POLICY BRIEF

Nordic Environmental Fiscal Reform:

Case studies and application for post-pandemic economic recovery

Tara Laan, Joachim Roth, and Estan Beedell[1]

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1.0 Introduction

Over the coming decade, governments will need to recover from the economic crisis caused by the COVID-19 pandemic while responding to the growing impacts of climate change. Environmental fiscal reform (EFR) provides a means of addressing both these challenges by raising revenues (for debt reduction and stimulus spending) while creating price signals to deter carbon and other pollution. EFR is the alignment of taxes and similar measures with the costs of environmental damage, implemented alongside socially or environmentally productive spending of the revenues (Organisation for Economic Co-operation and Development [OECD], n.d., 2017b).[2] The basic principles of EFR are summarized in Figure 1.

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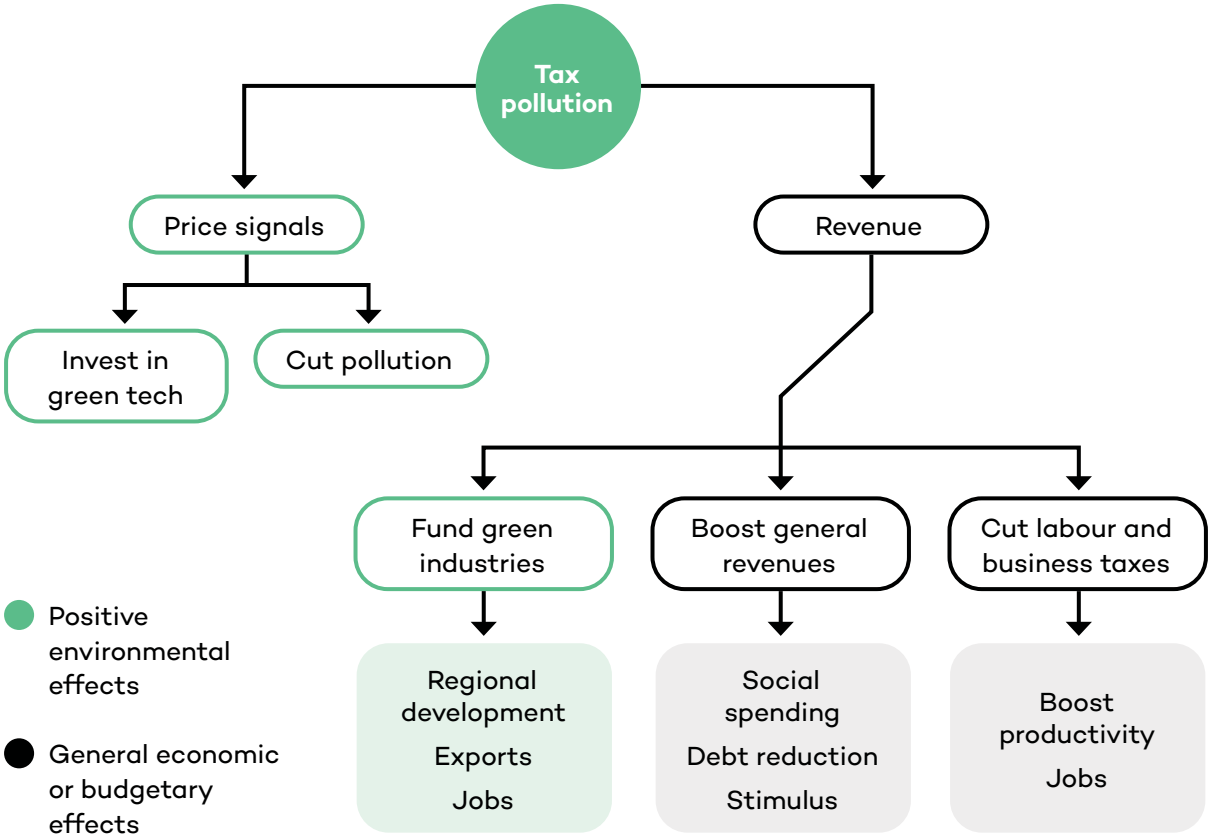
[2] For a discussion of the definitions of EFR, see OECD (2017). An environmental tax is defined as one whose tax base is a physical unit (or a proxy of it) that has a proven specific negative impact on the environment. There are four subsets: energy, transport, pollution, and resource taxes.

Figure 1. Principles of EFR



Nordic countries[3] have deep experience with EFR, having pioneered the use of carbon taxes as an environmental and economic recovery tool in response to a regional financial crisis in the early 1990s (Denmark, Finland, Sweden, and Norway) and the 2008 global financial crisis (Iceland) (Carl & Fedor, 2016a; Roth & Laan, 2020). The Nordics also tax energy, transport, air pollution, and waste (Svenningsen et al., 2018). While national policies vary, the Nordics have generally used environmental tax revenues to fund reductions in taxes that are a drag on the economy, finance green stimulus to boost productivity, and provide a price signal to encourage energy efficiency while discouraging pollution (Carl & Fedor, 2016a; Ekins & Speck, 2011). Using existing literature, this brief examines the effect of Nordic EFR on five key indicators: economic growth, employment, revenues, air pollution, and carbon emissions. A Nordic case study is provided for each indicator.

However, is experience from the Nordics relevant to other countries, particularly developing and emerging economies? The Nordic region consists of advanced economies with high taxation, strong governance, and a population that is generally supportive of environmental action (Franzen & Vogl, 2013; Weishaar, 2018). All Nordics except Iceland are in the top 10 highest revenue-collecting countries.[4] They are expert at collecting revenue, particularly from

[3] The Nordic region consists of Denmark, Finland, Iceland, Norway, and Sweden, as well as the Faroe Islands, Greenland, and Åland.

[4] Based on government revenue as a % of GDP in 2015 for OECD and partner economies: Norway (2nd, 55%), Finland (3rd, 54%), Denmark (4th, 53%), Sweden (8th, 49%) and Iceland (17th, 43%) (OECD, 2021c).

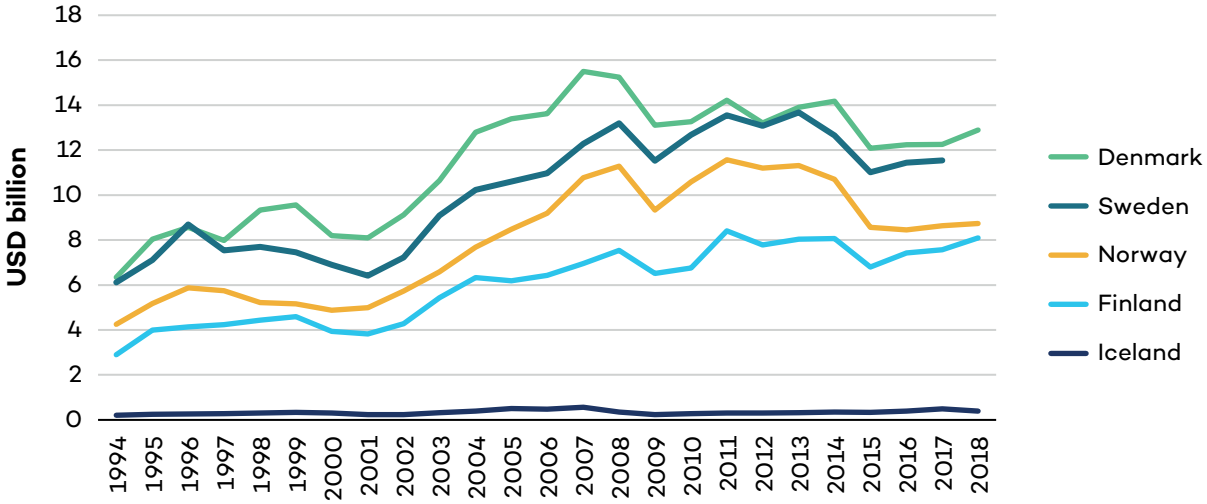
environmental taxes. In 2017, the median environmental tax per capita for Nordic countries was 7.5 times the global median based on available data (OECD, 2021b).

While country circumstances vary widely, lessons can be drawn from the Nordic experience that are relevant to all countries seeking to recover fiscal space while addressing pollution. Emulation of the Nordic fiscal model is not necessarily feasible or even desirable for every country. Instead, this policy brief aims to help governments "seek what they sought": the design of fiscal instruments that deliver both economic and environmental benefits.

2.0 Revenues From Green Taxes

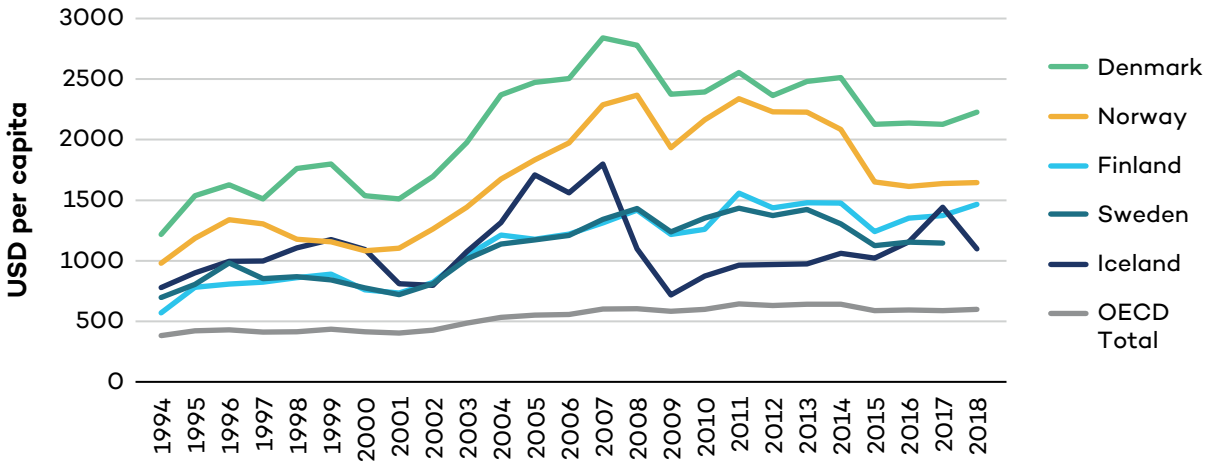
Energy, transport, and pollution taxes generate significant revenue for the Nordic countries, with each country except Iceland collecting between USD 7 billion and USD 13 billion from environmental taxes in 2018 (Figure 2). All Nordics have at least double the environmental tax per capita as the OECD average, with Denmark's being over four times higher (Figure 3). Sweden and Finland rely most heavily on taxing energy and carbon, whereas vehicle registration and road taxes play a larger role in Norway and Denmark (Box 1) (Svenningsen et al., 2018). Pollution taxes play a relatively minor role except in Iceland.

Figure 2. Nordic environmental tax revenue



Note: Sweden's 2018 data not available at time of writing
Source: OECD, 2021b.

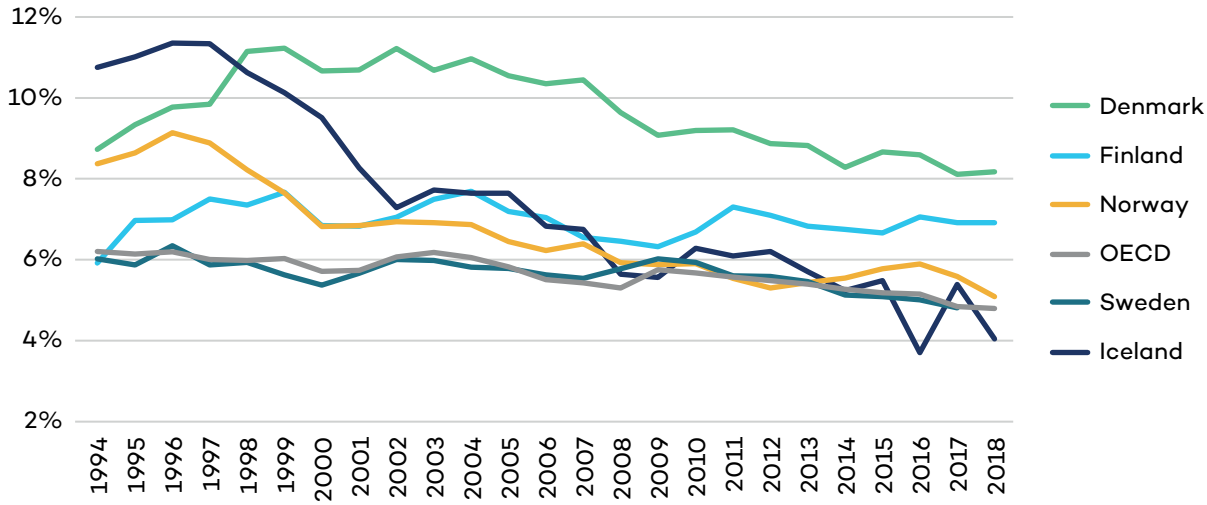
Figure 3. Revenue per capita from environmental taxes in Nordic countries compared with OECD average



Note: Sweden's 2018 data not available at time of writing
Source: OECD, 2021b

Environmental tax revenue as a proportion of total revenues shows a declining trend for both the Nordics and the OECD average (Figure 4). This is partly because overall tax revenue increased significantly from the mid-2000s (OECD, 2021b) but also because environmental taxes are, by design, a declining source of revenue. As consumers adapt behaviour, tax revenues decline (assuming a constant base and rate). Behavioural change does not occur overnight: the long-run price elasticity of gasoline demand is between –0.2 and –0.4 (Burke & Nishitateno, 2013). Declining revenues can be addressed by increasing the tax rate regularly (including by putting in place an automatic accelerator), which will maintain revenues and incentives for behavioural change. This approach provides time for policy-makers to adjust and diversify the tax base.

Figure 4. Environmental tax revenue as a percent of total tax revenue



Source: OECD, 2021b.

How environmental tax revenues are spent is fundamental to the tax's social and economic impacts, political acceptance, and contribution toward a low-carbon economy. Denmark, Finland, Norway and Sweden favoured revenue recycling: reducing other taxes (notably personal income taxes and social security contributions by businesses) to offset the carbon tax, particularly for low-income groups (Carl & Fedor, 2016a). Nordic-style EFR does not generally involve explicit earmarking due to the constraints it puts on government spending and the difficulty of matching environmental tax revenues with foregone revenue from reduced capital and labour taxes (International Council on Mining & Metals [ICMM], 2013). However, there are exceptions, such as Denmark's allocation of 30% of its carbon tax revenues for energy efficiency subsidies in 1996 (Carl & Fedor, 2016a). Iceland did not recycle revenues and instead allocated all of its carbon tax receipts to boost general revenue (Carl & Fedor, 2016a). In non-Nordic countries, carbon tax revenues are frequently earmarked to support green technologies and to ease the transition for exposed industrial sectors or vulnerable populations (ICMM, 2013).

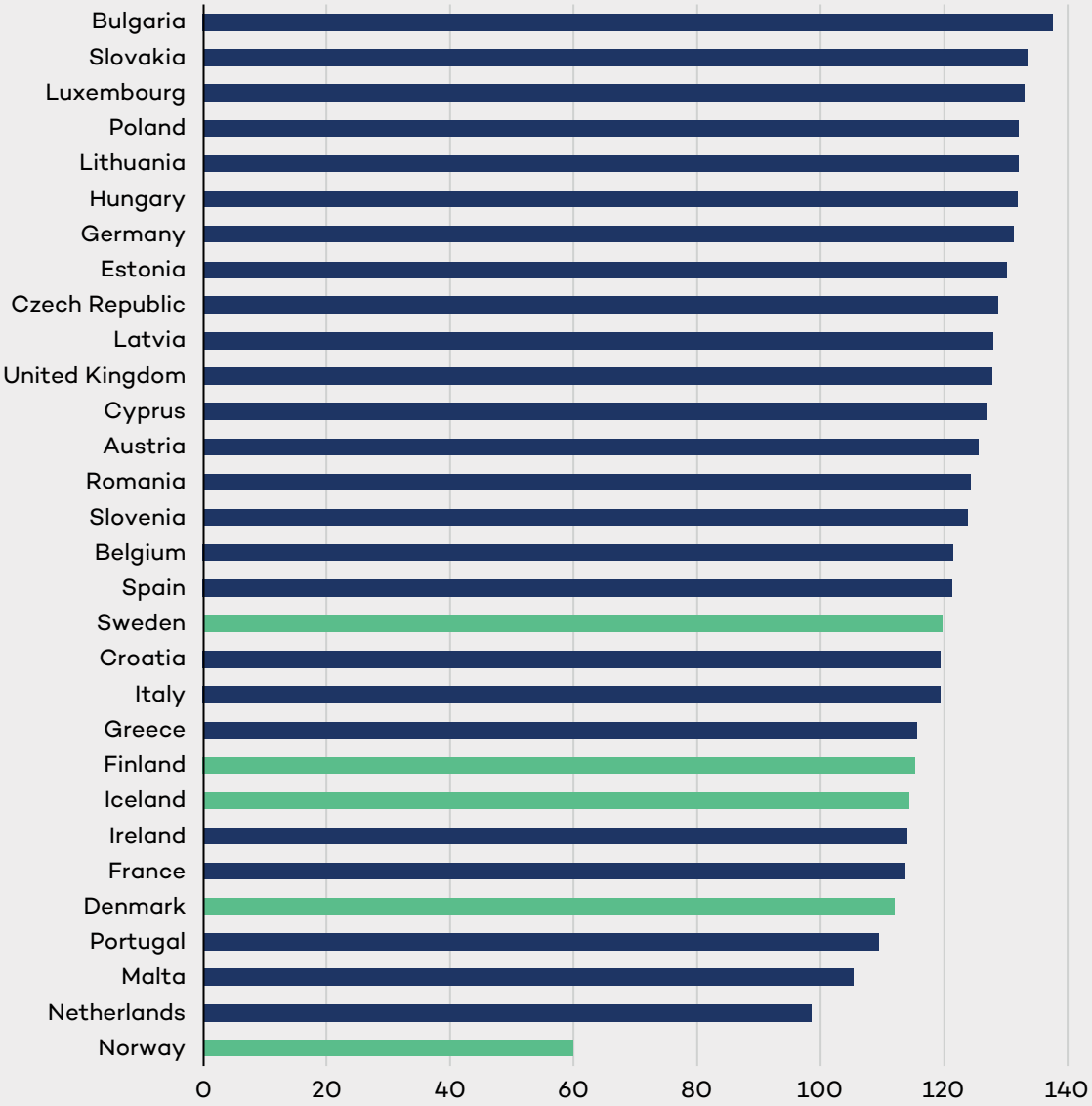
Box 1. Vehicle registration taxes in Denmark and Norway

Vehicle registration taxes are the largest source of environmental tax revenue in Denmark and Norway. These taxes are levied on the purchase of vehicles and are designed to incentivize consumers to purchase vehicles with a lower carbon footprint. In Denmark, registration and road taxes raise around 2.3% of GDP (Autovista Group, 2020) and in Norway, vehicle registration taxes alone raise 3.2% of GDP (Norwegian Ministry of Finance, 2020). Registration taxes and value-added tax (VAT) together can raise the purchase price of vehicles by 50%-100% in Norway and up to 150% in Denmark, compared with a maximum of 40% of the vehicle price in most EU countries (International Energy Agency [IEA], 2018).

Registration taxes are more effective in shifting consumer patterns than other transport-related taxes such as road taxes (Jordal-Jørgensen et al., 2017). There is a strong correlation between countries that have implemented higher vehicle registration taxes and those that have lower average carbon dioxide (CO_2) emissions (measured in grams of CO_2 per kilometre [gCO_2/km]) from passenger cars (Runkel & Mahler, 2018). Registration taxes in Denmark and Norway include specific mechanisms that make them effective mitigation tools. In Norway, the registration tax is calculated based on the weight of the vehicle and its nitrogen oxides (NO_x) and CO_2 emissions (IEA, 2018). In Denmark, the tax rate varies with fuel efficiency (Svenningsen et al., 2018).

Denmark and Norway are among the lowest CO_2-emitting countries for passenger cars (European Environment Agency, 2019) (Figure 5). Norway's low emissions resulted from a combination of taxes on conventional vehicles and subsidies for electric vehicles (EVs). Among the Nordics, Norway provided the greatest variety of enabling policies for EVs with registration and VAT exemptions, subsidies for charging infrastructure, and free charging and parking (IEA, 2018). Norway now has the highest EV stock and market share of all the Nordics (IEA, 2018). In Denmark, the average size of cars has decreased, and its vehicle fleet is the youngest of the Nordics (Jordal-Jørgensen et al., 2017).

Figure 5. Average emissions by passenger cars by European country (gCO_2/km)



Note: Nordic countries highlighted in green

Source: European Environment Agency, 2019.

Application to non-Nordic Countries

Denmark and Norway used a "carrot-and-stick" strategy to reduce average vehicle emissions and scale up alternatives to conventional vehicles. In developing countries, vehicle registration taxes would be progressive if higher rates are applied for larger vehicles purchased by wealthier consumers. However, tax revenues might be lower than in the Nordics if fewer such vehicles are purchased. A revenue-neutral "feebate"[5] scheme (OECD, 2001) could also be used to impose charges on high-emissions vehicles

[5] "Feebates" refer to a system that applies fees to a more polluting technology (such as on point of purchase of higher-emitting vehicles) and rebates for lower-polluting technology, based on their pollution level. Feebates are generally revenue neutral and aim to send a price signal to consumers to make less polluting choices.

and provide rebates to energy-efficient vehicles. Governments could also increase the tax rate for imported used vehicles that have poor emission standards and are a growing source of pollution in many developing countries (Muiruri, 2020).

3.0 Economic Growth

Although 30 years have passed since several Nordic carbon taxes were implemented, there is little empirical evidence about their effects on economic growth given the high number of confounding factors that also influence economies. Economic modelling has attempted to tease out the influence of EFR, with most studies finding marginal impacts on gross domestic product (GDP). Two modelling studies on Finland projected slight negative impacts on GDP from energy and carbon tax reforms (Honkatukia & Tamminen, 2013; Khastar, Aslani, & Nejati, 2020; Khastar, Aslani, Nejati, et al., 2020). On the other hand, EFR was projected to have a slightly positive (0.5%) effect on GDP in Denmark, Finland, and Sweden (National Environmental Research Institute, 2007) and in Finland (0.29%) (He et al., 2019). Macroeconomic modelling that analyzed 31 European countries participating in the EU emissions trading system (including several Nordics) found no evidence of adverse effects on GDP growth (Metcalf & Stock, 2020). In Iceland, the 2010 carbon tax does not appear to have hindered growth: GDP per capita rebounded from USD 41,333 in 2009 to USD 73,191 in 2018, a staggering 77% growth per capita (IEA, 2020a; 2020b; World Bank, 2020). The case of Sweden illustrates how EFR can boost economic growth and productivity through a "green tax shift" (Box 2).

Box 2. Sweden's green tax swaps to boost economic growth

Sweden's carbon tax was part of a wider reform to shift taxes from productive sectors of the economy toward pollution, broaden the tax base, and reduce the overall tax burden (Criqui et al., 2019). The carbon tax primarily targets fossil fuels used for heating and transport, such as gasoline, oil and coal; other sectors may be covered by the EU Emissions Trading Scheme or are exempt from carbon pricing (Jonsson et al., 2020). The impact of the carbon tax on the economy was offset by revenue recycling (the reduction of other taxes) and exemptions for exposed sectors.

Revenue recycling resulted in Sweden's carbon tax being revenue negative. The carbon tax was accompanied by cuts in taxes on energy, personal incomes, property and wealth, as well as a lowering of social security contributions by firms and raising of the tax-free threshold for individuals (Criqui et al., 2019; Hammar et al., 2013; OECD, 2017a; Ricardo, 2018; Stenkula, 2014). The overall tax level fell from over 50% of GDP in 1990 to 44% in 2018 (Criqui et al., 2019).

Exemptions were initially put in place for energy-intensive industries and electricity production (Ricardo, 2018). Over the following decades, many industry exemptions were phased out and the carbon tax rate gradually increased (Criqui et al., 2019). The general carbon tax level is now the highest in the world (Jonsson et al., 2020).

Following Sweden's "green tax shift," median disposable income in Swedish households grew 4 times faster after 1995 than during the previous twenty years (Fölster & Kreicbergs, 2014). GDP per capita increased in real terms by more than 50% between 1990 and 2019 (Jonsson et al., 2020). And Sweden successfully decoupled economic growth from GHG emissions: between 1990 and 2019, overall GDP grew by around 125% while GHG emissions fell by 27% (OECD, 2021a).

Application to non-Nordic countries

Revenue recycling programs that reduce distortionary taxes are more economically efficient than lump sum recycling programs because they reduce drags on productivity (ICMM, 2013). Income or employment-related tax cuts do not directly benefit those who are not part of the tax system, but they can lower prices, the benefits of which tend to be shared by those who are not direct taxpayers. However, to ensure progressive outcomes, other policies such as cash transfer can be used to compensate the poor for higher energy prices associated with carbon or pollution taxes.

4.0 Employment

A "green tax shift" can affect employment directly (such as the number of jobs in renewable energy and fossil fuel sectors) and indirectly through macroeconomic changes: transferring taxes from labour to pollution, transferring investment from capital to labour, or by changing the size of the economy (OECD, 2017a; Metcalf, 2019). While untangling these impacts is difficult, most studies have found positive employment impacts from Nordic tax reform. A green tax shift in Denmark was expected to have net employment benefits: a 2% reduction in employment per 1% GDP increase in energy taxes and a 4% increase in employment per 1% GDP decrease in income taxes (Green Budget Europe and the Danish Ecological Council, 2014). Honkatukia & Tamminen (2013) estimated that Finland's energy tax reform of 2011 would increase employment. Using a general equilibrium model to estimate the impacts of EFR on energy-intensive firms and income inequality in Finland, Tamminen et al. (2019) showed a 0.7%–2.2% increase in employment by 2030 compared to the baseline. An analysis of 31 European countries participating in the EU emissions trading system (including several Nordics) found no evidence of adverse effects on total employment (Metcalf & Stock, 2020).

How the green tax shift should take place to maximize employment depends on country circumstances, including the extent of employment dependent on highly polluting industries, existing tax levels and impacts on the tax base (OECD, 2012). In the case of Denmark, renewable energy jobs were fostered through a broad range of measures, which were adjusted over time (Box 3).

Box 3. Tax reforms create Danish wind industry jobs

Denmark cultivated its wind industry through a range of fiscal and pricing measures. In 2019, **the Danish wind industry employed 33,159 direct employees**, approximately 2% of private employment and mostly in regional areas (Wind Denmark, 2020). Establishing

another 6.5 gigawatts (GW) of wind capacity, as currently planned, is expected to create 48,140 temporary jobs over the next 10 years[6] and 1,490 permanent jobs (United Federation of Workers in Denmark, 2020). Wind accounts for 47% of total Danish electricity production (Gronholt-Pedersen, 2020) and wind turbines and components make up 7% of total exports (Wind Denmark, 2020). In 2019 the export of energy technology and services were valued at DKK 122.6 billion (USD 18.3 billion).[7]

Environmental taxes played a major role in the establishment of the wind industry (Table 1). Tax reforms included electricity taxes to fund research and development (R&D) and feed-in tariffs. Taxes on fossil fuels, including a carbon tax imposed in 1992, helped make renewables more competitive (IRENA, 2013). The Danish government also provided subsidies to wind power generators. While there is no explicit earmarking of energy or carbon tax revenues for renewable energy, the additional income augmented the national budget, increasing resources available for these subsidies.

Table 1. History of the wind power industry in Denmark

Decade	Tax or related policy
1970s	Taxes on electricity used to support research and development[a]
1980s	Tax incentives encouraged cooperatives to invest in community-owned turbines[a]
	Taxes imposed on oil and coal increased the competitiveness of renewables[a]
1990s	Guaranteed prices and grid connection ensured economic viability of wind farms[b]
	Carbon tax implemented[a,b] • Improved wind power competitiveness • Wind projects given a refund from carbon tax and partial refund on the energy tax, effectively doubling payments to wind projects for the first five years of operation • Generated revenues to fund subsidies (no explicit earmarking)
2000s	Wind subsidies funded through a Public Service Obligation (PSO) levy on electricity consumers[a]
2010s	PSO scheme phased out from 2017 to 2021; financing of subsidies shifted to state budget[a,c]
2020s	Taxes for heating energy and electricity to be reduced. Electricity heating tax to be lower than for fossil fuel heating per gigajoule (GJ), encouraging a shift to heat pumps (largely powered by renewable electricity)[c]

Sources: (a) IRENA, 2013; (b) UNESCAP, 2012; (c) Danish Ministry of Climate, Energy, and Utilities, 2019.

[6] 4,814 per year for 10 years.

[7] Conversions based on average annual exchange rate from the United States Federal Reserve Bank, available at https://www.federalreserve.gov/releases/g5a/current/

Application to non-Nordic Countries

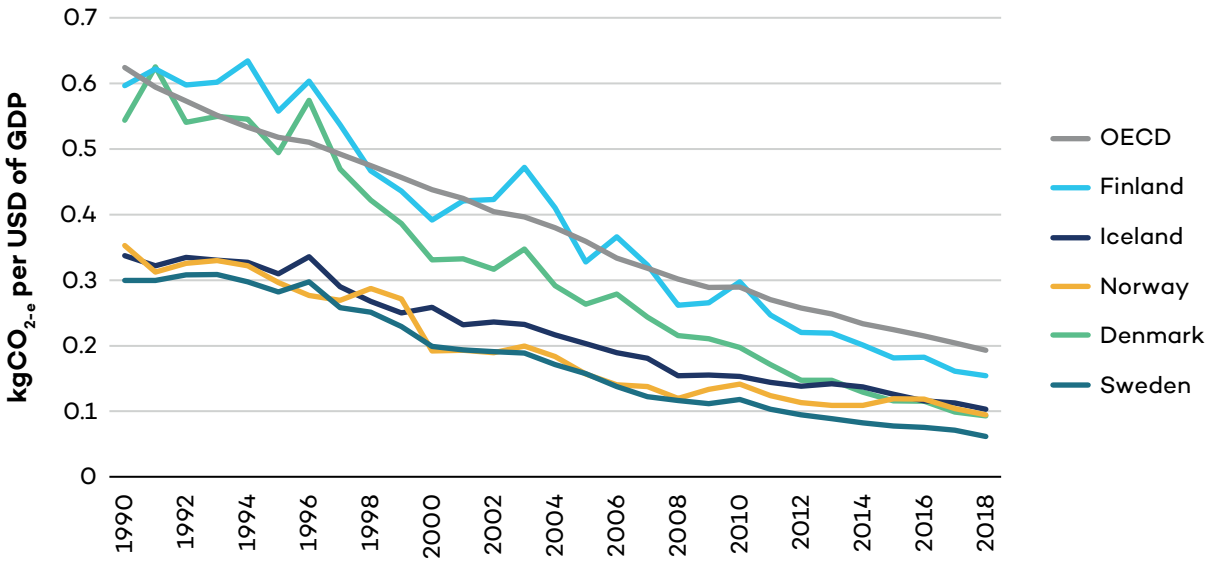
Denmark's experience demonstrates that taxes can promote green jobs by 1) generating revenue to finance R&D, installation of renewables and grid integration; 2) taxing fossil fuels to give the clean energy industry a competitive advantage. Electricity taxes, however, should be used with caution: they tend to be regressive (impacting the poor more than the rich), do not distinguish between generation sources (polluting versus non-polluting), and can push consumers toward more polluting options. Also, the aim of environmental taxes is to tax negative externalities. Electricity does not necessarily have externalities; therefore, it is better to tax its fossil fuel feedstocks instead. Further, a substantial increase in electricity supply and use will be needed over the coming years as electrification of a wide range of sectors gathers pace and needs to be encouraged as a way to reduce emissions in transport, industry, and other sectors.

5.0 Carbon Pollution

Carbon taxes contributed to greenhouse gas emission reductions in Nordic countries. A recent study of 43 countries, including the Nordics, found that the countries with a carbon price have an average annual growth rate of CO_2 emissions from fuel combustion that is around 2% lower than countries without (Best et al., 2020). In addition, GHG emissions per dollar of GDP have declined for Denmark, Finland, and Sweden relative to the OECD average from the early 1990s when carbon taxes were introduced (Figure 6). Denmark shows the largest decrease: GHG emissions per dollar GDP declined from a level matching the OECD average in the early 1990s to 48% of the OECD average in 2018. Sweden's decreased from 48% of the OECD average in 1990 to 32% in 2018. Iceland's carbon tax was imposed in 2010 and emissions have continued to fall since that time (Figure 6). Norway reduced GHG emissions per dollar GDP despite hosting a significant oil and gas industry.

The economic importance of Norway's oil and gas industry intensified the political challenges associated with the introduction of a carbon tax. The government's careful management of stakeholders provides useful lessons for EFR in other countries (Box 4).

Figure 6. GHG emissions per USD of GDP



Source: OECD, 2021.

Box 4. Norway's approach to the political challenges of introducing a carbon tax

The key to Norway's successful implementation of its carbon tax in 1991 was strong leadership, adept stakeholder management, and industry exemptions that were later phased out (Anker, 2018). Then-Prime Minister Gro Harlem Brundtland[8] appointed the former Vice-President of Statoil, Norway's state-owned oil company, as the first chairperson of an independent Center for International Climate Environmental Research (Anker, 2018). Industry exemptions and concessional tax rates were granted to heavy industries, industries important to regional communities, and offshore petroleum producers (Bruvoll & Dalen, 2009; OECD, 2019; Sumner et al., 2009). Until 2015, industrial fuel oils and natural gas were taxed at a lower rate than gasoline (IEA, 2020; Sumner et al., 2009).

A major reform proposed in 1998 to remove carbon tax exemptions was strongly opposed by unions and not passed by parliament (Svendsen et al., 2001). In 2006, however, reforms were passed that increased the carbon tax rate for offshore petroleum producers to bring it in line with gasoline (Bruvoll & Dalen, 2009; Sumner et al., 2009). Norway has now eliminated most exemptions (Asen, 2020). Norway's carbon tax rate is not as high as Finland's or Sweden's, but it has higher coverage: 62% of GHG emissions compared with Finland (36%) and Sweden (40%) (Metcalf & Stock, 2020).

In its first decade, Norway's carbon tax was estimated to decrease the country's carbon emissions by 2.3%: a modest amount due to exemptions and inelastic demand for oil and gas (Bruvoll & Larsen, 2004; Sumner et al., 2009). Overall GHG emissions then

[8] Brundtland wrote the landmark report *Our Common Future*, which first popularized the term "sustainable development" (Norwegian Ministry of Foreign Affairs, 2017).

declined from 2007 to present with the scaling back of exemptions (OECD, 2021a). In the period 1990–2018, emissions per unit GDP decreased by 73%, showing a decoupling of economic growth and emissions (OECD, 2021a). Fears of job losses were allayed as Norway continued to see strong economic growth and low (2.5% to 5%) unemployment through the 2000s, while raising the carbon tax and phasing out exemptions (Statistics Norway, 2021).

Norway divides its carbon tax revenue between green spending (30%), general funds (40%), and revenue recycling (income tax reductions; 30%) (Carl & Fedor, 2016b). Moreover, revenues from the carbon tax levied on the petroleum sector are transferred into the Government Pension Fund Global, established in 1990 and now the world's largest sovereign wealth fund with over USD 1 trillion in assets (Norges Bank Investment Management, 2021). The financial security this fund gives Norway has greatly bolstered political support for taxation of the petroleum industry (Arvin, 2021).

Application to Non-Nordic Countries

Norway's experience shows that political economy challenges are manageable with strong leadership and stakeholder management, as well as judicious and temporary exemptions. Although Norway's carbon tax was initially low and included many exemptions, it served as a foundation on which incremental increases could be made. Developing countries would similarly benefit from carbon tax revenues for green stimulus spending, reducing distortionary taxes, and increasing investment in infrastructure, education, and other prerequisites for long-term growth. As was done in Norway, earmarking funds for politically popular and productive purposes can help improve the acceptance of a carbon tax.

6.0 Air Pollution

Air quality in the Nordic region has benefited from EU and domestic policies. At the EU level, key policies included fuel standards, the emission trading scheme, and the 2016 National Air Pollution Control Programmes (European Commission, 2019). Domestic policies include national taxes on carbon, energy and specific air pollutants such as NO_X, sulfur oxides (SO_X), as well as industry agreements to increase energy efficiency and support for green innovation. Taxes on specific pollutants generate revenue as well as reducing pollution levels and related mortality (Cuevas & Haines, 2016). The Nordics have lower levels of particulate matter 2.5, NO_X and SO_X emissions than the EU average (Eurostat, 2021). Pollution taxes and refund schemes proved effective in reducing NO_X emissions in Norway and Sweden (Box 5).

The Nordics have also been active at the international level. Sweden was one of six countries along with the United Nations Environment Programme (UNEP) to launch the Clean Air Coalition to provide financial support and capacity building to reduce short-lived pollutants such as black carbon, methane, and hydrofluorocarbons (Climate and Clean Air Coalition, n.d.). Since then, other Nordics such as Finland, Denmark, and Norway have also partnered with the coalition.

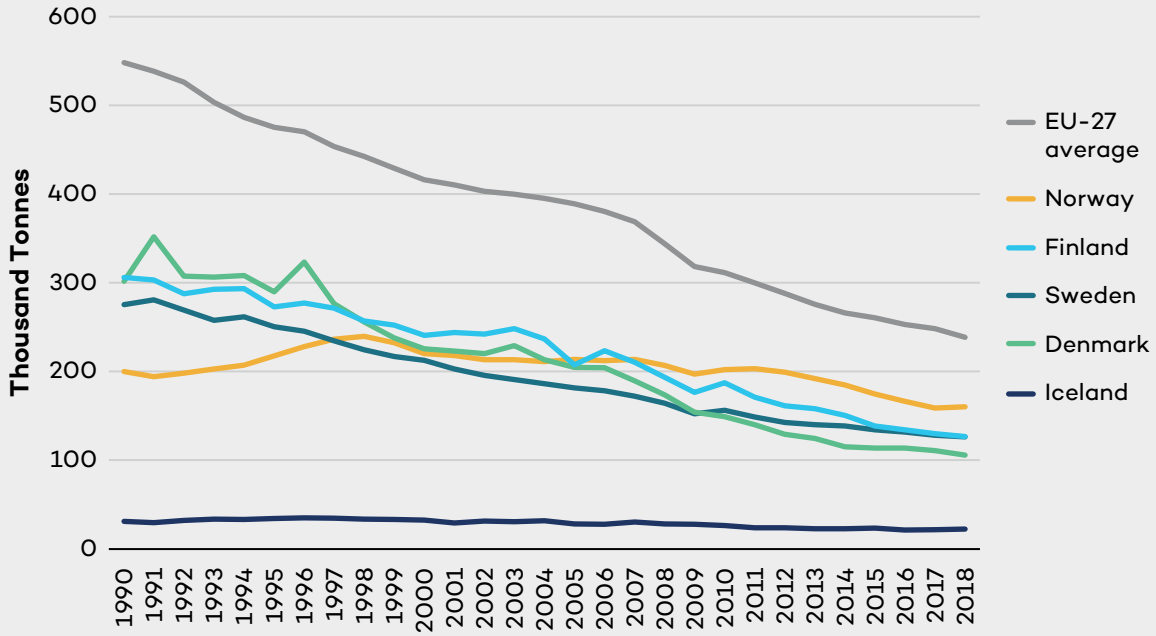
Box 5. Nitrogen oxides (NO_X) charges and funds in Norway and Sweden

NO_X is an air pollutant responsible for smog that can lead to acid rain and the formation of ground-level ozone, with detrimental impacts on human health and ecosystems (NOx-fondet, n.d.). In Norway, NO_X emissions come mainly from the gas, oil, shipping, and road transport sectors. Norway introduced a tax on NO_X emissions in 2007 at NOK 15 (USD 2.22) per kilo (NO_X-fondet, n.d.). However, many industries found it difficult to reduce emissions without subsidies. As a result, the NO_X tax was lowered to NOK 4 (USD 0.59) per kg (except for offshore oil and gas) and revenues were allocated to fund abatement technology (AirClim, 2010). Importantly, the NO_X tax has been regularly increased reaching NOK 16.5 (USD 1.75) for offshore oil and gas and NOK 10.5 (USD 1.16) for all other activities in 2020 (NO_X-fondet, 2019).

Since 1990, NO_X emissions in Norway have decreased by about 20% (Figure 7) (Eurostat, 2021). This is a lower reduction than other Nordics but still commendable given Norway's significant oil and gas industry. The NO_X fund channelled more than USD 500 million to develop innovative NO_X-reducing technologies including NO_X cleaning with selective catalytic reduction systems and battery technology for shipping (NOx-fondet, n.d.). Norway's 2019 Action Plan for green shipping aims to halve emissions from domestic shipping and fisheries by 2030 (Norwegian Government, 2019).

Sweden put in place a NO_X tax in 1990 of SEK 40 (USD 6.75) per kg of NO_X (which increased to SEK 50 [USD 7.60] in 2008) that now applies to all stationary combustion plants producing more than 25 GWh of energy (ECOTEC, 2001). Above the 25 GWh threshold, the scheme operates as a feebate: plants with lower levels of NO_X per unit of energy are net beneficiaries and those with higher NO_X intensities are net contributors (Hagström, 2016). The refund system incentivizes firms to achieve the lowest NO_X emissions and has led to new monitoring, combustion, and energy efficiency technologies. The Swedish NO_X tax is three to five times higher than Norway's. The tax was also coupled with the requirement for polluters to install NO_X-monitoring equipment (OECD, 2013). Together, these policies resulted in a decline of 54% in NO_X emissions from 1990–2018 (Cottrell et al., 2016).

Figure 7. Total NO_X emissions in the Nordics and in the EU 1990–2018



Source: Eurostat, 2021.

Application to non-Nordic Countries

Air pollution taxes would be equally beneficial for addressing air pollution and related mortalities in developing countries as in the Nordics. A feebate scheme provides a revenue-neutral means of reducing emissions and scaling up the necessary technology in power plants. Such a scheme would be useful in India, for example, where the government increased the NO_X emission threshold for coal power plants from 300 mg/Nm^3 (cubic milligrams of NO_X) to 400mg/Nm^3 in October 2020 due to the perceived difficulty in reducing NO_X emissions (Ramanathan, 2020). In China, which has suffered from high levels of NO_X and SO_X pollution, differentiated grid prices for desulphurized electricity acted as a price signal for power plants to invest in air pollution abatement technology, which succeeded in reducing the cost of environmental damage by USD 5 billion (Cottrell et al., 2017).

7.0 Conclusions

The Nordics have used EFR for over three decades as part of their response to economic crises. These reforms have been successful in reducing carbon and air pollution, while generating significant revenue and creating jobs (such as in the Danish wind sector), with no evidence of significant negative impacts on economic growth (and potentially positive impacts).

Environmental taxes must be spent productively. If they are squandered, economic impacts could be negative, as higher energy prices will not be offset by effective stimulus spending or the reduction of inefficient taxes (OECD, 2017b)—however, environmental impacts could still be positive given the price signals sent to consumers and investors. The principle of revenue

neutrality made EFR more politically palatable in the Nordics, as did linking the introduction of environmental taxes to popular and easy-to-understand measures. The Nordics spent environmental tax revenue (not necessarily using earmarking) on:

- Cuts in personal income, inheritance, wealth, and property taxes as well as employer social security contributions (all Nordics except Iceland)
- Promoting energy efficiency, green industries, and green jobs (e.g., Denmark's wind sector)
- Increasing taxes for polluting activities and allocating the funds for less-polluting activities (such as NO_X taxes or vehicle registration based on emissions).

Finland and Sweden, went one step further and made EFR revenue negative, reducing the overall tax burden. At the same time, the combination of environmental taxes (carbon, fuel, registration) has proven effective in the Nordics in sending a strong price signal to consumers and delivering significant revenues to governments.

If the world's economies are to recover from COVID-19 and climate change, we will need to draw on lessons from those with experience in innovative fiscal measures. The principles for adapting Nordic EFR to other countries post-COVID are:

1. Ensure reforms are progressive and protect the poor from higher energy prices
2. Use revenues for productive purposes to offset the economic and employment impacts of higher taxation
3. Provide a transition strategy for exposed sectors, which might include funding for clean technology and a gradual approach to phasing in taxes
4. Link reforms with popular and easy-to-understand measures, not necessarily using explicit earmarking
5. Ensure price signals are sufficiently strong to encourage a shift to clean alternatives and provide fiscal incentives for those alternatives.

Governments have a choice whether they double down on fossil fuel and polluting industries as part of their economic recovery strategy or use the upheaval caused by COVID-19 to build a new, cleaner economy. The Nordics have shown that this is an economically viable approach. Other governments would do well to follow their lead.

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Head Office

111 Lombard Avenue, Suite 325
Winnipeg, Manitoba
Canada R3B 0T4

Tel: +1 (204) 958-7700
Website: www.iisd.org
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