

POLICY BRIEF

What is carbon pricing and why is it important?



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Introduction

The Nordic governments all have set targets to reach climate neutrality at different times, ranging from 2030 (Norway) to 2050 (Denmark). Regardless of the target year, to reach climate neutrality will require significant efforts in reducing net greenhouse gas emissions.

Carbon pricing is one of the most important market-based tools designed to achieve set climate goals in the most efficient way possible. Carbon pricing means adding a price on CO₂ (or on CO₂ equivalent) emissions through for example emissions trading systems (ETS) or carbon taxes. By pricing carbon, the negative external effect created by greenhouse gas emissions is internalized. The negative external effect is defined as the derived cost of climate change including costs due to sea-level-rise or increased costs of healthcare due to more extreme heat waves. A price on carbon internalizes these costs to economic decision-making and provides an economic incentive to emitters to reduce emissions for example by increasing the competitiveness of low-carbon fuels and low-carbon production processes compared to the alternative (1, 4). According to van den Bergh and Savin (3), carbon pricing has reduced emissions and is among the most mentioned policy instruments in Nationally Determined Contributions submitted to the UNFCCC (2).

Carbon pricing includes various pricing mechanisms, ranging from taxes to tradable emission permits such as the EU Emissions trading system (EU-ETS). Common to them all is that they put an explicit price on emissions normally expressed as per ton of carbon dioxide equivalent (CO₂ eq). Ideally carbon pricing should reflect the social cost of carbon, that is the external cost associated with emitting a ton of carbon into the atmosphere (1, 4).

An *emissions trading system* (ETS) such as the EU-ETS system is a system where emitters can trade emission units to meet their emission targets. The EU-ETS system is a Cap-and-trade system, which applies a cap or absolute limit on emissions. Emissions allowances are distributed amongst ETS applicable sectors. To comply with their emission targets, based on the relative cost of the options,

emitters either reduce emissions or purchase emission units in the carbon market. The market thereby establishes a price on carbon. The mitigation outcome of an ETS system, such as the EU-ETS should therefore be known, but not the carbon price.

A *carbon tax* sets a price on carbon by through an explicit tax rate on GHG emissions, that is a price per ton of CO₂eq. In contrast to an ETS, the price of carbon is known, but the mitigation outcome is not known.

The *explicit carbon rate* is based on the sum of a carbon tax and the price of carbon from an ETS. An *effective carbon rate (ECR)* is based on three components, a carbon (or GHG) tax, the carbon price from an ETS and other energy taxes. A *net effective carbon rate (Net ECR)* in addition accounts for negative carbon prices, such as subsidies.

The Nordic Stocktake and Visions project

For the Nordic Council of Ministers, the organizations CONCITO, CICERO, IVL Swedish Environmental Research Institute, University of Iceland and Reykjavik University, and Tyrsky Consulting have carried out the project “Nordic Stocktake and Visions – Pathways to climate neutrality”.

The consortium has taken stock of GHG emissions in the Nordic countries, and described and assessed the national pathways towards climate neutrality in the Nordic region. The results are described in the report “Nordic Stocktake”. The Nordic Stocktake is intended as a regional tool to support the Global Stocktake process and spur to further climate action, both within the Nordics and beyond.

As a part of the “Nordic Stocktake and Visions – Pathways to climate neutrality” project, the consortium held five webinars on topics of special relevance for reaching climate neutrality in the Nordic region. The webinars can be viewed on Norden.org.

This policy brief is a follow-up to the webinar on “Carbon pricing”, organized by University of Iceland and Reykjavik University.

The project is a part of the initiative “Climate transition in the Nordics” to support the Nordic Vision 2030. The overall aim of the Nordic Vision is to become the most sustainable and integrated region in the world by 2030.

The status of explicit carbon pricing in Nordic countries

Collectively the Nordic countries have been at the forefront in carbon pricing. All have implemented carbon taxes and all participate in the EU-ETS system. In all cases are carbon taxes at least used to complement the EU-ETS when carbon taxes are for example levied on fuel use in sectors outside of the EU-ETS. In some cases, for selected sectors the two carbon pricing schemes overlap. For example in Norway (see Table 1) a fraction of the Norwegian carbon tax is added to the EU ETS price for petroleum activities on the continental shelf, to ensure that the carbon price levied on the industry is comparable to the carbon tax rate. This ensures that the explicit carbon rate is similar across sectors. The ETS derived carbon price and implementation is comparable across the Nordic countries however the rate and implementation of carbon taxes differ, resulting in differences in the effective carbon price. Table 1 compares carbon taxes across the Nordic countries (1, 4)

Table 1: Comparison of carbon taxing schemes across the Nordic countries (1, 4).

	DENMARK	FINLAND	ICELAND	NORWAY	SWEDEN
When established?	1992	1990	2010	1991	1990
Coverage	Scope 1 ¹ CO ₂ emissions from fossil fuels and industrial emissions not covered by the EU ETS. Central heating.	Direct and indirect (lifecycle) CO ₂ emissions from energy as fuel or heat.	Scope 1 CO ₂ emissions liquid and gaseous fossil fuels. F-gases	Scope 1 CO ₂ emissions from combustion of all fossil fuels, incineration of waste, CO ₂ and CH ₄ fugitive emissions, HFCs and PFCs.	Scope 1 CO ₂ emissions from combustion of fossil fuels
Exemptions (examples)	Most installations subject to the EU-ETS system. Electricity generation	Fuels for electricity production, waste fuels, emissions from biomass	Installations subject to the EU-ETS system, Fuel use in aviation	Installations subject to the EU-ETS system with some exceptions including the offshore petroleum sector	Installations subject to the EU-ETS system; gasoline for rail and shipping.
Discounts or reimbursements (examples)	Emissions from some energy intensive industries	Combined heat and power production (CHP), industrial machinery, diesel for transport, farms and energy intensive industries	None	Offshore petroleum sector, waste incinerators, fishing, domestic aviation	Forestry, agriculture and fishing for fuel use in specialized equipment
General tax rate	€24/tCO ₂ e	€77/tCO ₂ e,	€36/tCO ₂ e.	€83/tCO ₂ e.	€119/tCO ₂ e.
Interaction with EU ETS	Overlap	Overlap	Complements	Overlap	Complements

¹ Scope 1 emissions are defined as direct greenhouse (GHG) emissions derived as a result of an activity

Denmark (1, 4) introduced a carbon tax in 1992. The tax applies to scope 1 GHG emissions from fossil fuels in all sectors except electricity, plus industrial emissions not covered by the EU ETS and emissions from central heating. Electricity generation and other EU ETS installations are in most cases exempt from the tax. Some industries are eligible for a reimbursement. In 2022 a broad majority in the Danish Parliament agreed on a green tax reform (5) which is an important step in achieving carbon neutrality. The tax reform introduces a national carbon tax on level with the EU ETS in 2030. The tax will be phased in from 2025-2030 and will gradually increase the carbon price while lifting selected energy taxes. Non-ETS industry will pay the full carbon price while ETS sectors will pay 50% of the national tax on top of the ETS price. Energy facilities producing heating will pay the full carbon prices on top of the EU ETS. This includes waste incineration, which in Denmark are included in the EU ETS (5).

Carbon pricing in **Finland** (1, 4) was established in 1990 when Finland introduced a carbon tax. The carbon tax applies to direct and indirect (lifecycle) CO₂ emissions from energy use for transport or heat. The tax covers all fossil fuels, but fuels used for electricity production, waste fuels and CO₂ emissions from biomass are exempt in addition to energy used as raw materials in industrial processes. Installations subject to the EU-ETS system are exempt with the exception of CHP. Tax rates differ and are higher for transport fuels than for others. For example, fuels used for combined heat and power production (CHP) and in industrial machinery are taxed at a lower rate. Energy-intensive companies and farms have been entitled to a rebate on their fuel taxes. Recent developments have included efforts to phase out environmentally harmful tax subsidies and promote electrification. The tax rebate on energy-intensive companies will be phased out by 2025 and the tax subsidy on peat has been slightly reduced.

A carbon tax was introduced in **Iceland** in 2010 (1, 4). The carbon tax is levied on liquid and gaseous fossil fuels except jet fuel and levied on direct F-gas emissions. Installations subject to the EU-ETS system and emissions from jet fuels are not subject to the tax. The carbon tax therefore complements the EU-ETS system. According to the Ministry of Finance the carbon tax is indexed each year by expected inflation.

Norway (1, 4) introduced a carbon tax in 1991. The tax is currently levied on scope 1 CO₂ emissions from burning of fossil fuels, emissions from the petroleum sector on the continental shelf, HFC/PFC emissions and, since 2022 on CO₂ emissions from waste incineration. The tax complements the carbon price created by the EU ETS by adding a carbon price to selected activities not captured by the ETS. Most installations subject to the EU-ETS system are exempt from the tax, but not all. In some sectors the two carbon pricing systems overlap where some activities subject to the EU-ETS system are also subject to the tax.

This includes the offshore oil production sector and waste incineration. In the offshore oil production sector the carbon tax is added to the EU ETS allowance price such that the total carbon price is at a similar level as the carbon tax. Tax rates are expected to reach €170/ tCO₂e by 2030, which is 2-3 times higher than it is currently, depending on the sector.

Sweden (1, 4) implemented a carbon tax in 1991. The carbon tax applies to direct (scope 1) CO₂ emissions from the combustion of fossil fuels except peat. Major exemptions have been part of the Swedish carbon tax since its implementation. Industries subject to the EU ETS system are exempt from the tax in addition to gasoline used for rail or shipping and fuels other than jet fuel or jet kerosene used in aviation. Discounts of 50% apply to fuel used for specialized equipment in agriculture, forestry and fishing.



Emerging common challenges

1. The need to increase the effectiveness of carbon pricing

To achieve climate neutrality it is important that carbon pricing is as effective as possible. Studies confirm that carbon pricing has been somewhat effective in reducing GHG emissions (6). But effectiveness can be undermined by low carbon price levels, wide ranging exemptions and overlapping policies (6). As carbon pricing in the Nordic countries is higher than elsewhere key issues related to effectiveness in the Nordic countries are exemptions and overlapping policies.

Exemptions can be either when certain actors face lower carbon prices or are fully exempt. Free trading allowances, lower carbon taxes for some sectors and tax refunds are all examples known within the Nordic countries. Agriculture, for example, is largely exempt from carbon pricing. The justification of exemptions normally is based on the argument to maintain competitiveness. Yet studies illustrate that the case for exemptions based on maintaining competitiveness is not strong (6). To ensure effectiveness more sectors, including agriculture need to be covered by full carbon pricing to provide economic incentives for mitigation. Denmark is already moving in this direction (5).

Another challenge common to all the Nordic countries is the pending adjustment to new EU regulations on carbon pricing where taxation and trading systems will overlap more with for example transport now being brought into an emissions trading system.

2. Addressing the expected reduction in revenue

As the Nordic countries shift away from the use of fossil fuels, revenue from carbon and fuel taxation will decline leaving a gap in state finances. Nordic authorities are already anticipating this development. The Icelandic ministry of finance for example expects revenue from both carbon taxes and auctions to decline in the not-so-distant future (Ministry of Finance (Iceland), 2022). The ministry of finance in Finland is expecting serious budget implications that require short and long term mitigation actions (Ministry of Finance (Finland), 2020).

A reduction in revenue from carbon pricing across the Nordic countries calls for a simultaneous increase in carbon and energy taxes in the short term and a reduction in exemptions. This would strengthen the incentive to reduce emissions, improve cost effectiveness of carbon pricing and improve the state budgets in the short and medium term. Preparations should also begin for actions in the long run such as shifting away from carbon pricing as Nordic economies are decarbonized to other types of pricing, for example in transport towards user fees.

3. Realizing justice dimensions

Carbon pricing is an essential part of creating the enabling environment for the emergence of the low-carbon economy. Carbon pricing has however justice related implications in: i) its disproportionate impact on low-income households (are regressive) and ii) possible negative impact on employment for example if those industries that are subject to carbon prices loose competitiveness.

First, as energy is considered a basic need, energy expenditures weigh more heavily in the budget of lower income households (a larger proportion of their disposable income spent on energy) compared to those that are more affluent. As a result, carbon pricing may disproportionately affect those that have lower income. Studies have also illustrated that carbon taxes are likely to be more regressive in more affluent countries due to reliance on private car ownership (6). Therefore carbon taxes in the Nordic countries are likely to be regressive, in particular, in the context of transport.

Second, as carbon pricing extends to other sectors that fulfill basic needs, such as agriculture, this also may translate to higher food prices and as in the case of energy disproportionately affect those that are less affluent compared to others.

Third, extending carbon pricing to sectors such as agriculture that have little adaptive or coping capacity to increased taxation may result in reduced employment. In the case of such impact, it is important that fundamental labor principles and rights are honored by for example ensuring opportunities for retraining and capacity building of workers.

Regardless of the character of justice related implications of carbon pricing, they need to be addressed to ensure a just transition to a low-carbon economy.

Recommendations for Nordic Collaboration

A collaborative approach to carbon pricing

1

Despite some differences in carbon pricing across the Nordic countries, they all are forerunners in carbon pricing in Europe and internationally in terms of coverage and effective carbon rates. They do however face somewhat similar challenges when it comes to the effectiveness of carbon taxes. This includes exemptions of industries subject to the EU-ETS system and exclusions such as agricultural emissions. They also have much in common when addressing changes in EU policies related to carbon pricing including the pending inclusion of transport in an ETS. To enhance collective effectiveness of carbon pricing across the Nordic countries a collaborative approach could be desirable.

A collaborative approach to ensure a just transition

2

The Nordic countries are all affluent welfare states, that have much in common when it comes to social policies and labor laws. They also are at the forefront of the women's rights movement which is relevant in the context of carbon pricing as women may be more likely to be affected by the regressiveness of carbon pricing. The Nordic countries should demonstrate excellence in how to address justice dimensions related to carbon pricing and should collaborate in identifying the best way forward.

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