biodiesel                           | -           | -           | 3.44 (0.37) | 3.8 (0.41)  |
| Bioethanol                          | -           | -           | 4.99 (0.54) | 5.19 (0.56) |
| Natural gas                         | -           | -           | -           | -           |
| LPG                                 | -           | -           | 0.69 (0.07) | 1.43 (0.15) |

Source: Government tax proposals 2014–2017 (St. prp. nr. 1 Skatte- avgifts- og tollvedtak).

### 5.1.8 *Subsidies for energy efficiency and renewable energy*

In June 2001 the public agency Enova was established and remains the most important tool for promoting energy efficiency and increased heat and electricity production from renewable sources. Enova is financed through a surcharge of 1 NOK öre per kWh on the grid tariff paid by all electricity users, annual grants from the Government budget and yields from the Basic Energy fund.

A fund to promote technological advances in industry under Enova was established in 2012. The Norwegian government also grants funds for research and development concerning energy and oil production and consumption, and also provides large subsidies to research and test facilities for carbon capture and storage (NCM, 2014).

### Renewable electricity certificate scheme

Since 2012, a certificate scheme for renewable electricity has been in place in Norway. For every MWh of electricity produced from renewable sources, producers get a certificate. The scheme is administrated by the NVE (Norwegian Water Resources and Energy Directorate). Costs associated with the scheme are added to the energy bill of the end-user. Certificates are traded on an open market based on supply and demand (NCM, 2014). Norway is part of the Swedish certificate market. The common market will last until end of 2035. By 2020, Norway and Sweden are set to increase energy production based on renewable energy sources by 28.4 MW (NVE, 2018).

## 5.2 Water

No specific environmental taxes or charges targeted water pollution are in place in Norway. However, there is a service fee associated with water and waste-water usage. Suppliers of drinking water and wastewater treatment, including municipalities are not allowed to charge more for water-related services than required to cover the associated costs. The end-users pay a fee to the local municipality or supplier of fresh water, which is either a fixed rate or consumption-based method which usually has a minimum fee (NCM, 2014).

Even though less than one per cent of total run-off in Norway is withdrawn for human use, at the local level water scarcity may still occur, and there is an increasing trend among municipalities towards metering and volumetric pricing of water use by households and other consumers.

## 5.3 Waste

### 5.3.1 Waste disposal tax

Introduced in 1992, the tax on waste disposal originally consisted of a tax on waste for landfills and a tax on emissions from waste incineration. The latter was removed in 2010.

In 2009 it became prohibited to dispose of biologically degradable waste in landfills. The tax has since then been considered to have minimal effect on the environment, and deprived landfills of resources (NCM, 2014). In 2015 it was therefore decided to remove the waste disposal tax. See Table 41.

Table 41: Waste disposal tax, 2014, NOK (EUR) per tonne

|                                                                          | 2014        |
|--------------------------------------------------------------------------|-------------|
| Waste for landfills                                                      | 294 (31.55) |
| Waste exempt from ban on landfilling of biologically degradable material | 488 (52.36) |

Source: Government tax proposals 2014–2017 (St. prp. nr. 1 Skatte- avgifts- og tollvedtak).

### 5.3.2 *Tax and refund system on hazardous substances*

In 2000 a tax on the use of trichloroethylene (TRI) and tetrachloroethylene (PER) was introduced. The tax also includes use of recovered TRI and PER, and inclusion in other products with more than 1% and 0.1% respectively. TRI and PER that are recovered for own use are exempted from the tax (NCM, 2014). As seen in Table 42 the tax in 2017 was set at NOK 71.15 (EUR 7.63) per kg pure compound.

**Table 42: Tax on TRI and PER, 2014–2017, NOK (EUR) per kg pure compound**

|                    | 2014         | 2015         | 2016         | 2017         |
|--------------------|--------------|--------------|--------------|--------------|
| Tax on TRI and PER | 66.65 (7.15) | 68.05 (7.30) | 69.75 (7.48) | 71.15 (7.63) |

Source: Government tax proposals 2014–2017 (St. prp. nr. 1 Skatte- avgifts- og tollvedtak).

### 5.3.3 *Tax and refund system for some greenhouse gases*

In 2003 a tax on the import and production of hydrofluorcarbons (HFC) and perfluorcarbons (PFC) was introduced to reduce emissions of the substances and stimulate the use of alternative gases. The tax also includes all mixtures of HFC and PFC products containing these substances. Recovered HFC and PFC are exempted from the tax.

By delivering waste containing HFC and PFC to a certified waste collector, the entire tax is refunded (NCM, 2014). In 2017, the tax on HFC and PFC was NOK 450 (EUR 48.29) per tonne CO<sub>2</sub> equivalent, see Table 43.

**Table 43: Tax on HFC and PFC, 2014–2017, NOK (EUR) per tonne CO<sub>2</sub> equivalent**

|                    | 2014        | 2015        | 2016        | 2017        |
|--------------------|-------------|-------------|-------------|-------------|
| Tax on HFC and PFC | 330 (35.41) | 354 (37.98) | 383 (41.10) | 450 (48.29) |

Source: Government tax proposals 2014–2017 (St. prp. nr. 1 Skatte- avgifts- og tollvedtak).

### 5.3.4 *Tax and refund system for lubricating oil*

With its introduction in 1988, the tax on lubricating oil aimed to reduce unfavourable disposal of waste oil (discarded lubricating oil). The tax rates have been adjusted to price levels in 2014–2017.

The tax does not cover lubrication oil used as process-, transformer-, or switch oils. Distribution of oil to consumers in packages containing less than 0.15 litres are also exempted. As of 2017, the tax is set at NOK 2.17 (EUR 0.23) per litre, see Table 44.

**Table 44: Tax on lubricating oil, 2014–2017, NOK (EUR) per litre**

|                        | 2014        | 2015        | 2016        | 2017        |
|------------------------|-------------|-------------|-------------|-------------|
| Tax on lubricating oil | 1.94 (0.21) | 1.98 (0.21) | 2.13 (0.23) | 2.17 (0.23) |

Source: Government tax proposals 2014–2017 (St. prp. nr. 1 Skatte- avgifts- og tollvedtak).

### 5.3.5 *Taxes on beverage containers*

The tax on beverage containers was introduced in 1994 and consist of both an environmental tax and a general tax on each unit. The general tax is imposed on all beverage containers that cannot be used in their original form. Depending on the material the taxes vary between NOK 1.17–5.70 (EUR 0.13–0.61) per unit, see Table 45.

**Table 45: Taxes on beverage containers, 2014–2017, NOK (EUR) per unit**

|                            | 2014        | 2015        | 2016        | 2017        |
|----------------------------|-------------|-------------|-------------|-------------|
| Glass and metal containers | 5.34 (0.57) | 5.45 (0.58) | 5.59 (0.60) | 5.70 (0.61) |
| Plastic containers         | 3.22 (0.35) | 3.29 (0.35) | 3.37 (0.36) | 3.44 (0.37) |
| Carton and cardboard       | 1.32 (0.14) | 1.35 (0.14) | 1.38 (0.15) | 1.41 (0.15) |
| General tax                | 1.10 (0.12) | 1.12 (0.12) | 1.15 (0.12) | 1.17 (0.13) |

Source: Government tax proposals 2014–2017 (St. prp. nr. 1 Skatte- avgifts- og tollvedtak).

The purpose of the environmental tax is to price the cost of littering the natural environment with empty containers, with different rates reflecting the fact that the environmental harm they cause is different. Depending on the recycling rate, the environmental tax is differentiated. Beverage containers with a recycle rate of 95% or more are fully exempted from the tax (NCM, 2014).

### 5.3.6 *Deposit-refund and other systems for refillable and non-refillable beverage containers*

The system of taxation on beverage containers consists of a deposit-refund system, which is supported by producer responsibility. The deposit system is operated by the trade and industry organisation Infinitum<sup>22</sup> which enables manufacturers and importers of beverages in cans or non-refillable PET bottles to benefit from reduced rates of the environmental tax (see Table 45) by registration of their products. There are also two other return systems based on a refundable deposit scheme. Grønt Punkt Norge operate for one-way drinks cartons, while Norsk Glassgjenvinning are handles non-refillable and refillable glass and plastic bottles. These are collected through a system which Norwegian brewers and soft drinks producers operate. Refillable beverage containers are part of the deposit-refund system described above. One-way cartons and non-refillable glass are not part of this system but financed through product fees.

### 5.3.7 *Deposit-refund system and producer responsibility for end-of-life vehicle (ELVs)*

The refund system for ELVs weighing less than 3.5 tonnes was established in 1978 to encourage car owners to return their vehicles to a certified treatment plant (Nordic Council, 2014). Later, the system also covered caravans, snow scooters and minibuses.

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<sup>22</sup> [www.infinitum.no](http://www.infinitum.no)

A refund of NOK 3,000 (EUR 322) is given when a vehicle is returned. Up until 2007 the Norwegian Pollution Control Authority (SFT) operated the system, and the car dismantlers themselves received a fee per car for removing the environmentally hazardous elements. Further funding was also provided for costs associated with compressing and transporting the scrapped cars. As a follow-up to the requirements of the European Commission's amendment to the End of Life Vehicle Directive 2000/53, car importers and producers from 2007 took over responsibility for the collection and recycling of scrap cars from SFT. Norwegian car importers established Autoretur AS in 2007. Collection of vehicles are operated by Bilgjenvinning, Norsk Gjenvinning Metall and Bilretur AS.

From 1 January 2018 the deposit-refund system was extended to cover motor bikes and heavy vehicles such as trucks and tankers.

## 5.4 Transport

### 5.4.1 *Registration tax*

In order to reduce increasing problems with the trade balance, the purchase tax on passenger cars and other motor vehicles was introduced in 1955. The purchase tax increased the purchase prices on new vehicles and thus reduced demand. The tax has primarily been a fiscal tax, although it has shifted towards an environmental focus over the years (NCM, 2014).

Several changes have been made to the tax scheme over time, with the last major change taking place in 2017. The registration tax is calculated based on the weight of the vehicle, engine stroke, NO<sub>x</sub> and CO<sub>2</sub> emissions. The environment component of the vehicle registration tax was strengthened further, with the NO<sub>x</sub> and CO<sub>2</sub> emissions having a larger weight, while the engine effect rate was abolished. The details are shown in Table 46.

**Table 46: Various components in the registration tax for passenger cars, 2014–2017, NOK (EUR)**

|                                                                                                                                        | 2014           | 2015              | 2016              | 2017              |
|----------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------------|-------------------|-------------------|
| <b>Specific weight (NOK (EUR) per kg)</b>                                                                                              |                |                   |                   |                   |
| First 1,150 kg (150 kg in 2016, 350 kg in 2017)                                                                                        | 38.30 (4.11)   | 39.10 (4.20)      | 0 (0)             | 0 (0)             |
| Next 1000 kg (in 2016, 850 kg in 2017)                                                                                                 | -              | -                 | 38.08 (4.09)      | 26.51 (2.84)      |
| Next 250 kg (200 kg in 2017)                                                                                                           | 83.50 (8.96)   | 85.25 (9.15)      | 83.01 (8.91)      | 66.05 (7.09)      |
| Next 100 kg                                                                                                                            | 167.01 (17.92) | 170.52 (18.30)    | 166.04 (17.82)    | 206.41 (22.15)    |
| Rest                                                                                                                                   | 194.23 (20.84) | 198.31 (21.28)    | 193.11 (20.72)    | 240.06 (25.76)    |
| <b>Engine effect (NOK (EUR) per kW)</b>                                                                                                |                |                   |                   |                   |
| First 70 kW                                                                                                                            | 0 (0)          | 0 (0)             | 0 (0)             | 0 (0)             |
| Next 30 kW                                                                                                                             | 240 (25.75)    | 245.04 (26.29)    | 125.59 (13.48)    | 0 (0)             |
| Next 40 kW                                                                                                                             | 695 (74.57)    | 709.60 (76.14)    | 363.67 (39.02)    | 0 (0)             |
| Rest                                                                                                                                   | 1,720 (184.56) | 1,756.12 (188.43) | 900.01 (96.57)    | 0 (0)             |
| <b>NOX emissions (NOK (EUR) per kg)</b>                                                                                                | 46.14 (4.95)   | 47.11 (5.05)      | 57.95 (6.22)      | 70.93 (7.61)      |
| <b>CO<sub>2</sub> emissions (NOK (EUR) per g/km)</b>                                                                                   |                |                   |                   |                   |
| First 105 g/km (95 g/km in 2016, 75 g/km in 2017)                                                                                      | 0 (0)          | 0 (0)             | 0 (0)             | 0 (0)             |
| Next 15 g/km (25 g/km in 2017)                                                                                                         | 779 (83.59)    | 795.36 (85.34)    | 896.76 (96.22)    | 914.70 (98.15)    |
| Next 40 g/km (30 g/km from 2016)                                                                                                       | 785 (84.23)    | 801.49 (86.00)    | 903.68 (96.97)    | 995.49 (106.82)   |
| Next 70 g/km                                                                                                                           | 1,830 (196.36) | 1,868.43 (200.49) | 2,106.65 (226.05) | 2,685.98 (288.21) |
| Rest                                                                                                                                   | 2,938 (315.25) | 2,999.70 (321.87) | 3,382.16 (362.91) | 3,449.80 (370.17) |
| Deduction per gram of emissions, for emissions below 105 g/km, applicable down to 50 g/km and only to cars emitting less than 105 g/km | 829 (88.95)    | 896.41 (96.19)    | 918.82 (98.59)    | 937.2 (100.56)    |
| Deduction per gram of emissions for emissions below 50 g/km, applicable only to cars emitting less than 50 g/km                        | 984 (105.58)   | 1,054.66 (113.17) | 1,081.03 (116.00) | 1,102.65 (118.32) |

Source: Government tax proposals 2014–2017 (St.prp. nr. 1 Skatte- avgifts- og tollvedtak).

To encourage take-up of cars with low NO<sub>x</sub> emissions, a tax on NO<sub>x</sub> emissions was added to the registration tax in 2012. The engine effect component has been reduced over the last years, and it was decided to remove this element of the registration tax in 2017. Furthermore, the change towards a revenue-neutral framework is set to favour vehicles with low emissions.

The registration taxes for motor cycles and snow scooters still have progressive tax systems based on displacement and engine effect, on top of this there is a unit tax for motor cycles and a weight tax for snow scooters (NCM, 2014).

#### 5.4.2 Tax on boat engines

In order to favour the demand of smaller boat engines, a tax on boat engines was introduced in 1978. In 2014 the tax was at NOK 161.5 (EUR 17.33) per horse power. However, the government decided to abolish the tax from 1 July 2014, with the purpose of a faster transformation towards new and more environmentally-friendly boats.

#### 5.4.3 *Annual excise tax on motor vehicles*

A predecessor of the excise tax was introduced in 1917 as part of a taxation regime on luxury goods. The current tax is paid annually by owners of vehicles with a total weight of less than 7,500 kg and is seen as a fiscal tax.

Since 2008 the annual tax has been differentiated according to whether the diesel vehicle has an originally installed particle filter or not. The change had to be seen in the light of the change in the registration tax in 2007 that led to purchase of more diesel cars (NCM, 2014). In 2017 the highest rate was reduced by approx. 12%, while the other rates were adjusted to the expected inflation rate.

From 2018 the annual excise tax is replaced with a traffic insurance fee for vehicles with a total weight of less than 7,500 kg. The insurance fee is to be collected by the insurance companies. It is expected to minimally affect the owner of the vehicle, as it will be around the same amount as the previous annual excise tax. See the details in Table 47.

**Table 47: Vehicle excise tax, 2014–2017, NOK (EUR) per vehicle**

|                                                                | 2014           | 2015           | 2016           | 2017           |
|----------------------------------------------------------------|----------------|----------------|----------------|----------------|
| Diesel vehicles without factory fitted particle filter         | 3,490 (374.48) | 3,565 (382.53) | 3,655 (392.19) | 3,290 (353.02) |
| Petrol and diesel vehicles with factory fitted particle filter | 2,995 (321.37) | 3,060 (328.34) | 3,135 (336.39) | 2,820 (302.59) |
| Motor cycles                                                   | 1,835 (196.90) | 1,875 (201.19) | 1,920 (206.02) | 1,960 (210.31) |
| Camping trailers                                               | 1,120 (120.18) | 0 (0)          | 0 (0)          | 0 (0)          |
| Tractors, mopeds etc. (including electric cars)                | 425 (45.60)    | 435 (46.68)    | 445 (47.75)    | 455 (48.82)    |

Source: Government tax proposals 2014–2017 (St.prp. nr. 1 Skatte- avgifts- og tollvedtak).

#### 5.4.4 *Annual weight excise tax*

This annual weight excise tax consists of a weight component and an environmental component. Since 2006 the tax has been broadened to comprise all vehicles with a total weight of 7,500 kg or more. The tax component regarding weight is dependent on the total weight of the vehicle, suspension system and the number of axles. The tax rates are highly differentiated and detailed. As opposed to the traffic insurance tax (for vehicles < 7,500 kg), this tax is still to be collected by the Norwegian Tax Administration (NCM, 2014).

#### 5.4.5 *Road tolls*

Several toll roads are found around the country where vehicles have to pay to use the road, bridge or tunnel. This is done to finance the construction of roads, bridges, tunnels, etc. Several larger Norwegian cities also have toll rings where all vehicles entering the city centres have to pay a fee (OECD, 2011). In recent years, fees have been differentiated between small and large vehicles, rush hours and in Oslo- between diesel, petrol and electric cars. Thus, the environmental effect of the tolls is shifting from a purely fiscal purpose to an environmental instrument (NCM, 2014).

#### 5.4.6 *Landing charges*

A starting charge, passenger charges, en route charges, security charges and de-icing charges are levied on flights to and from Norwegian airports to finance operation costs and investments in Norwegian airports. The charges are made to reduce passenger air travel demand which could have environmental consequences, through contributing to increasing travel costs. At Bodø Airport a noise-differentiated surcharge on the start charge has been in place since 1990, differentiated by airplane noise and time of the day. The rationale behind this tax was to encourage airlines to use low-noise airplanes at this airport.

#### 5.4.7 *Air passenger tax*

On 1 June 2016 an air passenger tax was introduced. The tax covers all flights departing Norwegian airports. Exemptions are made for cabin personnel, children under the age of 2 and passengers on transfer flights.

A similar air passenger tax was introduced in 1978 on charter flights departing Norwegian airports. In 1994 this was broadened to cover all flights with overseas destination. In the 2000s the tax appeared with variations in the rate, including domestic flights, before being abolished in 2002.

#### 5.4.8 *Support to public transport*

Public transport is subsidised to make it more competitive and to achieve the aims of the national transport policy, including reducing emissions to air. Subsidies vary on an annual basis (NCM, 2014).

### 5.5 *Agriculture and natural resources*

#### 5.5.1 *Environmental tax on pesticides*

The tax on pesticides is an excise tax collected by the Ministry of Agriculture. Before 2009 the tax was earmarked, but since then the revenue has gone to the Treasury. The pesticides are grouped in seven tax classes depending on their health and environmental risk, and the tax is paid according to this and the size of the land used. The tax has led to the use of pesticides with lower health and environmental risks (NCM, 2014).

#### 5.5.2 *Funding for conservation of land*

Funds for land conservation are mainly spent on establishing conservation areas on private land according to the Nature Conservation Act, through the purchase of private land, and/or to compensate for inconvenience connected with the restriction of use of private land areas. The funds are provided by the Ministry of Environment and are mainly used for conservation and protection of forest land, national parks and other protected areas, and to make coastal areas available for the public. The amount of funding provided varies considerably from one year to another, depending on the establishing of new protected land areas (NCM, 2014).



## 6. Sweden

Economic instruments used to correct for negative environmental externalities have been widely used in Sweden since the early 1990s. Among the different types of economic instruments available, taxes and subsidies appear to be the most widely used even though there are examples of other market-based solutions e.g. the EU-ETS, tradable fishing quotas and a market-based system for reduction of nitrous oxides from combustion plants.

Traditionally, and still today, there has been a dominance of economic instruments in the areas of energy, greenhouse gases and air pollution. Examples are a tax on energy consumption, energy and carbon dioxide tax on fossil fuels, a sulphur tax and regulation for nitrous oxides. In addition, Sweden has since 2005 participated in the EU Emissions Trading Scheme for greenhouse gases. A final instrument worth mentioning with a purpose to decrease emissions of greenhouse gases is the subsidy scheme for renewable energy sources, which has been in place since 2003.

In the period of 2014–2017, several changes have been made to existing instruments and a few new instruments have been implemented. A decision from 2017, that most likely will have significant effect on climate policy and related economic instruments in the years to come, regards the Climate Act where Sweden commits to several actions with a purpose to decrease greenhouse gas emissions. As a result of a broad agreement among the political parties in Sweden, the energy tax on consumption for households and industries was subject to a smaller increase in 2017. The increase was intended to finance lowered taxes for electricity production, decided upon in the same agreement<sup>23</sup>. Increases in both energy and carbon dioxide taxes on fossil fuels have occurred yearly over the period, which have been made to adjust for inflation. A new addition since 2017 is that the yearly adjustment of tax rates also should include changes in gross domestic product (GDP), which add to the energy tax on gasoline and diesel an additional yearly increase corresponding to 2% of both the energy and carbon dioxide tax on such fuels. Other changes in regulations related to energy and reduction of greenhouse gas emissions are e.g. stronger support for renewable energy through an increase in the green certificate system, as well as an implementation of a new subsidy scheme for local climate investments (Climate leap or *Klimatklivet* in Swedish) in 2015. Economic instruments related to water management appears to not be widely used and identified regulations are user charges for water supply and a subsidy scheme for projects with a purpose to improve water quality.

Traditionally, economic instruments have not been used to regulate the use of hazardous substances, instead administrative instruments such as bans, or other

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<sup>23</sup> <https://www.regeringen.se/496384/contentassets/6179b08ced824454a37bba63ddfc02c/skatteforslag-med-anledning-av-energioverenskommelsen-prop.-201617142>

restrictions are more commonly used. A change can be described in 2017 when the so-called *Chemical tax* (*Kemikalieskatten*) was introduced following the results of a public report (SOU 2015:30) regarding market-based regulation of hazardous substances. The tax is levied on harmful flame retardants in certain electronic products.

Besides already mentioned changes in energy and carbon dioxide tax on fuels, other changes regarding regulations related to transport have been made during the period. With the purpose to increase the share of cars in the car pool associated with low carbon emissions, a more stringently incentivizing tax and subsidy scheme, a bonus-malus program, on vehicles was decided upon in 2017 and implemented in 2018. Other noteworthy changes in transport is the implementation of a subsidy on the purchase of electric bicycles as well as a new tax on aviation, both implemented in 2017.

See Table 48 for the revenue from the ten highest revenue generating environmental taxes, fees and charges.

**Table 48: Revenue from the ten highest revenue-generating environmental taxes, fees and charges, 2017, SEK (EUR)**

|                                        | Million                |
|----------------------------------------|------------------------|
| Energy tax on fuels                    | 23,664 (2,457)         |
| Carbon dioxide tax                     | 23,530 (2,443)         |
| Energy tax on electricity              | 23,213 (2,410)         |
| Vehicle tax                            | 13,273 (1,378)         |
| Fee to nuclear fuel fund               | 3,796 (394)            |
| Tax on road traffic insurance          | 2,894 (300)            |
| Congestion tax                         | 2,743 (285)            |
| Tax on thermal effect of nuclear power | 2,564 (266)            |
| Road charges                           | 1,015 (105)            |
| Tax on chemicals                       | 734 (76)               |
| <i>Total</i>                           | <i>97,172 (10,089)</i> |

Note: Selection based on the ten highest revenue-generating taxes, fees and charges. The total revenue is larger than the sum of these.

Source: Statistics Sweden (2018).

## 6.1 Energy and air pollution

In June 2017, the Swedish government decided on a new climate policy framework which is described as the most important climate reform in Swedish history (Government Offices of Sweden, 2018). One part of the climate policy framework is the implementation of a Climate Act stating that the government is obliged to pursue climate policy based on climate goals taken by the Riksdag. The overall climate goal is that Sweden will have net zero emissions of greenhouse gases by the year 2045. By implementing the climate policy framework, Sweden continues on an ambitious road for decreasing domestic greenhouse gas emissions. The carbon dioxide tax is described as the corner stone in climate regulation. It was introduced in the early 1990s as one of the first of its kind in the world, and the tax rate is the highest compared with equivalent instruments in other countries (World Bank, 2018). High energy taxes on fuel and on the

consumption of energy also contribute to the reduction of energy use and emissions of greenhouse gas emissions.

Following severe environmental problems with acidification and eutrophication in terrestrial environments as well as lakes, rivers and coastal areas, economic instruments on emissions of sulphur and nitrogen oxides have been in place in Sweden since early 1990s. Both a tax on sulphur dioxide and a market based regulatory instrument for nitrogen oxides have led to significant decrease of emissions from regulated sources since the introduction (Swedish Environmental Protection Agency, 2015).

### 6.1.1 Carbon dioxide tax

Together with the neighbouring countries Finland and Norway, Sweden was one of the first countries to implement a tax on carbon dioxide on fossil fuel in the early 1990s. The tax is viewed upon as a cost-effective way to reduce greenhouse gas emissions that also meets the conditions of polluters pays principle. In 2017, the revenues collected from the tax exceeded SEK 23 (EUR 2.4) billion (Statistics Sweden, 2018). All fossil fuels are levied with a carbon tax. The tax rate is differentiated with respect to the content of carbon in the fuel where fuel with higher carbon content receives a higher tax. Biofuel and peat are not considered fossil fuels and are therefore excluded from the tax<sup>24</sup>. The tax has been raised gradually since its introduction and by 2018 it is at a level of SEK 1,150 (EUR 119) per ton of emitted carbon dioxide. This is considerably higher compared to the price in EU Emissions Trading Scheme (EU ETS) which is SEK 94 (EUR 9.76) per ton (comparison originally made by Anthesis Enveco (2018) based on the price of permits of 16 February 2018. Industries included in the EU ETS have been targeted to a lower tax rate from 2011 to avoid double pricing. However, in 2018 this tax exemption was taken away for combined heat and power plants that are included in EU ETS. Industries outside the EU ETS have been subject to a lower tax rate compared to the general level, but this exemption is removed in 2018. Some exemptions are made from the carbon dioxide tax among which certain industries such as metallurgic processes and diesel used in agriculture, forestry and aquaculture are examples. In 2016, the tax reduction for diesel used in agriculture, forestry and aquaculture was raised from SEK 0,9 (EUR 0.09) per litre to SEK 1,7 (EUR 0.18) per litre (Swedish Tax Agency, 2018b). For a complete list of exemptions and reduced tax rates, see Act (1994:1776) on Energy Tax, chapter 6a 1§. Tax rates for different fuels over the period 2014–2017 are shown in Table 49 below.

In 2017, a new law was enforced (Lag [2017:1201] *om reduktion av växthusgasutsläpp genom inblandning av biodrivmedel i bensin och dieselbränslen*), which will have direct and indirect effects on carbon taxes levied on fuels. With the aim of reducing life cycle carbon emissions from fuels by 40% by the year 2030, the new law requires that gasoline and diesel include a certain percent of biofuel (Swedish Energy Agency, 2018b). Carbon tax levied on gasoline and diesel will, as a direct effect, be lowered to adjust for new levels

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<sup>24</sup> In 2018 this will partly change through implementation of a new law (Lag (2017:1201) which enjoins mixing of a certain percent of biofuels in diesel and gasoline. Biofuels that are blended with diesel and gasoline will face a carbon dioxide tax.

of carbon content (based on a life cycle perspective) in the mixed fuels. Other adjustments address the right for tax deductions from carbon taxes, which will not be available for the share of fuel that comes from biofuel. Initially, the minimum share of biofuels in gasoline will be approximately 5% whereas the share of biofuels in diesel is significantly higher, at approximately 25% (Regeringskansliet, 2017). Restrictions regarding the share of biofuels in gasoline and diesel are expected to increase during the period, in order to gradually phase out the use of fossil fuels.

#### 6.1.2 *Energy tax on fuels*

In addition to the CO<sub>2</sub> tax, fossil fuels are also subject to energy taxes. Tax rates for different fuels over the period 2014–2017 are listed in the table below. Energy tax on fuels are differentiated with respect to a classification based on environmental impact, where a more stringent tax is levied on fuels associated with a larger environmental impact. Regarding changes in tax rates, yearly adjustments in both energy and carbon dioxide tax have been made since 1994 to adjust for inflation in the country (consumer price index). In 2017, an additional yearly adjustment of 2% increase of the energy tax on gasoline and diesel was introduced to also adjust for changes in Gross Domestic Product (GDP). The increase is to be calculated from the sum of the CO<sub>2</sub> tax and the energy tax. Tax rates over the period 2014–2017 for different fuels can be seen in Table 49 below.

Several exemptions and reduced rates of the energy tax exists for different commercial activities. Examples are reduced tax rates of 89% for diesel (transparent diesel fuel) used in certain mining industrial activities, 70% reduction of energy tax for diesel and other fuel (not gasoline) used in machines in agricultural activities as well as forestry and aquaculture. See again Act (1994:1776) on Energy Tax, chapter 6a 1§ for a complete list of exemptions and reduced tax rates.

**Table 49: Energy and CO<sub>2</sub> tax rates for different transportation fuels and energy sources, 2014–2017, SEK (EUR)**

|                                       |                       | 2014               | 2015               | 2016               | 2017               |
|---------------------------------------|-----------------------|--------------------|--------------------|--------------------|--------------------|
| <b>Petrol (MK1)</b>                   | <b>Energy tax</b>     | <b>3.13 (0.32)</b> | <b>3.25 (0.34)</b> | <b>3.72 (0.39)</b> | <b>3.88 (0.40)</b> |
| SEK (EUR)/litre                       | CO <sub>2</sub> tax   | 2.50 (0.26)        | 2.60 (0.27)        | 2.59 (0.27)        | 2.62 (0.27)        |
| <b>Petrol (acrylate)</b>              | <b>Energy tax</b>     | <b>1.40 (0.15)</b> | <b>1.46 (0.15)</b> | <b>1.93 (0.20)</b> | <b>2.04 (0.21)</b> |
| SEK (EUR)/litre                       | CO <sub>2</sub> tax   | 2.50 (0.26)        | 2.60 (0.27)        | 2.59 (0.27)        | 2.62 (0.27)        |
| <b>Petrol (MK2)</b>                   | <b>Energy Tax</b>     | <b>3.16 (0.33)</b> | <b>3.28 (0.34)</b> | <b>3.75 (0.39)</b> | <b>3.91 (0.41)</b> |
| SEK (EUR)/litre                       | CO <sub>2</sub> tax - | 2.50 (0.26)        | 2.60 (0.27)        | 2.59 (0.27)        | 2.62 (0.27)        |
| <b>Light oil fuel</b>                 | <b>Energy tax</b>     | <b>0.82 (0.09)</b> | <b>0.85 (0.09)</b> | <b>0.85 (0.09)</b> | <b>0.86 (0.09)</b> |
| SEK (EUR)/litre                       | CO <sub>2</sub> tax   | 3.09 (0.32)        | 3.22 (0.33)        | 3.20 (0.33)        | 3.24 (0.34)        |
| <b>Heavy fuel oil (MK1)</b>           | <b>Energy tax</b>     | <b>1.76 (0.18)</b> | <b>1.83 (0.19)</b> | <b>2.36 (0.25)</b> | <b>2.49 (0.26)</b> |
| SEK (EUR)/litre                       | CO <sub>2</sub> tax   | 3.09 (0.32)        | 3.22 (0.33)        | 3.20 (0.33)        | 3.24 (0.34)        |
| <b>Heavy fuel oil (MK2)</b>           | <b>Energy tax</b>     | <b>2.03 (0.21)</b> | <b>2.11 (0.22)</b> | <b>2.63 (0.27)</b> | <b>2.78 (0.29)</b> |
| SEK (EUR)/litre                       | CO <sub>2</sub> tax   | 3.09 (0.32)        | 3.22 (0.33)        | 3.20 (0.33)        | 3.24 (0.34)        |
| <b>Heavy fuel oil (MK3)</b>           | <b>Energy tax</b>     | <b>2.17 (0.23)</b> | <b>2.56 (0.27)</b> | <b>2.78 (0.29)</b> | <b>2.98 (0.31)</b> |
| SEK (EUR)/litre                       | CO <sub>2</sub> tax   | 3.09 (0.32)        | 3.22 (0.33)        | 3.20 (0.33)        | 3.24 (0.34)        |
| <b>Natural gas for transportation</b> | <b>Energy tax</b>     | <b>0 (0)</b>       | <b>0 (0)</b>       | <b>0 (0)</b>       | <b>0 (0)</b>       |
| SEK (EUR)/litre                       | CO <sub>2</sub> tax   | 1.85 (0.19)        | 2.41 (0.258)       | 2.39 (0.25)        | 2.42 (0.25)        |
| <b>Natural gas for other use</b>      | <b>Energy tax</b>     | <b>0.90 (0.09)</b> | <b>0.94 (0.10)</b> | <b>0.94 (0.10)</b> | <b>0.95 (0.10)</b> |
| SEK (EUR)/litre                       | CO <sub>2</sub> tax   | 1.85 (0.19)        | 2.41 (0.25)        | 2.39 (0.25)        | 2.42 (0.25)        |
| <b>LPG for transportation</b>         | <b>Energy tax</b>     | <b>0 (0)</b>       | <b>0 (0)</b>       | <b>0 (0)</b>       | <b>0 (0)</b>       |
| SEK (EUR)/kilo                        | CO <sub>2</sub> tax   | 2.59 (0.27)        | 3.38 (0.35)        | 3.37 (0.35)        | 3.41 (0.35)        |
| <b>LPG for other use</b>              | <b>Energy tax</b>     | <b>1.05 (0.11)</b> | <b>1.09 (0.11)</b> | <b>1.09 (0.11)</b> | <b>1.10 (0.11)</b> |
| SEK (EUR)/kilo                        | CO <sub>2</sub> tax   | 3.25 (0.34)        | 3.25 (0.34)        | 3.37 (0.35)        | 3.41 (0.35)        |
| <b>Coal</b>                           | <b>Energy Tax</b>     | <b>0.62 (0.06)</b> | <b>0.65 (0.07)</b> | <b>0.64 (0.07)</b> | <b>0.65 (0.07)</b> |
| SEK (EUR)/kilo                        | CO <sub>2</sub> tax - | 2.69 (0.28)        | 2.80 (0.29)        | 2.79 (0.29)        | 2.82 (0.29)        |

Source: Swedish Tax Agency, 2018d.

### 6.1.3 Excise tax on electricity consumption

In addition to the energy tax on fuels, there is also an excise tax levied on electricity consumption. It was introduced in Sweden as early as the 1950s. Since 1981, municipalities in northern parts of Sweden have paid a considerably lower tax on (approximately 30% lower). Manufacturing industries receive a significantly lower tax compared to other commercial activities. Since 2004, the energy tax for manufacturing industries and commercial greenhouse activities has been SEK 0.005 (EUR 0.0005) per kWh. The general energy tax on consumption has been significantly higher as can be seen in the table below. After an agreement across political parties, the so called Energiöverenskommelsen, a rise with SEK 0.03 (EUR 0.003) per kWh was made in July 2017. This was the first of two steps to increase the general electricity tax on consumption for households and industries. The second raise is planned in January 2019 with SEK 0.019 (EUR 0.002) per kWh (Skatteutskottets betänkande 2016/17:SkU31). The increase in the energy tax on consumption was motivated in part by the decision to phase out a tax on thermal effect for nuclear power plants, as well as a lowered property tax for hydropower (Prop. 2016/17:142). Commercial activities in agriculture, forestry and aquaculture are entitled to tax reduction to the level of SEK 0.0005 (EUR 0.00005) per kWh (Swedish Tax Agency, 2018f). This tax reduction has been constant over the period. See Table 50.

**Table 50: Electricity tax on consumption, 2014–2017, SEK öre (eurocent) per kWh**

|                                     | 2014        | 2015        | 2016        | 2017        |
|-------------------------------------|-------------|-------------|-------------|-------------|
| Energy tax, general                 | 29.4 (3.05) | 29.4 (3.05) | 29.2 (3.03) | 32.5 (3.37) |
| Energy tax, northern municipalities | 19.4 (2.01) | 19.4 (2.01) | 19.3 (2.00) | 22.9 (2.38) |
| Energy tax, manufacturing industry  | 0.5 (0.05)  | 0.5 (0.05)  | 0.5 (0.05)  | 0.5 (0.05)  |

Source: Swedish Tax Agency (2018d).

#### 6.1.4 *CO<sub>2</sub> emissions trading system*

Sweden has been a part of the EU Emissions Trading Scheme (ETS) since 2005, which is governed by the Emissions Trading Directive (2003/87/EC). Having a common market for reduction of greenhouse gas emissions in EU member states together with Norway and Lichtenstein, ensures that reductions are made cost-effective i.e. cost are held where the cost of reduction is low. Today, the third trading period is ongoing (2013–2020) which was preceded by the first period 2005–2007 and the second period 2008–2012. The scheme has been changed over the years including a step by step expansion to include more activities, different design of allocating permits and fewer permits with a correspondingly higher price. The scheme includes large combustion plants (plants with installed power of 20 MW), industries such as mineral oil refineries, coke ovens, iron and steel industry, mineral industry (cement, lime, glass, ceramics), paper and pulp industry, certain chemical industry. Approximately 750 plants and industries are covered in Sweden. In the third period, aviation within EU member states was included. Swedish Environmental Protection Agency (2018b).

#### 6.1.5 *Nitrogen oxide charge*

The nitrogen oxide charge was introduced in 1992 with the aim of reducing nitrogen emissions from large combustion plants. The charge is paid for NO<sub>x</sub>-emissions from boilers, stationary combustion engines and gas turbines with a useful energy production of at least 25 GWh. The economic instrument builds on the principle that collected revenues from the charge per unit of emitted NO<sub>x</sub> are returned to the participating plants in proportion to production of energy. In this way participants with low emission per unit of produced energy is promoted. Additional to the charge, plants are also regulated through emission limits for NO<sub>x</sub> in operating permits. The charge was changed in 2008 from the initial level of SEK 40 (EUR 4.15) to SEK 50 (EUR 5.19) (Swedish Environmental Protection Agency, 2014). In 2016, the NO<sub>x</sub> charge was reviewed with the purpose of analysing the potential effects of replacing the charge with a tax (SOU 2017:83). This was done with motivation that the charge does not lead to efficient reduction of NO<sub>x</sub> and that that it is not in line with the polluter pays principle. This is because polluters with low emissions per unit of produced energy does actually benefit economically from the program.

#### 6.1.6 *Sulphur tax*

With the purpose of reducing emissions of sulphur dioxide from combustion processes, a tax on sulphur on certain fuels was introduced 1991. The tax is levied on fuels with high sulphur content; coal, peat and certain oils. The tax has been constant since the introduction in 1991 at a level of SEK 30 (EUR 3.11) per kg sulphur in coal and peat and SEK 27 (EUR 2.80) per cubic litre for every tenth weight percent of sulphur (Swedish Tax Agency, 2018d). Since the tax rate have been constant over the period and no adjustments have been made to correct for development for consumer price index or GDP, the actual tax rate can be considered to have decreased over the period.

#### 6.1.7 *Subsidies for energy efficiency, renewable energy and climate investments*

##### **The electricity certificate system**

A subsidy scheme for renewable energy have been in place in Sweden since 2003. In 2012, Norway became a part of the scheme and today the countries have a common market for certificates. The scheme can be described as follows. It is a subsidy scheme with market features where producers of renewable energy receive a certificate for every produced unit of energy (MWh). The certificate can be sold on a market where the price is decided by market mechanisms. Buyers of the certificates are operators who are enforced to have a certain share of certificates in proportion to electricity consumed or sold. These are mainly suppliers of electricity and energy intense industries (Swedish Energy Agency, 2018a). The goal has been to increase the production of renewable energy with 26.4 TWh from the year 2012 to 2020. In 2015, the Swedish government made a decision to increase this ambition with 2 TWh to 28.4 TWh renewable energy.

##### **Subsidy schemes for climate investments; Climate leap (Klimatklivet), Industry leap (Industriklivet) and more**

With the main purpose to reduce greenhouse gas emissions, a subsidy scheme was introduced in 2015 targeted at local and regional investments with low carbon emissions. Measures concerned are climate initiatives in transport, industries, housing and urban planning for example. It may concern for example charging infrastructure for electric vehicles, infrastructure for biogas, cycle paths and information campaigns. Private as well as public operators, organizations and universities are allowed to apply for grants, the only group that cannot apply is individuals. The budget has increased significantly over the first years, starting in 2015 with SEK 125 (EUR 12.98) million. In 2016 and 2017 the budget was SEK 600 (EUR 62.29) million and SEK 1.2 (EUR 0.12) billion respectively (Swedish Government Offices, 2016).<sup>25</sup> A significant stepwise increase of the grant is planned the coming years including SEK 1.5 (EUR 0.16) billion in 2018, SEK 2 (EUR 0.21) billion in 2019 and SEK 3 (EUR 0.31) billion in 2020 (Swedish

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<sup>25</sup> The total budget over the period 2015–2017 is given by the reference. Distribution per year was given from personal communication with administrator in the Swedish Environmental Protection Agency.

Environmental Protection Agency, 2018c). As mentioned, individuals are exempted from the Climate leap but in 2018, individuals have the possibility to apply for financial support to install charging facilities on private properties through a new supplementary subsidy scheme (Ladda-hemma-stödet in Swedish).

In 2017, a decision on a similar program to the Climate leap but instead targeted at industry was taken, the so called Industry leap (Industriklivet in Swedish). A total yearly budget of SEK 300,000 (EUR 31,147) between 2018 and 2040 is planned to be distributed for investments, projects, pilot projects, research and other with the purpose to reduce process related emissions of greenhouse gases from industries (Swedish Energy Agency 2018c).

### **Subsidies for installation costs and production of renewable energy**

Since 2009, it has been possible for private and public operators as well as individuals to apply for a subsidy to cover parts of installation costs for solar panels. There has been a gradual decrease of the subsidy from the initial level of 60% of installation cost in 2009 to a level of 30% for commercial activities and 20% for individuals in 2017 (Swedish National Audit Office, 2017). The total budget has increased over the period and was raised by SEK 200 (EUR 20.76) billion to a level of SEK 590 (EUR 61.25) billion in 2017.

Companies in agriculture, gardening and reindeer husbandry can apply for subsidies to cover up to 40% of installation and investment costs to produce renewable energy from biogas, wind power, solar power, hydro power and geothermal energy. To be able to apply for the subsidy, investment cost must exceed SEK 100,000 (EUR 10,382). Energy produced can be either used in the industry or it can be sold on the market (Swedish Board of Agriculture, 2018a). A decision was taken in 2017 to introduce an additional subsidy targeted at production of biogas instead of investment costs, also including not only production of biogas from manure but from other sources. It is introduced in 2018 and has a total yearly budget of SEK 270 (EUR 28.03) billion. The size of the subsidy received by applicants depends on the total amount of biogas that is applied for since the total budget is distributed between applicants. The subsidy is paid per produced kilowatt hour and is estimated to be around SEK 0.3–0.35 (EUR 0.03–0.036) (Swedish Board of Agriculture, 2018b).

## **6.2 Water**

### **6.2.1 LOVA – a subsidy scheme**

In order to take on and stimulate creative and cost-effective initiatives on local level aimed at reducing eutrophication in the sea, a subsidy scheme, called LOVA, was introduced in 2009. The scheme includes measures not only to reduce eutrophication but also measures to reduce environmentally hazardous substances from recreational boating and to collect lost fishing gears, so called ghost gears. Municipalities and organizations are allowed to apply for financial support within the scheme. For 2018, the total budget is SEK 6 (EUR 0.62) million.

### 6.2.2 *User charges for water supply and wastewater services*

Municipalities in Sweden take out a fee on the usage of fresh water. The fee consists of one fixed part and one part that depends on the amount of water that is being used. Different fees are levied for different types of housing (The Swedish Water and Wastewater Association, 2018).

## 6.3 **Waste**

### 6.3.1 *Landfill tax*

A tax on waste was introduced in Sweden in 2001 with the purpose to reduce the disposal of waste on landfills and to promote reuse and recycling of material. The tax is based on weight and does not differ with regard to material or content. The tax has doubled since its implementation in the year 2001. The tax on waste was raised in 2015 with 15% to SEK 500 (EUR 51.91) per ton (Swedish Tax Agency, 2018c).

In Sweden, no tax on incineration of waste have been in place since 2010. In a recent public report (SOU 2017:83) the potential effects from implementing an incineration tax was analysed. Such a tax was shown to not fulfil the purpose of reducing waste, increasing reuse and recycling of materials because of the lack of incentives for producers. The extra costs associated with the tax burden was instead found to mainly be transferred to consumers of district heating, a product sold by the plants.

### 6.3.2 *Charges for collecting household waste*

Most municipalities in Sweden take out a fee for collecting waste at private housing. A few municipalities instead use a tax to finance associated costs. The fee often consists of a fixed part and a part that varies with e.g. frequency for collecting waste and the size of trash bin. Lower costs for less frequent collecting and smaller trash bins incentivizes household to produce less waste. Some municipalities incentivize separation of biodegradable waste, used to e.g. produce biogas, by offering a lower cost for households that collect biodegradable waste in separate bins. The level of the fee varies with municipalities but the mean yearly cost for a villa was SEK 2,035 (EUR 211) and SEK 1,305 (EUR 135) for a standard size apartment in 2015 (Sveriges avfallsportal, 2017).

### 6.3.3 *Tax on chemicals in certain electronic products*

Flame retardants with danger for human health and environment exists in several electronic products with the purpose to prevent and retard fire. A tax on harmful flame retardants in electronic products was introduced in 2017 with the objective to phase out and replace them with less harmful substitutes. The tax rate levied on large electronic products such as washing machines, dishwashers, freezers and refrigerators is SEK 8

(EUR 0.83) per kilo of the product. Other electronic products containing the harmful substances face a tax rate of SEK 120 (EUR 12.46) per kilo of the product (Swedish Tax Agency, 2018g).

#### 6.3.4 *Tax reduction for reparation of certain goods*

With the main purpose to reduce material use and the environmental effects linked to that, two separate regulations were introduced in 2017. Both regulations build on the principle that making reparation and maintenance of certain goods cheaper incentivises consumers to take care of good they already have instead of replacing them with new products. One of the two regulations concern large electric housing products such as dishwashers, washing machines and refrigerators. New since 2017 is that households only have to pay 50% of labour cost (to a maximum cost of SEK 25,000 (EUR 2,596) for individuals under 65 years old and SEK 50,000 (EUR 5,191) for individuals over 65). One restriction is that the reparation needs to be performed in the household and not at a repair shop. This was made through an extension of the already existing cost reduction scheme for household services (so called RUT-avdraget in Swedish) (Ministry of Finance, 2016). The second regulation concerns reparation of goods such as bicycles, leather products, clothes and shoes. Since January 2017, the tax on reparation services on these goods was reduced from 25% to 12% (Swedish Tax Agency, 2018e).

#### 6.3.5 *Producer responsibility*

In Sweden, there is producer responsibility for the following product groups: batteries, vehicles, tyres, electronic equipment, packaging, waste paper, pharmaceuticals and radioactive products (Swedish Environmental Protection Agency, 2018d). This implies that producers of the mentioned products have the responsibility to collect and take care of the products after being used by consumers as well as to inform and communicate to consumers on how and where to dispose of the products. To cover the costs associated with collection and disposal, consumers are faced with an additional charge on the consumer price. As pointed out in the previous report (NCM, 2014), it can be discussed whether this policy is actually an economic instrument or rather an administrative regulation. This is because of the lack of economically incentivizing aspects for most of the product groups, deposit-refunds for cans and bottles exempted. For consistency with previous reports, the policy is described also here.

In the period 2014–2017, no changes have been identified with significant effect on the producer responsibility. Only minor changes were made in 2014 mainly regarding administration and supervision of compliance with producer responsibility for packages, waste paper and electronic equipment (through act 2014:1073, 2014:1074, 2014:1075) (Swedish Environmental Protection Agency, 2016).

The producer responsibility for vehicles is regulated in act (2007:185), in line with the EG Directive 2000/53/EG. Before 2007, Sweden had instead a refund scheme for used

cars where consumers received a deposit when the vehicle was submitted at the end of life (NMC, 2014).

The collection of cans and bottles for beverages differs a little from the remaining product groups included in the producer responsibility. Consumers are targeted to an economic incentive to recycle aluminium cans and plastic bottles because they receive a refund when doing so. A refund system has been in place since 1984, for recycling aluminium cans and later also for plastic bottles. Producers of beverages for commercial use (dairy products and juice exempted) are required to provide a possibility to recycle cans and bottles for refund (Förordning [2005:220]). In 2010, the refund for aluminium cans was doubled from SEK 0.5 (EUR 0.05) to SEK 1 (EUR 0.10). No changes have been identified for the period 2014–2017.

## 6.4 Transport

### 6.4.1 *Tax and subsidies for vehicles*

Vehicles such as cars, trucks, buses, tractors and motorcycles are subject to both annual taxation and in some cases subsidies that are linked to levels of emissions of greenhouse gases. Before July 2018, when the implementation of a new tax and subsidy scheme was implemented, the annual tax and subsidies can be described as follows. The level of the annual vehicle tax varied with several aspects among which CO<sub>2</sub>-emissions is one, so that a higher annual tax was paid for vehicles associated with a higher level of CO<sub>2</sub>-emissions. A baseline cost of SEK 360 (EUR 37.38) was paid per car and an additional cost of SEK 22 (EUR 2.28) per gram of CO<sub>2</sub> above a threshold level of 111 grams per kilometre was paid per car. An additional environmental fee of SEK 500 (EUR 51.91) was paid for diesel cars taken into use before the year 2008 (half the fee was paid for diesel cars taken into use after 2008). To encourage the purchase of vehicles with a relatively low environmental impact such as electric or plug-in hybrid cars, a tax exemption was levied for the first five years on cars classified as a car with low environmental impact.<sup>26</sup> In addition to the tax exemption, a subsidy for new cars associated with very low CO<sub>2</sub>-emissions (maximum 50 gram per kilometre) have been in place since 2012. The subsidy was maximum SEK 40,000 (EUR 4,153).

In July 2018, a significant change in the tax and subsidy scheme for vehicles was taking place through the implementation of a bonus-malus system. The system is targeted at new cars and implies that vehicles with diesel and petrol receives a higher annual tax during the first three years. New is also that all cars receive a vehicle tax implying that the earlier tax exemption for cars associated with low CO<sub>2</sub>-emissions is removed. At the same time cars with very low emissions receive a subsidy of maximum SEK 60,000 (EUR 6,229) at the time of purchase. The above-mentioned subsidy is thereby replaced. Government Offices of Sweden (2017).

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<sup>26</sup> In Swedish *miljöbil*.

#### 6.4.2 *Tax on aviation*

In 2017, a new act (Lag (2017:1200) om skatt på flygresor) was taken implying a tax on aviation from Swedish airports. The new tax applies from 1 April 2018. The tax is paid per passenger and varies with destination. The size of the tax is SEK 60 (EUR 6.23) for domestic flights and trips inside Europe, SEK 250 (EUR 25.96) for trips outside Europe at a smaller distance than 6,000 km and SEK 400 (EUR 41.53) for trips with other destinations.

#### 6.4.3 *Road charges for trucks*

Road charges was introduced in Sweden together with several other European countries in 1998 following the EU Directive (99/62/EC). The directive made it possible to cooperate with specific countries in the union and introduce common fees which led to the introduction of common fees in 1994. From 2017, the charges concern trucks with a total weight of 12 tons that are driving on certain roads in Sweden, Denmark, Luxembourg and The Netherlands (Swedish Tax Agency, 2018h). The road charge for trucks registered in Sweden varies between SEK 7,194 (EUR 750) and SEK 14,869 (EUR 1,550) per year depending on which fuel is being used and the number of axles of the truck. The charges have not been increased since 2001, however the partners took a joint decision in 2017 to increase the charges (Ministry of Finance, 2018a). At the same time the charges are differentiated to a larger extent with regard to exhaust class. The changes are not however considered to be large enough to cause any significant effect on transport hence no considerable effect on the reduction of emissions is expected (Ministry of Finance, 2018a). Worth mentioning when discussing road charges, is the ongoing political discussion to perhaps replace the existing road charge with a road wear tax that varies with distance instead of time driven on the roads. One reason is described to be correction of competitive advantages for international trucks driving on Swedish roads (Ministry of Finance, 2018b). See Figure 51.

Figure 51: Annual road charges, 2018, SEK (EUR)

| Number of axles | Exhaust class     | Road charge    |
|-----------------|-------------------|----------------|
| Max. three      | Euro 0            | 9,209 (960)    |
| Max. three      | Euro 1            | 8,154 (850)    |
| Max. three      | Euro 2 or cleaner | 7,194 (750)    |
| Four or more    | Euro 0            | 14,869 (1,550) |
| Four or more    | Euro 1            | 13,430 (1,400) |
| Four or more    | Euro 2 or cleaner | 11,991 (1,250) |

Source: Swedish Tax Agency (2018e).

#### 6.4.4 *Road toll / Congestion tax*

In Stockholm, a congestion tax was introduced in 2007. The tax is levied on vehicles driving on certain roads around the city centre during hours of the day when there is normally a lot of traffic. The tax varies during the day with a higher tax during peak hours and a lower tax or no tax on hours when there is normally less traffic. The main

purpose of the tax is to reduce congestion, improve accessibility and reduce emissions of CO<sub>2</sub> and air pollutants. Gothenburg followed the example in Stockholm and introduced a congestion charge in 2013. In 2016, a significant increase of the Stockholm congestion charge was made, increasing the tax on rush hours from SEK 20 (EUR 2.08) to SEK 35 (EUR 3.63) (Transportstyrelsen, 2018). The system was also extended to include one additional route.

#### 6.4.5 *Other subsidies*

A decision from 2017 makes it possible for private individuals to apply for financial support when purchasing electric bicycles, mopeds, motorbikes. The subsidy is currently 25% of the purchasing price or maximum SEK 10,000 (EUR 1,038) per vehicle. The annual cap for the total amount of subsidies in the program is SEK 341 (EUR 35.40) million for 2018 (Swedish Environmental Protection Agency, 2018a)

### 6.5 *Agriculture and natural resources*

#### 6.5.1 *Tax on gravel*

To reduce extraction of naturally occurring accumulations of gravel, a tax was introduced in Sweden in 1995. Gravel can be used as a component in the preparation and production of concrete. Gravel suited for extraction is a finite natural resource which play an important role in for example producing drinking water through providing a natural cleaning process. In 2015, the tax was raised from SEK 13 (EUR 1.35) to SEK 15 (EUR 1.56) per ton (Swedish Tax Agency, 2018i).

#### 6.5.2 *Subsidies in agriculture*

In line with the Swedish implementation of the European Common Agricultural Policy (CAP), several subsidies are available for farmers through the Swedish Rural Development Program (RDP). The Swedish RDP consists of different subsidies to agriculture, among which several are targeted at actions made to improve environmental quality. The subsidies can be categorized based on the targeted environmental aspect. For example, financial support is paid to farmers that grow crops to reduce nitrogen leaching, establishing wetlands or zones adjacent to rivers with one of several purposes to reduce problems related to eutrophication. Financial support is also paid to farmers with organic production or for different measures with the purpose of preserving biodiversity. Following the previous CAP and RDP period of 2007–2013, Sweden implemented a reformed RDP in 2015 which is valid until 2020. Through the reformation, some minor changes in the subsidies targeted at measures improving environmental quality were made. Changes regards mainly merges, relocations and separations of earlier subsidies while some are removed, and some has been added. Changes has also been made to simplify administrative burden for users (Swedish Board of Agriculture, 2012).

An additional economic instrument targeted at farmers is the earlier mentioned reduced energy and CO<sub>2</sub> tax on diesel for machines used in agriculture as well as energy tax on consumption.

### 6.5.3 *Tax on pesticides*

Since 1984, there has been a tax on pesticides with the purpose to reduce the consumption of pesticides in agriculture and thereby to reduce environmental and health effects accordingly. The tax is targeted at production and is paid per kilogram of active substance in the pesticide. In 2015, the tax was raised by 13% from SEK 30 (EUR 3.11) to SEK 34 (EUR 3.53) per kilogram (Swedish Tax Agency 2018a). A recent public review of the tax suggests replacing the current tax with a tax on cadmium and on certain chemical pesticides (SOU 2017:102). Differences compared to the current tax include changes of the basis for collecting the tax from a price per kilo active substance to a highest level per hectare. Among other changes, the suggestion also includes introducing a risk differentiation of the tax by identifying three risk-based categories of plant protection products. The suggested tax on cadmium, with the aim to reduce cadmium in foodstuff and related health problems, is targeted at several different sources used in agriculture such as lining, lime and fertilizers that includes minerals and sewage used in agriculture. The replacements of acts are suggested to occur 1 July 2019. Worth mentioning in this context is that Sweden have had a tax on fertilizers implemented during the 1980s, but it was removed in 2010.

### 6.5.4 *Forestry*

In forestry, a distinction can be made between regulations targeted at land owners and regulations targeted at contractors who normally performs operations such as harvesting and other management operations in the forest. There are a few subsidies targeted at land owners with the main purpose to preserve and strengthen biodiversity in forests. Examples of actions that subsidies can be applied for are controlled fires with the purpose to support certain biotopes, creating wetlands and improving conditions for selected valuable broad leaf forest by clearing other types of vegetation. A specific subsidy scheme is available with the purpose of improving conditions for the selected broad leaf forests. The above-mentioned subsidies are provided by the Swedish government, whereas other financial support is provided in line with EU regulations.

With the purpose of protecting valuable biotopes, land can be purchased by the state for permanent protection of the land or the state can provide monetary compensation to land owners for managing the land with the purpose of preserving and developing biodiversity and related values. The Swedish forest agency can provide financial support in case of natural catastrophes such as heavy wind and storms and fires with great impact for the forests. It may concern financial support for fuel or support for taking care of damaged trees and for planting new forest (Swedish Forest Agency, 2018). Economic regulation targeted at operating contractors are mainly the earlier mentioned reliefs in energy and CO<sub>2</sub>-taxes for fuels used in machines.

#### 6.5.5 *Tradable quotas for fish and subsidies to fishing sector*

With the purpose to reduce problems related to overfishing and low profitability in the fisheries sector, individual tradable fishing quotas was introduced in Sweden in 2009. Swedish marine fishery is overall regulated through EU's Common Fisheries Policy (CFP). Through negotiations between countries in EU, a yearly limit or cap of each commercial fish species is decided, a so called total allowable catch (TAC). The TAC is then transferred and divided into quotas that are distributed and allocated to Swedish fishermen based on historical level of fishing (allocation principle is called grandfathering). These individual quotas can be traded among fishermen, creating a market price for quotas. In principle, fishermen that meets a higher cost per unit of extracted fish compared to the market price, will sell their quotas. Conversely, fishermen with lower cost to extract one unit of fish compared to the market price will buy quotas. In theory this will lead to cost effective fishery, meaning that fishing will be allocated to vessels with the lowest costs (Stage et al., 2015). Tradeable fishing quotas have until recently included only pelagic species i.e. species living in open waters such as herring and mackerel. In 2017, the regulation was extended to include a number of demersal fish species, i.e. fishes living close to seabed (Swedish Agency for Marine and Water Management, 2018).

Other economic instruments targeted at the fishing sector that have relevance for the environment are subsidies. There are subsidies that fishermen can apply for to cover costs for gathering lost fishing equipment (so called ghost gear) or other marine waste. Other subsidies available for fishermen among others (mainly public authorities) are for projects and measures with purpose to restore marine biodiversity and marine protected areas (Swedish Board of Agriculture, 2016). These subsidies are available through the national Maritime and Fisheries Program that is part of the Common Fisheries Policy in EU.



## **Part 2: The Use of Voluntary Environmental Agreements in Nordic Environmental Policy 2014–2017**



## 7. Voluntary agreements in Nordic environmental policy

This chapter presents several determinants for a successful outcome of a voluntary agreement (VA). An overview of the use of current VAs in Nordic environmental policy is provided, along with relevant experiences.

### 7.1 Voluntary agreements in environmental policy

Voluntary agreements in environmental policy are usually used to describe an agreement wherein companies or industry representatives agree to implement certain changes to limit their environmental impact. In the following section, arguments and incentives for using VAs are described, as well as criteria for making them successful. This means that the successful use of VAs depends of the specific conditions in each case. It also indicates that a VA initiative typically should be based on a prior positive assessment of the existence of such criteria/conditions. In case such positive conditions are not foreseen, it should be carefully considered whether another instrument than VAs should be employed.

*Public authorities* have an incentive to enter into VAs if they are seen as a more effective mean, following the points raised in this section of achieving a given environmental target. The use of VAs may also support a political desire for de-regulation and for further involvement of private participation based on self-governance and shared responsibilities in meeting public policy objectives. For *companies*, incentives to enter into VAs could be ascribed to reduced green taxes, less political pressure, benefits from subsidies and increased resource efficiency to mention a few (NCM, 2011). Incentives for both public authorities and companies also follow the simple notion that any party actively involved in an agreement takes ownership and commitment to the success of the project. Through incentives, public authorities and private operators (industry organisations, companies and citizens) may gain added knowledge and certainty, which can provide a competitive advantage over peers. Finally, the VA may also reduce costs for both private operators and public authorities.

*Flexibility* is often referred as the main selling point of VAs in comparison to command-and-control and economic instruments (Crocì, 2006), as a VA often does not impose restrictions on the participating companies in how they achieve the environmental target. Furthermore, as the VA is an agreement between two or more parties, any need for revision of the terms and conditions can typically be met swiftly.

The success of voluntary agreements has also been linked to how extensive the preparation phase for the voluntary agreement has been. This includes developing a

baseline to which developments can be compared, quantifying targets, designing monitoring mechanisms, etc. (OECD, 2003).

Furthermore, the flexibility characteristic of voluntary agreements must be seen as a tool in the context of complexity management. As environmental management increasingly has become an issue of managing complexity and uncertainty, involvement of private creativity and learning processes may prove beneficial for both government and private operators. This development takes its departure in the 1990s as we have witnessed a demand for new and flexible instruments to increase efficiency, flexibility and legitimacy in managing complexity in several policy areas (Homeyer, 2010). The complexity involved may make it difficult for government at all levels and private operators to predict and regulate all conditions for sound environmental management up front. Flexibility may allow for innovation and experimentation within a set framework, leading to increased and shared knowledge and certainty. The use of voluntary agreements is instrumental in such complexity management, as it motivates and engages the parties through flexibility and self-governance.

It has been proposed that an incentive for companies to enter into a VA is that it constitutes a learning process in a shared uncertain *context*, where the benefits of resolving this uncertainty are larger than the associated shared costs (Crocì, 2006). An example of this could be the introduction of a new environmental target, dictated by EU legislation, in a sector where the companies at present do not know how to reach this environmental target, because they do not have the necessary technologies developed. In such a context, it could make sense for companies to enter a voluntary agreement, in order to engage in knowledge-sharing and technology development. On a broader scale, VAs can entail diffusion of knowledge and technology from companies involved in a VA to those outside the agreement (Lyon and Maxwell, 2007).

However, the *successful outcome of VAs depends on several factors*:

1. These advantages require that the VA regime, the supporting legal framework and the administrative capacity of both public authorities and firms in order to manage and follow-up on the VA, are well developed.
2. The participation and incentive of the private part may not entirely be free and/or based on a voluntary approach as the VA may be a requirement following from legislation or environmental policies. This may in principle constitute a potential threat to implementation and environmental compliance of goals stated in the VA, simply because the motivation is not entirely driven by full voluntary commitment. Nevertheless, motivation is typically secured as the alternative command and control regulation is less desirable for the participating private operator (industry organisations, company and citizen). Utilising VAs typically affords a private party a higher degree of influence over process and outcomes compared to traditional regulation.
3. Like any other involvement in private self-regulation, the VA presupposes a high level of trust and confidence amongst the parties. As opposed to the traditional environmental permitting system based on command and control regulation, a

VA is based on a private law approach between two equal partners with mutual interests. Without such trust, the use of VA should be questioned, and other means of regulation should be considered. In any case, the VA should include efficient monitoring, reporting and compliance mechanisms ensuring fulfilment of target goals. Such fulfilment is especially important for the government regulator, as the ultimate responsibility and accountability at the political level and to the public remains with the regulator, regardless of the involvement and behaviour of the private operator.

4. The use of VAs may be a way to reduce costs and resources for both the public authorities and the private operator, compared to the costs involved in traditional environmental regulation. However, this presupposes a certain “economy of scale” meaning that the VA provided should be the result of a systemic approach based on templates, involvement of branch organisation, and other references in order to make it cost effective.

## 7.2 The use of voluntary agreements in Nordic environmental policy

Voluntary agreements are identified for all five Nordic countries, with the largest number of agreements being in Denmark, Norway and Sweden. There is no single or clear definition of the term across the five countries, nor a general policy regarding their use. For example, the use of VAs has since 1994 been incorporated in the Danish Environmental Protection Law's §10 as a means for the incumbent minister to ensure certain environmental improvements, while in Iceland there is in general very little on the subject. Although no formal definition of VAs is made within Swedish environmental legislation, there are certain limitations in the constitution for the use of VAs without legal grounds. However, most of the agreements are seen as being a replacement for actual legislation. The focus has primarily been on generating an overview of VAs that can be characterised as voluntary public schemes. Other VAs, characterised as either negotiated agreements or unilateral commitments, are also considered if the given VA is strongly tied to public regulators.

Most of the identified VAs are negotiated between the relevant public authority and the affected industries, or in some cases individual companies.

### 7.2.1 *Voluntary agreements in use across the Nordic countries*

The following sections seek to present an updated overview of voluntary agreements following the 2011 report from the Nordic Council of Ministers, “*Voluntary agreements and environmental labelling in the Nordic countries*”. Since 2011, seven new VAs have been initiated in the five Nordic countries, not considering new agreements that are built on former VAs. Four of these have been initiated in Denmark, two in Finland and one in Norway.

The sectors considered are *Energy and air pollution*, *Water*, *Waste*, *Transport* and *Agriculture and natural resources*. See Table 52 for an overview of the number of identified VAs in the respective sectors covered for all five countries.

**Table 52: Number of environmental voluntary agreements in the Nordic countries**

| Country                           | Denmark          | Finland         | Iceland         | Norway          | Sweden          |
|-----------------------------------|------------------|-----------------|-----------------|-----------------|-----------------|
| Energy and air pollution          | 3 (20%)          | 1 (20%)         | -               | 4 (44%)         | 2 (33%)         |
| Water                             | 1 (7%)           | 1 (20%)         | -               | -               | -               |
| Waste                             | 5 (33%)          | 2 (40%)         | 2 (100%)        | 3 (33%)         | 3 (50%)         |
| Transport                         | 1 (7%)           | -               | -               | -               | -               |
| Agriculture and natural resources | 4 (27%)          | 1 (20%)         | -               | 2 (22%)         | 1 (17%)         |
| Other                             | 1 (7%)           | -               | -               | -               | -               |
| <i>Total</i>                      | <i>15 (100%)</i> | <i>5 (100%)</i> | <i>2 (100%)</i> | <i>9 (100%)</i> | <i>6 (100%)</i> |

Denmark has agreements in all five sectors. Finland, Norway and Sweden, all have VAs within *Waste* and *Agriculture and natural resources*. Iceland only applies VAs within the *Waste* sector. Although the countries have VAs within the same sectors, the specific target of the agreement may very well differ between the countries. However, Denmark, Finland, Norway and Sweden all have agreements in place targeted at making energy intensive industries more efficient in their electricity use.

All five countries have VAs in the *Waste* sector that date to the 1990s. In Sweden, it regards recycling of office paper. In Finland and Iceland, the agreements cover the remediation or treatment of oil. Norway has two agreements dating back to the 1990s, covering waste collection and proper handling of electronics and electronic waste. Denmark has four agreements from the 1990s on scrap tyre recycling, selective demolition, lead accumulators and recycling of transport packaging.

### 7.2.2 Findings from evaluations

To provide an updated overview of how voluntary agreements are used in Nordic environmental policy, it is necessary to identify the use of VAs and the sectors to which they apply, and to identify how they are monitored and evaluated.

As a follow up on the NCM report from 2011, the identified evaluations and reports for this study have all been conducted after 2011. 15 evaluations or reports covering the VAs were identified during the period. Five of the 15 evaluations concern VAs in Finland, four evaluations concern VAs in Denmark, whereas three evaluations were identified in Norway and Sweden. No evaluations were identified for VAs in Iceland.

The NCM report from 2011 pointed to the lack of national strategies concerning the use of VAs in environmental policy and that there should be an increased focus on monitoring and evaluating the outcome of the agreements. This finding remains relevant. The identified reports and evaluations have diverging focuses, themes and methodologies, making it difficult and arbitrary to draw conclusions from the evaluations. There are still issues related to securing sufficient monitoring, reporting and compliance mechanisms, even though these mechanisms are considered very important when ensuring the success of a VA. This was also a finding in the previous

evaluation (NCM, 2011). This is still an issue in the identified agreements, according to the evaluations resulting in a need to streamline focus areas and apply a common methodology to conduct evaluations on voluntary agreements.

The analysis of the identified evaluations addresses five areas: *effectiveness* (e.g. *has the VA reached its goal?*), *cost-effectiveness* (e.g. *how efficient has the VA been?*), *flexibility* (e.g. *is the VA a more flexible option for private operators?*), *competition* (e.g. *has the VA affected the companies competitiveness?*) and *policy mix* (e.g. *is there any synergy effects of the used policy mix?*). The main findings of the evaluations are presented below.

### Effectiveness

The analysis of effectiveness of the VAs has in general led to mixed findings, as not all VAs have reached or are predicted to reach their targets. These differences in effectiveness might be attributed to how successful the regulatory body was in monitoring the agreements and sanctioning when necessary– as well as the potential alternative (e.g. taxation or regulation). The individual case and market complexities also play a part in each VA's effectiveness and success.

The evaluations considering the effectiveness of VAs on energy efficiency in energy intensive industries have gotten different results across the countries. In Sweden, the VA was considered effective, fulfilling and surpassing the target based on calculated electricity savings had a tax been in place instead. In Finland, the conclusion was not as positive since neither the energy program for farms nor transport reached their set target implying the agreements were ineffective.

### Cost-effectiveness

A specific focus of this report regarding the different VAs has been to answer the following question; *when can voluntary agreements be cost-effective instruments?* As mentioned in section 7.2.1 several factors are important for ensuring a successful outcome of VAs and thus also proving a cost-effective approach. However, most of the evaluations does not include a baseline scenario<sup>27</sup>, which is a potential explanation for the lack of evaluations concerning whether the agreements have been cost-effective or not.

The efficiency of the VAs is not generally addressed in the identified evaluations, although agreements on energy efficiency in the industry are in place in four out of five countries. In Finland, it is noticed that the energy efficiency agreements in the transport and agriculture sectors have not been efficient ways of improving energy efficiency, due to the lack of monitoring and reporting.

In one evaluation the Swedish energy efficiency scheme was found to be cost-effective and, in terms of electricity saving for society, beneficial for the companies. The NOx-agreement in Norway and the SOIL agreement in Finland were also found to be cost-effective.

In terms of climate goals, energy efficiency agreements might not be cost-effective, as they ignore the fuel used to generate the energy. Greenhouse gas

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<sup>27</sup> A baseline scenario concerning the expected development without the use of a VA.

emissions can vary substantially per unit of energy consumed given the specific energy mix, e.g. considering whether the energy mix depends on more or less renewable energy sources. Thus, in terms of emissions reduction, energy efficiency agreements lack flexibility and incentives to substitute fuels (Henriksson and Söderholm, 2009). On a societal level, VAs are seldom considered cost-effective, as they do not give all companies the same incentives to reduce emissions (i.e. they usually do not ensure that the marginal costs of emission reductions are equal across all companies) (Henriksson and Söderholm, 2009). However, Henriksson and Söderholm (2009) highlight reasons why the VAs might constitute second best solutions, in securing an industry's international competition, and in bypassing the difficulties of taxation.

### **Flexibility**

The flexibility of VAs is another issue not generally addressed in evaluations of VAs. Although, flexibility is commonly viewed as being one of the main arguments for VAs compared to regulation.

### **Competition**

Competition is relevant in two ways:

First, competition between companies within a sector can be affected by the introduction of a VA. This can be seen where the VA weakens participating companies, as companies outside the VA can act on more favourable terms and thus free ride on the participating companies' efforts. In some of the evaluations this is mentioned as being one of the main reasons for the agreement not reaching its target, as exemplified in Denmark regarding the VA on selective demolition. The opposite result has also been noticed, as companies participating in a VA in some cases are compensated more than the associated cost of participation. This compensation can for example be in form of a tax exemption, and thus remove any free rider problem. This is seen in the Danish voluntary agreement concerning the energy savings scheme (ESO).

Secondly, participation in a VA can have an effect on the overall competitiveness for companies in the sector, due to the impact of the applied measures. The agreement on NO<sub>x</sub>-emissions in Norway is seen as improving the competitiveness of the participating companies, in part due to lower energy consumption and upcoming international requirements, especially in the maritime sector.

### **Policy Mix**

The mix of VAs with other policy instruments has generally not been a focus for the identified evaluations, although it can be seen as a supplement to laws and subsidies.

## 8. The use of Voluntary agreements in Nordic environmental policy

An overview of voluntary environmental agreements that have been active in the period 2014–2017 has been generated through literature studies,<sup>28</sup> interviews with relevant stakeholders and environmental experts.

The literature study has taken its point of departure from "Voluntary agreements and environmental labelling in the Nordic countries" (NCM, 2011), which is the most comprehensive overview of voluntary agreements in the Nordic countries. In addition to the overview, we have identified evaluations of the voluntary agreement, covering the period 2011–2018. A specific purpose with the analysis is thus to provide an update on the findings in the report from NCM. The intention has been to collect a complete overview of voluntary agreements in use throughout the Nordic countries, but the often diffuse registration of voluntary agreements leads to the possibility that the overview is not complete.<sup>29</sup>

As seen above, the analysis and synthesis of the evaluations were focussed on the following areas:

- effectiveness (in reaching the environmental target)
- cost-effectiveness
- flexibility
- competition and
- policy mix

A specific focus in the examination of the different evaluation has been to answer the following question; *when can voluntary agreements be cost-effective instruments?*

Table 53 lists all the VAs that were identified in this project and the following subsections will provide a short, country-specific presentation of each agreement followed by an analysis and synthesis of identified evaluations of the individual VAs. The overview of VAs has been developed and classified according to level, target and outcome according to the categories in Box 1.

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<sup>28</sup> Literature includes published research papers, reports and articles published by the relevant Nordic ministries.

<sup>29</sup> The same issues have been present in terms of describing and characterising the voluntary agreements.

### Box 1: Additional classification of voluntary agreements applied in this report

#### Further classification of voluntary agreements

In work conducted in this report, we have further refined the classification of VAs, to encompass the following parameters:

- **Sector.** The classification of sectors follows the classification used in Part I: Energy and air pollution, water, waste, transport, agriculture and natural resources
- **Level.** Identifies the level at which the environmental agreement is made.  
*High-level:* Agreements made between national and local authorities and industrial organizations  
*Low-level:* Agreements made between national and local authorities and individual companies
- **Target.** Used to classify the environmental agreements according to the type of environmental target:  
*Input target:* e.g. a target for improvement of energy efficiency, for reduced use of PVC in the production, for (relatively) increased use of cleaner diesel in transport, or for increased recycling.  
*Output target:* e.g. a target for reduced use of plastic carrier bags, for enhanced waste water treatment in respect of phosphor and nitrogen loads, or for reduced agricultural production in sensitive areas.  
*Removal target:* e.g. targets for collection and disposal of batteries, tires, or CFC-containing appliances.
- **Outcome.** Used to identify whether the environmental agreement is either goal-based or process-oriented:  
*Goal-based:* Does the environmental agreement include at specific reduction goal, e.g. kg pollutant reduced?  
*Process-oriented:* Is the environmental agreement more geared towards a process, e.g. the development of new technologies, knowledge-sharing etc.

Table 53: Overview of environmental voluntary agreements

| Country | Name of agreement                                       | Active by | Sector                            | Level      | Target  | Outcome          |
|---------|---------------------------------------------------------|-----------|-----------------------------------|------------|---------|------------------|
| Denmark | Agreement on WEEE                                       | 2014–2016 | Waste                             | High       | Input   | Process          |
| Denmark | Scrap tyre recycling                                    | 1995–     | Waste                             | High       | Removal | Goal             |
| Denmark | Agreement on selective demolition (NMG96)               | 1996–     | Waste                             | High       | Input   | Goal             |
| Denmark | Agreement on collection of lead accumulators            | 1996–     | Waste                             | High       | Output  | Goal             |
| Denmark | Agreement on recycling of transport packaging           | 1994–     | Waste                             | High       | Removal | Goal             |
| Denmark | Agreements regarding aquatic environment                | 2009–2021 | Water                             | High / Low | Output  | Goal             |
| Denmark | ESO (Energispareordning)                                | 2006–2020 | Energy and air pollution          | High       | Input   | Goal             |
| Denmark | Agreement on industrial energy efficiency               | 1996–     | Energy and air pollution          | Low        | Input   | Goal             |
| Denmark | Oil industry environmental fund                         | 1992–2017 | Agriculture and natural resources | High       | Output  | Goal             |
| Denmark | Green taxicabs                                          | 2011–     | Energy and air pollution          | Low        | Input   | Process          |
| Denmark | Partnership on green public purchasing                  | 2006–     | Multiple sectors                  | Low        | Input   | Process          |
| Denmark | Agreements regarding forestland and wildlife protection | 1996–     | Agriculture and natural resources | Low        | Output  | Goal             |
| Denmark | Partnership on precision spraying                       | 2017–2021 | Agriculture and natural resources | Low        | Output  | Process          |
| Denmark | Agreement on pesticide use in public areas              | 1998–     | Agriculture and natural resources | High       | Input   | Process          |
| Denmark | Partnership on Green Shipping                           | 2016 -    | Transport                         | High       | Input   | Goal/<br>Process |

| Country | Name of agreement                                                                                                 | Active by                                | Sector                            | Level | Target             | Outcome |
|---------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------|-------|--------------------|---------|
| Finland | Energy efficiency agreements                                                                                      | 2008–2025                                | Energy and air-pollution          | High  | Input              | Process |
| Finland | Green Deal Agreement on plastic carrier bags                                                                      | 2016–2025                                | Waste                             | High  | Removal            | Goal    |
| Finland | Voluntary sectoral agreement on waste water nutrients                                                             | 2016–2018                                | Water                             | High  | Output             | Process |
| Finland | Forest Biodiversity Program for Southern Finland (METSO)                                                          | 2003–2025                                | Agriculture and natural resources | Low   | Output             | Goal    |
| Finland | Voluntary agreement on the remediation of land contaminated by oil (SOILI)                                        | 1996–                                    | Waste                             | High  | Removal            | Process |
| Iceland | Treatment of waste oil (heavy fuel oil)                                                                           | 1998–                                    | Waste                             | High  | Output/<br>Removal | Goal    |
| Iceland | Collection and recycling of synthetic fishing gear                                                                | 2005–                                    | Waste                             | High  | Output/<br>Removal | Goal    |
| Norway  | Waste collection and recycling (PPWD)                                                                             | 1992–2017                                | Waste                             | High  | Output             | Goal    |
| Norway  | Emissions of NO <sub>x</sub>                                                                                      | 2008 (New agreement 2018–2025)           | Energy and air pollution          | High  | Output             | Goal    |
| Norway  | Emission of SO <sub>2</sub>                                                                                       | 2001–2018                                | Energy and air pollution          | High  | Output             | Goal    |
| Norway  | The Enova agreement                                                                                               | 2018–2021                                | Energy and air pollution          | High  | Output             | Goal    |
| Norway  | Voluntary conservation of forest areas                                                                            | 2003–                                    | Agriculture and natural resources | High  | Output             | Goal    |
| Norway  | Voluntary agreement with the wood processing industry in Norway, regarding implementation of electricity savings. | 2004–2014                                | Energy and air pollution          | High  | Output             | Goal    |
| Norway  | Agreement on collection and proper handling of electronics and electronic waste                                   | 1995–                                    | Waste                             | High  | Removal            | Goal    |
| Norway  | Agreement on the collection of windows containing PCB                                                             | 2002–                                    | Waste                             | High  | Output             | Goal    |
| Norway  | Voluntary agreement on improving water quality in agriculture                                                     | 2004–2014                                | Agriculture and natural resources | High  | Output             | Goal    |
| Sweden  | Energy efficiency in energy-intensive industries                                                                  | 2005–2017 (No new applicants since 2012) | Energy and air pollution          | High  | Input              | Goal    |
| Sweden  | Reduce methane leakage from biogas production                                                                     | 2007–                                    | Energy and air pollution          | High  | Input              | Goal    |
| Sweden  | Waste management in the construction sector                                                                       | 2007–                                    | Waste                             | High  | Input/<br>Output   | Process |
| Sweden  | Recycling of office paper                                                                                         | 1996–                                    | Waste                             | High  | Output             | Goal    |
| Sweden  | Recycling of plastic from agriculture                                                                             | 2002–                                    | Waste                             | High  | Output             | Goal    |
| Sweden  | Voluntary spare of woodland for nature preservation                                                               | 1992/1993–                               | Agriculture and natural resources | High  | Output             | Goal    |

Source: COWI (2018).

## 8.1 Voluntary agreements in Denmark

Voluntary Agreements have been in place for some time in Denmark, with the first VA signed in 1987. In 1994, the use of agreements was incorporated in the Danish Environmental Protection Law's §10,<sup>30</sup> to ensure certain environmental improvements are reached, and through which means they are to be reached. However, we have not been able to find any VAs that have been initiated under this paragraph. §10 can be seen as more ideal requirements to control and compliance when parties are agreeing on a VA. Most often, VAs in Denmark are negotiated by affected private operators and are made as an alternative to actual regulation through legislation (NCM, 2011).

15 VAs have been identified to be in place during the period 2014–2017. VAs have been an especially used policy instrument in the *Waste* and *Agriculture and natural resources* sectors accounting for nearly 2/3 of all VAs. Three agreements are identified in the *Energy and air pollution* sector, two in the *Water* sector and one VA is identified in the *Transport* sector. One VA regarding the partnership on green public purchasing is relevant for more sectors. The partnership is a collaboration between municipalities and other public organisations based on joint mandatory procurement objectives considering global and local environmental concerns.

### 8.1.1 VAs in the Energy and air pollution sector

Three VAs have been identified in the *Energy and air pollution* sector. The newest VA is from 2011 and concerns an agreement between five ministries on officials' use of taxis. The agreement ensures that officials from the five ministries are only allowed to use *green taxi cabs*. *Green taxi cabs* are defined as vehicles with particle filters and classified energy class C or above. In addition taxi drivers must undertake training in energy efficiency driving (Danish Ministry of Environment and Food, 2011).

The Danish Energy Agency has administrated a voluntary scheme on energy efficiency since 1996. As of 2010, 230 companies have participated in the scheme, corresponding to 8–9% of the national gross energy consumption. Companies in energy intensives industries can obtain an energy tax relief that exceeds the costs associated with the requirements for the company by participating in the voluntary scheme. The main requirements include the company implementing and maintaining a certified energy management system and implementing energy efficiency projects with a payback time of four years or less (Danish Energy Agency, 2015).

The third agreement has been in place since 2006, wherein energy companies have a liability to achieve energy savings for the end-user. The framework and guidelines are determined by voluntary agreements between energy companies and the Danish Ministry of Energy, Utilities and Climate. The agreement was reinforced, first in 2009 and since in 2012, which covers the period 2012–2020 (Deloitte, 2015).

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<sup>30</sup> <https://www.retsinformation.dk/eli/lt/2018/1121>

### 8.1.2 VAs in the Water sector

Different VAs concerning groundwater, lakes, watercourses and wetlands are in place in Denmark. The agreements are included in the management plan for aquatic environments, which have been in place since 2009 and updated in 2016. The management plan consists of several wetland projects in the different municipalities, where some more or less depend on voluntary agreements. The aim of the projects is to recreate natural water conditions. And thereby also reduce nitrogen and phosphorus emissions, to e.g. inner fjords.

Most of the agreements, included in the management plan, are made between municipalities and landowners. Landowners can participate by voluntarily i) selling project land; ii) selling project land and subsequently buying new farmland; or iii) keeping project land with the option of receiving a subsidy in return for maintaining the aquatic environment (Danish Environmental Protection Agency, 2018a).

### 8.1.3 VAs in the Waste sector

Four out of five voluntary agreements on waste, namely tyre recycling, selective demolition, collection of lead accumulators and the recycling of transport packaging, have all been in place since the mid-1990s.

The *Danish Tyretrade Environmental Foundation*, which consists of representatives from the tyre and auto industry, is appointed by the Environmental Protection Agency to administer and secure the collecting and recycling of used tyres in an environmentally sustainable way. Consumers are paying an additional fee when purchasing a tyre, which are later used to pay a grant to tyre collectors delivering used tyres to approved recycling plants (Danish Tyretrade Environmental Foundation, 2018).

A similar agreement is in place regarding discarded lead accumulators between the association for the collection of lead accumulators in Denmark and the Ministry of Environment and Food. The agreement has been in place since 1996, but as early as 1994, the association has been collecting used accumulators (Returbat, 2004).

Both the agreement on selective demolition from 1996, and the agreement on recycling of transport packaging from 1994, are unilateral commitments, with no involvement of public regulators. The agreement on recycling of transport packaging has since its inception been aligned with the EU Packaging and Packaging Waste Directive's objectives for recycling of packaging waste (Danish Environmental Protection Agency, 2009).

The fifth identified agreement was an analysis of the potential within *Waste from Electrical and Electronical Equipment (WEEE)*, which was active during the period 2014–2016. The agreement was made between a series of industry organizations and the Ministry of Environment and Food of Denmark, with the purpose of identifying and promoting the use of eco-design to improve resource utilization in end-of-life electronics. The agreement ended with a series of recommendations to how the framework conditions under the current collection system and EU legislation could improve, as it in its current form does not support a resource-efficient utilisation of the materials used in electronics (Dansk Industri, 2018).

#### 8.1.4 *VAs in the Transport sector*

In late 2016 the Ministry of Environment and Food, the Ministry of Industry, Business and Financial Affairs and Danish Shipping signed an agreement on the *Partnership on Green Shipping*, which builds on the former *Partnership for Cleaner Shipping* from 2008 and focuses on reducing SO<sub>x</sub>- and NO<sub>x</sub> emissions. The Partnership aims to create growth and a better environment by strengthening Denmark's position as an environmentally friendly shipping nation (Danish Maritime Authority, 2016). As the agreement targets air emission, it could also fall under the *Energy and air pollution* sector.

#### 8.1.5 *VAs in the Agriculture and natural resources sector*

The use of pesticides in public areas has been regulated through voluntary agreements since 1997. As of 2007 the agreement is negotiated between the Ministry of Environment and Food of Denmark, Danish Regions and Local Government Denmark (KL), with the main aim to phase out the use of pesticides in public areas. Within the Danish government's Pesticide Strategy 2017–2021, some measures are aimed at the pesticide consumption in public areas in accordance with the 2007 agreement (Danish Environmental Protection Agency, 2017c). Likewise, to reduce the pesticide use, a partnership on precision spraying was also established within the Pesticide Strategy to increase the use of precision technologies to help reduce the pesticide consumption, and thereby also making it more profitable for farmers (Danish Environmental Protection Agency, 2017a).

Another agreement in the sector concerns the oil industry's environmental fund, which has been in place since 1992, but discontinued in 2017. The aim of the fund was to detect and remedy oil pollution at discharge gas stations and places with retail sale of motor fuels. As of 2017, 10,000 separate land areas have been or are still undergoing remediation.

Like the agreements concerning aquatic environments, there are multiple VAs concerning the protection of forestland and wildlife in projects under the Danish Nature Agency and Agricultural Agency. For example has the Agricultural Agency through the use of VAs with private landowners been able to gather areas and turning it into a coherent nature conservation area, to boost Tøndermarsken's birdlife and thereby strengthening the biodiversity of the area and region (Danish Nature Agency, 2017). Through VAs with landowners, municipalities have also been able to secure natural habitats and optimal water conditions to preserve and promote certain bird species (Aalborg Kommune, Mariagerfjord Kommune, Rebild Kommune, 2017).

#### 8.1.6 *Evaluations of voluntary agreements in Denmark*

This section will summarise the findings from the identified evaluations, as well as reports, of VAs in Denmark, which have been undertaken after the publication of the NCM report in 2011. The publications regarding the following VA programs have been identified:

- A 2015 evaluation of the energy savings scheme (ESO) by Deloitte (Deloitte, 2015) and *Rigsrevisionen's* 2017 report on the scheme (Rigsrevisionen, 2017)
- A 2017 report on the practices on selective demolition by the Environmental Protection Agency (Danish Environmental Protection Agency, 2017b)
- A 2016 analysis on the scrap tyre recycling scheme by the Environmental Protection Agency (Danish Ministry of Environment and Food, 2016c).

In the following the main points from the evaluations are derived and summarised.

### *On the subject of effectiveness*

The two findings regarding the *energy savings scheme (ESO)* represent diverging conclusions. In the 2015 report by Deloitte, it is concluded that the energy saving efforts for 2006–2013 did have an effect in reducing the total energy consumption in Denmark, thus having a positive social impact. Even though Deloitte points out potential pitfalls and comes up with some recommendations to make the efforts even more competitive and cost-effective, the overall conclusion is somewhat positive. Later, in 2017, *Rigsrevisionen* criticises the scheme and finds it to be cost-effective unsatisfactory. This is in part due to the lack of control by the Ministry of Energy, Utilities and Climate, in whether the reported energy savings by the participating companies complied with the rules set up by the scheme. As no controls have been made by the ministry, the companies have had no economic incentive to minimise their costs, as all the costs connected to the energy savings are refunded. Another shortcoming was the lack of certainty in which body of the ministry was responsible and had the legal basis to perform the controls. Having one-third of the efforts aimed at households has also shown to yield a societal deficit, warranting a revision of the agreement and its components. The VA does thus not live up to the factors for a successful outcome of VAs as described in Section 7.

The 2016 analysis on the scrap tyre recycling scheme looks into the environmental, economic and market aspects of the scheme. The scheme is considered very effective as practically all tyres in Denmark are collected, even though the capacity for recycling exceeds the amount available, making it necessary to import tyres. It is concluded that the grant, given to the tyre collectors, plays an effective role for the recycling of materials.

### *On the subject of competition*

As part of the analysis on the scrap tyre recycling scheme, interviews with stakeholders were conducted. In these interviews it was mentioned that an increased grant would lead to improved sorting of tyres, resulting in a higher quality in the supply of granules, thus giving the Danish companies a competitive advantage. However, it is mentioned that in order to do this, a constant supply of material is needed which would necessitate importing.

The focus of the report on the practices on selective demolition is not on the voluntary agreement, however it is mentioned along with practices in a number of other countries. The report points out that the agreement is skewed in some aspects and thereby affects the competitiveness of the participating companies. One aspect being that the agreement only applies to the demolition section of the Danish Construction Association and not for the whole sector. Also, not all builders and advisors take the agreement seriously or follow up on specific requirements for quality management. Thus, there is a need for a rules-based solution.

Part of the reasoning for the report by *Rigsrevisionen*, mentioned in the above section, was the suspicion that the scheme distorted competition. However, nothing was concluded regarding this aspect.

## 8.2 Voluntary agreements in Finland

Historically, voluntary agreements have played a relatively small part in Finnish environmental policy. VAs have been used since the late 1980s to address issues related to air pollution, waste and wastewater, energy, biodiversity and the restoration of contaminated land. In some of the early cases, VAs were shortly replaced by legislation (NCM, 2011).

However, recent years have seen the renewal of longstanding VA programs, as well as the addition of new programs. Furthermore, new agreements are currently being discussed, such as a “green deal” for managing oil waste (Ministry of the Environment, 2018e), new voluntary measures within wastewater treatment (Ministry of the Environment, 2017b), and material efficiency agreements (Motiva, 2018).

Currently, some VAs play a large part in terms of fulfilling the requirements of international agreements and EU directives, such as the Convention of Biological Diversity and the EU energy efficiency directive.

The following section provides a short overview of the VAs implemented and renewed in Finland after 2011. For earlier VAs, some of which are discussed in the evaluations, see the report “Voluntary Agreements and Environmental Labelling in the Nordic Countries” by the NCM (2011).

### 8.2.1 VAs in the Energy and air pollution sector

VAs have been used within energy savings and efficiency since 1997. The current energy efficiency agreements are an important part of Finland’s energy and climate strategy and a primary tool to improve the efficient use of energy in Finland and reach the targets of the Energy Efficiency Directive (Motiva, 2016a). The current energy efficiency agreement period (2017–2025) is the third in the series, and a continuance of the 2008–2016 period. For the current period, four different energy efficiency agreements have been signed, and include *Industries* (Industry, Energy sector and Private Service sector), *Property Sector*, *Municipal Sector*, and *Oil Sector* (Distribution of liquid heating fuels) (Motiva, 2016a).

For the Oil sector, the target is focused on improving processes, whereas for the other three sectors, the targets are set goals. These are to achieve energy savings of 7.5% in for the period 2017–2025, with 4% achieved before 2020, compared to a business as usual scenario. For companies that have participated in earlier agreements and want to include energy savings from measures undertaken in years 2014–2016, the target is a 10.5% reduction in 2025, and an interim target of 7% in 2020. The agreements are expected to reach a cumulative saving of 28 TWh in the period 2014–2020 (Motiva, 2016b).

Energy efficiency agreements were also made in the transport sector, but due to poor performance and limited interest, the program was discontinued in 2016 (Peltola, 2017). To replace the energy efficiency agreements, a certification scheme “Responsibility model for road transport enterprises”, was launched in 2017 (Peltola, 2017; TRAFI, 2018c). However, the scheme has so far not proven to be popular.

Similarly, a voluntary program aimed at improving energy efficiency within agriculture was also in effect between 2010–2016. The program was amended in 2016, with the contract period extended to 2020. The agreements focus on improving energy efficiency through knowledge sharing between the agricultural interest organizations and individual farmers (Ministry of Agriculture and Forestry, 2016).

#### 8.2.2 *VAs in the Waste sector*

The Green Deal Agreement on plastic carrier bags is part of Society’s Commitment to Sustainable Development, which is one of the key tools in implementing Agenda 2030 for Sustainable Development, its principles and 17 objectives (Ministry of the Environment, 2013). Within this framework, organizations, companies and private individuals can give voluntary operational commitments to sustainable development and ideas on implementing sustainable development. The Finnish National Commission on Sustainable Development, the general secretariat and the expert panel monitor and support the commitments and their progress.

In relation to these, in 2016, the Ministry of the Environment and the Federation of Finnish Commerce concluded the first Green Deal agreement (Plastic Carrier Bag Agreement) to implement the EU Directive on packaging and packaging waste. The agreement is in force until the end of 2025, with the aim of reducing the consumption of plastic carrier bags in Finland to no more than 40 bags per person by the end of 2025. The reduction target concerns all plastic carrier bags in retail outlets, excluding very lightweight bags provided for loose food such as fruit and vegetables and those required for hygiene purposes. The Finnish Commerce Federation commits itself to encourage and advise companies in the trade sector to join the agreement on plastic carrier bags, support advisory and information campaigns, monitor the fulfilment of the objectives, and deliver the monitoring data to the Ministry of the Environment (Ministry of the Environment, 2016).

The Ministry of the Environment will assess the impact of the measures after three years from concluding the agreement, and if the agreement is judged to be ineffective, the Ministry will consider other means to reduce the consumption of plastic carrier bags. The methods to reduce the consumption are not fixed in the agreement, except

that companies should provide information to reduce the consumption of lightweight plastic carrier bags and prevent littering, price lightweight plastic bags, and remove the availability of very thin plastic carrier bags at retail outlets on a self-service basis. The Green Deal agreement now covers more than 3,400 stores and 95% of all grocery stores (Ministry of the Environment, 2018f).

The Ministry of the Environment is currently preparing a “Green deal” agreement for the management of waste oil, which has previously been handled by a working centralized system. However, this system has been judged to be administratively burdensome and unfair, and a recent report concludes that the best option for a new system would be one based on VAs (Haavisto et al. 2018).

The SOILI-program was aimed at the remediation of land areas that were contaminated by oil and was active between 1996 and 2015. The program was partly financed by the industry, who financed the remediation of their properties, or properties under their control. The remainder of the funds were taken from the Finnish Oil Pollution Compensation Fund, which is funded by oil waste charges. The VA is described at greater length in the report by NCM (2011). When the SOILI-program ended in 2015, a similar program, referred to as JASKA, was set up. JASKA is also a VA scheme, in which owners of property potentially contaminated by oil can voluntarily enrol. The assessment of the land is financed by the Finnish Oil Pollution Compensation Fund. If remediation of the land is necessary, the owner of the property can also apply to have the remediation financed by the Finnish Oil Pollution Compensation Fund (Öljyalan Palvelukeskus, 2015).

### 8.2.3 *VAs in the Water sector*

In 2012 the Ministry of the Environment signed a VA with the Association of Finnish Local and Regional Authorities and the Finnish Water Utilities Association regarding a VA scheme aimed at reducing nutrient loading in treated wastewater in cost-effective ways. The contract period ended in 2016.

Before the agreement, wastewater treatment plants had no incentive to improve their effectiveness, as this could lead to more stringent requirements in the future. The agreement aimed to break this structure, by setting the requirements for the wastewater treatment plants based on the best available technology, rather than past performance of the treatment plant. In doing so, the treatment plants have the correct incentive to operate their plants as effectively as possible (Ministry of the Environment, 2012).

The environmental targets of the agreement were to reduce the loading of phosphorus and nitrogen by 22% and 17%, respectively, compared to the 2005–2007 level. (Ministry of the Environment, 2012).

### 8.2.4 *VAs in the Agriculture and natural resources sector*

The Forest Biodiversity Program for Southern Finland (METSO) was started in 2008 and renewed in 2014 until 2025. It aims to halt the ongoing decline in the biodiversity of forest habitats and species and establish stable favourable trends in Southern Finland's

forest ecosystems. It is a collaborative effort between the Ministry of the Environment, the Ministry of Agriculture and Forestry and different stakeholders. The program forms a part of Finland's implementation of various international agreements and commitments, such as the Convention on Biological Diversity (CBD) and the EU 2020 Biodiversity Strategy (Ministry of Agriculture and Forestry, 2015).

The METSO program is an example of a payment scheme for ecosystem services where protected areas are designated based on voluntary conservation agreements between the authorities and forest owners. Within the program, forest owners can offer their forests either for temporary conservation or for permanent protection. The sites that are chosen for the program are selected based on different ecological criteria. The forest owners are compensated based on the value of timber at the protected site.

The objectives of the program are to have sites covering about 96,000 hectares by 2025, that will be voluntarily offered by landowners to be established as private nature reserves or that will be acquired by the state. Additionally, about 82,000 hectares of valuable forest habitats will be protected in commercially managed privately owned forests (Ministry of Agriculture and Forestry, 2015).

#### 8.2.5 *Evaluations of voluntary agreements in Finland*

This section will summarise the findings from the identified evaluations, as well as the final program reports of VAs in Finland, which have been undertaken after the publication of the NCM report in 2011. The publications regarding the following VA programs have been identified:

- Energy efficiency agreements in the public transport sector, final report (Peltola, 2017)
- Energy program for farms, final report (Pyykkönen and Ranta, 2015)
- SOILI-Agreement concerning remediation of land contaminated by oil, final report (Öljyalan Palvelukeskus, 2017)
- METSO-program, interim report (Laita et al., 2012)
- Voluntary sectoral agreement on wastewater nutrients, final report (Ministry of the Environment, 2017b).

In the following the main points from the evaluations are derived and summarised.

##### **On the subject of effectiveness**

The evaluation of the SOILI agreement seems positive regarding its effectiveness, as roughly 1,000 contaminated sites were investigated during the program, and roughly 600 sites were remediated. However, given the lack of a business as usual estimate, attributing this effect directly to the VA scheme is not possible.

During the contract period for the VA on wastewater nutrients, the phosphorus and nitrogen load from the wastewater treatment plants were reduced by 27% and 10%

respectively. However, the evaluation concludes that disentangling the effect of the VA from a business as usual case is impossible.

The most recently published evaluation of the METSO program in 2012 states that the biggest barrier for the program in reaching its objective was the lack in funding. After the evaluation was published, the funding has been increased, and at the end of 2017 67% of the 96,000 ha goal of nature reserves had been established. Regarding the second goal of establishing 82,000 ha of protected areas in commercially and privately-owned forest, 52% had been reached. Overall, the evaluation concludes that the METSO program has been successful in reaching its target so far.

Within the transport sector, the number of energy efficiency agreements during the period 2008–2016 did not reach the target, nor did the signatory firms report their energy use adequately and appropriately, both implying that the scheme was not effective (Peltola, 2017).

Similarly, the energy program for farms did not reach the target for signatory farms. The target for the program was that farms to join should cover 80% of the energy consumption in agriculture. This was probably an unrealistic goal, which the program did not come close to meeting. However, for the farms that did join the program, it was expected that the reduction goal of 9% would be met, however, this effect might not be fully attributable to the program (Pyykkönen and Ranta, 2015).

#### On the subject of cost-effectiveness

While the efficiency of the VAs is not generally addressed in the evaluations, based on the evaluated effects of the programs, it can be said that the energy efficiency agreements in the transport sector, as well as the energy programs for farms were not efficient ways of improving energy efficiency. For the transport sector, the reasons are attributed to the lack of monitoring and reporting obligations, which is seen as a result of the relatively limited available funds for the program. This undermined the credibility of the program, and as such the benefits for companies were limited as it provided no competitive advantage (Peltola, 2017).

Regarding the energy program for farms, the low number of signatories is attributed to a low recognition of the program. One of the main reasons for this might be that the farmers were not included in the preparation of the program, and that the marketing of the program was not effective (Pyykkönen and Ranta, 2015).

While the evaluation of the SOILI agreement does not specifically assess the cost-effectiveness of the VA, it highlights the fact as a result of the agreements, a cost-effective approach to land remediation has been developed, resulting in land remediation projects in general being more cost-effective. Given the fact that the companies themselves funded the remediation of their contaminated land, the program provided an incentive to the companies to do it in a cost-effective way. In a previous report (NCM, 2011), the agreements were also regarded as a cost-effective way of managing contaminated land sites.

For the METSO- program, cost-effectiveness can be hard to evaluate, as it cannot be done on a cost-per-hectare-protected-land-approach, because the ecological effects vary from plot to plot, and requires longer term monitoring and prediction of

the effects. On the other hand, Mönkkönen et al. (2011) found that permanent forest reserves as well as small temporary reserves (10-year protection contracts) can be cost-effective, depending on the time horizon of the evaluation.

#### On the subject of flexibility

In the SOILI agreements, the method of remediation was not specified, but decided on a case by case basis. This allowed for flexibility in implementation and enabled the use and development of cost-effective methods. Similarly, for the VA on wastewater nutrients, the means of reaching the reduction target were not specified, but rather left up to the individual treatment plants.

#### On the subject of competition

In the transport sector, signatories of energy efficiency agreements did not benefit in terms of increased demand, as signing the VA was generally not taken into account by potential customers. Firm-specific quality control mechanism and efficiency standards were seemingly taken as adequate guarantees of energy efficiency (Peltola, 2017). This was seen as one of the key elements for the program failing to attract signatory companies, but this itself was a result of loose enforcement and the lack of trust in the program.

#### On the subject of policy mix

The evaluation of the VA on wastewater nutrients concludes that the signing of the agreement did not materially affect the environmental permit process of a company. The contract period ended in 2016, and the parties have started preparations for how voluntary measure could, in the future, be taken into account when setting river basin management plans and synchronizing the contract periods with the planning periods.

### 8.3 Voluntary agreements in Iceland

There are very few examples of VAs in Iceland and no general policy is in place regarding their use, neither as a single instrument nor as a part of a policy mix. No common definition of the term *Voluntary Agreement* can be found in legislation or existing agreements, and literature on the subject is very limited. Existing VAs have not been evaluated and very limited data are available on their efficiency, effectiveness etc.

The oldest example of a VA in Iceland relates to the treatment of waste generated by use of heavy fuel oil.<sup>31</sup> Three such agreements now exist, which all can be traced back to a unilateral declaration by three oil waste companies. A similar VA was made in 2005 on the treatment of synthetic fishing gear. All these agreements are negotiated agreements between public authorities and companies or association of companies,

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<sup>31</sup> Unless otherwise stated, the information provided in this chapter is based on acts and legislative proposals from Althingi (The Icelandic Parliament) and interviews with Sigurbjörg Sæmundsdóttir, a specialist at the Icelandic Ministry for the Environment and Natural Resources, and Ólafur Kjartansson, General Director of the Icelandic Recycling Fund (Úrvinnslusjóður).

creating obligations for companies related to waste treatment and exempting them, in turn, from certain legal requirements (recycling fees).

In 2016 the Ministry for the Environment and Natural Resources and the Association of Companies in Commerce and Services (SVÞ) entered into a VA which required the association to take effective measures to reduce the use of plastic bags in retail stores. The agreement was based on the government's "Action Plan to Reduce the Use of Plastic Bags" from 2015 and belonged to a series of actions which were intended to lead up to a ban in 2019 on the provision of free plastic bags. However, the agreement was never fully implemented and was finally terminated in 2018.

Recently, there has been some development of third-party initiatives encouraging companies to make voluntary environmental commitments. One such example is a project created by Festa – the Icelandic Center for Corporate Social Responsibility which offers companies and organisations a platform to make pledges to reduce their GHG emissions. Funds have also been established to offset GHG emissions from participating organisations, companies and individuals. These third-party initiatives involve pre-set environmental targets and are intended to enhance the public image of participating companies. They are however not overseen or monitored by public authorities or linked to legal requirements.

#### 8.3.1 *VAs in the Waste sector*

Agreements on the treatment of waste related to heavy fuel oil are governed by Act No 162/2002 on Recycling Fees, which imposes fees on certain products to cover the cost of collection, transport and treatment of waste originated from these products. According to the Act, companies and associations of companies can negotiate an agreement with the Iceland Recycling Fund (Úrvinnslusjóður) on measures to ensure proper treatment of waste generated from the use of heavy fuel oil. Upon the formal approval of the Minister for the Environment and Natural Resources of such agreement, heavy fuel oil will be exempted from the recycling fee under Act No 162/2002.

On this basis, three separate agreements have been concluded between the Icelandic Recycling Fund and oil companies importing heavy fuel oil to Iceland. The existing agreements were signed in 2014 but represent a continuation of earlier arrangement based on a unilateral commitment of the three oil companies from 1998. The objective of the agreements is to prevent pollution caused by waste related to the use of heavy fuel oil. To that end, the oil companies are required to provide waste management facilities for such waste and ensure its proper treatment in accordance with Icelandic law. In practice, the oil companies also provide facilities for treatment of other waste oil according to a separate agreement with the Icelandic Recycling Fund. The waste generated by use of heavy fuel oil mixes with this other waste oil, the treatment of which is financed through recycling fees imposed on the relevant oil products. Because of this, the heavy fuel agreements with each of the oil companies include a cost allocation provision that requires the companies to finance the treatment of the estimated quantity of heavy fuel oil waste in the waste oil mix. In turn, heavy fuel oil is exempted from the recycling fee.

Each agreement on the treatment of heavy fuel oil can be terminated by either party, but the Icelandic Recycling Fund can however only do so in case of a breach of the agreement. The agreements are furthermore based on the premise that all oil importers in Iceland participate in the scheme created by the agreements. A refusal by one oil importer to maintain the scheme will thus result in termination of all the agreements. Following a termination of the agreements, heavy fuel oil would become subject to a recycling fee under Act No 162/2002.

In 2004, Act No. 162/2002 on Recycling Fees was amended to allow companies and associations of companies in the fishing industry to enter into an agreement with the Icelandic Recycling Fund on the proper disposal of synthetic fishing gear, under the same terms applied in relation to heavy fuel oil (above). The amendment was intended to prevent and reduce pollution caused by synthetic fishing gear by promoting its collection and recycling.

An agreement was concluded between the Icelandic Recycling Fund and the association of fishing vessel owners (LÍÚ, later SFS) in 2005. The agreement, which is still in force, requires the association to ensure proper treatment of a certain quantity of fishing gear every year. The fishing gear is, in turn, exempted from the recycling fee under Act No. 162/2002. Estimating the amount of fishing gear waste has proven difficult, mainly because part of the fishing gear is purchased abroad for immediate use and does not enter the country through customs. The agreement is currently under review and data are being collected to improve the accuracy of the estimate.

#### 8.4 Voluntary agreements in Norway

Voluntary Agreements in Norway were primarily focused on waste and making companies responsible for recycling and recovering used packaging. Agreements were made between the Norwegian Ministry of Climate and Environment and the industry in 1992 and are still effective today. A few years later, VAs to reduce SO<sub>x</sub>, NO<sub>x</sub> and greenhouse gas emissions followed, and in the mid-2000s three agreements targeting the agriculture and natural resources sector came into place. Most of the VAs are negotiated agreements between the Ministry of Climate and Environment and different economic sectors. In most cases some basis regulation or general law is in place to regulate the area or impose penalties, should the obligations stated in the agreements not be achieved. There is no specific definition of voluntary agreements in Norwegian Environmental Regulations (NCM, 2011).

7 voluntary agreements have been identified to be or have been in place during the period 2014–2017. The agreements focus mainly on two sectors, namely the *Waste* and *Agriculture and natural resources* sectors, with three agreements each.

#### 8.4.1 *VAs in the Energy and air pollution sector*

The Federation of Norwegian Industries and Enova, who is owned by the Ministry of Climate and Environment, are collaborating to create a competitive and climate efficient industry in Norway, through increased innovation in energy and climate technology, knowledge-building and reduction of greenhouse gases. The agreement describes relevant areas of cooperation, common interests, meeting frequency, etc. (Norsk Industri and Enova SF, 2018).

Since 2008, the so-called NO<sub>x</sub>-agreement has been in place and prolonged twice, most recently in 2017 for the period 2018–2025. The latest agreement was made between the Norwegian authorities and 15 corporate organizations (NO<sub>x</sub>-fondet, 2018a). The agreement is made in response to the NO<sub>x</sub> tax that the Norwegian government introduced in 2007, see section 5.1.6. In joining the agreement, corporate organisations are obliged to significantly reduce NO<sub>x</sub>-emissions. The organisations are sanctioned if they fail to comply, and are subsidised for implementing emissions-reducing measures. The fee to NO<sub>x</sub>-fondet for joining the agreement is lower than the NO<sub>x</sub> tax, making it financially attractive.

Similarly, the processing industry and the Ministry of Climate and Environment had an agreement on reducing SO<sub>2</sub> emissions since 2001. Companies that previously paid a SO<sub>2</sub> tax now pay a corresponding amount to Miljøfondet (Environmental Fund). The funds are then used to finance technological development and the construction and modernization of treatment plants<sup>32</sup>. Participating companies are not to emit more than 11,000 tons of SO<sub>2</sub> per year. The latest agreement was made for the period 2019–2022 (Miljøfondet, 2018).

The last agreement is on implementing electricity savings in the wood processing industry. In the agreement, companies within wood processing could apply to the Norwegian Water Resources and Energy Directorate to participate in the program and through the program be exempted from the electricity tax. Through the program, the approved companies, in exchange for the lower tax, have to establish an energy plan, map their electricity efficiency measures, and implement the measures with a repayment period of less than three years (Bye et al., 2016).

#### 8.4.2 *VAs in the Waste sector*

As mentioned above, the longest running voluntary agreement is found in the *Waste* sector. The agreement is part of the EU Packaging and Packaging Waste Directive and covers several voluntary agreements that were made between the Ministry of Climate and Environment and the industry starting in 1992. Following this, an agreement on the collection and proper handling of electronics and electronic waste was made with the electronics industry in 1995. In 2017 a new regulation came into effect, ensuring that recycling companies must be able to fulfil the requirements of regulations from the Environmental Directorate (Norwegian Environment Agency, 2017a, 2017b).

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<sup>32</sup> <https://miljofondet.no/miljofondets-tiltak-for-a-redusere-so2-utslippene/>

The newest agreement concerning waste is the agreement on the collection of discarded insulating glass units containing PCBs. The agreement dates back to 2002, with the establishment of the recycling company *Ruteretur AS* and was negotiated between the Ministry of Climate and Environment and organisations from the construction sector. *Ruteretur AS* is a non-profit company owned by the industry and is responsible for collecting and managing the discarded insulating glass units, containing the hazard in a safe and cost-effective way that is in compliance with the Norwegian Waste Regulation. The agreement was made to prevent glass units used in the 1960s and 1970s ending up in the wrong places. In more recent years, *Ruteretur AS* has succeeded in annually collecting around 50,000 glass units containing PCBs (Ruteretur, 2018).

#### 8.4.3 *VAs in the Agriculture and natural resources sector*

The two agreements targeting the *Agriculture and natural resources* sector were implemented in the mid-2000s. In 2003, the voluntary conservation of forest areas was introduced, having forest owners themselves offer areas for protection, under §37 in the Norwegian Nature Diversity Act. In the agreement, forest owners abandon their right to do business in the areas but receive some compensation for the loss of future income (Frivillig vern, 2018). The voluntary agreement on improving water quality in agriculture was focused on Rogaland county in Western Norway and ended in 2014. It is an umbrella of different voluntary measures, such as environmental spreading of animal manure, and aimed to prevent excessive consumption of phosphorus and nitrogen. The agreement was made between the county and some of the municipalities of Rogaland. The objective of the agreement was to overcome the challenges many cities experienced with regard to nutrient drainage, reducing the water quality while still acknowledging Rogaland as an important agricultural community (Vannportalen.no, 2013).

#### 8.4.4 *Evaluations of voluntary agreements in Norway*

This section will summarise the findings from the identified evaluations, as well as reports, of VAs in Norway, which have been undertaken after the publication of the NCM report in 2011. Evaluations are few and only two reports are identified. The Norwegian reports primarily focus on the effectiveness of the agreements. However, the competitiveness of the agreements also seems to be a priority for the Norwegian authorities. The publications regarding the following VA programs have been identified:

- A 2015 report on electricity savings in the wood processing industry by the Norwegian Water Resources and Energy Directorate (The Norwegian Water Resources and Energy Directorate, 2015);
- A 2014 report on the effects of the NO<sub>x</sub>-agreement by Vista Analyse (Vista Analyse, 2014), plus annual reports from NOX-fondet (NO<sub>x</sub>-fondet, 2018b);

- A 2017 evaluation of the Norwegian forest protection building on two former evaluation of the voluntary conservation of forest areas by the Norwegian Institute for Nature Research (Framstad et al., 2017).

In the following, the main points from the evaluations are derived and summarised.

#### On the subject of effectiveness

The report on electricity savings in the wood processing industry is a short report summarising the project, which ran from 2004 to 2014, and the related savings and costs. The Norwegian Water Resources and Energy Directorate informed 41 companies in the wood processing industry that they were eligible for participation in the programme. 18 companies participated in the programme, however only 10 remained when the programme ended, resulting in a participation rate of around 24%. Throughout the programme period, around 525 GWh in electricity savings were made, constituting a financial gain for the remaining 10 companies.

Regarding whether the NO<sub>x</sub> agreement has been the most effective way of lowering NO<sub>x</sub>-emissions, the reports examine the rate of approved measures and the side-effects of these measures. In the period, there were 1,985 applications regarding measures to significantly reduce NO<sub>x</sub> emissions. 934 of these applications were carried through, with an additional 146 applications to be carried out in the period 2018–2020. It is noted that the use of clean technology and energy conversion targeted at reducing the NO<sub>x</sub>-emissions has proven to have a positive side effect in reduced CO<sub>2</sub>-emissions.

The results on the voluntary conservation of forest areas showed that the scheme had largely led to the protection of valuable forest areas, although some of the more valuable areas were not covered by the scheme.

#### On the subject of cost-effectiveness

Regarding the agreement on electricity savings in the wood processing industry, it was concluded that 525 GWh were made in electricity savings. This reduction was in part due to the efficiency measures the participating companies were obligated to apply. Comparing the electricity savings with the given tax exemptions of NOK 182 (EUR 19.53) million, the average costs for electricity savings ended at approximately NOK35 øre (EUR 0.04) per kWh. It is however mentioned that some of the energy savings are due to closures, which could have an impact on the efficiency of the agreements.

In their annual report for 2017, NO<sub>x</sub>-fondet summarises both the results for 2017 and for the whole period, during which the first agreements were operational. The agreement has proved very effective throughout the period, with the total emission reduction ending at approximately 1,800 tonnes NO<sub>x</sub> above the determined obligation. Compared to 2007, when the only operational instrument was a NO<sub>x</sub> fee at NOK 15 (EUR 1.61) per kg NO<sub>x</sub>, the annual NO<sub>x</sub> reduction under the agreement is significantly larger. When looking at cost-effectiveness, an analysis from 2005 cited in the report shows that there are large differences depending on the specific measure and industry. On average, the cost-effectiveness is calculated at NOK 19.1 (EUR 2.05) per kg NO<sub>x</sub>.

The evaluations of the voluntary conservation of forest areas, showed that forest owners, in general, received higher payments (price per hectare) through the voluntary scheme compared to former processes. At the same time, the administrative costs, processing time and the costly and time-consuming legal processes were reduced significantly, making the scheme successful.

#### On the subject of competition

The Norwegian authorities have in some cases accounted for the impact on competitiveness when designing voluntary agreements. In the 2017 annual report from NO<sub>x</sub>-fondet, it is mentioned that lower emissions and energy consumption as a result of the measures to reduce NO<sub>x</sub>-emissions improve the competitiveness of the companies participating in the agreement. Especially in the maritime sector, where the largest proportion of the funds have been used, it is seen as having given companies a head start in the international market with upcoming stricter requirements for emissions from international shipping.

Although not mentioned in an evaluation, the new regulation on collection of packaging waste from 2017, was made to strengthen the competitiveness of the recycling companies, who participated in the voluntary agreements. As it is open to everyone to establish themselves as a recycling company, entrants who were not bound by the agreements, could choose to collect the most profitable packaging waste. With the regulation from 2017, companies must now be able to fulfil compliance with the regulations from the Environmental Directorate (Norwegian Environment Agency, 2017a).

#### On the subject of policy mix

The policy mix regarding voluntary agreements in Norway has not been a primary area of focus in the identified reports and evaluations. However, it is mentioned by Fischer-Bogason (Fischer-Bogason, 2011), that there were some problems in Norway regarding voluntary agreements and policy mix. Waste treatment was identified to be an area influenced by different policies and measures from several Ministries. It is concluded that second best solutions might be the results for actors in these markets, given the incentives and barriers in place (Fischer-Bogason, 2011).

## 8.5 Voluntary agreements in Sweden

Of the five Nordic countries, Sweden has used voluntary agreements for the longest time. The first voluntary agreements in Sweden were made throughout the 1970s, and their use increased during the 1980s. One of the main arguments in Sweden for using VAs, is the belief that they lower public administrative costs and are less bureaucratic. No formal definition of voluntary agreement is made within the framework of the Swedish environmental legislation, and the Swedish constitution has set limits for the use of VAs without legal grounds (NCM, 2011).

6 voluntary agreements have been identified to be or have been in place during the period 2014–2017. Three sectors are covered by voluntary agreements in Sweden, *Energy and air pollution*, *Waste* and *Agriculture and natural resources*, covering two, three and one agreement, respectively.

#### 8.5.1 *VAs in the Energy and air pollution sector*

Since 2005, an agreement on energy efficiency in energy intensive industries has been in place, with the purpose of promoting energy efficiency and savings. Some 100 energy-intensive companies have been a part of the 5-year voluntary agreement. To participate in the agreement, the companies have committed to perform energy auditing and analysis, implementing and adopting routines for energy efficiency procurement and project planning, in exchange for a tax exemption from the EU minimum tax on electricity. The eligible companies most frequently came from the pulp and paper, mining, iron and steel, non-metal minerals and industrial chemicals sectors (Stenqvist and Nilsson, 2012). There have not been any new applicants since 2012 and participating energy intensive industries were allowed to continue until 2017 when the existing agreement ended (International Energy Agency, 2016).

An agreement to reduce methane leakage from biogas production was introduced in 2007. The agreement consists of two parts, where the biogas plants themselves detect and remedy leaks once a year. External independent consultants then measure the emissions, and on the basis hereof write a report with suggestions on how to reduce emissions from leaks (Avfall Sverige, 2018).

#### 8.5.2 *VAs in the Waste sector*

Two of the voluntary agreements concerns recycling resembles producer responsibility but are on a voluntary basis. The agreements concern office paper and agricultural plastics. As it functions similarly to the legislative producer responsibility, it is the manufacturer or importer of the products that has the responsibility to ensure that the waste is collected, and processed or recycled (Swedish Environmental Protection Agency, 2003).

The last of the three waste agreements is on waste management in the construction sector, which originated in 2007. At the time, *Kretloppsrådet* formulated a set of guidelines for the construction sector's waste and waste management, to serve as an industry standard. As an example, guidelines are formulated to design buildings in a way that it can be disassembled and recycled to reduce its energy and resource consumption, while minimising the environmental impact. Today, the Swedish Construction Federation has taken over responsibility and is committed to ensuring that the guidelines continue to be updated (Sveriges Byggindustrier, 2018).

#### 8.5.3 *VA's in the Agriculture and natural resources sector*

The voluntary agreement identified in the *Agriculture and natural resources* sector is from the early 1990s and concerns voluntary sparing of woodland for nature preservation. The agreement is in some ways similar to the Norwegian agreement on conservation of forest areas, however the Swedish land owners are not compensated for abandoning their right of doing business in the area. In Sweden, the voluntary provision of forest land has to be of at least 0.5 hectares of coherent productive forest land. Besides that, the land has to contain a high biodiversity and have environmental or recreational value (Skogsstyrelsen, 2017a). Other agreements for conservation of nature also exist, such as the *Naturvårdsavtal*, where a renewable agreement with the Swedish Forestry Agency or county administrative boards is signed by either private or local authorities (Skogsstyrelsen, 2017c).

#### 8.5.4 *Evaluations of voluntary agreements in Sweden*

This section will summarise the findings from the identified evaluations, as well as reports, of VAs in Sweden, which have been undertaken after the publication of the NCM report in 2011. Findings regarding voluntary agreements are sparse in Sweden. Three reports or evaluations have been identified. The publications regarding the following VA programs have been identified:

- A 2012 evaluation published by Lund University on the Swedish voluntary programme on energy efficiency in energy-intensive industries (PFE) (Stenqvist and Nilsson, 2012);
- A 2017 report on voluntary spare of woodland for nature preservation by the Swedish Forest Agency (Skogsstyrelsen, 2017b);
- A 2016 report on the data regarding methane leakage for the period 2007–2015, prepared by the Swedish Waste Management and Recycling association, Avfall Sverige (Avfall Sverige, 2016).

In the following the main points from the evaluations are derived and summarised.

##### **On the subject of effectiveness**

The effectiveness of voluntary agreements or whether the agreements have fulfilled their targets is generally the main focus of the Swedish reports and evaluations.

The 2012 evaluation of energy efficiency in energy-intensive industries (PFE) showed that the participating companies managed to fulfil and surpass the impact goal set at the time, based on the calculated electricity savings, had there been a tax instead. Compared to number of eligible companies, the participating companies only comprised 10%. However, in terms of electricity consumption, they accounted for 85% of the eligible electricity demand, thereby fulfilling the target. Only a small percentage of eligible companies with lower electricity demand (<100 GWh/year) took part in the programme, indicating that for small and medium sized companies the tax relief did not incentivise or make up for the associated costs (e.g. implementing and obtaining a certification for a standardised energy management system). Despite fulfilling and

surpassing the impact goal, it should be noted that the agreement was abolished in 2012. The duration of a company's participation in the PFE is five years, and the agreements officially ended in 2017 (International Energy Agency, 2016).

In the report on methane leakage, it is concluded that the voluntary agreement has had a major impact in the Swedish waste management sector. The agreement has resulted in a high level of knowledge of the methane emissions in the waste management sector, compared to other sectors where production and upgrading of biogas takes place. The high level of knowledge has helped to reduce methane emissions. Data on the voluntary agreement has likewise been used to define default values given in the Swedish gas industry's calculation tool for sustainability criteria for biofuels.

In the 2017 evaluation on the voluntary provision of forest land, it is concluded that no noteworthy changes have been observed since 2010. This does not mean that no new land has been voluntarily provisioned, but rather that some of the voluntary provision have been transferred to formal protection. The report identifies FSC and PEFC certified forest areas as one of the big reasons for the voluntary provision areas not increasing since 2010, as certified areas have increased by approximately 1.1 million ha in the same period. Being certified gives a competitive advantage, as certified woods and raw material are in demand. The certification standards currently require land owners to exclude 5% of the productive forest land, leaving no incentive to further provision. It is thus doubtful that the government's goal for voluntary provision can be reached by 2020. It is also concluded that there is a need for greater transparency of the position, scope and quality of the voluntary provisions, if the goal is to be met.

#### On the subject of cost-effectiveness

In the evaluation on energy efficiency in energy-intensive industries, the cost-effectiveness ratio, in terms of electricity saving for society, showed that it was beneficial for the companies, both from an investment and administrative standpoint, as well as for the Swedish Energy Agency for administering the programme. The evaluation also emphasises that the motivational factor of having the companies implement the electricity saving measured over the programme period in order to continue their participation.

#### On the subject of competition

In the evaluation regarding PFE it is mentioned that industrial competitiveness is a prioritised political goal. To obligate the industry to act, without weakening the competitiveness, an economic incentive such as a tax exemption should follow. However, as mentioned in the effectiveness section, the incentive was not effective in including small and medium sized companies.

#### On the subject of policy mix

The policy mix regarding voluntary agreements in Sweden has not been the focus of the identified reports and evaluations. However, it is mentioned in the NCM report from 2011 that *voluntary agreements are a way to implement real changes as a supplement to laws and subsidies* in Sweden. And thus, they contribute to more cost-effective solutions, and distribute the responsibility to agents that are willing to act in order to reach given objectives and targets.

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# Sammenfatning

## Abstract

Nærværende rapport består af to dele. Del 1 opsummerer de væsentligste ændringer i anvendelsen af økonomiske virkemidler i miljøpolitikken i de nordiske lande ved at give et overblik over nye virkemidler eller vigtige ændringer i eksisterende i perioden 2014–2017<sup>33</sup>. Derudover indeholder Del 1 en detaljeret beskrivelse af udviklingen i hvert af de nordiske lande, som danner udgangspunkt for en efterfølgende sammenligning og vurdering på tværs af landene. Del 1 indeholder også "rådata", som politiske beslutningstagere og øvrige interessenter kan anvende til uddybende analyser. Del 2 indeholder en oversigt over anvendelsen af frivillige miljøaftaler i de nordiske lande fordelt på sektorer. Endelig sammenfatter Del 2 de studier, som har evalueret effekten af frivillige miljøaftaler.

Der har været anvendt en lang række forskellige økonomiske virkemidler på tværs af sektorerne i de nordiske lande. Forskellene i anvendelsen af de økonomiske virkemidler skyldes dels særlige forhold, der gør sig gældende i de enkelte lande og sektorer, dels national lovgivning på området. Et fælles tema på tværs af landene har været klimaforhold. I perioden 2014–2017 er der overordnet set kun sket få ændringer, hvad angår indførelse af nye eller afvikling af eksisterende økonomiske virkemidler, og de fleste ændringer vedrører justeringer i afgiftssatser eller afgiftsfritagelse. De største ændringer er sket inden for transport, energi og luftforurening. Eksempler på ændringer er forhøjelse af CO<sub>2</sub>-afgifter, subsidier til lavemissionskøretøjer, afgifter på luftfart og afgiftsgodtgørelse i forhold til reparation og vedligehold af visse varer med henblik på at mindske materialeanvendelse. Det skal samtidig bemærkes, at skatteprovenuet pr. indbygger fra økonomiske virkemidler har været svagt stigende i perioden 2014 til 2016.<sup>34</sup>

Der er identificeret frivillige aftaler i alle fem nordiske lande. Danmark står for langt den største andel af aftalerne (15 aftaler). Finland, Norge og Sverige ligger på samme niveau (5–9 aftaler), mens der på Island kun er identificeret få eksempler på frivillige aftaler (2).

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<sup>33</sup> Rapporten fokuserer på perioden 2014–2017; derfor er ikke alle ændringer til eksisterende virkemidler eller indførelsen af nye fra 2018 og frem medtaget.

<sup>34</sup> Data fra 2017 var ikke tilgængelige ved rapportens afslutning.

## Baggrund og formål

Hvert tredje eller fjerde år udgiver Nordisk Ministerråds Nordiske Arbejdsgruppe for Miljø og Økonomi (NME, tidligere MEG) en oversigt over anvendelsen af økonomiske virkemidler i de nordiske landes miljøpolitik. Nærværende rapport indgår i denne serie af udgivelser.

Rapporten er opbygget på samme måde som tidligere rapporter i serien. Den første del indeholder derfor en vurdering af de ændringer, der er sket i anvendelsen af økonomiske virkemidler i perioden 2014 til 2017. Økonomiske virkemidler er bredt defineret og omfatter afgifter, gebyrer og subsidier, som sigter mod at give et økonomisk incitament til adfærdsendringer. Vurderingen indeholdt i Del 1 sammenligner anvendelsen af økonomiske virkemidler på tværs af sektorer og lande. Ændringerne i anvendelsen af økonomiske virkemidler belyses med udgangspunkt i forhold, der har været genstand for internationalt fokus. Efter oversigtskapitlet i Del 1 følger en detaljeret vurdering af hvert land fordelt på sektorer. Der er anvendt samme definition af sektorer som i de tidligere rapporter, dvs. energi og forurening, vand, affald, transport, landbrug og naturressourcer.

Del 2 af rapporten identificerer, beskriver og sammenligner de senere års anvendelse af økonomiske virkemidler i de forskellige miljøsektorer på tværs af de nordiske lande. I tråd med OECD's definition forstås frivillige aftaler som "arrangements between firms and regulators in which firms commit to actions that improve the natural environment. The regulator encourages and/or supervises these actions" (OECD, 2003). Frivillige aftaler kan være alternativer til, forløbere for eller supplerende foranstaltninger til økonomiske virkemidler eller styrings- og kontrollovgivning. For eksempel kan frivillige aftaler indledningsvis bruges som et virkemiddel, når et nyt politikområde introduceres, hvis økonomiske virkemidler endnu ikke er en mulighed.

## Nøgleresultater og konklusioner

### *De væsentligste ændringer er sket inden for transport, energi og luftforurening*

I perioden 2014-2017 var fokus i de nordiske lande på økonomiske virkemidler inden for transport, energi og luftforurening. Undtaget fra dette er Island, hvor der kun ses få ændringer i anvendelsen af økonomiske virkemidler i alle sektorer. En stor del af ændringerne i de økonomiske virkemidler må tilskrives klimadagsordenen og det dermed forbundne behov for at nedbringe CO<sub>2</sub>-udledningerne.

I transportsektoren har det været et centralt mål at nedbringe brugen af fossile brændstoffer, men afgiftsrater er også sænket. Der er forskel på, hvordan de økonomiske virkemidler anvendes fra land til land. Nogle lande har hævet CO<sub>2</sub>-afgiften, mens andre har introduceret subsidier til lavemissionskøretøjer. Derudover har både Sverige og Norge indført skat på luftfart. I begge lande opkræves afgifter på flypassagertrafik fra nationale lufthavne. Inden for energisektoren har Finland, Norge og Sverige hævet afgiftsniveauet.

### *Økonomiske virkemidler i Danmark*

I perioden 2014–2017 er der i Danmark sket mindre ændringer i skattesystemet. De fleste ændringer er sket i energisektoren, hvor flere afgiftsrater er blevet hævet. Det modsatte er sket i transportsektoren, hvor flere afgiftsrater er blevet sænket. Registreringsafgiften er en progressiv, værdibaseret afgift, hvor afgiften bl.a. afhænger af køretøjets CO<sub>2</sub>-udledning. I 2017 blev registreringsafgiftssatsen sat ned fra 105 % til 85 % for værdien af køretøjet op til grænseværdien, mens grænseværdien samtidig blev forhøjet fra DKK 106,600 (EUR 41,331) til DKK 185,100 (EUR 24,884). I 2015 blev afgiftssatsen på beløb over grænseværdien nedsat fra 180 % til 150 %<sup>35</sup>. En væsentlig ændring af afgifterne rettet mod transport er, at elbiler fra 2016 og frem ikke længere er fuldstændig fritaget fra registreringsafgift. Som en del af energiaftalen fra 2012 blev det besluttet at analysere afgifts- og støttestrukturen i energisektoren. Denne analyse blev afsluttet i 2017 og opdateret i 2018. Konklusionen var, at der var forskel på marginalsat og subsidier, alt afhængig af teknologi og anvendelsesformål. Derudover blev det konkluderet, at en mere ensartet afgiftsstruktur ville give en samfundsøkonomisk gevinst i form af lavere omkostninger i forhold til at opfylde Danmarks nationale og internationale forpligtelser og energirelaterede miljømål. Klimahensynet har vejet tungt i perioden. I juni 2018 underskrev den danske regering – med støtte fra alle partier i folketinget – en energiaftale. Formålet med aftalen er at sikre en markedsbaseret grøn omstilling. I oktober 2018 præsenterede den danske regering sit forslag til en ny luft- og klimastrategi, som skulle sikre, at Danmark kunne opfylde EU's klimamål for 2030. Blandt de foreslåede initiativer er et forbud mod salg af diesel- og benzinbiler efter 2030, afgiftslettelse på grønne biler, en højere ophugningspræmie for gamle dieslbiler og en ny ophugningspræmie for gamle brændeovne.

### *Økonomiske virkemidler i Finland*

I perioden 2014–2017 blev der primært foretaget ændringer til eksisterende virkemidler. I energisektoren blev satsen for energirelaterede afgifter forhøjet flere gange. Fra 2016 blev subsidierne til vindkraft nedsat til samme niveau som subsidier til biogas og anlæg, der anvender træ som brændsel. Loftet for vindkraftssubsidier blev imidlertid nået i november 2017, og det diskuteres p.t., om der skal indføres en teknologineutral støtteordning for fornybar energi. De økonomiske virkemidler rettet mod køretøjer er også blevet ændret flere gange siden 2013. Overordnet er den årlige bilafgift blevet hævet betydeligt for alle køretøjer uanset emissionsniveau. Den årlige bilafgift består af en basistakst, som er bundet op på køretøjets CO<sub>2</sub>-emission, og en brændstofafhængig afgift, hvor der på benzindrevne køretøjer kun opkræves basistaksten. I 2015 blev det dog besluttet, at registreringsafgiften på nye køretøjer skulle nedsættes, hvis CO<sub>2</sub>-udledningen er mindre end 140 g CO<sub>2</sub> pr. km. Derudover

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<sup>35</sup> I 2015 var afgiftsgrænsen for en passagerbil DKK 81,700 (EUR 10,983), hvilket betyder, at afgiftssatsen var 105 % op til dette beløb og 180 % af værdien over dette beløb.

blev der indført en tilbagebetalingsordning for udrangerede køretøjer, der var i kraft fra januar 2018 til august 2018. Endelig er affaldsafgiften, som er et af de centrale virkemidler inden for affaldshåndtering og -forebyggelse, også sat op flere gange.

### *Økonomiske virkemidler i Island*

Bortset fra mindre justeringer er der ikke sket ændringer i anvendelsen af økonomiske virkemidler i Island i perioden 2014-2017. Dette ser dog ud til at blive ændret indenfor de nærmeste år. Regeringen har f.eks. erklæret, at den ønsker at indføre en ny deponeringsafgift og hæve CO<sub>2</sub>-afgiften for at styrke klimapolitikken i landet. Som resultat af en parlamentarisk beslutning i 2017 forudses en øget anvendelse af økonomiske virkemidler i perioden 2017-2021 med henblik på at fremskynde overgangen fra fossile brændstoffer til fornybar energi for landbaseret transport og skibsfart.

### *Økonomiske virkemidler i Norge*

Siden 2014 har Norge styrket miljøprofilen på en række afgifter. CO<sub>2</sub>-afgiften er gradvis blevet hævet og udbredt til flere sektorer gennem reduktion af antallet af sektorer med afgiftsfritagelse. Der er dog stadig forskellige afgiftsniveauer i visse sektorer. CO<sub>2</sub>-afgiften på flybrændstof på indenrigsflyvninger blev hævet i 2015 og 2017, og CO<sub>2</sub>-afgiften på luftbårne emissioner fra naturgas udvundet fra kontinentalsoklen er også blevet sat op. Vejbrugsafgiften på bioethanol, LPG og biodiesel er gradvis hævet, så den nu er på samme niveau som for benzin og autodiesel (2016). Endvidere skal det nævnes, at afgiften på bortskaffelse af affald er blevet afskaffet, da det blev vurderet, at den havde en begrænset effekt på miljøet. Den 1. juni 2016 indførte Norge en afgift på flypassagerer rejsende med fly fra norske lufthavne. I 2017 var satsen NOK 82 (EUR 8,80) pr. passager.

### *Økonomiske virkemidler i Sverige*

I perioden 2014-2017 blev flere eksisterende virkemidler ændret og en række nye introduceret, især i energi- og transportsektoren. I energisektoren er både energi- og CO<sub>2</sub>-afgiften på fossile brændstoffer nu inflationskorrigeret (forbrugerprisindeks). Fra 2017 og fremover hæves energiafgiften på benzin og diesel med 2 % årligt. Tilsvarende blev energiafgiften på elforbrug i husholdninger og virksomheder hævet en smule i 2017. Ændringer i økonomiske virkemidler rettet mod energisektoren, herunder reduktion af drivhusgasser, omfatter en udvidelse af systemet med grønne certifikater og indførelsen af en ny støtteordning for lokale klimainvesteringer (Klimatklivet) i 2015. I transportsektoren blev der i 2017 truffet beslutning om en afgifts- og støtteordning (bonus malus) for køretøjer. Ordningen blev implementeret i 2018. Ordningen, der erstattede et tidligere program, har til formål at øge andelen af lavemissionskøretøjer. Fra 2017 ydes der tilskud til køb af elcykler, og samme år blev der indført afgift på luftfart. Markedsbaserede lovgivningsinstrumenter har generelt ikke været anvendt til

at regulere skadelige stoffer, hvis de i øvrigt reguleres gennem administrative instrumenter. I 2017 blev dette ændret ved indførelsen af en kemiafgift, som er en afgift, der pålægges flammehæmmere i elektroniske produkter.

Endelig vil en beslutning fra 2017 formentlig få stor effekt på klimapolitikken og de dermed forbundne økonomiske virkemidler i de kommende år. Det drejer sig om klimaloven (klimatlagen), med hvilken Sverige forpligter sig til at træffe forskellige foranstaltninger for at nedbringe udledningen af drivhusgasser.

### *Frivillige aftaler*

Det er de specifikke forhold i den enkelte sag, som afgør, om der bør anvendes en *frivillig aftale* som virkemiddel, og om denne bliver en succes. Anvendelsen af frivillige aftaler bør generelt baseres på en forudgående vurdering af, om de rette kriterier/forhold er til stede, jf. nedenstående afsnit. Når det vurderes, at en frivillig aftale kan være en omkostningseffektiv løsning, så kan det være en fleksibel løsning for de private aktører (brancheorganisationer, virksomheder og borgere) og give synergieffekter inden for den givne politiske ramme.

Litteraturgennemgangen viser, at en vellykket frivillig aftale afhænger af flere faktorer, herunder især 1) et veludviklet setup med understøttende juridiske rammer og kapacitet til at håndtere og følge op på den frivillige aftale både over for myndigheder og private aktører, 2) motiverede private aktører, 3) en høj grad af tillid blandt parterne (effektiv overvågning, afrapportering og efterlevels mekanismer) og 4) en omkostningseffektiv anvendelse af den frivillige aftale.

Oversigten over de frivillige miljøaftaler, som var i brug i perioden 2014-2017, blev tilvejebragt via litteraturstudier og interview med relevante interessenter og miljøeksperter. Der blev identificeret frivillige aftaler i alle fem nordiske lande med Danmark som det land med det højeste antal aftaler (15). En mere beskeden anvendelse af frivillige aftaler ses i Finland, Norge og Sverige (5-9). I Island anvendes frivillige aftaler i meget begrænset omfang (2). Frivillige aftaler har især været anvendt i affaldssektoren, mens der kun er fundet et eksempel på en frivillig aftale i transportsektoren. Alle fem lande har frivillige aftaler i affaldssektoren, indgået tilbage i 1990'erne. Der er kun indgået få frivillige aftaler siden den foregående evaluering af frivillige aftaler i 2011, og kun i Danmark og Finland. Det har vist sig at være vanskeligt at fremskaffe detaljeret information om de enkelte frivillige aftaler og deres oprindelse. Dog er de fleste frivillige aftaler, som er blevet identificeret, et resultat af forhandlinger mellem den relevante offentlige myndighed og de berørte industrier, eller i nogle tilfælde virksomheder.

Der blev identificeret 15 evalueringer eller rapporter omhandlende frivillige aftaler. Da rapporterne og evalueringerne er forskellige med hensyn til fokus, tema og metode, har det været vanskeligt at drage nogen generelle konklusioner. Resultaterne af de evaluerede frivillige aftaler er blandede, da ikke alle aftaler har nået eller forventes at nå deres mål. De frivillige aftalers varierende effektivitet kan tilskrives kapaciteten hos den regulerende myndighed i forhold til at overvåge og om nødvendigt sanktionere aftalerne. Derudover spiller også den konkrete sag og markedskompleksiteten en rolle

for aftalens effektivitet og resultater. Generelt ses et behov for øget fokus på overvågning og evaluering af aftalerne, som er i tråd med konklusionerne fra en tidligere rapport udgivet af Nordisk Ministerråd "Voluntary agreements and environmental labelling in the Nordic countries" (NCM, 2011). Et fremtidigt fokusområde kunne være fastlæggelse af en fælles metode til brug for evaluering af frivillige aftaler i en tidlig udviklingsfase.



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### **The Use of Economic Instruments in Nordic Environmental Policy 2014–2017**

This is the eighth quadrennial report on the use of economic instruments in Nordic environmental policy published by the Nordic Working Group for Environment and Economics. The report comprises two parts. Part I summarises the use of economic instruments in environmental policies of the five countries, during the period 2014-2017. It provides an overview of new instruments and major changes to existing instruments, a detailed country-by-country description of these developments, and a cross-country comparison. Part II provides an overview of the use of voluntary environmental agreements in different environmental sectors across the Nordic countries. It includes an overview and synthesis of studies that have evaluated the effects of voluntary environmental agreements.

