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A carbon pricing blueprint for the EU

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Executive summary

In December 2019, with the launch of its European Green Deal, the European Commission announced that the European Union would become the first climate-neutral continent in 2050. In line with this commitment, in September 2020, the European Commission proposed to increase the Union's 2030 GHG emissions reduction target to "at least -55% net" compared to 1990 levels. Achieving this ambition level will require a major legislative overhaul of the 2030 climate and energy package, combining top-down regulation, policy tools, incentive schemes, and financial instruments, which the Commission has planned to adopt in July 2021. **Most notably, in its strategy towards climate-neutrality, the European Commission has outlined the importance of carbon pricing to complement the existing climate policy framework**. The choice of policies for enhanced climate action deserves particular attention. Today's decisions will shape the future of climate policy and either be a driver or an obstacle to achieving the Paris Agreement's target on keeping the global average temperature rise to 1.5°C by mid-century.

Carbon pricing is further relevant considering the European Commission's declared support for **greening taxation schemes across the Union**. Fiscal frameworks need to be revised to factor in polluter pays principles, and carbon pricing could be critical in a tax system that focuses on environmental degradation rather than income. A discussion on carbon pricing is not only essential but also a *timely* one to have. **The context of the Green Deal and the Covid-19 Recovery Plan provide a window of opportunity to introduce reforms that support carbon pricing**. And carbon pricing may prove to be a valuable contributor to the green Covid-19 recovery.

The use of carbon pricing instruments in the EU has historically been limited to the energy-intensive manufacturing and power industries, through the introduction of the EU Emissions Trading Scheme (ETS). For the other economic sectors (transport, buildings, waste, agriculture, and small industry), some member states have adopted carbon taxation mechanisms as unilateral initiatives under the Effort Sharing Regulation (ESR), complementing those that were earlier set for purely national objectives. In the European Green Deal framework, the Commission suggests introducing EU-wide carbon pricing for the transport and buildings sectors, possibly by phasing out the ESR and extending the EU ETS. Ideally, a Carbon Border Adjustment Mechanism would complement the increased resort to carbon pricing to raise global climate ambition while safeguarding the European industry's competitiveness. These proposals entail a revision of key legislative pieces such as the EU ETS Directive, the Energy Taxation Directive, the Effort Sharing Regulation, and the parallel adoption of a Carbon Border Adjustment Mechanism. The toolkit must be appropriately designed for an improved climate performance. **A look at the current carbon pricing landscape in the EU can be a useful pointer to what a more effective architecture could resemble.**

This report is an overview of the state of carbon pricing in the EU and its prospects for the future. Drawing from academic literature and analyses of existing carbon pricing initiatives in the EU (both at the national and regional level), **we have extracted some observations on the carbon pricing landscape in the Union by highlighting good and less good practices. With these, we aim to contribute to the ongoing carbon pricing and green taxation discussion to help guide policymakers**.

We draw the following main conclusions from our analysis:

1. **The carbon pricing landscape outside of the EU ETS is patchy and the rates are too low, with very few cases of transformative pricing. As such, the current taxation policy mix is ineffective to help step up the EU's climate efforts.**

2. **Both at the EU-level with the EU ETS and the national level with carbon taxes, current rates are generally too low to incentivize a transition but can and should be made more ambitious, provided there is the political will for it.**

3. **The carbon leakage concern has led to a carbon pricing implemented on a very selective basis, hence with compromised effects. A carbon pricing that is more geographically widespread would allow for these practices to subside.**

4. **Carbon pricing can be an effective instrument for fiscal reforms. They raise substantial revenues, and a redistributive use of revenues can both offset regressive impacts and foster critical public support for the measure.**

5. **Exemptions have been historically granted beyond those sectors truly at risks of global competitiveness impacts and carbon leakage, weakening the impacts and credibility of the instruments.**

6. **There is a risk of over-reliance on the EU ETS for emissions reductions in the EU, given its history of over-generous allocations, slow ramp up of actioning and hence low prices and incentives.**

7. **Transparency in the use of revenues and involvement of civil society are key to address political and social resistance**

8. **Robust and ambitious carbon pricing is an effective climate tool for decarbonization which is also reconcilable with economic growth, jobs, innovation and competitiveness.**

9. **As shown by some National and Energy Climate Plans (NECPs), carbon pricing is gaining prominence in member states' climate policy tools. Moreover, there is a significant window of opportunity right now of including carbon pricing into the policy reforms promised in the context of the National Recovery and Resilience Plans (NRRPs).**

10. **Carbon pricing is no silver bullet but if prices are high enough, the tax design reflecting social concerns, then complemented by the right policy mix, it can drive a deep decarbonisation of our systems and foster the needed system change.**

In a nutshell, as currently implemented across the EU, carbon pricing is not yet an effective tool to contribute to the EU's overall climate ambition for 2030 and towards climate neutrality. Yet, **experience at the national level shows that carbon pricing systems can combine significant climate and economic benefits**. For the potentials of carbon pricing to materialize, prices need to be in line with climate ambition, and coverage should include a broader scope of sectors and greenhouse gases. To offset potential regressive social impacts and competitiveness concerns, policies need to be accompanied by cuts in distortionary taxes through revenue recycling and the adoption of a carbon border adjustment mechanism.

The EU needs to give a new impetus to carbon pricing and green tax reforms and ensure the consistency of its Union's environmental and climate strategy. A Union-wide carbon tax should be the EU's long-term objective, and a gradually harmonized approach on carbon pricing should serve as a shorter-term, trail-blazing alternative. The EU should take a close look at national carbon taxes to find several answers on how to tackle the environmental, economic, and social aspects and encourage political will.

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1. Carbon pricing as a tool for change: the theory

Climate policy has risen on political agendas worldwide as countries debate policy tools to address the climate crisis and deliver on the Paris Agreement.

Building on the impetus given by the Paris Agreement, carbon *pricing* has gained traction as a fundamental policy tool to expedite our transition to a greener future. As the failure to adequately price pollution and invest in clean energy is increasingly recognized as a key factor in climate breakdown and social inequality, putting a price on carbon has been pointed to as one of the drivers of decarbonization. Article 6 of the Paris Agreement channels the establishment of a policy foundation for a worldwide emission trading system, hinting at the eventuality of a global carbon price.

With 64 carbon pricing initiatives implemented or scheduled internationally so far, and announcements of new measures or extension of the scope of existing ones, carbon pricing is likely to further expand in the future. What are the rationales motivating this trend, and how can carbon pricing be translated into policy?

1.1 The rationales

Economic theory has traditionally considered climate change as the effect of one or several market failures, which dedicated, market-based policy instruments can help address. One such failure is the *unpriced* externality of the climate damage caused by economic activities. The theory holds that **prices paid today for fossil fuels do not reflect their actual climate destabilization costs, thereby creating misleading price signals.**

Defined as "initiatives that put an explicit price on greenhouse gas emissions, i.e., price expressed as a value per ton of carbon dioxide equivalent (tCO2e)", carbon pricing is considered one of the tools to fix this failure. By embedding the *polluter pays principle* into the reality of economic and political systems, financial incentives are provided for climate-conscious decision-making. Carbon pricing levels the playing field between emission-intensive and low-carbon activities. In the short run, a higher price for fossil-fuel-based products deters their heedless consumption. In the longer run, it gives a systemic impulse to invest in and switch to climate-friendly alternatives, notably by bending the cost curves for energy efficiency and renewables. **In sum, pricing high-carbon activities is expected to trigger catalytic shifts towards carbon-neutral societies by financially incentivizing behavioral change and innovation**.

Other arguments make carbon pricing a valuable instrument:

- It acts on the recognition that investment and consumption choices are more motivated by profit and price than moral or ethical concerns.
- It is a systemic solution: carbon pricing can apply to a broader majority of emitters than would interventions to individual industries or sectors. As every price is corrected to embody the emissions effect of the associated product or service, it has a widespread regulatory influence that no economic decision should escape. Measures that seek to solve each sector's emissions separately are thus held as less efficient than a general policy instrument like carbon pricing.
- It responds to the urgency of the climate crisis: carbon pricing is a relatively easy and inexpensive instrument to both implement and administer compared to complex regulations that can take

years to craft. A carbon price will start working almost immediately by sending direct price signals and has little regulation needs.

- It allows for flexibility and autonomy for emitters who can opt for the climate-friendly alternatives they see fit.
- It safeguards that emissions are lowered cost-effectively: a carbon price aligns the marginal abatement costs across all agents, minimizing economic efficiency loss.
- They can be designed in a way that takes into account affordability and equity concerns, indeed with the right policy mix, can promote progressive incentives.
- It can raise substantial funds that can be used to support the transition or to uphold social acceptance by addressing potentially regressive impacts.
- It supports the principle that polluters should pay and embrace responsibilities to take measures to avoid emissions that affect people and the planet.

1.2 The mechanisms

Direct carbon pricing can be implemented in two ways: by imposing a carbon *tax* or by setting up a *cap-and-trade* system.

A carbon tax directly sets a price on carbon by defining a per-ton tax rate on greenhouse gas emissions embedded in fossil fuels or other emissions sources. Emitters pay the tax depending on the number of emissions they produce.

A cap-and-trade system enforces a limit (a cap) on the quantity of carbon that can be emitted in a given amount of time. Several permits (allowances) corresponding to the cap limit are issued in the carbon market, where emitters can buy and trade them. The supply and demand for emission allowances drive the price of a ton of CO2 in the carbon market.

In theory, once implemented, a cap-and-trade system is essentially governed by the market, while national fiscal authorities regulate a carbon tax. In practice, and as shown by the history of the EU ETS, before the market instrument can deliver the expected GHG emissions reduction, it requires interventions to refine and adjust it to the external context (economy trends, complementary legislation, etc.).

Note on direct versus indirect forms of carbon pricing: There are more *indirect* ways of pricing carbon, such as through fuel and energy taxes, removal of fossil fuel subsidies, or product standards and regulations. These do not directly put a price on carbon, but they do make carbon-intensive activities and products more expensive than low-carbon ones. While acknowledging their relevance for decarbonization, **this report will not be focusing on *indirect* carbon pricing but only on *direct* carbon pricing mechanisms.**

Beyond the choice between **a tax and a cap-and-trade system**, there are many design options for carbon pricing that can determine the effectiveness of the mechanism in addressing related environmental and social aspects. These include:

- **Price rate and stringency**: In carbon taxation, adopting the right price is a crucial consideration. In theory, the higher the price, the larger the environmental benefits. Industrial competitiveness and public acceptance concerns, however, make high carbon prices often challenging to implement.

- **Price escalation**: The planned escalation of price over time is also an important design choice. In theory, the price should rise over time to reflect the growing damage expected from climate change. This further means stable and predictable signals to emitters that a shift to low-carbon alternatives is economically justified, a precondition for effective climate policy.

- **Fuels and greenhouse gas covered:** A carbon price can be imposed merely on carbon dioxide (CO2) emissions or expanded to include other greenhouse gases (for instance, methane). It can further apply to specific fossil fuels or all types (coal, natural gas, oils).

- **Sectoral scope and exemptions:** The potentials of carbon pricing materialize if it has an economy-wide application. However, as it has been introduced so far, it only covers specific sectors depending on its intended outcomes. Policymakers often grant exemptions or specific concessions to address competitiveness concerns.

- **Point of regulation:** In the design of either instrument, policymakers must decide on a point of regulation, i.e., identify the price payers. This can be done *upstream* hence at the production level (e.g., fossil fuel suppliers), *midstream* (e.g., electric utilities), or *downstream* at the consumption level (e.g., energy-using industries, households, vehicles). Levying the tax "upstream" is usually considered the most straightforward system to administer: fewer entities are concerned; hence the transaction costs of implementing and collecting the tax are lower.

- **Use of revenues:** Carbon pricing can raise significant revenues, and the way they are used is essentially a political choice. There are three main ways of using revenues: 1) general budget allocation, where they are directed to the government public funds with no specific indication of their use; 2) green subsidies, where they are reinvested in climate purposes such as promoting low-carbon technologies; 3) revenue recycling, where they return to consumers in the form of dividends/lump-sum rebates, or by reducing other taxes on labor and capital (i.e., tax shifting which swaps tax burdens from work to the environment).

- **Environmental target:** In a cap-and-trade system, the cap defines an amount of emissions in a precise timeframe. This makes it easier to project the achievement of the GHG emissions reduction target. Carbon pricing as a tax can also guarantee an environmental outcome, provided it is combined with a carbon emissions target (cap).

- **Political risk:** it is thought that carbon taxes, in contrast to regulated cap-and-trade systems, are more prone to political instability (and therefore to social resistance) due to their higher visibility.

- **Tactical risk:** some argue that pushing for EU carbon taxes is a dangerous waste of time as some member states will always block it due to the unanimity rule and political capital could be used to promote progress elsewhere. However, with ever increasing evidence on the cost-of-insufficient-action, the context of what is possible is changing. There is growing scope for EU-wide action, and if there is resistance by some Member States, the enhanced cooperation mechanism could be used to allow high-ambition countries to advance.

1.3 The challenges

An obvious consequence of putting a price on carbon is an increase in the costs of polluting activities and, in turn, in the price of goods and services. For industries, especially energy-intensive ones, the rise in costs may rationalize a geographic shift of their production processes to locations with weaker environmental regulations to safeguard their competitiveness. The result may be a loss of economic performance for the home country and, most importantly, an unchanged or even increased level of emissions at the global scale as pollution is merely "outsourced". For individuals, the increased cost of goods and services makes their livelihoods more expensive, and lower-income households more disproportionately bear the economic burden than the more affluent.

Therefore, the **regressive nature of carbon pricing raises concerns of climate injustice** as it is incompatible with the principle of just distribution of burdens in climate change mitigation. As such, carbon pricing can attract opposition both from industries and the broader public as to its impacts on businesses and its unfair distributional costs. This creates a political vulnerability for a government. Yet, measures can be taken to circumvent these resistances and the appropriate use of the revenues can be a way to address them.

Other arguments are raised against carbon pricing. The main argument is that pricing carbon may not be enough to drive a transition to low-carbon alternatives. Those facing the financial burdens are not always able to make the switch. They may lack access to alternatives (e.g., rural dwellers who have no access to public transport) or not hold decision-making power (e.g., a tenant who faces increased energy costs yet does not have the agency to change his energy source as it is essentially the landlord's decision). Another argument is that carbon pricing is an *incentive* rather than a *compulsory* mechanism. Hence, there is no apparent certainty on how entities respond to the measure. A third argument holds that carbon pricing ignores local or sectoral variation and fails to tailor to specific needs. The varying price and demand elasticity of each sector may imply that different rates are needed to motivate a low-carbon switch or that alternative climate policy measures such as product standards and requirements may be more fruitful for some sectors. Other objections sustain that, as carbon pricing essentially frames climate change as a market failure, it fails to address it as the fundamental system problem it is and therefore cannot drive the *deep* decarbonisation that our systems need.

In conclusions, carbon pricing strategies are politically charged and linked to debates on what constitutes the most appropriate climate policy solutions. **Carbon pricing faces political and social barriers. As such, it must go beyond considerations of environmental efficiency or economic effectiveness and specifically address the distributional effects of its implementation, with their resulting political implications**. **The challenges associated with the instrument have made carbon pricing a test of any government's climate pledges**.

2. Carbon pricing and fiscal policy in the EU

2.1 Carbon pricing at Union level

A cornerstone of EU climate policy, **the EU Emissions Trading Scheme** (EU-ETS) is the Union's key carbon pricing instrument for reducing greenhouse gas emissions. Set up in 2005 as a means for the EU to meet its first legally binding emissions reduction target under the Kyoto Protocol, the EU ETS was the world's first major carbon market and remains the largest today. The system is applied in all 27 member states as well as United Kingdom, Liechtenstein and Norway, covering a total 40% of EU greenhouse gas emissions. It includes CO2, nitrous oxide, and perfluorocarbons emitted by over 11,000 energy-intensive plants in the power and manufacturing sectors/industries. Operators must buy emission allowances (i.e., carbon permits) which are auctioned in the EU carbon market based on an overall EU emissions cap determined by the Union's climate targets. Operators may also trade emission allowances in the EU's secondary market.

According to the European Commission, the EU ETS is successfully driving emissions reductions. Installations covered by the mechanism have seen their emissions decline by about 35% between 2005 and 2019[1]. However, its potential has been very limited, and other policies have helped contribute to this progress (the Renewable Energy, Energy Efficiency and Ecodesign Directives, for instance).

While the power sector is gradually decarbonising, the distribution of free emissions allowances to around 90% of GHG emissions generated by industrial sectors provides little incentives to reduce the EU industry footprint. Moreover, free emissions allowances have led to significant windfall profits in the covered industrial sectors, amounting to over €25 billion during the 2008-2015 period[2].

Another concern is that the ETS price has been extremely volatile and never sufficiently high, clouding the price signals meant to trigger the economy into transition. The current ETS rate of €25/tCO2 is insufficient to incentivize the transition to neutrality effectively (at least €100/tCO2 is needed). The vast reserve of allowances available in the market further makes it unlikely for the carbon price to increase much in the foreseeable future. Moreover, the State Aid rules under the EU ETS allow member states to grant national compensation schemes to subsidize energy-intensive industries' competitiveness. Yet, this public support is contrary to the "polluter pays principle" and work against the objectives of decarbonization. Due to the large subsidies given to businesses and the volatile and low prices, the current flaws of the EU ETS are reducing the market's environmental effectiveness. There are doubts about whether the EU ETS will provide the needed stimulus for climate neutrality if these concerns are not addressed.

2.2 Fiscal policy and taxation at EU level

Since carbon pricing can be introduced either through a market mechanism (such as the EU ETS) or through fiscal measures (taxes, fees, etc.), a reflection on EU fiscal policies is helpful to understand how either of the two measures could work for the EU and how to make the most of these two options at the region level.

[1] https://ec.europa.eu/clima/policies/ets_en

[2]https://carbonmarketwatch.org/wp-content/uploads/2016/03/Policy-brief_Industry-windfall-profits-from-Europe%E2%80%99s_web_final-1.pdf

Fiscal policy, taxation and the tax shifting approach: Fiscal policy can be loosely defined as a set of measures involving public spending and taxation, which governments use to exert direct influence in a country's economy. It is arguably a vital tool in any government's arsenal and one that has a direct impact on citizens. For this report, we focus on fiscal policy's taxation aspect and its implications for industry, households, and society. Taxation relates to the imposition by a political entity of the obligation to pay a certain levy on a given activity which translates into revenue for the government. Types of taxation may vary from tax on income to tax on goods and services. The former usually takes the form of tax on income from labor or on profits, while the latter can be introduced as value-added tax, excise duty, or also environmental tax.

The primary objective of a tax system is to raise government revenue which will finance the bulk of public expenditure. Through the income raised from taxation, governments will carry out their functions and respect their mandate. However, raising revenue is not the only purpose of a tax system. Taxation is a powerful tool in a government's pursuit of economic stability and to stimulate or, in some instances, restrain economic activity in its jurisdiction. Among the goals of economic stability, price stability and high employment rank high with policymakers. Their challenge is to develop the right tax-mix to reach these objectives while maintaining adequate revenue-generation. However, economic stability and revenue creation are by no means the only two taxation goals. Another essential purpose of a tax system, which is often overlooked, is **the redistributive function that tax plays in society.** A fundamental of taxes is that of redistributing income to reduce inequalities in the distribution of income and wealth. Taxation can also be a powerful tool to **support environmental goals**, provided they incentivize green investments, shifts in consumption patterns, efficiency gains, etc.

What to tax and how to tax have caused centuries-long debates. A plethora of different approaches has been adopted throughout the years. In recent decades, a **tax shifting approach** has been gaining traction and is becoming more widely accepted. This approach aims to shift the burden of taxation from labor and income (the "goods") to the taxation of consumption and externalities (the "bads"). By taxing externalities, we internalize the social cost associated with particular activities. The two main objectives to do so are 1) to increase the price to reflect the actual cost of the good or service and thus influence consumer behavior, and 2) to use the revenue generated from taxing the activity to mitigate the harm being caused to the environment and society by the same activity. The **earmarking of revenues** generated from taxation would enable a more transparent approach to directing public spending towards mitigating the direct and indirect adverse effects caused by the particular good or service. This approach towards taxation aims to lessen the burden of taxing effort through labor, creativity, or entrepreneurship and to tax environmentally harmful practices in order to limit their production and consumption and subsequently reduce their negative impacts on the environment.

Opting for such a **tax shift**, if done right and if the tax system effectively reduces the consumption of the targeted goods and services, will lead to a reduction in revenue that governments collect. This is one of the arguments that governments raise against such a shift, which is, however, one that does not consider the level of public funds spent on mitigating the effects of the specific harmful activities. Another argument against shifting the tax burden away from labor is that, by design, taxes on income tend to be more progressive, and therefore those earning more will pay more tax. Indirect taxes may be construed as being more regressive since lower-earning households would still have to pay the full amount of the tax and might not be able to afford a more suitable alternative. This makes the policy design behind a specific tax shift the more important, with the vital inclusions of the necessary redistributive features and assistance packages addressing all layers of society's needs. Yet, opting for such **a tax shift in the context of carbon taxation is a promising way to offset the regressive distributional impacts of the tax and to better foster public support for the mechanism**.

According to the Treaty on the Functioning of the European Union (TFEU), taxation is a member state competency. The EU has no direct role in setting taxes or collecting them within the individual countries. However, certain areas exist where taxation rules are *aligned* for goods and services, mainly relating to value-added tax (VAT), tax on energy products and electricity, and tax on tobacco and alcohol. Taxation rules for energy products in the EU are regulated through the EU **Energy Taxation Directive**. Adopted in 2003, this instrument was designed to avoid unfair competition between member states by harmonizing taxation of energy products such as electricity and motor and heating fuels. As member states can implement energy taxes domestically, the consequent variation in energy tax schemes is likely to have distortive competitiveness effects in an open market such as the EU. The Directive, therefore, aims to offset these effects by setting minimum fuel tax rates throughout the region. However, it should be noted that the ETD also grants generous scope for tax exemptions that member states can choose to implement to balance their industrial needs with climate action.

Parallel to supporting the EU's internal energy market, the Energy Taxation Directive can be a tool that promotes environmental ambition by regulating environment-related taxes. As currently shaped, however, the ETD does not contribute to climate objectives. Taxation schemes do not factor in climate objectives, and the weight of environmental taxation varies greatly among member states and knowing fluctuating trends. An ongoing study led by the Institute for European Environmental Policy (IEEP) and undertaken for the European Commission shares new evidence which further makes the case for greener tax systems in the EU. Preliminary results indicate that a simulation portfolio of €30bn of green taxes or market-based pricing instruments to replace income tax would raise the EU GDP by €35bn (0.2%) by 2030. It further shows a rise in employment by 0.1% and positive or zero impacts on income in all parts of the distribution in all member states, achievable through careful design of the taxes. The EU should work with member states to adopt green fiscal policy reforms, both at the national and regional levels.

The ETD could also provide the basis for implementing an EU-wide carbon tax or an alignment of energy taxation rules to carbon content. However, given the required unanimity in the Council, the chances that this will happen are very slim. It is also important to note that rules for *direct* and *indirect* taxation are different at EU level and are dealt with separately in the TFEU. The legal base for indirect taxation such as VAT is Article 113 TFEU, which establishes a certain level of harmonization in the rules governing the identified indirect taxes. In the area of direct taxation, on the contrary, there is no explicit provision for legislative EU competence, with Article 115 TFEU being somewhat of a legal base for company taxation, enabling approximation of rules that affect the internal market. Although still a very challenging task, **it is technically more accessible for the EU to adopt common rules in *indirect* taxation rather than the area of *direct* taxation**. These processes have proved to be a stumbling block for substantial reforms in taxation legislation within the European Union throughout the years. Failed attempts to introduce Union-wide carbon taxation in the past confirm these political difficulties.

There is some scope for this to change. The growing evidence of climate costs to the economy, society and the environment is leading to more frequent political declarations in support of carbon pricing – from policy makers and even business. At the EU level, discussions have included focus on whether to use the "passerelle clause" to move to majority voting on taxation, though use of this clause requires unanimity. There is also a legal possibility of using the enhanced cooperation mechanism to have a carbon tax that applies to a subset of EU Member States, much like the Schengen area and the Euro do not apply to all. While possibilities, the opposition to either of these is expected, however, to remain offputtingly strong in the immediate future.

While the application of a carbon tax at European level has been blocked in the past, some countries have taken ownership of the issue and decided to apply carbon taxes at the national level for those sectors not regulated by the EU ETS. This shows windows of opportunities for carbon pricing in the Union and a more

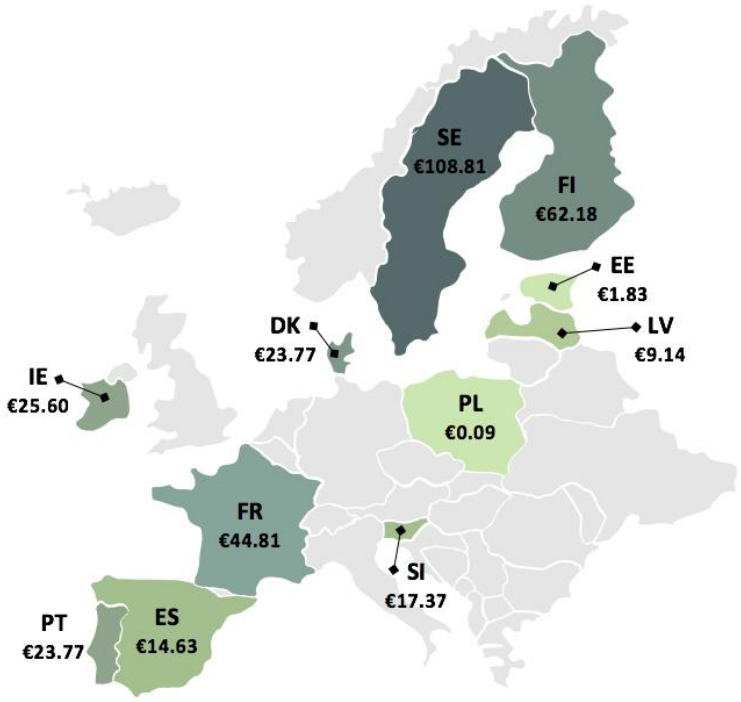
promising political environment to adopt a wider and more harmonized carbon taxation. Surpassing veto barriers in an area where unanimity is required is a challenge. Ideally, decision-makers would properly overcome political reluctance, and the right incentives would accompany such a tool to enable the establishment of a Union-wide carbon tax. Alternatively, a harmonization consisting of an alliance of environmentally-like minded countries, while less ambitious, could be a first step forward. A useful tool that exists in the EU where there is limited formal competencies, is the open method of coordination (OMC). This can be a process to benchmark, discuss and encourage progress in a type of soft harmonisation, with flexibility as to who is leading the coordination.

3. Carbon pricing at member state level

3.1 A general overview

Outside of the EU ETS, carbon pricing is still not a widespread practice in the Union. Nevertheless, some countries have committed themselves unilaterally to adopt domestic carbon taxes, often to address those emissions not covered by the EU ETS. Non-ETS emissions come from diffuse sources such as transport, heating of commercial and residential buildings, small and medium-size industry, agriculture, waste management, and products containing fluorinated gases. These represent the remaining 60% of the EU's greenhouse gas emissions and are covered by **the Effort Sharing Regulation (ESR)**. The ESR sets national aggregate climate targets for non-ETS sectors for every member state based on GDP. As such, policies that affect non-ETS sectors' emissions are generally determined at the domestic level as member states seek to fulfill their climate goals. Member states can flexibly meet their targets by opting for the policy instruments they deem fit. Carbon taxation is one of such tools which a few member states have introduced.

In 1990, Finland was the world's first country to introduce a carbon tax. An early wave of carbon tax enactments in the Nordic countries followed, and more countries have followed since. Currently, it is a total of 11 EU member states which have implemented carbon taxes, with rates that range from less than 1€/tCO2e to over 100€/tCO2e. These include Denmark, Estonia, Finland, France, Ireland, Latvia, Portugal, Slovenia, Spain, and Sweden.



The distinct design options each national initiative has opted for, and their relative effectiveness, are particularly important to understand what we should avoid and replicate. In Annex are included information

sheets for every member state with a carbon tax. These serve as the basis from which we conducted our analysis and drew conclusions.

3.1 Our main observations and conclusions

Despite the generally low carbon prices that have been in place to date, the adoption of carbon pricing is statistically associated with quite a considerable reduction in emissions growth rates relative to otherwise similar countries' trajectories. This holds for the **transport and heating sectors**, which are at times held to be irresponsive to carbon pricing. Some carbon taxes in Europe seem relatively ineffective, but this is due to excessive generosity in granting exemptions and low tax rates and should not argue against the policy instrument. Most evidently, the effectiveness of carbon pricing is not automatic but largely contingent on the (essentially political) decisions that shape its design. There are important success stories in the EU, where carbon pricing has not only been adopted but maintained despite subsequent political changes in the government but has also delivered on its environmental and economic performance goals. Experience debunks the myths that carbon pricing is climate-ineffective overall, or just for specific sectors, or it is incompatible with economic prosperity and environmental justice.

We have drawn the following conclusions from our analysis:

Conclusion 1: The carbon pricing landscape outside of the EU ETS is patchy and the rates are too low, with very few cases of transformative pricing. As such, the current taxation policy mix is ineffective to help step up the EU's climate efforts.

Carbon tax schemes in EU member states show that the pricing landscape in the Union is highly differentiated. First, only a handful of countries have introduced carbon pricing. Secondly, existing initiatives widely vary in scope and degrees of success. National schemes cover different fossil fuels, emissions, and sectors. For instance, the carbon tax introduced by Spain is economy-wide but only covers hydrofluorocarbons, while Denmark tackles all greenhouse gases but mainly applies to the buildings and transport sectors. With rates from as low as €0.09/tCO2e in Poland to as high as €108.81/tCO2e in Sweden, the extent to which countries in the European Union choose to price carbon emissions also varies substantially.

However, our analysis shows that **emissions reductions driven by the measure are more effective when and if there is a clear, uniform price signal that applies eventually to all jurisdictions and economic sectors**. The fragmented carbon pricing landscape can be problematic in a single market such as the EU, where relative carbon pricing stringency across borders may cause geographic shifts of production, i.e., carbon leakage within the Union itself. If carbon pricing is to bear its intended fruits, a region-wide carbon price that both extends carbon pricing throughout the EU and harmonizes carbon taxes should be sought. **Ensuring a unique tax of the sort may require introducing a supranational carbon tax or, alternatively, an expansion and coordination of national carbon taxes.**

Conclusion 2: Both at the EU-level with the EU ETS and the national level with carbon taxes, current rates are generally too low to incentivize a transition but can and should be made more ambitious, provided there is the political will for it.

In view of the Paris Agreement targets striving to limit the global average temperature increase to 1.5°C, the gold standard would be to base carbon prices on climate objectives. Anchoring the price to a fixed emissions reduction consistent with the Paris Agreement can guarantee that environmental gains are achieved. The High-Level Commission on Carbon Prices points out that countries should aim **for carbon**

prices of at least US$40-80/tCO2e by 2020 and US$50-100 by 2030 for Paris Agreement consistency and assuming a complementary policy landscape. This is far from reality in the European Union, where **only Finland, France, and Sweden apply Paris-Agreement compatible carbon prices**. **Most carbon prices across the EU are below the already insufficient EU ETS rate of €25/tCO2e and remain at too prudent of a level to propel change or adequately embed the climate costs of fuel**. With financially insignificant rates equalling €0.09/tCO2e for Poland and €1.83/tCO2e for Estonia, some taxes are even only symbolic. Modest rate levels are likely to be a result of economic and political challenges associated with the measure.

While prices are generally too low in the EU, there is significant leeway for broadening the tax base and increasing rates. **Some countries have gradually increased their rates over the years.** For instance, Sweden's tax was first implemented at a rate of €24/tCO2e in 1991 and progressively augmented to its current level of over €100/tCO2e. Only a few countries have announced plans to raise their carbon rates. France and Ireland are aiming to link their carbon price to climate targets, projecting a gradual increase to €100/tCO2e for 2030. Yet, most already unambitious schemes have usually kept their rates constant and have not made any proposals to increase them, such as Poland or Estonia. **Price definition needs, however, to be consistent with environmental ambition.**

Fossil fuel subsidies and policy coherence: It is important to highlight that one reason why existing carbon prices are so low, and that most emissions are not priced at all, is due to the political influence exerted by those with vested interests in the continued use of fossil fuels. Persisting **subsidies for fossil fuels** are even tantamount to a negative carbon price. **According to the IMF, based on current subsidies, the average carbon price in the world today is minus US$8**. As an obvious precondition for decarbonization, the complete removal of fossil fuel subsidies under all forms is necessary to ensure that counterproductive policies do not undermine any carbon pricing mechanism. Policy coherence is a prerequisite for a successful and *deep* decarbonisation of our economies.

Conclusion 3 - The carbon leakage argument has led to a carbon pricing implemented on a very selective basis. These practices should subside as carbon pricing becomes more geographically diffuse.

Theory holds that in order to achieve true economic efficiency, a carbon tax would have to be economy-wide. However, to date arguments of carbon leakage seem to have dominated climate policy discourse. Countries deploy domestic measures that grant full exemptions or reduced carbon rates to specific sectors, leading to a compromised stringency for carbon pricing.

In the member states, the common practice is to exempt EU-ETS sectors to avoid double-taxation (despite the fact these sectors already largely benefit from free allocation of permits under the ETS Directive), to grant exemptions from national carbon pricing on top of the EU ETS, and to generally disregard greenhouse gases other than CO2**. Careful adoption of complementary measures may be necessary in a world system where carbon pricing is not yet the norm. Still, the tradition until now has been to use exemptions as a rule rather than an exception**. The threat of carbon leakage to date is, however, not as high as anticipated by policymakers, and is usually limited to a few sectors, while its connection to carbon costs is yet unconfirmed. The main objective of a carbon pricing policy in such circumstances should be to ensure that exemptions are temporary. Sweden is a case in point. The adoption of differentiated carbon taxes initially addressed the challenge of carbon leakage. These have now converged to be similar for most economic sectors, but still there are still large exemptions for those industries that the EU ETS covers**.** Although the Swedish carbon tax has been hugely successful for reducing territorial emissions, **consumption-based emissions, which are largely imported, have remained high since 1993**. This may suggest that Swedish carbon emissions have moved geographically **when production of consumer goods gradually relocated abroad, mainly to China.**

When taxes are overwhelmingly implemented on a very selective basis, they cannot send a strong signal to economic actors and consumers. Mitigation effects of carbon pricing are further expected to be more modest where tax exemptions are in place. Arguably, as carbon prices spread regionally and globally, concerns about competitiveness should subside, and gains in growing low-carbon sectors may counterbalance losses in emissions-intensive production. Surely, a global carbon price would fully relieve fears of carbon leakage, but a unique worldwide tax is still unthinkable at present. **However, it is conceivable for the EU as a supranational entity with a budget to introduce a region-wide carbon taxation scheme that would be complemented by a carbon border adjustment mechanism to protect itself from carbon leakage.** With the more ambitious targets provided under the European Green Deal, impetus is provided for a larger resort to carbon taxation at Union-level.

Conclusion 4: Carbon pricing can be an effective instrument for fiscal reforms. They raise substantial revenues, and a redistributive use of revenues can both offset regressive impacts and foster critical public support for the measure.

In some countries, the overall contribution of carbon pricing has been limited by the political infeasibility of implementing robust prices and scopes. Attempts to increase carbon taxation have generally been aborted, and ambitions abandoned because of political difficulty. The case of France illustrates that increasing carbon taxes can meet strong social opposition to the point of reaching a stalemate. The demonstrations that erupted throughout the country against the carbon tax have halted the government's planned target of a carbon price of 100€/tCO2e by 2030. However, the situation should not be hailed as a testament that carbon pricing itself inevitably triggers social unrest. Instead, **it raises appreciation for understanding political acceptance and distributional effects as *paramount* carbon tax design considerations.**

Carbon pricing generates revenues that may rise to significant amounts. France garnered almost US$9000 million from carbon tax revenues in 2019, representing 1 to 2% of government budget. Sweden and Finland's tax also makes up 1 to 2% of its general revenues. Revenue generation can be a strong incentive to implement carbon taxation. In the European Union, the adoption of carbon taxes was often motivated by revenue rationales beyond climate mitigation. Ireland mainly adopted its carbon tax to overcome the country's deficit resulting from the 2008 crisis. Scandinavian countries enacted their carbon taxes to offset budget reductions caused by lowered income taxes.

The fiscal stakes of a carbon pricing mechanism make the choice around how to use its revenues more relevant. **In the European Union, mixed strategies for spending tax revenues are observed, and governments rarely use revenues in a single manner**. A noticeable trend is that carbon taxes may be introduced as part of broader tax policy reforms that generally aim to apply the tax shifting approach. Early movers such as Denmark, Sweden and Finland adopted carbon taxes as part of a **Green Tax Reform** designed to reduce marginal income tax rates. This is also the case for Portugal and Spain. A study on the effects of carbon tax policies in the Irish Republic found that a tax of 20€/tCO2e would cost the poorest households less than 3€/week and the richest more than 4€/week. In recognition of the carbon tax's regressive nature, the revenues are used to increase social security benefits. By cushioning socioeconomic side-effects via carbon dividends, lowering other taxes, or investing in additional ways to reduce emissions, tax revenues can be used to further public acceptability. **The gap between actual carbon prices and those required to achieve ambitious climate change mitigation could be closed by using revenues in a transparent way that ensures benefits are relevant to tweak the acceptability of a carbon tax**. **As such, we should not dismiss carbon taxation on the basis that it is, in essence, regressive.** Rather, we should recognize that there are ways to offset these impacts to make carbon taxation good both for the people and the planet.

Conclusion 5: Exemptions have been historically granted beyond those sectors truly at risks of global competitiveness impacts and carbon leakage, weakening the impacts and credibility of the instruments.

As shown by the detailed analysis of different carbon taxation schemes applied in the Member States, generous carbon tax exemptions have been granted to some specific economic sectors and in particular to industry operators under the EU ETS, thus adding up to free allowances they already receive under the Directive. This "double protection" has been largely sub-optimal and has clearly reduced the impact of carbon taxation as an effective tool in steering industrial production towards further decarbonisation.

Conclusion 6: There is over-reliance on the EU ETS for emissions reductions in the sectors covered.

All national carbon taxation schemes have been designed bearing in mind the EU ETS. In most cases, if not all, the sectors covered by the EU-ETS are entirely excluded from national carbon taxes, and some taxes, such as Portugal's, attempt to align their prices to the EU ETS. This suggests that member states mostly rely on the EU ETS as a pricing mechanism to address emissions in those sectors governed by it. **If the EU ETS is the pacesetter for carbon pricing within the EU, then its design must warrant effective climate action**. With a carbon price of €25/tCO2e and a free allowances system that exempts 90% of industrial emissions, the current EU ETS picture is far from performing as expected and therefore cannot be taken as a good reference. The price of allowances is still too low to drive change. **Over-reliance on an instrument whose environmental ambition has proved dubious until now is risky.** The large reserves of carbon allowances in Europe's emissions trading market continue to occur at a modest carbon price. **The carbon taxation schemes of ambitious countries seem to be providing more firm price signals to investors.**

Conclusion 7: Transparency in the use of revenues and involvement of civil society are key to address political and social resistance

Studies that dig into political and behavioral sciences to understand public resistance to carbon taxes have shed light on **the importance of confidence in government and its ability to manage fiscal revenues in a transparent, just, and effective way**. In Sweden, the relatively high confidence in the political system is often associated with the acceptance of carbon taxation, while lower levels in France may have contributed to difficulties. Lack of confidence in the government, combined with an apparent aversion against social inequalities, may cause fears that carbon taxes fall disproportionately on low-income households. The case of France shows the need for transparency and carbon tax money not to be "diverted" by the State but instead fully used either for household compensation or to finance the energy transition.

However, it should be noted that **there is limited transparency on how governments use carbon tax revenues**. The common practice is to direct revenues to the general budget with only guesstimated links to their use. This is often due to the "budget unicity" principle of public economics, according to which revenue inflows cannot be earmarked to specific uses. While revenue intentions are rarely upfront or part of the political justification for policy adoption, academic literature instead suggests that revenue visibility is crucial to foster trust and acceptability of the tax. This indicates that a trade-off exists between revisiting carbon revenue uses and postponing significant rate increases and further makes the case for transparent tax swaps.

Experts suggest other ways to better foster public acceptance of carbon taxes. **These include careful communication with regular updates on the use of proceeds and environmental, social, and economic impacts of the tax, phasing in the tax through time to build familiarity before raising rates, and transparent earmarking of carbon tax revenues**. Sweden's world-leading carbon tax may partly be owed

to extensive public dialogue and social deliberation, reinforcing political trust and transparency before the fiscal reform that introduced carbon taxation.

Conclusion 8: Robust and ambitious carbon pricing is an effective climate tool for decarbonization which is also reconcilable with economic growth, jobs, innovation and competitiveness.

The low ambition of some carbon pricing policies is an indication that all that glitters is not gold. With infertile tax rate levels and whopping distribution of exemptions, some carbon pricing initiatives seem to only exist on paper and cannot be expected to instigate transformative change. On the other hand, those countries that have dared to build robust carbon pricing mechanisms demonstrate that carbon pricing can be a successful story.

Empirical assessment of carbon pricing effectiveness is a challenging exercise: schemes have different intensities, scopes, revenue uses for every jurisdiction, and fully singling out the effects of carbon pricing from those of related policy instruments is difficult. Yet, **existing literature does indicate a positive impact from carbon taxes on stimulating emissions reduction in the EU**, even though effects were varied and on average limited due to the generally too low carbon rates and extensive granting of exemptions. Recent studies suggest that **countries' emission trajectories with and without carbon prices tend to diverge over time.** Countries with carbon pricing as part of their overall policy package have slower emissions growth rates (or faster emissions reduction rates) relative to otherwise similar countries. Evidence is found that the adoption of carbon pricing is associated with a subsequent tilting of national energy mixes towards lower emission energy sources such as wind power and away from higher-emission energy sources such as coal. Another major stumbling block to pricing carbon is concern about the economic impact of the policy. A recent study on the macroeconomic effect of European carbon taxes finds no robust evidence to support claims of adverse tax effects on various dimensions of competitiveness such as employment or GDP growth. Results showed that the **carbon-taxes could be an attractive environmental policy option if their major negative impacts are compensated by proper use of generated revenue. Recent evidence is broadly supportive of the double dividend hypothesis**.

The so-called "eco-leaders" of Northern Europe, amongst which Denmark and Sweden, have achieved considerable progress in applying carbon pricing policies. Investigation into the effects of a robust carbon taxation policy such as Sweden's is most relevant. With the world's highest carbon tax rate, the country has reduced emissions by 25% with a parallel economic expansion of 75% since 1995, showing that high carbon taxes and continued economic growth are not irreconcilable. **Direct effects of the carbon tax on emissions in the transport and building sectors have been reported.** After implementing a carbon tax and VAT on transport fuels, CO2 emissions from transport declined almost 11% in an average year, with 6% attributed to the carbon tax alone. This might appear modest given that Sweden has the highest carbon tax in the world, but it should be kept in mind that the transport sector is one of the most difficult to decarbonize. Further studies on Sweden's residential sector provide evidence that Sweden's decarbonization of the buildings was stimulated by the carbon tax, even when controlling for other variables such as complementary policies and the increased role of district heating. **Most notably, the rise of oil substitution and the increase in heat pump sales coincide with the carbon tax increase after 2000.**

Note: Carbon taxes are relatively easy to implement and administer: Rationales other than environmental and economic can make carbon taxes a suitable complementary instrument to reduce GHG emissions reductions. In most cases, carbon taxes were integrated as part of existing fossil fuel taxes under existing energy taxation schemes. Their smooth integration into existing systems makes them applicable at reasonable costs, as policymakers do not need to reinvent the wheel. Other instruments, of which cap-and-trade systems, generally exhibit higher bureaucratic costs. To take the example of Sweden, administrative costs of the country's carbon and energy taxes together were estimated at 0.1% of total revenues, therefore making the taxes administratively simple for both government and taxpayers.

Conclusion 9: As shown by some National and Energy Climate Plans (NECPs), carbon pricing is gaining prominence in member states' climate policy tools. Moreover, there is a significant window of opportunity right now of including carbon pricing into the policy reforms promised in the context of the National Recovery and Resilience Plans (NRRPs).

Chapter 4 of this report analyzes carbon taxation measures included in the NECPs submitted by the Member States and the Regulation on the Governance of the Energy Union for the period 2020-2030. The overall conclusion is that some member states are considering adopting taxation measures or strengthening existing ones. However, there is still a considerable gap in the European Union. Given the importance of economic and fiscal reforms in the National Recovery and Resilience Plans (NRRPs), carbon pricing and green taxation measures will have to be taken into consideration or reinforced in the national toolboxes to achieve the 37% climate objective set in the Recovery and Resilience Facility (RRF). The RRF also establishes that NRRPs will have to be consistent with the National Energy and Climate Plans. Member states are required to provide early indications in their NRRP on how they will ensure consistency and complementarity and of how specific investments or policies and measures set out in National Energy and Climate Plans could be fast-tracked with the help of the NRRPs.

Conclusion 10: Carbon pricing is no silver bullet but, complemented by the right policy mix, it can drive a deep decarbonisation of all sectors of the economy

Carbon pricing should be considered as part of a broader policy package, with complementary policies and targeted instruments that address other market failures. Studies of human behavior further suggest that price increases in carbon-intensive products are not always enough to incentivize a shift away from emissions-intensive production and consumption styles. First, the carbon price level needs to reach a threshold before it incites change, which largely depends on the sectors involved. Second, there are some sectors in which those bearing the burden of increased costs are not those that have the agency or power to make the switch (e.g., buildings/heating). As such, carbon pricing will have a more or less stringent role to play in stimulating the transition to a low carbon economy depending on the sectors in which it is applied. In those sectors, complementary policies are crucial to stimulate the decarbonisation process, and carbon pricing would merely play a supportive role. **Combining a well-designed carbon tax factoring in all the main observations provided above with other policies appears to be a sensible and necessary path for successful carbon taxes**. Jurisdictions that have witnessed declining emissions with carbon pricing have usually enacted it in tandem with other policy instruments such as command-and-control tools. Public interventions are necessary to transform existing infrastructure, for example, in the heating and transport sectors.

Carbon pricing and the planetary boundaries framework: Carbon pricing is typically justified on the basis that it helps mitigate climate change. The planetary boundaries framework begs the question as to how carbon pricing might connect to other environmental processes, either positively or negatively. Research suggests that a high global carbon price may prove sufficient to handle almost all planetary boundaries[1]. Only in demand for agricultural land were adverse effects found. Arguably, a higher price for fossil fuels triggers a resort to biofuel, which is land demanding. The results suggest combining carbon pricing with a reduction in biofuel subsidies to alleviate all planetary boundaries. This makes the case for a global carbon price even stronger when considering it beyond its climate change benefits.

4. Carbon pricing in National Energy and Climate Plans

The EU **Regulation on the Governance of the Energy Union** requires that all member states contribute to achieving the EU's climate and energy targets for 2030 and detail their objectives and measures in their **National Energy and Climate Plans (NECPs)** and national Long-Term Strategies to meet the Paris Agreement. Member states have already submitted their NECPs for 2021-2030 to the European Commission, which has published its final assessment in October 2020[3]. Moreover, given the importance of economic and fiscal reforms in the National Recovery and Resilience Plans (NRRPs), it is expected that carbon pricing and green taxation measures will be taken into consideration or reinforced in the national toolboxes to achieve the 37% climate objective set in the Recovery and Resilience Facility. One follow-up of this report will be analysing the final NRRPs submitted by the Members States (deadline 30 April 2021) to focus on this specific aspect.

As NECPs outline countries' respective policy packages for climate action for the years 2021-2030, investigating what they contain can be a useful pointer to the extent to which carbon pricing may be recognized as a powerful tool for climate action. The following takeaways are drawn from our analysis:

- ✓ **Countries that already have relatively ambitious carbon taxing schemes generally brand the strategy as an effective one to reach their climate targets, such as Sweden or Finland**. Oher countries outline ways to increase the ambition of their carbon taxes by raising rates, expanding the scope, or earmarking revenues for social or environmental purposes. These include Ireland, France, Portugal and Slovenia.

- ✓ **On top of the 11 member states which already have a carbon tax in place, an additional 3 have plans to implement carbon pricing schemes, as specified in their NECPs submitted to the Commission**. These member states put the new measure at the forefront of their decarbonisation strategies. For instance, Germany is introducing a national ETS for the transport and building sectors as of 2021. The system will initially resemble a carbon tax as a fixed price will be established and will gradually increase until 2025. The Netherlands and Luxembourg are also to implement carbon taxes in 2021

- ✓ **Several member states mention in their NECP that they are exploring the potentials of national carbon pricing and considering the implementation of such instrument**. This is seemingly hypothetical for some states such as Belgium and Lithuania, but at a more nascent stage for Croatia (which plans to conduct a study and introduce a tax if feasible) and Cyprus (which has analysed a carbon tax scenario and found positive emissions reduction outcomes).

- ✓ **Some NECPs promote or suggest green tax reforms. While there are not specific references to carbon pricing**, **there seems to be scope to implement new schemes or enhance existing ones.** Greening of the tax system is Latvia's main action line in its NECP, and it is highly incentivized in the NECPs of Spain, Cyprus, Lithuania, and less emphatic in those of Denmark and Slovakia.

- ✓ **Carbon pricing is overlooked by the remaining member states**, as their NECPs do not include it as part of their climate policy tools. This is the case for Bulgaria, Czechia, Greece, Hungary, Italy, Malta and Romania. Most notably, Estonia and Poland make no mention of carbon pricing even though the two have (admittedly merely symbolic) carbon taxes at the domestic level.

[3] https://ec.europa.eu/info/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en

- ✓ **Some countries call for the EU to promote carbon pricing at European level**. France's NECP most particularly asks for carbon tax expansion and convergence to be a Union-wide strategy. Luxembourg supports carbon pricing at European level, most notably alongside Belgium and The Netherlands, for an EU-wide kerosene tax.

Overall, **NECPs indicate that member states are looking with increased interest to a carbon pricing approach, as the measure gains prominence in their respective decarbonization policy toolkits**.

5. Conclusions

The EU has a variety of climate mitigation policy measures to contribute to the Paris Agreement climate goal. Given the increased climate ambition for 2030, carbon pricing can play a role as one of the still not fully exploited driving tools. Lessons at national level show that carbon taxes can speed up the transition if ambitiously and strategically designed. The role of carbon pricing is enhanced in the European Green Deal and has a place in the new EU Budget and the Covid-19 Recovery Plan. However, Europe's carbon pricing strategy still lacks cohesiveness. **The far-from-flawless EU ETS is currently the only Union-wide pricing mechanism, carbon taxes implemented at national level are overall sub-optimal, and a green taxation shift is still more debated than actually applied.**

Climate action undertaken only by some member states and in a non-coordinated way reduces the Union's environmental benefits (driving deeper decarbonization) and can create potential distortions in the single market.

An EU-wide approach would ensure that abatement is achieved where costs are lowest without creating distortions of competition across Europe. In a joint statement dating from 2018, the governments of France, Finland, Denmark, Ireland, Italy, Portugal, the UK, Sweden, and the Netherlands call for the EU to both strengthen and extend carbon pricing in Europe. They maintain that cooperation at the European level would increase both the economic and environmental efficiency of carbon pricing. The introduction of carbon taxation should be addressed at the European level, notably by taking on board the good practices in some pioneering member states.

Ideally, in the medium to long-term and when politically feasible, the EU should aim for a Union-wide carbon tax. It should apply a high rate linked to climate targets, increase through time, and have economy-wide coverage. It should also offset regressive impacts through tax shifting and be coupled with complementary policies. Such a scenario would optimize carbon pricing in the Union.

In the short-term and paving the way towards that main objective, the EU should have at least a harmonized approach on carbon taxes, setting some common provisions (as listed in the conclusions we provided above) and effective minimum taxation rates for all member states. More generally, the EU should implement a green taxation shift internalizing the polluter pays principles while addressing the needed distributional impacts and gaining public support. A more coordinated approach when it comes to economic instruments can influence both industrial production and consumer behavior. An immediate possibility is to engage in the Open Method of Coordination (OMC) to accelerate process via benchmarking, lesson learning, and coordination of launching or ramping up national taxes. As momentum develops the enhanced cooperation mechanism should be considered if political judgement concludes that a full EU-wide solution will not be feasible.

There are also immediate windows of opportunity for progress. The instruments under the European Green Deal and the Fit-for-55 package are clearly important, notably: the Revision of the EU ETS, Carbon border adjustment mechanism, and Revision of Energy Taxation Directive, expected in June. Right now countries are submitting their National Recovery and Resilience Plans (NRRPs) that need to be compatible with the EGD and abide by the “do no harm” principle to get a green light by the European Commission and European Parliament. Close scrutiny of these plans to promote carbon taxation and other fiscal reform initiative, such as subsidy reform, should be carried out to make sure the NRRPs are fit-for-purpose, help build back better and merit spending European taxpayer’s money.

Annexes

Snapshot of national carbon taxes

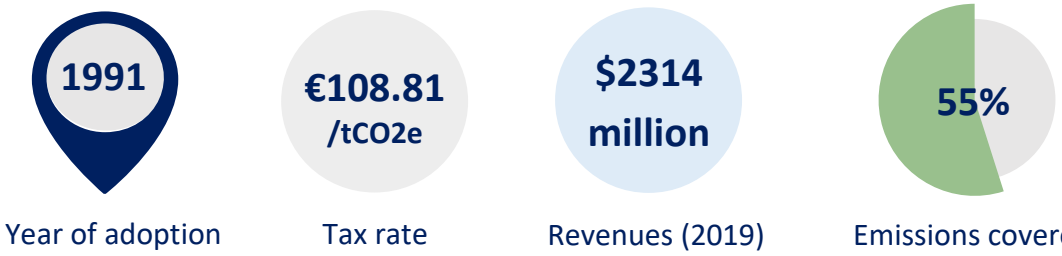
Country	Year	Price (2020)	Scope	Exemptions	% Total	Revenues (2019)
Denmark	1992	23.77€	All fossil fuels use, applying to GHG emissions from mainly the buildings and transport sectors, as there are (partial) exemptions for other sectors.	EU ETS sectors, except for district heating and waste incineration plants. Partial exemptions for certain energy-intensive industries: international aviation & shipping, export of fuels, modes of transportation (train, shipping, aviation) and power & heat production.	40%	US$520 million
Estonia	2000	1.83€	CO2 emissions from industry and power sectors, all fossil fuels applying to generating thermal energy	EU ETS operators	3%	US$3 million
Finland	1990	62.18€	CO2 emissions of all fossil fuels for heating and work machines from mainly the industry, transport and buildings sectors. Note EU ETS sectors are also covered by the carbon tax.	Partial exemptions for certain industries and fuel uses (fuel use in refineries and CHPs or use of coal and natural gas as raw materials in industrial processes). Exemptions for fuel use for commercial yachting and aviation, electricity production, international aviation and shipping. Peat is also exempted.	36%	US$1420 million
France	2014	44.81€	Part of tariffs on consumption of energy covering all fossil fuels from all sectors (mainly industry, buildings and transport) with exemptions.	Exemptions for EU ETS operators, and certain industrial processes (non-combustion usage), international aviation & shipping, power & heat, public transport and freight transport.	35%	US$8968 million
Ireland	2010	25.60€	Tax covering all fossil fuels and applying to CO2 emissions from all sectors, with exemptions.	EU ETS operators are partially exempted up to the minimum allowed by the EU ETD. There are also partial exemptions for international aviation & shipping, power & heat, export of fuels and certain industrial processes.	49%	US$481 million

Latvia	2004	9.14€	All fossil fuels (except for peat) and CO2 emissions from industry and power sectors not covered under the EU ETS	EU ETS sectors are exempt, as well as the use of peat in industrial activities.	15%	US$9 million
Poland	1990	0.09€	Applies to GHG emissions from all sectors. All fossil fuels and other fuels leading to GHG emissions.	Operators covered by the EU ETS are exempt. Exemptions also for entities whose annual tax amount due under the Environmental Protection act is less than 800 zloty.	4%	US$1 million
Portugal	2015	23.77€	Excise tax on consumption covering all fossil fuels applying to CO2 emissions mainly the industry, building, and transport sectors.	EU ETS operators are exempt. Certain industrial processes (including non-combustion usage), transport and vulnerable consumers.	29%	US$281 million
Slovenia	1996	17.37 €	Tax on natural gas and all liquid and solid fossil fuels. Applies to GHG emissions from the buildings and transport sectors.	Certain energy-intensive Industry, export of fuels, power & heat and aviation are exempt. EU ETS operators exposed to carbon leakage or energy-intensity are also exempt, i.e. almost all EU ETS operators.	24%	US$81 million
Spain	2014	14.63€	Tax on fluorinated greenhouse gases only, from all sectors and with exemptions	Partial exemptions for the use of fluorinated GHGs in certain sectors (exports, chemical processes and new equipment and medication). F-gases with a global warming potential less than 150 are exempt.	3%	US$120 million
Sweden	1991	108.81€	Component of the energy tax for all fossil fuels, applying to CO2 emissions mainly from the transport and buildings sector.	Almost all EU ETS operators are exempt, except for fossil fuels used to generate heat for other purposes than manufacturing). Transport, international aviation, agriculture, export of fuels, power & heat, and forestry have partial exemptions too.	40%	US$2314 million[i]

National carbon taxes

Information sheets on national carbon taxes in the EU, following a descending order according to ambition and effectiveness:

Sweden



Description: The Swedish carbon tax was one of the first worldwide to be introduced. It now levies the highest carbon tax rate worldwide at €108.81/tCO2e. The tax covers all fossil fuels (coal, gas and oil) and applies to CO2 emissions from all energy products excluding electricity, and mainly from the transport, manufacturing and buildings sector as there are many (partial) exemptions for other sectors. EU ETS operators are exempted from the tax, and **other exemptions** apply to: **export of the fuels covered, some modes of transportation (train, shipping, aviation), power production, forestry and agriculture**. All use of bioenergy is exempted from the Carbon tax, despite the fact that emissions from bioenergy sources are substantial and amounted to 33 million tonnes in 2018.[4] The tax is paid upstream by producers and importers, midstream by distributor and some of the costs are passed on to downstream users. It is not considered to fully cover all external environmental costs of climate change,[5] which can be estimated to be in a magnitude of 3 to 10 times higher. The carbon tax is part of the energy taxation. Both taxes are closely connected in the country and have to be inspected with regard to one another.

Development: Sweden's carbon tax was introduced in 1991 at a point in time when environmental concerns were high on the agenda and based on a proposal from the Swedish Society for Nature Conservation in 1988. An Environmental Tax Commission was set up in 1987 to assess the potentials of environmental taxes in the country, based on a broad involvement of stakeholders including bureaucrats, politicians and interest groups. In the late 80s, the reduction of income taxes had also become a policy priority in the country as economic distortions meant that middle income earners found themselves paying income tax rates intended for the very rich. These considerations allowed for the implementation of the carbon tax, which was therefore part of a broader reform of the tax system and included reductions for energy, labour and capital taxes. It largely consisted of a tax swap whereby reduced revenues through lower marginal tax rates on income were offset by raising revenues through carbon taxation. The fiscal reform spread across a few decades and the tax reductions were always superior to the tax increases, thereby reducing the overall revenue flowing to the general budget. When the new carbon tax was introduced, the existing energy taxes were subsequently cut by 50% and the two tax mechanisms co-existed side by side. While initially the tax was introduced without discriminating between industry and households, this changed in 1993 when several industries were exempted from all energy taxes and only had to pay 25% of the carbon tax, and 50% as of 1997 (manufacturing, agriculture, co-generation plants, forestry and aquaculture). Direct exemptions for EU ETS operators were not originally provided but gradually adopted. The latest exemption included district heating plants participating in the EU ETS, as of 2014. The tax rate was of €24/tCO2e in 1991 and

[4] https://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6848-6.pdf?pid=23767, page 26.
[5] https://www.trafa.se/globalassets/rapporter/2019/rapport-2019_4-transportsektorns-samhallsekonomiska-kostnader.pdf

has gradually increased since. The largest upwards adjustment took place between 2001 and 2004 from around €40/tCO2e to around €100/tCO2e.

Addressing public acceptance: Energy consumers in the residential sector are subject to 100% of the tax, but higher social transfers and reductions in the basic rate of incomes taxes since the implementation of the tax have helped to offset burdens for low and middle-income households. However, considerable aversion exists among the general public on petrol taxes, which consists of 40 per cent of carbon tax and to 60 per cent of energy tax. Total petrol tax is currently 6,69 SEK per litre.[6] The diesel tax is to 47 per cent based on carbon tax and to 53 per cent based on energy tax. Total diesel tax is currently 4,71 SEK per litre. The lower tax on diesel is partly counteracted by a diesel levy in the yearly vehicle tax paid by diesel car owners. By increasing the tax level gradually and in a stepwise manner, households and businesses have been given time to adapt, which has improved the political feasibility of tax increases. Overall, political consensus was maintained by involving all in the decision-making process via public consultations, but also by undertaking a transparent "step-by-step" approach that addressed both distributional impacts and competitiveness concerns. Moreover, Sweden is also a high-taxed country, and the absence of large fossil-fuel producing companies mean that the anti-climate lobby is small. Today, there remains a broad political consensus on the use of the CO2 tax as the primary instrument for climate change mitigation in Sweden and shifts in political power since 1991 have not led to any major alterations. (Apart from a temporarily broadened exemption for diesel use in agriculture during 2019 that was withdrawn in 2020).

Addressing competitiveness concerns: Initially, the carbon tax did not provide derogations for industry and industry did not support the tax. Increasing tax burdens led to competitiveness concerns as industry and households paid the same tax rates and temporary tax exemptions in sectors sensitive to trade were gradually adopted. From 1993 onwards, industry, agriculture, forestry and fisheries were exempt from energy tax payments and only subject to a reduced carbon tax for instance. EU ETS operators which originally faced a reduced carbon tax were finally fully exempt in 2011. Today, only a few exemptions persist. Since a tax reform in 2018, Sweden removed or reduced exemptions to its carbon tax as part of a set of measures to reach its climate target of zero emissions by 2045. Formerly, combined heat and power (CHP) plants covered by the EU ETS were exempted from the carbon tax, but since 2018, CHP emissions are being taxed at 11% of the full tax rate. The partial exemption for diesel used in mining, which stood at 40% of the carbon tax rate, was abolished after substantial lobbying from SSNC. In addition, the exemption for fuels used to generate heat in cogeneration facilities that fall under the EU ETS is reduced from 89% to 9% if this heat is not used in industrial manufacturing processes. The remaining exemptions are mainly for industries covered by the EU ETS. Competitiveness concerns were addressed through a lower initial rate for industries outside of the EU ETS, and this was progressively phased out by 2018. The Swedish case followed a step-by-step process to reduce carbon tax exemptions and the government argued that "the removal of these tax rebates would better align its policy with the polluter pays principle".

Revenues and their use: Carbon tax revenues are transferred to the general budget, but parallel tax reliefs for low-income households are provided. General budget funds are used for specific purposes linked to the carbon tax, such as addressing undesirable distributional consequences of taxation or financing other climate-related measures. Personal income-tax reductions were introduced alongside the introduction of the tax in 1991. In 2001, employer social security contributions were also reduced and income-tax free allowances were extended. From 2007-2010, a further labour tax for carbon tax shift occurred. These came as carbon tax reforms increased and, while there is no direct link established between carbon tax revenues and funding for these labour tax cuts, they were described by the government as a "green tax shift". Generally, the reductions in labour tax revenues were much larger than new gains in carbon tax revenues. Revenues are considered an integrated part of the tax system and among the most "revenue generation-

[6] https://drivkraftsverige.se/statistik/skatter/skatter-fossila-drivmedel-och-branslen/

focused" of global carbon-pricing systems, even though consumption-behaviour change was also acknowledged as a goal of the tax's creation.

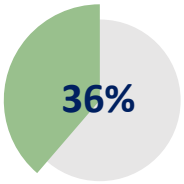
Effectiveness: The Swedish carbon tax and has been a success story and helped cut emissions of the covered sectors by half since its inception. **While emissions have remained high in the industry sector and have even increased in the transport sector, in total Swedish carbon emissions have decreased with 27 per cent between 1990 and 2018. The economy expanded by 75% in the same period. Although the Swedish carbon tax has been hugely successful for reducing territorial emissions, consumption-based emissions, which are largely imported, have remained high since 1993. This may suggest that Swedish carbon emissions have moved geographically when production of consumer goods gradually relocated abroad, mainly to China**. Administrative costs of Sweden's carbon and energy taxes together are estimated at 0.1% of total revenues, therefore making the taxes administratively simple for both government and taxpayers. This was an original design priority of the policies. There were several attempts made at assessing the impact of the carbon tax on the emissions stock of the country. The Swedish Ministry of the Environment estimated that the CO2 emissions of the country were reduced by 15% between the years 1990 and 1995 due to the carbon tax. Moreover, it was estimated that the countries emissions would be 20-25% higher by the year 2000 if the policy changes in 1990 had not been made.

Finland

Year of adoption

Tax rate

Revenues (2019)



Emissions covered

Description: Finland's carbon tax covers most fossil fuels (it excludes F-gases) and applies to CO2 emissions for heating and work machines mainly from industry, transport and buildings sectors. Exemptions exist for fuel use for commercial yachting and aviation, electricity production, international aviation and shipping. There are partial exemptions for certain industries and fuel uses, such as fuel use in refineries and CHPs or use of coal and natural gas as raw materials in industrial processes. While EU ETS operators are also covered by the carbon tax, large exemptions are granted for industrial companies, for a final 37% of emissions being covered both by the EU ETS and the tax. The tax is applied to emissions and is levied downstream as an excise tax. In 2019, Finland changed the methodology to calculate CO2 emissions for fuels covered by its carbon tax whereby full lifecycle emissions are now taken into account instead of only combustion emissions.

Revenues and their use: The revenues resulting from the tax amounted to a total of US$1420 million in 2019 and are valued at the same total for 2020. **This represents more than 2% of state revenues**. **Carbon tax revenues are not earmarked and are fully transferred to the government general budget.** The World Bank states that Finland is greening its tax system however by reforms that increase the carbon tax rates and lower income taxes and social security contributions. The government does this by "gradually strengthening the carbon tax component in the energy tax and shifting the tax burden to higher carbon fuels". Similar to many other Nordic countries with early carbon taxes, Finland in 1997 reduced personal national and local income taxed and employer social security contributions alongside the carbon tax implementation period, but at levels around five times the new carbon tax revenues. These tax reductions were not explicitly tied to the carbon tax but still regarded as a tax shift.

Development: When Finland introduced a carbon tax in 1990, it became the world's first country to implement national carbon pricing. It was designed as a component of the energy tax on fossil fuels and only covered heat and electricity generation, but was later extended to include transport and heating fuels (excluding peat which was covered by the energy tax). There were few exemptions at the tax inception: partial for natural gas, complete for the wood industry, partial for fuels used as raw materials or inputs for manufacturing. Up until 1996, the tax did not foresee many exemptions and only for specific sectors, but to ensure an internationally competitive position of Finnish energy intensive industries, the tax rate was relatively low. **As the Nordic electricity market opened up and neighbouring countries were providing large exemptions to energy-industries, Finnish companies felt at a disadvantage. This prompted partial exemption of energy-intensive industries from carbon pricing schemes (85% carbon tax refund scheme).**

Despite originally declared intentions of having a permanent CO2 tax system, the policy underwent several changes in the following decades. The tax was originally based only on carbon content but was subsequently changed in 1994 to become a combination of a carbon and energy tax with a 60% carbon and a 40% energy component. A major reform was undertaken in 1997 when the tax rates were highly increased and the tax

was changed again to become a pure carbon tax. Another major reform took place in 2011 when the carbon tax was split again into two taxes, one based on carbon content and another based on energy. The tax rates were thus adjusted between the carbon and the energy components.

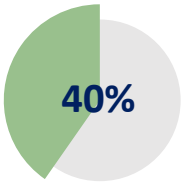
Effectiveness: Overall, it can be said that Finland's carbon tax has been partially successful in reducing the country's carbon emissions despite a large part of the country's economy being shielded from the carbon tax with a comprehensive system of exemptions. Empirical studies indicate that the tax has had a significant and negative impact on CO2 emission growth per capita. However, since the carbon tax is combined with an energy tax it is difficult to conclude whether the effects on emissions are the result of the implementation of the carbon tax, the energy tax or other policy instruments. Overall, between 1990 and 2017, and parallel to a doubling of the Finnish GDP: CO2 emissions from energy industry have declined by 8.1%; CO2 emissions from manufacturing industry have declined by 35.8%; CO2 emissions from transport have declined with 3.7%; CO2 emissions from residential and commercial sectors have declined with 58.8%; and CO2 emissions from energy industry have declined with 37.5 %.

Denmark

Year of adoption

Tax rate

Revenues (2019)



Emissions covered

Description: Denmark implemented its carbon tax in 1992. The tax currently covers all fossil fuels and greenhouse gas emissions, and mainly applies to the transport and buildings sectors (residential and commercial) as **there are exemptions for other sectors (agriculture and parts of industry).** Distributors and importers of the fossil fuels are liable for payment of the tax, though this is ultimately paid downstream by users and collected midstream by distributors. EU ETS operators are exempted from the tax, apart from the district heating and waste incineration plants. Other exemptions apply for international aviation and shipping, export of fuels and some modes of transportation (train, shipping, aviation). Businesses voluntarily entering into energy-efficiency improvement agreements with the Danish Energy Authority can also benefit from tax reliefs, though the terms of this exemption have changed over time.

Revenues and their use: The revenues resulting from Denmark's carbon tax amounted to a total of US$520 million in 2019 and are valued at US$535 million in 2020. Roughly half of the revenues are directed to the general budget, used to reduce the government's overall dependence on labour taxes. Employer social security contributions and personal income taxes have been reduced in phases over the various carbon tax implementation periods. The first stage of the carbon tax (1992-1993) came alongside significant reductions in income taxes for the household sector, which was initially the only impacted by the tax. Expansion in carbon tax revenues from the second stage (Green Tax Package reforms in 1996) was also largely used to offset new labour tax cuts, but some revenues were returned to industry as subsidies. The third-stage reforms (1998) which increased the carbon tax rate were also returned to the economy. **Though reducing these other taxes was stated as an original goal of expanding carbon and energy taxes, carbon tax revenues do not directly fund other labour tax reductions.** Labour tax reductions have generally exceeded any new carbon tax revenues. Overall, Denmark has effectively recycled money to finance income tax reductions and reductions in the social security payments paid by employers.

Development: Denmark implemented a carbon tax in 1992, largely displacing components of the existing energy tax. Today, both taxes are harmonized and administered as complements. The carbon tax was introduced gradually in multiple phases. In May 1992, the tax was introduced as part of a larger Environmental Tax Reform with energy taxes, a sulphur tax, as well as subsidies for green investments. It originally covered energy products consumption for a rate of around €13/tCO2e and targeted mainly households as industry was not yet affected by the tax. **When introduced, Denmark parallelly reduced income taxes and shifted the burden towards environmental tax bases**. From 1993-1995, the tax expanded to industry but with various exemptions. Only 50% of the total tax rate had to be paid, and more exemptions reduced the overall tax burden on industry to 10% of the total tax rate. As of 1996, and to align the country with its 20% emissions reduction by 2005 climate target, various changes were made to the tax under the "Green Tax Package". The carbon tax coverage was significantly expanded and now based on the different type of uses: highest for "industry space heating" and the "household and service sector", but

lower for "industry light processes" and lowest for "industry heavy processes". In 2005, the rate was lowered to €12/tCO2e, but this was accompanied by an energy tax increase. The carbon tax increased again in 2009 as tax reforms emphasized the polluter pays principle.

Addressing competitiveness concerns: When industry was included in the tax, trade associations advocated against it. The concerns were overcome by **earmarking funds for district heating system, supporting the natural gas market, and providing exemptions for industrial companies.** From 1993 to 1995, non-energy intensive companies enjoyed a lower CO2 tax rate as well as a generous refund scheme that was dependent on the size of the CO2 tax in relation to the net sales. Energy-intensive companies under this scheme were refunded 50% of the CO2 tax amount paid in excess of 1% and 2% of net sales. If the CO2 tax was between 2 and 3% of net sales, the refund was of 75% of the amount exceeding 2%, and of 90% of the amount exceeding the 3%. This refund scheme reduced the average CO2 tax burden to 35% of the standard household tax rate, and in effect placed a lower CO2 tax burden on the manufacturing sector. Moreover, additional support measures were available for up to 3 years if the company paid at least 10,000DK in CO2 tax. **To address competitiveness again, recycling measures were adopted which took the form of lowering employers' social security contributions**. Energy efficiency subsidy programs and a special fund for support of SMEs were set up. The refund scheme was overhauled so that industry would bear the same energy taxes as households. After 1996, to safeguard the adverse effects on Danish competitiveness, all money levied from businesses would be recycled back to them. The CO2 taxes applicable to industry changed in 1995 and companies were obliged to pay the CO2 tax in accordance with usage. Various measures meant that the tax rates faced by industries varied accordingly to their energy-intensity, and very substantial CO2 tax reductions were available for companies that reached an agreement with the government on investing in energy efficiency. The 2009 tax reform led to increases in the CO2 taxes, and the threshold for energy-intensive companies was reduced.

Effectiveness: Since the implementation of the carbon tax in 1992, emissions from the energy industry, manufacturing industry, residential and commercial sector and agriculture have declined, while the country's GDP has been increasing. There is overall a notable shift from coal as main energy source for industry to renewable energy since the 90s. Since the carbon tax implementation in 1992 up to 2017, and parallel to a tripling GDP: CO2 emissions from the energy industry declined by 62.2% in 2017: CO2 emissions from the manufacturing industry declined by 24.7%; CO2 emissions from transport increased by 15.8%; CO2 emissions from residential and commercial sector declined by 55.8%; and CO2 emissions from agriculture declined by 41.6%. Only in the transport sector can an increase in emissions be noted, even though road transport is taxed at the highest rate in the country. This is likely due to a growing population and the overall challenge that greening the transport sector represents.

France

Year of adoption | Tax rate | Revenues (2019) | Emissions covered

Description: France implemented its carbon tax in 2014. The tax covers all fossil fuels (natural gas, coal and oils). It applies to CO2 emissions mainly from the industry, buildings (residential and commercial heating) and transport sectors. Operators covered by the EU ETS are exempt from the tax. Full exemptions also apply to fuelwood, dual-use products, non-metallic mineral products, international and domestic aviation, and maritime transport (for people, goods and services). Partially exempted are energy-intensive industries at risk of carbon leakage, agriculture and road transport (freight transport, public transport, taxis, non-road diesel). The tax is paid upstream by producers and importers and midstream by distributors of fossil fuels.

Revenues and their use: The revenues resulting from the tax amounted to a total of US$8968 million in 2019 and are valued at the same amount for 2020. **This represents 1-2% of total state revenues**. All revenues from the French carbon tax go to the general budget. Owing to the governing principle of non-allocation of budgets (according to which revenues must be directed to the general budget without being explicitly allocated to specific expenses), and owing to the very nature of the tax (being a component of the internal consumption tax on energy products), **the detailed use of carbon tax revenues in France is not transparent**. Committing a portion of carbon tax revenues to fund other tax policy measures is however a legal commitment in France, and the country partly uses carbon tax revenues to support other tax policy measures. Initially, a proportion of carbon tax revenues were dedicated to the funding of green subsidies (the "Green Energy Transition Plans"), the share of which varied every year. These earmarking plans had for main target the boosting of employment in the green energy sector. The remaining part was transferred to the general budget. Over time the share of earmarked revenue has decline with the share allocated to general revenue rising. As of 2017, changes were made to the earmarking of carbon tax revenues, with a portion of them used to fund a special "Energy Transition" account to compensate electricity providers for using renewable energies for electricity generation. All remaining revenues go to the general budget, presumably used for tax base shifting purposes. The additional revenues generated by the tax rate increase for diesel use are used to lower the tax burden of low-income households and elderly and to support the financial aids given to individuals replacing old diesel vehicles.

Development: France launched its carbon tax in 2014 as part of the domestic tariffs on consumption of energy products not covered by the EU ETS. It originally addressed gas, heavy fuel oil and coal but was extended after a year to cover transport fuels and heating oils as well. At its launch, the tax was priced at €7/tCO2e. Long-term targets were set for future tax rises with the adoption of a Law on Energy Transition to Green Growth. The tax has risen to 14.50€/tCO2e, 25€/tCO2e in 2017, €44.60/tCO2e in 2018 and was meant to increase to 56€/tCO2e in 2020 **and 100€/tCO2e by 2030**, in respect to the country's climate targets. **The increases were put to a stalemate following nation-wide protests and consultation which froze the rate at 44.81€/tCO2e.**

The French carbon tax largely exempts the transport, energy industry and manufacturing industry, while a large part of the tax is paid by the residential and commercial sectors. It therefore still faces challenges regarding tax equality between industry and households and public acceptance. The yellow vest protests illustrate the importance of "just taxation" and shows that overlooking regressive distribution effects can even threaten the existence of a carbon tax. **An I4CE report indicates that the extensive exemptions granted under the carbon tax scheme are a great liability on public expenses and inconsistent with the country's climate objectives.**

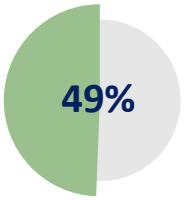
Public acceptance: Various studies seek to explain the cause of the *gilets jaunes* movement. Arguably, fuel poverty reduction policies in France were neglected and hit low-income and rural households the hardest. Timing also contributed to the outcome because the rise in the carbon tax was announced shortly after oil prices had risen by 23% and after President Macron had announced a reduction in wealth taxes.

Ireland

Year of adoption

Tax rate

Revenues (2019)



Emissions covered

Description: Ireland's carbon tax applies to all fossil fuels (coal, gas and oils). It covers CO2 emissions mostly from the non-traded sectors: emissions from transport, heat and process emissions by small industry and combustion for heat in the buildings sector (both residential and commercial). EU ETS operators are partially exempted from to tax, up to the minimum level allowed by the EU ETD. They receive exemptions on the tax when applied to coal, peat products, coke products and natural gas. Natural gas users are exempted from the tax if they can prove that they are using it to "generate electricity, for chemical reduction, or for electrolytic or metallurgical processes". Coal is also exempted when used for electricity generation. This is due to the fact that costs are already included under the Single Electricity Market (SEM). Installations with a specific "greenhouse gas emissions permit holders declaration" are granted reduced rates or full exemptions. Biomass (defined as any solid fuel product with a biomass content of 30% or more) is also fully relieved from the tax, and agriculture is largely exempted. Distributors and importers of the fossil fuels covered are liable for payment of the tax.

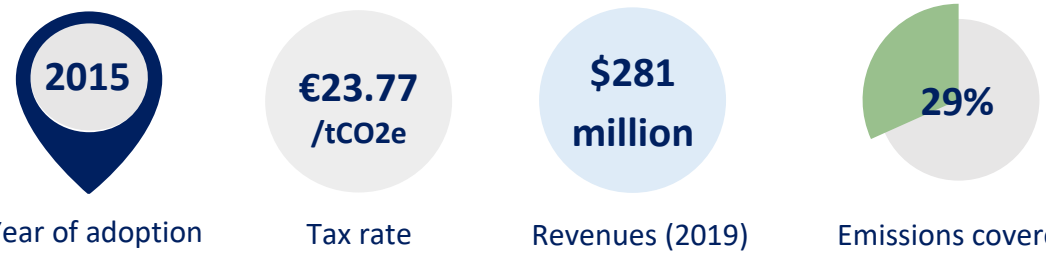
Revenues and their use: Revenues derived from the tax amounted to a total of US$481 million in 2019 and are value are US$580 million for 2020. Originally, all revenues were transferred to the general budget and, while the tax was meant to be revenue-neutral, it was largely used to ease off the large public deficit of the country after the 2008 financial crisis. There was no explicit legislative link between carbon tax revenues and specific spending programs, but parts of the revenues were reported to be used for green subsidies (investments that facilitate the low-carbon transition) and revenue recycling (redistribution to protect vulnerable energy consumers). With the tax rate increases, the government has committed to ringfencing the additional revenues resulting from the rise. They are used to finance the "National Fuel Allowance Scheme" which consists of weekly cash payments to low and fixed-income households in the colder portion of the year, but also energy efficiency measures for buildings and low-income households most vulnerable to fuel poverty through the recently formed "National Energy Retrofit Program". **Of the €90 million revenues raised by the €6/tCO2e rate increase in 2020, 38% are to be allocated to Protecting the Vulnerable programs, 34% are to fund Just Transition programs, and 28% will be used for investments in the Low Carbon Transition.**

Development: After the 2008 crisis, Ireland negotiated with the Commission, the European Central Bank and the IMF a Recovery Plan which would provide the country with financial support on the basis that new taxation instruments were implemented. **The carbon tax was developed in this context to reduced Ireland's public debt and as an alternative to overburdened employment-related taxes**. **It contributed to an overall 25% of the total tax raises required in this Recovery Plan**. The carbon tax was first implemented in 2009 on a phased basis. When introduced, it only applied to transport fuels (petrol and diesel) at a rate of €15/tCO2e. It was extended to include non-transport fuels (kerosene, marked gas oil, LPD and natural

gas) via the Natural Gas Carbon Tax in 2010, and extended again to include solid fuels (coal and peat) with the Solid Fuel Carbon Tax in 2013. The tax applied to CO2 emissions from most sectors not covered by the EU ETS, including transport, heat for residential sectors, commercial buildings and small industry. In 2012, the carbon tax rate was increased to €20/tCO2e. The Irish government has formulated a Climate Action Plan which sets out a **€100/tCO2e rate objective for 2030 to meet climate targets**. **Yearly linear carbon tax increases of €7.50 until 2029 are expected to be enshrined in law with a view to achieve this target**. As such, the carbon rate was extended to €26/tCO2e, effective for transport fuels in October 2019, and for other fuels in May 2020. It was announced in the Budget 2021 that the carbon tax on fuels will increase by €7.50 to reach a rate of €33.50/tCO2e for auto fuels in October 2020, and solid fuels in May 2021. These rate increases subsequently offer a wider revenue base. The government is committing to earmarking revenues raised from tax increases to green subsidies (investments that facilitate the low-carbon transition) and revenue recycling (redistribution to protect vulnerable energy consumers).

Competitiveness concerns: There has been rural backlash in reaction to latest carbon tax hikes from farm organizations and rural TDs. As farmers do not have a viable alternative to fossil-fuelled tractors, machinery or agri-diesel, it is argued that the tax rise is unfair to farmers that cannot achieve behavioural change and merely suffer the burden of increased rates

Portugal

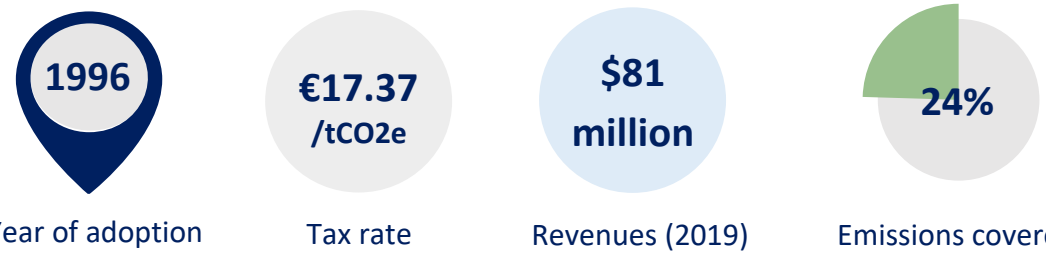


Description: Portugal implemented its carbon tax in 2015 as **part of a wider package of Green Fiscal Reform**. It is an excise tax which falls under the country's specialized taxes on consumption. The tax covers all fossil fuels and applies to CO2 emissions mainly from the industry, buildings and transport sectors[ii]. EU ETS operators are exempt from the tax and partial exemptions also apply for certain industrial processes (notably non-combustion fuel usage), modes of transport and more vulnerable consumers. The tax rate is determined annually based on the average EU ETS allowance price of the preceding year and was of 23.77€ in 2020. Distributors and importers of the fossil fuels covered are liable for payment of the tax[iii].

Revenues and their use: Portugal raised a total of US$281 million in revenues in 2019 and is expected to raise up to US$520 million in 2020[iv]. Portugal politically commits to use revenues for tax policy measures, with earmarking for tax cuts to help relieve large families from paying personal income taxes. Additional and partial use of revenues includes green spending, notably for electric and public transport programs and for conservation and climate mitigation programs[v].

Exemptions: The country has begun to reassess some of its tax exemptions in an effort to realign its fiscal policy with its climate objectives. **EU-ETS operators for coal-fired electricity generation and co-generation who were previously fully exempted from the tax now face an extra fee on top of EU ETS prices: this fee is equivalent to 50% of the difference between the carbon tax rate and a target carbon price of €25/tCO2e**. **Non-ETS emitters were fully exempted for fuel oil and natural gas used for electricity generation. They are now taxed at 25% and 10% of the carbon tax rate, respectively. The government plans other tax exemption phase outs[vi].**

Slovenia



Description: Slovenia implemented its carbon tax in 1996 along with other environmental taxes aiming to limit pollution. The tax covers liquid and solid fossil fuels, as well as natural gas. It applies to greenhouse gas emissions mainly from the buildings and transport sectors as there are exemptions for other sectors. EU ETS facilities deemed exposed to carbon leakage are exempted from the tax, i.e. almost all EU ETS operators. Other exemptions apply for certain (energy-intensive) industries, export of the fuels covered, aviation and power production. Small emitters excluded from the EU ETS can choose to meet their payment obligation with EU emission allowances or to meet up to 11% of their compliance obligations with international credits and in line with EU ETS qualitative restrictions (Certified Emission Reductions or Emission Reduction Units). Distributors and importers of the fossil fuels covered are liable for payment of the tax[vii].

Revenues and their use: Revenues from the tax amounted to US$81 million in 2019 and are valued at the same amount for 2020[viii]. It is reported that some revenues were direct towards green subsidies for industry (carbon-reduction projects and energy efficiency) in the years 2004 to 2008. However, most revenues go to the general budget with no indication of earmarking to specific purposes[ix].

Exemptions: When Slovenia introduced its carbon tax, the original rate of $6.26/tCO2e tripled in the following year. As a result, the country revisited the tax structure to include users and fuel-specific exemptions and discounts. **The breadth of these exemptions makes it questionable whether the tax should instead be considered a fuel excise tax rather than a carbon tax[x]**

Spain

Year of adoption | Tax rate | Revenues (2019) | Emissions covered

Description (scope, point of regulation): Spain's carbon tax was adopted in 2014 as part of a set of regulations that included environmental taxes, fiscal and financial measures. **It only applies to fluorinated greenhouse gas emissions:** hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, and preparations containing these substances, including regenerated and recycled gases and excluding those substances in Regulation (EC No 1005/2009) of the European Parliament and the Council (Sept 2009) on substances that depleted the ozone layer. In practice, those acquiring F-gases for use in production processes pay the tax to the suppliers who themselves collect revenues and return them annually to the Ministry of Finance. As such, the tax is levied on distributors of refrigerants and big installers, with the costs finally paid by small installers and final consumers. There are exemptions for exports of F-gases, F-gases with a global warming potential equal to or below 150, and first installation of F-gases in new equipment or installations. To encourage recovery and waste management, there is also partial reimbursement of the tax at end of life if disposed of or recycled in accordance with waste legislation. Further exemptions granting reduced or zero tax rates apply for specific uses: medical applications, fire extinguishing and fighting equipment, insulation foam and chemical transformations where its composition is altered[xi].

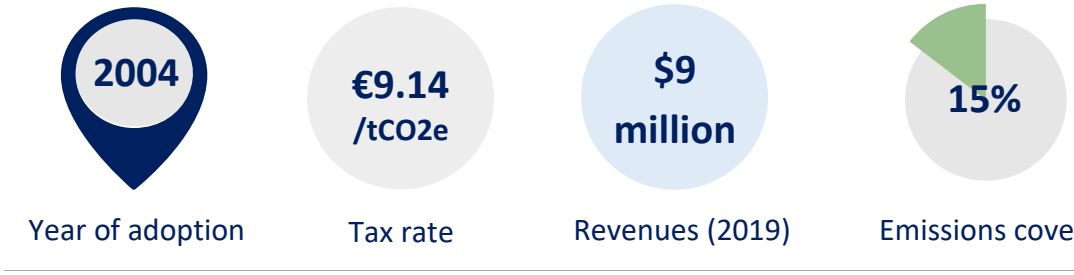
Development: **The idea of implementing a carbon tax in Spain was originally supported by regional governments but rejected by the central government.** In an energy-intensive country with high inflation rates, there were fears that an increase on energy taxation would have too adverse of an effect on inflation. The adoption of an EU Regulation on hydrofluorocarbons and country recommendations on environmental taxation made by the EU led to a more supportive political environment. Spain had a limited number of economic and fiscal tools for climate in comparison to other member states and environmental taxes were falling steadily since 2007 in the country. **As part of its country-specific recommendations under the European Semester, the EU suggested Spain to develop new environmental tax schemes. EU backing raised support for the measure until its implementation in 2014**. The design and implementation of the tax largely followed a top-down process, as main impacted economic agents (i.e. producers, distributors, installers) were not consulted. Although it was not supported by the industrial sector, the carbon tax was designed in ways that suggest industry inputs were taken into consideration. The government opted for a transitory regime of three years, which evolved from a 77% reduced rate in 2014, to a 44% reduced rate in 2015, and the full rate applied from 2016 onwards.

Revenues and their use: Revenues from the tax amounted to US$120 million in 2019 and are valued at the same amount for 2020. They go to the general budget and do not finance any specific endeavour.

Effectiveness: Spain has known a downward trend in emissions of fluorinated greenhouse gases since 1990. As the carbon tax was implemented in 2014, it is difficult to attribute this development to it alone, but the

tax is assumed to have consolidated the trend. Overall, there are reports of alternative technologies being promoted in new installations, H-GWP installations being retrofitted and leakages seeing reductions.

Latvia



Description: Latvia's carbon tax covers CO2 emissions in combustion installations that fall below the threshold for inclusion in the EU ETS. It therefore covers fossil fuels from industry and power sectors not covered under the EU ETS, apart from those using renewable energy or peat. Distributors and importers of the fossil fuels covered are liable for payment of the tax.

Revenues and their use: US$9 million were raised from the tax in 2019, and total revenues for 2020 are valued at US$18 million. While 40% of revenues were originally allocated to the municipality where it was generated, now 100% of revenues are credited to the state general budget.

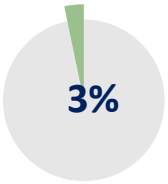
Development: In 2019, Latvia introduced a series of reform to its Natural Resources Tax Law. The tax rate was increased in an effort by the government to align it to its reduction targets and to the EU ETS rate. The rates are projected to increase to €12/tCO2e in 2021 and €15/tCO2e in 2022.

Estonia

Year of adoption

Tax rate

Revenues (2019)



Emissions covered

Description: Estonia's carbon tax was implemented in 2005 as the Ministry of Environment and the Ministry of Finance initiated ecological tax reforms. The tax covers all fossil fuels and applies to CO2 emissions from industry and power sectors generating thermal energy. EU ETS operators are fully exempted from the tax. Users of the fossil fuels covered are liable for payment of the tax.

Revenues and their use: The tax raised a total of US$3 million in 2019 and is expected to raise the same amount in 2020. Revenues are directed to the general budget with no reports of specific earmarking.

Effectiveness: Although Estonia has pollution charges in place, the rates have been too low to give firms or households compelling signals to alter behaviours.

Poland

Year of adoption | Tax rate | Revenues (2019) | Emissions covered

Description: Poland's carbon tax was implemented in 1990 as part of the Environmental Protection Act which taxes different kinds of environmental emissions including CO2, dust, sewage and waste. The tax covers all fossil fuels and other fuels leading to greenhouse gas emissions. It applies to CO2 emissions from all major stationary sources from all sectors, with some exemptions for certain entities. Fluorinated carbons face a special emission fee for "using the environment". Operators covered by the EU ETS are exempted from the tax, and entities whose annual tax amount due under the Environmental Protection Act is less than 800 zloty are also exempted[xii]. Users of the fossil fuels covered are liable for payment.

Revenues and their use: Poland's carbon tax rate is the lowest worldwide. It raised a total US$1 million in 2019 and the same amount is to be expected for 2020. All revenues from the tax flow to the Polish State Fund for Environmental Protection and Water Management, and those resulting from the special emission fee for F-gases are used for managing F-gases.

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