

Chapter 8: From Design to Administration: Practical Application of a Carbon Tax

1. Introduction

402. A functional administration is required to ensure that the carbon tax legislation is effective and serves as an operational instrument to reach a country's intended goals. The administration of the tax refers to the role of different agencies and how to make the system operate smoothly.¹⁶⁶ These administrative provisions may involve several institutional levels depending on the jurisdiction, and they are likely to be decided on during various steps in the implementation process. In this chapter, we will discuss some of the issues raised by the administration of the tax and especially focus on those aspects where the administration of a carbon tax may significantly differ from the application of other kinds of taxes.

2. General issues in tax administration

403. The principal role of the administration of a carbon tax, as well as any other tax, is to guarantee that the revenue is collected in line with the provisions laid down by the legislation. A carbon tax raises revenue, but also contributes to achieving climate objectives by pricing carbon emissions. The task of the administration is usually given to tax authorities; however, there are specific challenges and expectations when administering a carbon tax compared to other kinds of taxes.

404. The administration of a carbon tax is mainly affected by the design choice of whether to tax direct emissions or fuels (see Chapters 4 and 6 for a discussion). The differences between these approaches will be highlighted in this chapter as they relate to administrative issues.¹⁶⁷

405. The major elements of how to administer a carbon tax should be laid down by the legislation. Most jurisdictions use an act (law or statute) passed by a national parliament or similar body. However, the decision-making levels that regulate the details of administration may vary across jurisdictions. Once the legislation establishing the tax has been enacted, secondary legal acts, sectoral regulations, newsletters, or other administrative provisions are often used to facilitate day-to-day management. When setting these rules, attention should be paid to generating the necessary information for enabling their continuous improvement.

406. To overcome challenges in the administration of the tax, it is important to think about how to use existing institutions and tools to ensure low administrative costs and generate possible co-benefits. The priorities in the administrative cycle

can be reviewed to recalibrate or improve them considering the problems found and the responses given during the implementation phase.

407. In sum, the effectiveness of the tax in terms of its environmental objectives will depend both on the design and its administrative implementation. Furthermore, if adequate data is collected in the process, its effectiveness can be assessed by ex-post analyses and later perfected.

3. General issues in carbon tax administration

3.1 Institutions and their responsibilities

408. At an early stage in the design process, policymakers should decide on the public agency responsible for administering the carbon tax and subsequently allocating the necessary funds to cover the administrative costs (e.g., sufficient human resources and adequate technologies). This choice will often depend on the way the tax is designed and how tax administration in general is organised in the jurisdiction. The tax authorities administering the carbon tax may seek the involvement of relevant stakeholders, such as tax accountant's association, to ensure that administrative provisions are clear and well-functioning, both during the administrative design process and once the tax is in place.

Administration agencies/ administrative authorities

409. A carbon tax based on the Fuel Approach can be implemented through the existing fuel tax administration structure. This approach is relatively simple and there are a few new administrative issues. The main difference lies in the way the tax rate is calculated before it is included in the tax legislation. Since each fuel has a different carbon content, to estimate emissions correctly, the legislator must ensure that the relevant emission factors are used when establishing the tax rate in the tax law for each fuel.¹⁶⁸ This will likely involve cooperation with other relevant government agencies or public authorities.

410. Although the organisation of tax administration agencies may vary across jurisdictions (tax authorities may be independent bodies or part of the Ministry of Finance), the most common strategy for a carbon tax, under the Fuel Approach, is to assign the administration to the tax authorities. Another common approach is for taxes to be administered by the Customs Offices. This choice may be of particular interest if a country's fuel mix consists principally of imported fuels.

411. If the authorities adopt the Direct Emissions Approach, the best choice for an

¹⁶⁸ See description in Chapter 5.

administrative body to handle tax collection is still likely to be the tax authority.¹⁶⁹ However, it will probably need to rely on emissions data from the facilities. This data can be submitted by taxpayers as part of their declarations or be collected and communicated to the tax authority from an environmental authority. The tax authority normally does not have the expertise to monitor or assess this data. It will, therefore, require some form of verification and control performed by a government or independent technical agency.

412. In many cases, the environmental authorities are already in charge of gathering relevant data and have developed reporting and monitoring systems. The existing infrastructure can be used for collecting emissions data. In Chile, for example, the environmental agency used the Pollution Release and Transfer Registry (PRTR) system to register facilities and monitor emissions related data.¹⁷⁰

413. As with the tax authority, the technical agency required to assess emissions data may be independent or part of another government office (such as the Ministry of the Environment). On the one hand, this agency must ensure that the measurement of the emissions level is accurate, secure, and verified. Trust is vital since, under this system, emissions are tax liable. Using information initially collected for environmental reporting in accordance with the Intergovernmental Panel on Climate Change (IPCC) regulations could also result in strengthening capacity to fulfil these international obligations.

414. Therefore, devising a sound administrative strategy may require cooperation across different agencies of the national and sub-national levels of the government. This includes gathering the necessary information to effectively administer the tax. A basic aspect to consider, regardless of the design approach chosen, is to what extent existing organisational structures can be used, as this can keep administration costs low.

169 The administrative issues may differ from the drafting. Depending on national conditions, a jurisdiction may leave the Ministry of Finance in charge of drafting the carbon tax law and its officials would thus need to seek environmental technical assistance. Alternatively, a jurisdiction can ask the Ministry of the Environment to take the lead in the drafting, as the environmental knowledge is fundamental for the design of the carbon tax, and its officials should seek technical assistance in tax matters.

170 Pizarro and Pinto, 2020.

Box 23. Agencies responsible for administering the carbon tax in Singapore, the Netherlands and Australia

In Singapore, the carbon tax is collected by the National Environment Agency (NEA), not the Inland Revenue Authority of Singapore, and is paid into Singapore's Consolidated Fund. Under the Carbon Pricing Act 2018, registered persons with operational control of taxable facilities in Singapore would need to purchase fixed-price carbon credits and surrender them at the end of each reporting period in payment of their assessed carbon tax.

The carbon tax is levied on the direct emissions of six types of greenhouse gases. The Carbon Pricing Act 2018 also imposes annual reporting obligations for them (under the United Nations Framework Convention on Climate Change, Singapore must report these data in its greenhouse gas inventory). This Act distinguishes between facilities that are required to report and those that are liable for the tax, depending on their emissions levels. Different measurement, reporting and verification requirements apply to the different facilities. Verification of emission reports is carried out by NEA-accredited independent third parties.¹⁷¹

As shown in this example, different jurisdictions may allocate different tasks related to the administration of a carbon tax to different authorities. In this sense, any authority could be appointed to collect the tax (e.g., the standard tax authorities or other specific agencies not attached to the Ministry of Finance). In such a situation, the environmental agency might be also broadly considered as the tax authority, because it in fact administers the tax.

The Dutch Government provides another example. Effective in 2021, the Netherlands introduced a new national carbon tax, applied to emitters already covered by the European Union Emissions Trading System (EU ETS) plus industrial production and waste incineration. This tax was introduced alongside the existing EU ETS and is administered by the Dutch Emissions Authority (NEa), and not the Tax and Customs Administration.

When considering the tax design of the carbon tax in Australia (which was later revoked), collection through other parties in the value chain was also discussed.

Administration in a regional context

415. Effective carbon tax administration must also consider both the subnational and supranational levels.¹⁷² Carbon taxes applied where fiscal federalism exists may generate additional challenges, as in the case of Spain and Canada where carbon taxes are applied at subnational levels. Another type of administrative restrictions may occur within the framework of supranational associations or cooperation, for instance, the framework of taxation of energy products in the European Union (EU).

416. In subnational jurisdictions, policymakers may need to pay attention to specific conditions and restrictions. For example, several Autonomous Communities in Spain have implemented taxes on emissions, adopting different administrative requirements, such as payment periods and amounts. This may complicate compliance for companies that operate facilities in different regions within the same

171 See <https://sso.agc.gov.sg/>

172 The regional context (different provinces or other sub-national levels within one country, or even neighbouring countries) may influence decisions on the level of the carbon tax rate or measures to alleviate undesired distributional or competitive effects. These aspects have been dealt with in Chapter 5.

country.¹⁷³ Implementing carbon taxes with different designs and administrations in the same country may cause inefficiencies and a considerable administrative burden for taxpayers. Administrative channels should be developed to ensure fluent communication between tax authorities of different levels of government (both vertically and horizontally) and avoid problems in implementation.

417. At the international level, a regional association of countries may agree on legally binding rules to establish a common framework to administer certain taxes. This may generate considerable restrictions for carbon tax administration. One example is EU Member States. Proposals for a mandatory carbon tax in the EU have been discussed, but not yet implemented.¹⁷⁴ Nevertheless, some EU countries have moved ahead with national carbon taxes but are restricted by the Energy Taxation Directive framework.¹⁷⁵ See Box 24 for more details.

418. When regulating administration issues in a regional context (within or outside the national State borders), legislative coordination to enact a carbon tax among jurisdictions is desirable, as it facilitates coherent implementation. If a tax is levied on fuels, a cooperative administrative system needs to be established to avoid risks, such as double taxation, for example, one jurisdiction taxing production and another consumption of the same fuel.

419. Cooperation between tax administrations is needed to check the actual application of the tax and avoid fraud. This situation can arise within and across jurisdictions. However, when the taxpayer is the owner or operator of a liable stationary facility, it seems unlikely that specific regulations are needed in neighbouring jurisdictions to avoid this problem.

420. Specific administrative design challenges may emerge when attempting to ensure a stream of revenues for local governments or to facilitate public acceptance by committing revenue use for local projects. Such discussions are currently emerging in African countries. This issue may arise in countries like Indonesia where, although a carbon tax has yet to be introduced, local districts and provincial governments are playing a greater role in administering their territorial areas.

173 Galicia, Andalucía, Aragón, Castilla-La Mancha, Comunidad Valenciana and Cataluña. The Committee of Experts for the Regional Finance proposed the establishment of a permanent normative Commission where previous communication may take place between tax administrations in cases of new projects regarding environmental taxes to be introduced in the system (Adame Martínez, 2019). In the future, by reaching an agreement, a State framework Law could harmonize the core elements including the tax base and leave the Autonomous Communities the choice of the tax rate and tax reductions. The report presented in 2017 by this Committee can be found here (see proposal in p.59) https://www.hacienda.gob.es/CDI/sist%20financiacion%20y%20deuda/informacioncaa/informe_final_comision_reforma_sfa.pdf For Andalusia's Act 18/2003, 29 of December. Aragon's Act 13/2005, 30 of December (Legislative Decree 1/2007, 18 September). Castile's Act 16/2005, 29 of December, Catalonia's Act 12/2014, 10 of October. See Secretaría General de Financiación Autonómica y Local Subdirección General de Relaciones Tributarias con las Comunidades Autónomas

174 See https://ec.europa.eu/taxation_customs/business/excise-duties-alcohol-tobacco-energy/excise-duties-energy/excise-duties-energy-tax-proposal_en.

175 Council Directive 2003/96/EC.

Box 24. The Energy Taxation Directive framework (Council Directive 2003/96/EC)

The Energy Taxation Directive framework (Council Directive 2003/96/EC) does not refer specifically to carbon taxes; however, it covers indirect taxes, except value added tax, calculated directly or indirectly on the quantity of energy fuel products.

The EU law lays down provisions for the administration of those indirect taxes and allows production, storage, and movements of energy products under a tax suspension regime between tax warehouses within the EU.¹⁷⁶

Energy products subject to excise duties can be produced and stored without requiring the tax payment (suspension regime) in authorised tax warehouses. The tax warehouses and warehouse keepers are authorised by national authorities according to conditions meant to prevent any possible tax evasion or tax abuse.

Once these goods are released for consumption, i.e., removed from the tax suspension regime, the excise duties must be paid. An authorised warehouse keeper can move excise products – under tax suspension – from a tax warehouse (or the place of importation into the EU) to another tax warehouse without occurring the liability of paying excise duty.

All movements of excise goods under tax suspension between Member States are entered into a computerised system (Excise Movement Control System) and must be accompanied by a reference to the relevant entry into the system to enable a proper tax control.¹⁷⁷ Any national carbon tax applied in an EU Member State is thus subject to the constraints of these administrative procedures.¹⁷⁸

However, a regional approach could lead to an eventual scaling problem where the system was not well designed or implemented, because it would adversely affect a whole region, and not just one country. This could relate to the interaction between carbon tax and emission trading systems.¹⁷⁹ Greater attention should be paid to it.

3.2 Stakeholders and public engagement

421. Cooperation with the private sector may help to ensure the effectiveness of the carbon tax and its administrative efficiency. Incorporating stakeholders' views early on will help administrative design and public acceptance.

Administering consultations prior to enactment

422. Stakeholder involvement in the tax design process will vary across jurisdictions. Many tax administration systems have a formal organisational structure for consultations (e.g., by the tax revenue service or other Government bodies). In general, extensive consultation will inform a more efficient administrative design and help promote positive behavioural changes.

¹⁷⁶ Council Directive 2008/118/EC., concerning the general arrangements for excise duty and repealing Directive 92/12/EEC. A recast has been decided of Directive 2008/118/EC, see Council Directive (EU) 2020/262 of 19 December 2019 laying down the general arrangements for excise duty, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=uriserv:OJ.L_.2020.058.01.0004.01.ENG. The amendments will apply from 13 February 2023.

¹⁷⁷ For further information, see information on the EU Commission website https://ec.europa.eu/taxation_customs/business/excise-duties-alcohol-tobacco-energy/general-overview/common-provisions_en.

¹⁷⁸ This system has also been briefly mentioned in section 2.3 of Chapter 6, where a figure illustrating the taxable points within the tax suspension regime is included.

¹⁷⁹ The functioning of any other market-based instrument regarded when introducing the carbon tax should be monitored to adjust its administration accordingly. This could happen with an emissions trading system. For example, Friends of the Earth (Europe) pointed out in 2010 that failure of the EU ETS was leaving Europe in its failure to meet its share of the climate challenge. By 2010, twenty-one member states were seeking 2012 emission caps higher than 2005 emissions when the EU ETS was launched. It has also been pointed out that the EU ETS has been characterized by policy uncertainty. Sources: Friends of the Earth Europe, 2010; Andrei Marcu et al., 2018.

423. A consultation process prior to introducing a new tax, or major changes of an existing tax, will provide policymakers with relevant information to facilitate the administration, as well as support public acceptance. Such an approach is also in line with the principle of openness in providing public information prevailing in many jurisdictions. Public acceptability is important and essential for feasibility (see Chapter 3).

424. Given the nature of carbon taxation, public consultations should engage a broad group of stakeholders. These should range from potential agencies given the task of administering the tax, tax authorities, other relevant agencies, as well as business organizations, trade and consumer organisations representing their members who are likely to face the tax burden, and tax advisors or accountants. Environmental and technical experts may also be relevant. They should be consulted to provide information for both tax design and administration.

425. For example, in Sweden and France, the introduction of a carbon tax was the result of proposals from committees of inquiry that included various experts and business representatives. The tax proposals were sent out for public consultation, enabling more stakeholders to express their views.¹⁸⁰ In many jurisdictions, it is customary to make the draft proposals available for public consultation. Prior to the carbon tax introduction, the South African Ministry of Finance revised its proposal after a first round of consultations and sent it out for a second review by stakeholders. This process proved to be instrumental for social acceptance of the tax after several years of deliberation.

426. Public consultation may underscore the undesired distributional effects of taxes, which may make policymakers consider compensatory measures.¹⁸¹ However, they may also refer to more direct administrative issues, such as the length of declaration periods, how tax exemptions should be administered, how the tax collection should be designed to prevent tax fraud, and how to lower compliance costs, among other issues. This sort of communication helps support an efficient administration and increases legitimacy.

Information campaigns and post-enactment administration

427. Public consultations are important to support public acceptance and compliance when administering. This will help to support the administration of the

¹⁸⁰ Sometimes, a public consultation may not be particularly useful. In France, the proposal to implement carbon tax received strong public support in 2007 and a negative public reaction in 2009, and the Government shelved its plans to introduce a carbon emissions tax in 2010 (although another attempt was made in 2014). Butler, 2009. Rocamora, 2017.

¹⁸¹ See Chapter 7. To seek public acceptance, depending on national conditions, compensatory measures may take various forms. They are likely to be directed at consumers who would be affected by the distributional effects of the tax in a way that would not be politically desirable. The public acceptance of a carbon tax is an important matter for policymakers to consider and it is discussed in more detail in Chapter 3.

tax by reducing enforcement costs. Consultations can be combined with information campaigns, explaining the reasons for the adoption of a carbon tax, who will be affected, how the system will work, what the new reporting and filing obligations for taxpayers will be, and what outcomes are expected (e.g., environmental benefits and revenue use). These efforts aimed at transparency are needed to support any reform and later show accountability and good administrative performance, as well as avoid the risk of corruption.

428. A carbon tax aims to give households and firms incentives to change their behaviour. The effectiveness of a carbon tax is likely to increase if the objective of the tax is clearly presented and managed accordingly. Information campaigns, however, are normally not the task of the tax authority, but that of other public bodies. Nevertheless, the tax authority should be involved when developing online guides and leaflets to facilitate compliance by educating the affected parties.

429. Since the government may implement a carbon tax as part of a package with other measures, making it easier for households and firms to adopt green choices, the correlation between them should be clearly specified, as there are often linked administrative checks that may interact. Making affordable alternatives to fossil fuel use available may often be a key factor for an effective carbon tax. Such measures can include time-limited grants for households to invest in non-fossil heating or cooling equipment, more frequent local public transport options encouraging citizens to leave their car at home when commuting to work, and government aid to Research, Development, and Innovation (R&D+i) for environmentally friendly equipment.

3.3 Transition period considerations

430. Policymakers must allow a reasonable time period between the enactment of a new carbon tax and the date when the legislation will come into force. For example, Chile chose three years. The public authority in charge of the tax collection will need time to register taxpayers and establish relevant forms for filing returns or declarations; the taxpayers will need time to develop proper business routines in their book-keeping, internal systems, and procedures to ensure the declarations are accurately completed and payments of the tax amounts are made on time. Taxpayers may also need to consider the effects of the tax on the price of their products to pass the cost of the tax on to consumers.

431. Moreover, announcing the introduction of the tax well in advance helps the public acceptance of the tax and gives time for adjustments. A step-by-step approach could also ease the transition. Some jurisdictions have laid down a clear trajectory of the trend for the tax rate during a specific time, and it has been well

communicated.¹⁸² The tax rate may be adjusted to account for specific conditions in each sector while the carbon tax is implemented. Feedback from the operation of the administration is of paramount importance in this respect.

432. The adaptation of behaviours and procedures should occur both in the administration agencies and the private sector. An early announcement by the tax administration on how the carbon tax will be applied will also give businesses the incentive to kick-start measures that will reduce the use of carbon dioxide emissions, in line with the existing technologies and their associated costs. For example, Sweden's tax on the sulphur content in fuels was approved by Parliament in 1990 and came into effect in 1993. By then, fuel producers had already lowered the sulphur content below the taxable level in most of the volumes of fuels sold.

433. The length of this transition will depend on the national conditions, the complexity of the tax system introduced, and the way taxes are currently administered.¹⁸³ But even a relatively simple tax will need time to become fully operational. The official announcement of the planned implementation of a carbon tax may encourage authorities and taxpayers to start preparing for the tax, but the final administrative adjustments will not be made until the Tax Act is passed by the national Parliament or similar regional body.

434. Moreover, the time between the enactment of the carbon tax law and its actual implementation may also need to be longer if administrative issues are still left to be decided by lower jurisdiction levels. If the Fuel Approach is chosen, there should not be significant time constraints as the carbon tax declaration and payment can be linked to the already existing fuel taxation. However, in the case of the Direct Emissions Approach, the tax authorities will need time to coordinate with environmental authorities, although reporting may be linked with systems in place.

435. Furthermore, a longer period may be necessary if public consultations were not conducted before passing the national carbon tax law. Even with enough advanced notification in relation to the implementation of a new carbon tax, taxpayers may still face significant challenges related to their compliance capacity. Depending on the circumstances, it may be appropriate for the tax authority to have a defined transition period, under which taxpayers that "demonstrate best efforts" in complying with the new carbon tax are not given fines and penalties associated with non-compliance.

182 This was discussed in Chapter 5 regarding the tax rate and its possible annual increases by the budgetary law.

183 The choice between the Fuel or the Direct Emissions Approaches does not necessarily imply a longer transition period, as the direct measurement in the latter is not always required and estimation methods can be used. The decisions on the reporting level and the contents of the report may have an influence in timing.

3.4 Coordination with overlapping policy instruments

436. Overlapping policy instruments such as fuel taxes, energy contracts and Emission Trading Systems (ETS) are discussed in more detail in Chapter 10. These must be considered when dealing with the administration of a carbon tax. The most common concern with respect to overlapping economic instruments relates to fuel taxation and ETS. Fuels used in facilities or covered by an ETS could be totally or partially exempted from the carbon tax, and consequently provisions on how to administer the tax exemption must be laid down. See Box 25 for an example from the EU.

437. Some jurisdictions have addressed overlaps when granting fiscal benefits to the taxpayers regarding other, already existing taxes and schemes. For example, in South Africa, the 2019 budget recognised that emission reduction credits could be used to reduce a taxpayer's carbon tax liabilities. Consequently, the tax exemption for income generated from the sale of certified emission reduction credits was repealed. This was to prevent a situation where a taxpayer benefits from that exemption and has a reduced carbon tax liability.¹⁸⁴ In other cases, when introducing a carbon tax under the Fuel or the Direct Emissions Approaches, the possible connections between related taxes should be clarified.

Box 25. EU Emissions Trading System

The EU ETS set up the trade of emission allowances for large facilities in Europe and is also linked to systems in Iceland, Liechtenstein, Norway, and Switzerland.

The Member States that have introduced national carbon taxes on fuels have taken different approaches on how to deal with the overlapping regimes. Denmark, France, Ireland, Norway, Portugal, and Switzerland grant an exemption from their national carbon taxes to fuels used in installations covered by the EU ETS.

Sweden, on the other hand, has in recent years reintroduced parts of the carbon tax on fuels used in some of the Swedish installations that participate in the EU ETS. Coordination must exist between the tax administration and the registry of installations covered by the EU ETS.

Exactly how the coordination is handled varies across countries. For example, following requirements in the Swedish Act of Excise Duties on Energy, to be granted the tax reduction, it is sufficient to carry out activities according to the EU ETS in an installation under that scheme and use the fuel in such installation. It is not a task for the tax authority to check whether the EU ETS obligations are fulfilled. Such controls are part of the regulations governing the EU ETS.

4. Core features of the carbon tax

438. The core features of a carbon tax were discussed in Chapters 4, 5 and 6; a list can also be found below. These must be appraised in the tax law or in secondary regulations depending on the legal sources of each jurisdiction:

- Taxable event (occurrence of what chargeable events should make the tax due,

¹⁸⁴ KPMG, 2019.

e.g., extraction, sale or consumption of fuel volumes or actual emissions).

- Taxpayer (who should pay the tax to the public authorities?).¹⁸⁵
- Tax base and tax rate(s) (what is to be taxed and by which amount?).
- Public body to administer the tax or oversee its administration.
- Tax declaration period (timeframe to provide data or file the return).
- Information to be given in the tax declaration (concerning the taxpayer or other third parties).
- Administration of possible tax exemptions or other reductions (fiscal benefits) that the taxpayer may apply in the carbon tax declaration.
- Administration of reducing the facility's tax burden if other market features such as crediting, or emission offsetting schemes are applied. Such features reduce the facility's tax burden by reducing emissions in third party facilities. Typically, these schemes are based on some form of compensation or payment to both tax and/or non-tax liable entities and require some emissions' reduction verification system by the authority.¹⁸⁶
- Control mechanisms and tax enforcement regime (penalties in carbon taxation do not present any speciality and usually can be referred to the general applicable regime).

439. Some of these features need to be dealt with in the initial phase of the tax design, as they relate to the very essence of the tax and determine how well it will meet its declared objectives. This is the case with the taxpayer and the taxable event, the tax base and tax rate,¹⁸⁷ or the interactions with other instruments and management of various tax exemptions laid down in the primary legislative act.¹⁸⁸ However, there are many design elements relating to the details and these will inevitably be resolved at a later stage during the implementation phase. These elements are further discussed below.

440. Different jurisdictions have adopted different practical solutions when addressing these core elements. Chile and Sweden are taken into consideration here as examples because they have, respectively, chosen the Direct Emissions Approach and the Fuel Approach. Irrespective of the approach chosen, administrative issues are always key to the success of a carbon tax.

185 Additionally, some legislators may indicate other person liable as a warrant for the tax debt, and administrative procedures should be applied accordingly (jointly and severally, or in a subsidiary manner). E.g., if the designated taxpayer is who emits the taxed pollutant substance and does not pay the tax due, then the owner of the facilities or activities that are sources of emissions could be also declared liable (as a sort of personal guarantee) to be able to recover the carbon tax.

186 In the administration of the offset, for instance, when the mechanism may be triggered by the reinvestments in clean energy processes, they must be verified. If they were implemented badly, the tax base would be eroded, and no environmental benefit would be produced. This type of experiences can be found in Colombia and Costa Rica.

187 All of them have already been discussed in Chapters 4, 5 and 6.

188 More details on the possible interactions can be found in Chapter 10 (i.e., ETS, subsidies, etc.).

441. In the table below, a comparison is made of the main design features of the carbon taxes with implications on the administration in Sweden (the Fuel Approach) and in Chile (the Direct Emissions Approach).

Table 6. Comparison of approaches to administration of carbon taxes: Sweden and Chile

	Sweden – Fuel Approach	Chile – Direct Emissions Approach
Taxable event	When fuel leaves tax warehouse, operated by an authorised warehouse keeper (either consumed by the warehouse keeper in their own business or sold to someone who is not an authorised warehouse keeper)	The emissions at the facility level
Taxpayer	Authorised warehouse keepers* (fuel distributors or undertakings consuming large amounts of fuel)	Operator of facility with boiler and turbine with an energy potential of 50MW or more **
Tax base	Fossil fuels	Carbon emissions
Tax rate	In volume or weight units (litres, tons), calculated based on average CO2 emissions from each fuel type	US\$ 5 /CO2 tons
Public body in charge of administration	Tax authority	Tax authority and Ministry of the Environment
Declaration period	Monthly	Facilities are required to report their respective emissions quarterly to the environmental authority, but submit a tax declaration annually based on the reported emissions.
Information given in tax declaration	Amount of fuels (litres, tons) that left the tax warehouse during the declaration period or were consumed by the warehouse keeper themselves	Emissions, provided by the Environmental Authority. The emissions report to the environmental authority requires additional information to verify that it is accurate
Administration of tax exemptions (e.g. for a special activity, special sector)	Deductions in declaration, if relating to warehouse keeper's own consumption; reimbursement application to tax authority in other situations (fuels are bought taxed)	No exemptions; however, power energy facilities which are regulated under formal contracts in the electric energy system have rebates associated with their electric generation tariff law
Additional market mechanisms or other forms of crediting through offsetting mechanisms	None	None exist at present; however, a recent tax reform (Tax Law 21.210, February 2020) contemplates crediting through an offsetting mechanism by third party emitters. The Ministry of the Environment has yet to publish the secondary legislation to make this innovation operational. It is important to point out that these schemes require an additional administrative burden since the Technical Agency must verify emission reductions. Moreover, if non-tax liable entities are recognized, in practice, the tax base is broadened, and the average tax-rate reduced.
Control mechanisms	Check volumes declared by taxpayer (and related transactions) according to general tax auditing procedures.	Both the environmental agency and the tax authority can inspect emissions, but at present there is no independent verification system

* While normally the taxpayer is an authorized warehouse keeper, the system also, more rarely, allows for other operators to pay tax on a single consignment of fuels.

** As of February 2020, the tax Law 21.210 reformed the taxpayer based on an emissions threshold. However, the new system will be implemented once secondary legislation is adopted (probably in 2021-2022).

Checklist 10. General administration issues

1. Determine who will administer the tax – usually tax or custom agency
2. Consider sub-national and supranational coordination
3. Consider stakeholder consultation before enactment
4. Consider public and targeted information campaign
5. Consider transition periods for effective administration
6. Assess coordination with overlapping policy instruments

5. Considerations regarding detailed administrative regulations to manage the carbon tax

442. Once the basic carbon tax legislation is in place, in most cases, additional detailed administrative regulations are needed. The power to decide such regulations is often based on delegating provisions in the tax law (delegated acts) or may follow directly from the national Constitution.¹⁸⁹ Their nature will depend on the body that enacts them, and their effects will vary depending on whether they are published or not.

443. To provide the additional administrative clarity and certainty required by taxpayers, administrative regulations and guidelines, or information newsletters, should be prepared as close to the finalization of the underlying legislation as possible.

444. To ensure that the administration of a new carbon tax will work smoothly, taxpayers need accurate information on their responsibilities and ways to perform those tasks in detail. While there are variations across jurisdictions, usually tax authorities are responsible for publishing this information.

445. Information can be shared with taxpayers through direct contacts, which may be feasible if the taxpayers are a small number of companies or are already well defined, e.g., registered facilities to be covered by a Direct Emissions Tax. If the Fuel Approach is adopted, information can be shared with the same group of taxpayers that already are responsible for handling other excise duty, levied on the same fuels covered by a carbon tax. A common approach is to communicate general information via websites and other public communication tools, which may be complemented by individual company-by-company basis at later stages of tax collection and auditing.

446. Administrative agencies should be aware of the management effort demanded to administer any tax, both for the Administration Authority (whose efficiency is often mandated by constitutional law) and the taxpayers themselves. Thus, making proportionate requirements (limiting to what is strictly necessary

in terms of amount of data, frequency of filing, etc.) for the good administration of a carbon tax will lead to increased acceptability by the taxpayers, and it will also help the tax administration to render a better service. It is important to avoid unnecessary workload for taxpayers as well as for tax officials (by taking advantage of digitalisation, when possible, to avoid waste of time and resources).

447. Administrative regulations required include the following:

- Criteria for registering taxpayers and the associated timeframe for registration. (section 5.1)
- Various forms, such as tax returns (declarations) and book-keeping (section 5.2).
- Information that taxpayers need to include in each declaration (section 5.2)
- Tax exemptions and reimbursements (section 5.3)
- Period to file the tax return (section 5.4)
- Securing the payment of the tax due (section 5.5)
- Liability thresholds (section 5.6)
- Control mechanisms and emissions reporting (section 5.7)
- Compliance and enforcement mechanisms (section 5.8)

5.1 Registering taxpayers

448. The tax legislation should establish the criteria to determine which individuals and legal bodies are liable for the carbon tax. Further, it should give authority to a specific agency to identify and register the liable facilities or taxpayers. The agency responsible for registration may vary with the carbon tax approach. In the case of the Fuel Approach, this is usually done by the tax authority. In the case of the Emissions Approach, this will require support from the Ministry of the Environment, but it will probably depend on the role of different agencies in the specific jurisdiction implementing the carbon tax.

449. Depending on which entities are required to pay the tax, the authorities will implement a system to register them. Detailed regulations will include the specific steps or system necessary to ensure that liable facilities/entities register, as well as the sanctions for not registering or giving false or insufficient information. The information asked for will vary, depending on the type of design approach as well as specific requirements laid down by the relevant authority, but could include data on the types of fuels handled, facility, owner, or operator and the financial liability of the taxpayer to ensure the fulfilment of their tax obligations. In the case of the

Direct Emissions Approach, information on the technology and processes, to verify that the emissions data is consistent with the fuel consumption or load capacity, may also be necessary.

450. In some cases, once the entity has registered, the tax agency must decide whether the entity is liable. This may involve certain thresholds for total fuel-use, annual emissions or uses of certain technologies (see further below). However, this is only for enforcement purposes; facilities are ultimately responsible for determining whether they are subject to the tax, thus, as with other taxes, placing the burden of tax declaration on the liable entity/facility.

Box 26. Swedish tax warehouses

A key component of the Swedish carbon tax system is the authorisation of companies handling energy products as taxpayers. These are referred to as tax warehouse keepers. This system reduces the administrative burden by allowing the authorities to control a small number of liable taxpayers.

Out of 900,000 registered business companies in Sweden, only around 300 companies are registered taxpayers for the carbon tax, mainly fuel distributors selling taxed fuel to end-consumers.

The warehouse keepers are obliged to store fuels in specific premises, which need to be approved as storing facilities (tax warehouses) by the tax administration. The tax authorities decide if a company may be granted a warehouse keeper status, depending on several criteria, the principal of which is economic situation, and being able to put forward a sound and reliable business idea.

The possibility to register as taxpayers in Sweden has also been extended to large consumers, normally engaged in industrial activities. They can store fuels under the tax suspension regime and declare the tax once the actual consumption has occurred, thus avoiding negative liquidity effects.

Box 27. Definition of liable facilities in Chile

Under the Direct Emissions Approach, many jurisdictions establish emission thresholds, to determine from what emissions level a facility is liable to pay tax on its emissions. The problem with this approach is that it requires information of current emissions to determine liable facilities. Chile took a different approach. It established technological criterion to determine which facilities were liable, rather than a threshold of liable emissions.

In the Chilean example, liable facilities are defined as those that have boilers and turbines with 50 MW or above potential capacity. This identifies only large installations, which have the greatest expected emissions, as tax liable. The authorities requested information on the facility, owner and operator among others, but above all the technology and processes to verify that the emissions data is consistent with the fuel consumption or load capacity.

Once the liable facilities have been identified and are formally registered, they are liable for all their emissions regardless of the amount. The advantage of this approach is that the liable facilities can be clearly identified without recourse to emissions monitoring. Furthermore, the burden of the reporting is placed on the facilities that are liable. They are interested in developing the most accurate reporting system to reduce their tax burden. Finally, the tax can be operational immediately without waiting for a long period of establishing a reporting system.

Once the entity has registered, the Environmental Agency set up a reporting structure to ensure the monitoring of emissions (MRV system).

5.2 Tax returns (declaration) and book-keeping

451. Tax returns and book-keeping are essential for administrative issues. While both carbon tax approaches will need to determine how to handle this administrative aspect, the advantage of the Fuel Approach is that a carbon tax can often be handled

as an additional part of an already existent excise tax declaration. See Box 28 for an example from Sweden. In the Direct Emissions Approach, the tax return is associated with emissions reporting at the facility level. See below for a discussion for emission monitoring.

452. In the case of both approaches, book-keeping regulations are needed to enable efficient tax controls. However, in the case of the Direct Emissions Approach, tax returns and book-keeping are associated with emissions reporting. Once the methodology to calculate emissions is established (see below), the tax or environmental authorities must regulate how facilities report their emissions.

453. The emissions reporting process should be based on pre-established guidelines that fix the conditions and standards to be met. The tax-liable facility must therefore submit an emissions monitoring or estimation report, in accordance with those general guidelines stipulated by the relevant authority (what, when, where, how to report, etc.).

454. The authority must decide when to require this reporting (which may be every year, or other time periods). The moment will depend, in turn, on when the taxpayer is liable. Reporting can be carried out through various platforms (from paper reporting to digital reporting) and security is important, since emissions are causally related to the liable entities tax burden.

455. Furthermore, often independent verification is necessary. This requires setting up the institutional framework that includes third-party verification. These verification or certification agencies must be registered with the competent authorities and must follow the appropriate guidelines and protocols established by the Government. Once emissions are reported, the environmental or technical agencies in charge of overseeing the emissions verify and consolidate this information. Therefore, the tax authority places the responsibility for determining emissions on the liable entities, and their verification on the Environmental Agency.

Box 28. Swedish carbon tax return (declaration) periods

The Swedish carbon tax base covers the same fuel as the general excise duty on fuels (named as energy tax in Sweden). The two taxes are handled in the same tax declaration forms by the same taxpayers under basically the same administrative rules. This strategic option greatly facilitates the tax administration and makes administrative costs low. The administration costs for the Swedish Tax Agency amount to 0.1 percent of the total revenues from energy and carbon taxes.¹⁹⁰

The Swedish energy tax and carbon tax return (declaration) is filed once a month and the warehouse keeper supplies lump-sum information of the amount of fuels that left the tax suspension regime (by own consumption or deliveries to a company or individual who is not a taxpayer), for which tax has become chargeable during that month. The required data is typically found in the taxpayer's ordinary book-keeping, but the Swedish legislation also lays down specific requirements for stock records to be kept by the warehouse keeper. The Tax Agency issues regulations on how these requirements are to be followed in more detail. Taxpayers are further required to keep proper records of all individual transactions, enabling the Tax Agency to do more in-depth checks of the book-keeping at a later stage.

5.3 Tax exemptions and reimbursements

456. The carbon tax design may establish specific tax exemptions. For example, in the case of the Swedish tax, there are full or partial exemptions to non-fuel use of energy products, as well as in parts of the manufacturing, agricultural and railway sectors and the mining industry. There are different ways to administer these exemptions.

457. Examples of how to deal with tax exemptions include deductions in tax declarations if the fuels have been consumed for a tax-exempt purpose. This system ensures that the taxpayer will not face liquidity constraints, which would be the case if the tax was paid and later reimbursed. However, in most cases, if a company operating within a tax exempted sector is not an approved taxpayer, the company would need to pay the tax included in the price of the fuel, and later request for a tax reimbursement from the tax authority. In some specific cases where the risk of fraud is deemed to be minor, it is possible, however, for a taxpayer to deliver non-taxed fuels to a company not being an approved taxpayer.¹⁹¹ Such a delivery requires that the recipient holds a special approval by the tax authority.

458. In the case of the Swedish carbon tax, a gross declaration is required. This means that deductions are made for deliveries or own use for certain tax-exempted areas. As mentioned above, such deliveries need to be to a recipient who has received a special approval by the tax authority, to be able to receive the fuels without tax being charged. If the end-consumer buys the fuels fully taxed, they need to ask for a tax reimbursement at a later stage from the tax authority, upon showing that the fuels have been consumed for a tax-exempted area.

459. In the case of the Direct Emissions Approach, tax reimbursement or

190 Hammar and Åkerfeldt, 2011.

191 The fuels are in this situation delivered outside the tax suspension regime. The handling of fuels within a tax suspension has been further described in Chapter 6 as well as above in this chapter.

crediting may be associated with offsetting or compensation schemes. Colombia has introduced such an approach, where a tax-liable entity can be exempted if it can show reduced emissions elsewhere.

5.4 Period to file the tax return

460. The period to file the tax return refers to the regular dates for its presentation, and determination in case the activity starts later or finishes earlier. Also, it is necessary to identify possible payment plans (e.g., by instalments fractioning the amount to pay in each period) and acceptable payment methods. Deadlines may vary depending on the traditions in the jurisdiction (declarations may be required after a month, a quarter of a year, or even yearly). Other administrative aspects that the authority needs to define are specific book-keeping obligations, records that need to be maintained, and the length of time they need to be maintained by the taxpayer (commensurate with the statute of limitations) to make them available if a more in-depth audit takes place.¹⁹²

5.5 Securing the payment of the tax due

461. The tax administration system seeks a balance between flexibility and tax compliance. Some jurisdictions consider time periods for tax payments, but this may require guarantees. For example, in Sweden, the registered taxpayers (authorised warehouse keepers) are obliged to provide a guarantee, following mandatory EU regulations. This provides a secure and tested system for ensuring that tax obligations are met. The fuels must be stored in specially approved tax warehouses, and the warehouse keeper must leave security to cover potential losses in storage or transport between tax warehouses.

462. A financial guarantee (e.g., a bank guarantee to ensure proper tax collection) for movement of fuels as well as for 10 percent of the fuels stored on average for one year is required in Sweden. The purpose of the guarantee is to enable the tax authority to claim it in case of non-payment of a tax debt.

463. In the case of the Direct Emissions Approach, the tax is due usually at the end of the fiscal year, after emissions have been reported and certified. However, some systems establish crediting mechanism for complementary market mechanisms such as emission offsets.

192 Fiscal control is an essential part of any tax system. The way control mechanisms are administered differs between jurisdictions. However, it is more likely that the variation in control is linked to fiscal traditions in the jurisdictions, rather than to any special characteristic of a carbon tax. Also, some jurisdictions tend to rely on book-keeping checks to a large extent, while the fiscal control in other jurisdictions more generally includes checks of the premises where the tax liability occurs. The degree of digitalization of tax reporting also varies across jurisdictions. Many developing countries are adopting digital tax declarations systems, which can significantly facilitate the tax administration if extended to also cover a carbon tax. Labour resources can thus be concentrated on tax control in the forms of tax audits and spot-checks.

5.6 Liability thresholds

464. There is a need to strike a balance between the administrative burden and fairness, including by treating small and big operators in a similar way. In terms of administrative control, it would be preferable if the tax collection system could be designed in a way that limits the number of taxpayers.

465. Therefore, to reduce the administrative burden on the tax authority, many jurisdictions have adopted thresholds regarding procedural aspects either in the Direct Emissions Approach or the Fuel approach (e.g., for registration or reimbursement). These can limit the number of liable facilities that register as taxpayers. Eventually, it could be decided that only the tax paid above a certain amount would be reimbursed (even if the fuel is used in an exempted area).

466. Under the Direct Emissions Approach, many jurisdictions establish emission thresholds to determine from what emissions level a facility is liable to pay tax on its emissions. Typical thresholds are 10 or 25 thousand tons of CO₂ emissions a year. Another approach is to pay the tax regardless of the emission amount and limit the number of liable facilities; this was the approach taken by Chile.

5.7 Control mechanisms and emissions reporting

467. Control mechanisms are necessary to ensure accurate reporting and determining the tax burden. In the case of the Fuel Approach, it is necessary to control the use of fuels and, in the case of the Direct Emissions Approach, to monitor emissions. In the latter, emissions control systems are often referred to as Monitoring, Reporting and Verification (MRV) systems.

468. The MRV system is made up of at least four components: the registry of liable entities/taxpayers, which necessarily requires a broader survey of facilities that may be subject to the tax discussed above; the measurement or quantification (M) of emissions regulated under government guidelines; reporting (R), which stipulates guidelines for emissions reporting; and verification (V), covered under regulatory verification guidelines in the case of third party verification, or enforcement in the case of government verification.¹⁹³

469. In the case of the Fuel Approach, the tax authority does not require specific emissions data reported from a facility, since monitoring involves control of fuel volumes. The tax administration only needs to calculate and audit the taxpayer's amount of fuel used or sold. This is a task which tax authorities are normally familiar with, and generally involves regulations on book-keeping records. In the case of

193 Pizarro et al, 2017.

the Direct Emissions Approach, despite its name, the measurement of emissions at the facility level is not actually required, and emissions data can also be based on average carbon content from fuel volumes. What is essential, however, is facility level reporting.

470. That is, for the Direct Emissions Approach to work, an administration system must be set up to receive information from each tax-liable facility on their emissions. This will require a new agency or, at least, a new reporting system to ensure the capacity to receive and assess emissions data at the facility level.

471. Nevertheless, when possible, measurement is recommended. Facilities can monitor their emissions through various measurement strategies, monitoring emissions through end of pipe technology, such as Continuous Emissions Monitoring Systems (CEMS), or estimating emissions through emission factors and using energy inputs.

472. Thus, a MRV system will need to be developed at a facility level before implementing the carbon tax. The complexity and costs will depend on the infrastructure already in place in the jurisdiction following national or international emissions reporting obligations. More accurate reporting systems will be essential when a system used for international reporting is to be expanded to fill the needs of a well-functioning carbon tax administration.

473. The process of introducing a carbon tax will, in the case of the Direct Emissions Approach, necessarily entail expanding and strengthening administrative capacity, particularly of environmental agencies, establishing protocols for determining procedural responsibilities, creating more robust information systems, and improving inter-ministerial coordination. In this regard, the Chilean experience provides a clear example that an emissions-based taxation strategy can be implemented in way that is coherent, administratively feasible, and at a low cost.¹⁹⁴

474. A jurisdiction choosing a Direct Emissions Approach will still, in most cases, leave the administration of the carbon tax to the tax authority in charge of administering other kinds of taxes in its territory. However, the environmental agency will oversee the actual monitoring and verification of emissions from the facility, and report this information to the tax authority. This establishes a different institutional relationship between agencies. It requires agencies such as the tax authority, Ministry of Finance and Ministry of the Environment, among others, to establish a permanent dialogue.¹⁹⁵

194 Pizarro and Pinto 2020.

195 It is most likely to be the general tax authority that administers the tax, but nothing would prevent a jurisdiction from deciding that the environmental agency also oversee the tax collection. In such a situation, someone, as a matter of terminology, could call the environmental body a tax authority too.

475. Although this may be initially difficult and many conflicts may arise, particularly in the initial phase, ultimately it will benefit all institutions since there will be a better understanding of the objectives and of the carbon tax design. Furthermore, the different agencies will understand the restrictions and commitments of the other institutions involved.

476. The tax law can be designed so that the taxpayer pays the tax based on the amount of emissions given by a certificate of emissions, issued by a competent supervising environmental authority. This would mean that the tax authority does not need to enter an area where their officials have no technical competence. The policymaker could also choose to focus all the administration relating to the liable facilities to the environmental body, making it in charge of administering the tax as well as all the MRV. And, quite obviously, there are a variety of alternatives on how to distribute the responsibilities to different agencies in a way that the policymaker decides is most appropriate in the relevant jurisdiction; however they are structured, it is important to ensure clear channels for information flows. Even as their roles are being set out, there is need to ensure that the mandates of all the agencies are clearly defined to avoid a situation where there are overlapping functions, as these could give rise to confusion and conflicts.

Box 29. MRV system in Chile

In the case of the Direct Emissions Approach, liable facilities must implement the emissions quantification methodologies determined by the protocols of the regulating agencies. These may be difficult, and capacity building may be necessary. In general, there are three types of measurement approaches that may vary in different sectors or technologies.

(a) *Sampling and measurement*: This comprises the direct quantification of emissions concentrations, using measurement equipment installed at the facility. Both sampling and continuous measurement are among quantification options, including CEMS. CEMS provides hour-by-hour emissions averages over the course of the tax period (e.g., a year).

(b) *Discrete sampling*: Monitoring equipment is used to take a sample, which is then analysed in a laboratory or on site. This method is used to determine output concentration and representative flow rate at the time the measurement is taken.

(c) *Estimation*: This method comprises the indirect quantification of emissions using emission-factors (for the specific production process in question) and annual activity records (such as operating hours and fuel consumption).

In Chile, once liable entities/taxpayers are registered, each facility is required to report emissions. The authority established different reporting and measurement protocols for the liable entities, depending on the sector, capacity, and type of technology. Large energy installations were required to use CEMS. These monitoring devices can capture CO₂ data and they can report through the same system. However, these systems are expensive and, if not adequately managed, may be imprecise. Other facilities may prefer to report fuel data and estimate emissions through emission factors. In any of these ways, facilities are making a legally binding declaration of their emissions, which has a direct impact on their tax liability. For example, in the case of Chile, eleven methodologies for emissions quantification were initially proposed to the facilities to choose how to report their emissions.

5.8 Compliance and enforcement mechanisms

477. In the Fuel Approach and the Direct Emissions Approach, enforcement is dependent on the role of the different authorities. For all kinds of taxes, including the carbon tax, authorities rely on checking relevant book-keeping rather than extended physical checks of the taxpayer's premises. This has enabled low administrative costs for both the tax authority and the taxpayers, while maintaining fiscal control.

478. To avoid fraud, some penalties may reinforce the sanctioning of violations under the different approaches. In the Fuel Approach, the volumes are subject to controls. Here, anti-fraud and control measures might also need the legislation to allow for checks with other entities than taxpayers (such as the companies who have bought goods including tax from a taxpayer). This is not different from other kinds of taxes such as value-added tax (VAT), with which controls could be coordinated.

479. In the case of the Fuel Approach, taxpayers provide lump sum data in their monthly declarations, and individual transactions need to be recorded in the taxpayer's books to be available if in-depth auditing is eventually performed. In Sweden, the tax authority performs basic computer-based control of the tax declarations, and further audits are handled on a risk analysis-based selection.

480. Basic audits include, for example, comprehensive checks of tax declaration data and annual financial reports. In-depth audits may include visits to the taxpayer's premises and checks of book-keeping, including individual transaction checks with customers, and checks of anti-fraud systems at warehouses. Often such in-depth audits include checking other taxes, such as corporate tax and VAT. For example, computer support is used as much as possible in the Swedish fiscal controls.

481. In the case of the Direct Emissions Approach, enforcement is more difficult because emissions must be monitored and certified. However, some jurisdictions have facilitated this process through independent verification. This may also be important in developing future carbon markets.

482. Facility level reporting may require a more detailed enforcement or verification system, and this requires setting up the institutional framework to both register liable facilities or installations and establish a periodic reporting system. This may be carried out by government agencies through usual enforcement and compliance practices, or by third-party verification.

483. These verification or certification agencies must be registered with the competent authorities and must follow the appropriate guidelines and protocols (established by the Government). Once emissions are reported, the environmental or technical agencies in charge of overseeing the emissions verify and consolidate this information. After verification or certification, they are sent to the tax authority.

Likewise, the tax authority places the responsibility for determining emissions on the liable entities, and their verification on the Environmental Agency.

Checklist 11. Core administration issues

1. Establish criteria for registering taxpayers and the associated timeframe for registration
2. Develop necessary forms, such as tax returns (declarations) and book-keeping rules
3. Determine the necessary information that taxpayers must provide
4. Determine criteria and requirements for tax exemptions and reimbursement
5. Establish periods to file the tax return
6. Determine administration and control to secure tax payment
7. Establish liability thresholds
8. Establish control mechanisms and emissions reporting guidelines
9. Determine compliance and enforcement mechanisms

6. Ex-post evaluation of a carbon tax

484. While the pure administrative design is a pre-condition to be able to implement a carbon tax, it is also advisable to identify the criteria to evaluate how well the carbon tax is performing, considering the need for further development and the opportunity to make necessary changes to improve its design. Ensuring an efficiently administrated and well-functioning carbon tax system is an ongoing process. If the carbon tax introduction has not been preceded by a comprehensive public consultation, the need for ex-post evaluations may be even more necessary to avoid criticism on the goals and risk of institutional mistrust by civil society.

485. For example, the Swedish carbon tax has been in force for 30 years and legal changes – minor or major – have been made nearly every year since its introduction. These changes have included measures such as changing the tax rate, areas covered, the full or partial exemptions and the administrative procedures (e.g., conditions for approval to act as a taxpayer or level of thresholds for tax reimbursements). Aspects such as guaranteeing that tax is properly collected with no major tax evasion, and making sure that the legislation is followed, are core elements to consider when doing ex-post evaluations of the effectiveness of a carbon tax. This ensures a well-functioning tax, ready to meet its revenue objectives and consequently the environmental goals. Similarly, after two years of implementation, Chile introduced important reforms to its tax, including improving the accuracy of definitions and other procedural aspects.

486. Jurisdictions will decide on different types of evaluation method (environmental, revenues, administrative effectiveness and simplicity, anti-fraud design, etc.) based on specific objectives and the legal traditions and constitutional

obligations. Certain permanent bodies may be assigned the task to evaluate a tax regularly, at predefined times or upon a special mandate from the Government.

487. A special commission for evaluation may also be appointed. In some jurisdictions, this may be a task for the tax authorities, while in others, it is considered vital that such evaluations are performed by external, independent bodies. For example, where they exist, a Court of Auditors may help with the control of efficiency of the administrative actions, when reviewing the tax incentives granted for environmental purposes. In Spain, the Court of Auditors has published periodical special reports on the control carried out by the tax administration, with respect to environmental deductions in the national corporate income tax.

488. The reasons for decisions in favour of changes in a carbon tax design and administration may depend on the feedback received from different stakeholders. Issues typically raised include the desire to increase the environmental impact of the tax, the lobbies arguing for special treatment for specific sectors, the necessary coordination with other measures to foster a transition to a low-carbon economy, as well as changes required by the tax authority.

489. A frequent dialogue with the relevant stakeholders may be beneficial to understand the needs and the improvements required in each sector. Ultimately, it can result in a modification of the administrative practices or rules to make them more suitable in accordance with business life.

490. Existing international mutual assistance frameworks for administrative cooperation (either at bilateral or multilateral level) could quite easily cover carbon taxes (just by expanding their scope). This would allow the State parties to these agreements to realise how these environmental regulations are applied in practice by other jurisdictions (by making use of the possibilities to exchange information relevant to determining the tax debts or collecting them).

491. Further, the discussions carried out to assess carbon taxes in different global fora (such as the United Nations (UN), the World Bank, or the International Monetary Fund (IMF)) in line with their joint efforts towards the achievement of the Sustainable Development Goals (SDGs), would be useful.

7. Conclusion

492. This chapter has discussed the administrative issues raised by a carbon tax, considering the specific issues raised by the different tax design approaches. Drawing heavily from the cases of Sweden and Chile, it explored some of the more relevant administrative decisions that authorities must make.

493. The chapter dealt with general administrative issues and specifically the

role of tax authorities. In this context, the relevance of clearly stating the role of the involved competent authorities has been underscored. Furthermore, special attention should be paid to inter-administrative cooperation relations (particularly in cases of fiscal federalism or regional groupings). It also discussed the importance of public consultations and information campaigns, and how they may be beneficial in improving administration and public acceptance.

494. The chapter also analysed, considering the different approaches, the detailed regulations of the core elements of good administration that promote compliance, such as how to ensure greater certainty in the measurement of the tax base, or how to deal with filing and reporting obligations.

495. Nevertheless, it is impossible to deal with all administrative issues effectively. Carbon tax design and implementation are dynamic and, therefore, we argued that administrative requirements should facilitate ex-post evaluation to ensure the necessary adjustments to both the design and administration of the tax.

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Chapter 9: Revenue Use

1. Introduction

496. Carbon taxes may raise significant revenues. Therefore, governments, particularly in developing countries with low tax-to-Gross Domestic Product (GDP) ratios¹⁹⁶, may want to consider carbon taxes as a source for domestic resource mobilization in addition to their role as an environmental policy instrument.

497. Broadly, revenue use co-determines carbon taxes' net economic benefits (beyond the direct environmental benefit); it can affect distributional impacts, as well as strengthen support for their introduction or increase. This chapter explores revenue use in the context of the political economy of carbon tax design and implementation. Section 2 identifies possible revenue uses. Section 3 discusses how to establish revenue commitments, and Section 4 how to communicate those choices. Finally, the appendix presents information on estimates of potential revenues of carbon taxes and similar instruments.

2. Options for revenue use

2.1 Compensation for vulnerable industries

498. Carbon taxes increase costs, particularly in energy-intensive industries; this can trigger carbon leakage (production moving to places with lower carbon costs) and reduce the ability of firms to compete internationally. These effects may need to be dampened, which can be done by using part of the revenues to compensate trade-exposed industries after the introduction of the tax.

499. Two mechanisms can be used to address competitiveness concerns. First, revenue-recycling measures. This implies direct financial transfers to companies based on output, or financial support for efficiency improvements. Second, measures that reduce tax rates and/or targeted tax exemptions; however, they may result in the loss of revenues and reduced environmental effectiveness.

500. So as not to compromise the environmental objective of the carbon tax, two design principles should be considered. First, compensations should only benefit companies (or facilities) that are highly exposed to international trade and face significant cost increases because of the carbon tax. Second, compensations should be designed in a way that maintains the incentive to reduce carbon emissions.

501. To satisfy the second principle, having companies pay the full tax rate and

196 World Bank data, Tax Revenue (% GDP) <https://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS>

recycling part of the revenues to those same companies (based on their output), or for supporting efficiency improvements, are better options than tax rate reductions or exemptions. If such revenue-recycling is not feasible, tax reductions or exemptions can be an alternative, but these should be limited and eventually phased out. Additionally, these measures should be granted conditional on efficiency improvements.

502. When designing compensation schemes for affected industries, governments will inevitably be confronted with significant lobbying for more generous compensation or for broader exemptions. While it is important, in principle, to limit beneficiaries (i.e., to those facilities exposed to international trade) and to maintain the incentive for reducing emissions, in practice, it may also be necessary to strike a balance between these principles and the political feasibility of the carbon tax considering industry pushback.

503. Instead of using tax exemptions or transfers, governments can also address the leakage and competitiveness concerns with measures such as tariffs on imports of highly traded emission-intensive commodities, which are known as Carbon Border Adjustment Mechanisms (CBAM).¹⁹⁷

2.2 Compensation for households

504. Carbon taxes can result in different relative burdens on households depending on their income.¹⁹⁸ A disproportionate burden on low-income households, or reduced energy affordability (irrespective of how the burden differs by income), may not be possible politically and reduce the public acceptability of the tax.

505. To mitigate unwanted negative effects of carbon taxes on households, governments may choose to use parts of the revenue for compensating some (usually low-income) households for the price increase. Country experience with compensation mechanisms in the context of a carbon tax is scarce, but there is considerable experience in the context of reforming energy subsidies and energy taxes, which can be built upon.¹⁹⁹

506. As is the case of vulnerable industries, mechanisms for compensating households should be limited to those that need support without compromising the incentive of the tax to change consumption. Also, households can be shielded from rising energy prices either through targeted transfers (revenue-recycling) or through reduced rates or exemptions (forgone revenues).

507. Designing compensation mechanisms that reach targeted households may

197 See Chapter 7.

198 Potential distributive implications of carbon taxes are discussed in Chapter 7.

199 Coady et al., 2015.

be more difficult than compensating vulnerable industries. This is due to two factors. First, it might be difficult to identify the households most affected by higher energy prices. Second, administratively simple compensation measures, such as tax deductions or tax credits, might not target low-income households, since they are not paying taxes. This problem is exacerbated where there is a large informal economy.²⁰⁰

508. To avoid the second problem identified above, governments can choose to implement targeted transfers as a redistributive mechanism. Targeted transfers can take the form of cash transfers or near-cash transfers.²⁰¹ If a cash transfer system already exists, where beneficiaries are known and coincide with households that should receive compensation for increased energy prices, transfers from carbon tax revenues can be distributed by piggybacking on these systems. Targeted transfers can also be handed out conditional on specific household behaviour (e.g., children going to school), hence pursuing other policy objectives in addition to redistribution.

509. Cash transfers or near-cash transfers can compensate households without reducing the incentive for changing behaviour. Cash transfers are more effective when provided at regular intervals, for example, as monthly dividends, to truly offset impacts on household income.²⁰²

510. Sometimes, broad or universal cash transfers are used to compensate households after the introduction of a carbon tax (this was the case, for example, in Switzerland and British Columbia), or after the removal of fuel subsidies (for example, Iran in 2010).²⁰³ In the case of a carbon tax, this mechanism is known as a carbon dividend. The benefits of such a compensation mechanism are its salience and universality; these can help increase the acceptability of the tax.²⁰⁴ This is especially true if the dividend is disbursed before the tax is introduced. The downside of using carbon tax revenue for universal cash transfers is that this mechanism may not improve distributional outcomes.²⁰⁵

511. An alternative to cash-transfers can be expanding existing programs

200 Falcão and Cottrell, 2018.

201 An example is the National Fuel Allowance Scheme, a weekly cash payment to low- and fixed-income households which recycles carbon tax revenues in Ireland.

202 For a comprehensive discussion of the evidence on cash and near-cash transfers in a general context, see Bastagli et al, 2016.

203 In 2013 and 2015, the government of India also introduced a reform of liquified petroleum gas (LPG) subsidies. LPG cylinders were sold at market price, and a consumption-linked subsidy was directed to households.. The scheme aimed to reduce leakages (and avoid a black market of LPG cylinders) by achieving a common market price for LPG and by channelling the consumption-linked subsidy directly to domestic consumers (MoPNG, 2013). Under the scheme, households would buy LPG at the market price (instead of the subsidised price) and receive the subsidy directly into their bank accounts (following the purchase, for a maximum of 12 cylinders of 14.2 kilograms each per household per year). This scheme was first launched on 1 June 2013 and subsequently expanded to 291 districts in six phases covering 17 million people (Nag, 2014).

204 Klenert et al., 2018.

205 Vogt-Shilb et al, 2019.

targeting low-income households (e.g., school meals, public works, reductions in education and health user fees, subsidized mass urban transport, subsidies for water and electricity connection costs).²⁰⁶ Further, if transfers are not possible, other policy choices include granting life-line tariffs, reduced rates for low-income households, or providing vouchers.

512. Finally, reinvestment of additional revenue in vulnerable communities can be an alternative, albeit not focalized on compensating the directly affected low-income households.

2.3 Environmental spending

513. Carbon taxes are simultaneously a revenue-raising and environmental policy instrument. While the environmental objective of the carbon tax is achieved primarily by changing the relative price of goods that generate carbon emissions, governments may choose to use part of the revenues to further additional environmental objectives. This can strengthen support where the demand for more ambitious environment policy is high and can be justified if environmental spending needs are not currently met.

514. There are examples of governments using revenues to finance environment-related programmes and projects, including promoting or subsidising the use of renewable energies and low-carbon technologies, the conservation and protection of biodiversity, waste and water management, and other green programmes. Carbon tax revenues can also be used to fund energy efficiency and savings measures.²⁰⁷

515. Directing part of revenues towards the promotion of low-carbon technologies and Research, Development and Innovation (R&D+i) can help address the issue of hard-to-eliminate emissions.

516. To reduce emissions, countries should aim at “filling-the-gap” policies that use revenues to address emissions that the tax would miss, while avoiding reinforcing behaviours that are incentivised by the tax anyway. For example, carbon tax revenues used to incentivise businesses to install solar panels are often redundant, since many of those businesses would have likely installed the panels because of the tax anyway. “Filling-the-gap” policies, on the other hand, aim at targeting only those entities for which the tax would not be a sufficient incentive to change behaviour. With this approach, more revenues would potentially be available to spend to reduce emissions that would otherwise have been missed, in our example small businesses that might not have the necessary capital to install solar panels.

206 For example, British Columbia uses part of the carbon tax revenue to grant non-energy related tax credits to low-income households, including a “children’s fitness and arts” tax credit.

207 Some examples include the carbon dioxide tax in Denmark, which uses part of revenues to fund business energy efficiency subsidies; and the Slovenia emissions tax, where a third of revenues are used for emissions mitigation.

517. For developing countries, investing in R&D might not be a priority. To further environmental protection, they might choose measures that directly impact citizens instead, such as expanding low-carbon public transport infrastructure or the public electrical grid with renewable energy. These direct measures would also contribute to increasing the acceptance of the carbon tax, as citizens can see the visible results of the policy.

2.4 Tax shifts

518. Revenues from carbon taxes can also be used to finance changes in the overall tax policy, by lowering other taxes simultaneously with the introduction of carbon taxes. Typical examples include the reduction of taxes on personal or corporate income (including social security contributions), or taxes on capital. The use of revenues from carbon or other environmental taxes to reduce other taxes is often referred to as a green tax shift or an environmental fiscal reform.²⁰⁸

519. The rationale for such tax shifts can be to improve the overall efficiency of the tax system. A more efficient tax system is one that raises the same amount of revenue at lower economic cost (i.e., with smaller economic distortions). In general, only lump-sum taxes do not distort economic behaviour and therefore are considered efficient. Carbon taxes can also reduce distortions since they internalize the social cost of externalities. Hence, in tax regimes where personal or corporate income taxes are high, using revenues from carbon taxes to lower income taxes can improve the overall efficiency of the tax system. While such tax shifts may be appropriate for high income countries with high levels of income tax, they may be less relevant – and less advisable – for developing countries with comparatively low overall tax-to-GDP ratios and low levels of income taxation. However, carbon taxes apply to consumption in the informal economy, which helps to reduce the – inefficient – differential treatment between formal and informal sectors.

Checklist 12. Possible revenue use

1. Compensation of vulnerable industries
2. Compensation for households
3. Environmental spending
4. Double-dividend tax changes (tax shifts)

3. Administrative systems to commit tax revenues

520. In practice, allocating carbon tax revenues to specific, pre-determined expenditures may involve earmarking or establishing explicit political commitments.

521. Earmarking entails legal prescriptions assigning revenues to specific spending purposes. These provisions, depending on the country, can be included in primary or secondary legislation. While earmarking is standard practice in some jurisdictions, it is constitutionally prohibited in others.²⁰⁹ Where earmarking is prohibited, the creation of special trust funds – with an environmental purpose, or other – may be an option for ring-fencing revenues to specific purposes, in cases where this is considered important for political reasons (see Box 30).

522. Politically committing revenue to specific spending purposes is an option that can have the same effect as earmarking, but with more flexibility and the possibility to change the allocation of funds as environmental or social priorities change. Political commitments can, therefore, be useful both in jurisdictions that allow earmarking and in those that do not. Political commitments for specific revenues use can be made by public statements (e.g., as part of policy packages) but may not necessarily involve legal prescriptions. However, such flexibility might also result in lower political thresholds when shifting revenue use, because of changing political priorities of different governments, and therefore in increased uncertainty.²¹⁰

209 For example, in Chile, earmarking revenues from any tax is prohibited by the Constitution, while British Columbia earmarked some revenues from their carbon tax to lower the energy costs of low-income households, and Denmark partially earmarked revenues for green spending, specifically for energy efficiency.

210 For example, in the case where revenues from a carbon tax are politically committed to supporting renewable energy power plants, a change in political priorities that reallocate such revenues to lowering energy costs for low-income households would create uncertainty for power producers; they might therefore have less of an incentive to invest in the first place.

Box 30. The potential role of trust funds in linking revenue sources to spending items

When earmarking revenues is not an option, and depending on the country's legal framework, a trust fund can still help to ensure that some funding is set aside for a specific purpose (environmental or other) in the case that this should be a policy objective. Independent government agencies could play a similar role.

In general, environmental funds are mechanisms that help mobilize, combine, and oversee the collection and allocation of financial resources for environmental purposes. The money allocated to the fund is usually tied to the specified purposes of its mission and kept separate from other funding sources such as a country's general budget. This can help to ring-fence the allocation of resources from the possible influence of political cycles, but also limits the flexibility of the budgetary process.

Revenues from carbon taxes and other environmental taxes can be sources of funding for environmental funds, while allowing these independent structures to be long-lasting, to the extent that they receive a steady flow of revenue resources. This feature may be constrained by legal impediments within a country's budgetary legislation and may require some form of oversight to operate independently.

Many environmental funds (e.g., the National Fund for Environment and Climate Change (FONERWA) in Rwanda and the Environmental Investment Fund in Namibia) have their own internal governance structures that regulate how they operate and how the funds get to be employed. An internal governance structure can be an important step in keeping the revenues or general resources attributed to the fund separate from the country's general budget, and even allowing contributions from private sources in addition to the revenues from environmental taxes. The more transparent the fund, the more likely it will be successful in harnessing private investors and international attention to sponsor promoted activities.

Examples of successful environmental funds

As shown by these country examples, environmental funds can allow the employment of carbon tax revenues for environmental purposes.

- Colombia: 30 percent of the revenues accumulated via the carbon tax are geared towards a national environmental fund for coastal preservation (activities include protecting the erosion of coastal areas, fighting deforestation, monitoring forested areas, preserving water sources as well as other strategic ecosystems, and fighting climate change).
- Costa Rica: the main source of funding for the Forestry Environmental Services Program (FESP), which is the revenue accumulated via a dedicated tax on the sale of fossil fuels. Over one third of the revenues accumulated via the tax, i.e., 5 percent of fuel sales, is earmarked to invest into forest reforestation, sustainable management of forests, and forest preservation.²¹¹

For more information about environmental funds, see UNDP, 2017.

4. Transparency and communication

523. When carbon taxes are introduced as part of a policy package, and revenues are used to compensate vulnerable industries, or households, or for environmental purposes, the perception of fairness and effectiveness of revenue use becomes an important factor for the public acceptability. While the effects of the tax on the price of fuel products are usually felt directly by businesses and consumers as a price increase, the (positive) effects of compensating measures addressing businesses or households, or of environmental measures, are often indirect and less salient.

524. In this situation, deliberate efforts by governments to communicate and explain the design and purpose of the policy package, including the use of revenue,

211 Chomitz, et al., 1999.

become an important factor for the acceptance of the tax. Revenue-recycling mechanisms may not be self-evident. Governments should communicate clearly what purpose revenues are used for, and how these purposes are meant to address negative competitiveness or fairness concerns, or further environmental objectives.

525. Trust in the government is relevant for choosing and communicating revenue use. When the policy objective of using revenues for compensating affected households is to increase public acceptability, compensation measures become even more important where trust in government is low. In countries with high distrust, very salient options for revenue use like uniform lump-sum or other cash transfers generate more public support for a carbon tax.²¹²

526. The labelling of a carbon tax can also be an important part of the communication strategy. A 'fee-and-dividend' renaming (with lump-sum payments) has been found to be an effective labelling strategy when the credibility of revenue-recycling for households and firms is chosen to increase political acceptance²¹³.

5. Conclusion

527. While the principal objective of carbon taxes is to provide incentives for emissions' reductions, they also raise revenue. This chapter discussed several potential ways for using the revenues that are typically associated with the introduction of a carbon taxes, namely to: (1) provide compensations for affected vulnerable industries; (2) provide compensation for households; (3) increase environmental spending purposes, and (4) finance tax shifts. Tax revenue can also be used for financing additional spending or paying off debt, issues that are not discussed in this Handbook.

528. The rationale for specific forms of revenue use, as opposed to contributing to general revenue raising, often lies in seeking public support for the carbon tax. The use of revenues also co-determines their net economic benefits, affects their distributional impact, and can strengthen support for their introduction or increase.

529. There is no one-size-fits-all solution or recommendation for carbon tax policy packages including revenue use. The right choice of revenue use depends on country circumstances including the pre-existing tax system, income distribution and consumption patterns, industrial structure and competitiveness, trust in government, understanding, as well as acceptance of environmental taxes and environmental policy, to name the main ones.

530. In the policy deliberation and design process leading up to a carbon tax,

212 Klenert et al., 2018.

213 Ibid.

governments should be mindful of potential sources of political opposition towards the tax, as well as key economic and social impact variables. They should also assess the likely impact of different options of revenue use and try to strike a balance between strengthening support and optimizing economic and distributional gains, by choosing an appropriate form of revenue use (or a combination of several).

531. In practice, using carbon tax revenue for specific purposes can take the form of earmarking or explicit political commitments. Since earmarking may not always be possible (and is prohibited in some jurisdictions), political commitments or other concurrent measures, such as environmental funds, can be used to direct revenues towards a specific priority. Where it is possible and where constraints on revenue are conducive to strengthening public support for carbon taxes (e.g., because of low trust in government), earmarking can be advisable. Generally, significant political support can be achieved by clearly communicating explicit commitments in the use of revenues and making sure that the chosen form of revenue use is adapted to local circumstances.

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Appendix 3: Carbon tax revenue in perspective

532. This appendix discusses actual and potential revenue from carbon taxes, and compares these figures to the revenues from excise taxes on energy use and emissions trading systems (ETS).

A1. Current carbon tax revenue

533. The World Bank's annual State and Trends of Carbon Pricing Reports tracks the adoption and continued application of carbon taxes and ETS across the world. In addition to key statistics on the price level and the base covered, the reports provide estimates of the total annual revenue and the total annual value of carbon pricing. See Table 7.

Table 7. Revenue from and value of carbon pricing. Carbon taxes and ETS²¹⁴

Billion US\$	2015	2016	2017	2018	2019	2020
Revenue (carbon tax and ETS)	26	22	33	45	45	53
Share of revenues from carbon tax ²¹⁵	64%	74%	66%	53%	53%	51%
Value (carbon tax and ETS)	48	49	52	82	98	120
Share of value from carbon tax ²¹⁶	34%	34%	42%	29%	24%	22%

Source: World Bank State and Trends of Carbon Pricing Reports 2016 – 2021

534. The table presents revenue in US\$ billions from carbon pricing, including both carbon taxes and ETS. As can be observed in Table 7, the value of carbon pricing is around twice as large as the revenue that it generates. This is due to the fact that the value of an ETS includes the total value of allowances in the economy, while the revenue generated will likely be lower, with the difference attributable to the allocation of free allowances and of permits below the auction price.^{217 218}

535. It can be observed that both revenues and values have increased considerably, from 26 to 53 billion US\$ between 2015 and 2020. The increase between 2017 and 2018 is mostly attributable to rising allowance prices in the EU ETS, but rising carbon taxes, notably in France and Alberta (Canada), also contributed to the increase. The EU ETS allowance prices stabilised in 2019 and then increased again in 2020,

²¹⁴ 2019 and 2020 figures for value are calculated based on the Carbon Pricing Dashboard data - <https://carbonpricingdashboard.worldbank.org/>.

²¹⁵ Calculations based on Carbon Pricing Dashboard data - <https://carbonpricingdashboard.worldbank.org/>.

²¹⁶ Calculations based on Carbon Pricing Dashboard data - <https://carbonpricingdashboard.worldbank.org/>.

²¹⁷ The table reports the revenues collected, and value of, carbon taxes and ETS worldwide. The value of an ETS is estimated by multiplying the number of allowances by the allowance price, whereas the revenue from the carbon tax is obtained from government budget documents.

²¹⁸ It can be noted from the table that revenue proportions are opposite the value proportions (i.e. carbon taxes represent a larger share of revenues but a lower share of value), indicating the widespread practice in ETS of allocating allowances for free. Flues and Van Dender, 2017, reach a similar conclusion in a study based on Organisation for Economic Co-operation and Development (OECD) and G20 countries.

contributing to the total increase in revenues and values, as well as the increase in the revenues generated by the ETS as a share of total carbon pricing revenues.²¹⁹

536. To put the revenues from carbon taxes and ETS in perspective, the revenue from excise taxes on energy use, across OECD and G20 countries, is an estimated EUR 420 billion in 2016 (approximately US\$ 466 billion).²²⁰ This was twenty times larger than the revenue from carbon taxes and ETS combined. In other words, if the sum of excise taxes, carbon taxes, and emission permit prices is taken to be an effective price on carbon (an “effective carbon rate” in OECD terminology), then the revenue from effective carbon rates consists of 95.2 percent of excise tax revenue, 3.2 percent of carbon tax revenue, and 1.6 percent of revenues from emission allowances.^{221 222}

A2. Potential carbon tax revenue

537. Carbon pricing presently raises less revenue than it would if the instrument were deployed more in line with its climate policy potential. Low revenues from carbon taxes are mainly attributable to low tax rates and narrow tax bases. Estimates of the potential revenues, not considering behavioural change, conclude that a minimum carbon price of EUR 30/tCO₂, (where pre-existing excise taxes, carbon taxes and emission permit prices are considered to calculate the required tax increase) can raise additional revenues worth of 1.32 percent of GDP across the 40 OECD and G20 countries analysed (0.72 percent for OECD only).²²³

538. Other estimates, considering behavioural responses (sector-elasticities) to carbon price increases, suggest carbon tax revenues will still be high. Table 8 summarizes the estimated impact on revenues of introducing a carbon tax of US\$ 25, 50 or 75/tCO₂ for a selection of countries and across the G20 from one study. The same study suggests that a carbon tax of US\$ 75/tCO₂ would reduce emissions by 35 percent in 2030 compared to 1990, which is sufficient to be on track for the Paris Agreement targets. For the G20, this tax would raise revenues worth 0.4 percent of GDP. Countries where current taxes are lower would collect proportionally more revenue.²²⁴

219 World Bank, 2020.

220 See Marten and K. van Dender, 2019 for a discussion.

221 This also means that revenues from carbon taxes are twice as high as those from emissions trading, compared to the near equal split estimated in the Global Carbon Accounts 2020 in the OECD estimate for 2016. As noted, the share of carbon tax revenues is lower in 2019 than in earlier years because of rising emission permit prices in the EU ETS. Differences in country coverage may also matter. According to the Carbon Pricing Dashboard data, the revenue from ETS systems is one quarter of revenues from taxes and trading systems combined in 2016.

222 See World Bank Carbon Pricing Dashboard for country data: <https://carbonpricingdashboard.worldbank.org/>

223 See Marten and Van Dender, 2019 for a discussion.

224 IMF, 2019.

Table 8. Estimated revenue from carbon taxes, % of GDP, 2030

	Revenue from carbon tax of \$25/tCO ₂	Extra-revenue from carbon tax of \$50/tCO ₂	Extra-revenue from carbon tax of \$75/tCO ₂
G20 weighted average	0.7	0.5	0.4
Russian Federation (largest increase)	1.7	1.4	1.3
France, UK (smallest increase)	0.3	0.2	0.2
India	1.1	0.7	0.6
Indonesia	0.7	0.6	0.5

Source: International Monetary Fund (IMF), 2019

539. The IMF and the OECD studies suggest that there is potential for a considerable revenue increase over the next decades, particularly where carbon prices and energy taxes are currently low, and the base is narrow. However, they also indicate that higher carbon tax rates would likely not result in a structural impact on the composition of overall tax revenues of countries. Also, ultimately revenues should decline as carbon-based fuel use declines. However, in the near to medium run, this should not prevent countries from integrating carbon tax revenue considerations into their broader tax, climate, and spending policy frameworks.

540. Recent OECD estimates of the carbon pricing revenue potential of a carbon tax (set to a minimum rate of EUR 30/tCO₂) for a selection of developing countries show considerable variation.²²⁵ For Egypt, the combined effect of removing fossil fuel subsidies and raising the carbon tax could generate extra revenue worth 4.5 percent of GDP. In Ecuador, the potential is around 3.7 percent, in Morocco close to 2 percent, and in Nigeria, Sri Lanka and the Philippines around 1 percent. Jamaica, Côte d'Ivoire, Guatemala, Dominican Republic, and Ghana could raise around 0.5 percent of GDP. Uruguay and Kenya might raise around 0.25 percent of GDP. In Uganda and Costa Rica, the revenue potential of a carbon tax set at EUR 30/tCO₂ is limited and almost negligible.

541. The revenue potential differs among countries for two main reasons. First, there are substantial differences in pre-existing carbon prices. In Uganda, for example, where most fossil fuel use occurs in the road sector, prevailing tax rates are already above the low-end carbon benchmark. Second, the carbon intensity of energy use varies across countries. In countries that do not use coal, tax and

225 OECD, 2021.

subsidy reform will provide incentives for skipping the coal phase in electricity generation and industry. According to the OECD analysis, candidate countries include Costa Rica and to a lesser extent Uruguay and Kenya. These estimates suggest that while rising carbon taxes can help some countries mobilize some revenue, the revenue potential is modest if compared to the total budget of most countries, and it is unlikely that they will be able to adopt fundamentally different domestic revenue mobilization strategies following the introduction of a carbon tax.

Box 31. Price elasticity of demand

The size of the change in energy consumption following a change in energy prices (whether induced by a carbon tax or other causes) is described by the price elasticity of demand. The own-price elasticity measures the percentage change in the demand for a good or service following a percentage change in its price. A high (absolute) value indicates that the behavioural response to a given price change will be large; a small value indicates that it will be small. For example, an own-price elasticity of the demand for gasoline of -0.2 means that a 10 percent increase in the price of gasoline triggers a reduction of the demand for gasoline of 2 percent.

Price elasticities are determined by various factors, including the untapped potential for using fuels more efficiently and the cost of tapping it, the availability and price of substitutes, and consumer knowledge. Hence, the price elasticity of demand can vary over time and geography, as well as by income level or even with the price of the good itself. For example, in section 2.1 of Chapter 7, we discussed about how motor fuel taxation can be neutral or even progressive in developing countries, due to vehicle ownership profile. These conclusions are based on empirical studies that show that demand of fuels in developing countries reacts more strongly to price changes, or in other words that price elasticity of fuel products is higher in poor countries than in rich countries.

The price elasticity of demand of the fuels covered by a carbon tax partly determines the environmental effectiveness of the tax and the amount of tax revenue that it raises. By way of example, suppose that a household's demand for gasoline is 100 litre per month at a price of US\$ 1 per litre, and that its price elasticity of demand in the short run (e.g., a year) is -0.2. If a carbon tax were introduced which leads to a 10 percent increase in the gasoline price, the price is now USD 1.1 per litre. The demand for gasoline drops by 2 percent to 98 litre per month. The carbon tax revenue is 10 cent per litre, i.e., US\$ 9.8.

Demand is usually more price elastic in the long run than in the short run because more options for changing behaviour become available. Suppose in the previous example that the long price elasticity is -0.4. In that case, over the long run, the 10 percent price increase leads to a 4 percent drop in demand, to 96 litres, and tax revenues are US\$ 9.6. Hence, over the long run, the abatement impact of a tax rises, whereas the revenue generated declines (even if it is still greater than in the situation where there was no carbon tax).

Consequently, to the extent that the price incentive created by the tax leads to stronger behavioural responses of households and firms over time, consumption of the taxed fuels will be reduced and along with it the tax revenue, unless the tax rate is simultaneously increased. In practice, if carbon taxes were to be introduced and gradually increased, it can be expected that revenues would first increase and then start to decline over the span of one or two decades.

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Chapter 10: Interactions Between the Carbon Tax and Other Instruments

1. Introduction

542. A carbon tax is not introduced in a policy vacuum. Policies and regulations already in place may have relevant interactions with the tax and can enhance or inhibit its effectiveness, or even prompt additional administrative requirements for implementation.

543. This chapter seeks to support policymakers in understanding potential interactions between policies and instruments that affect carbon pricing, and discuss options on how the interactions can be addressed when designing and implementing carbon taxes.

2. Carbon Tax to be considered in context

544. The effectiveness of a carbon tax will not only depend on its design and implementation, but also on how the proposed carbon tax interacts with other related policies and instruments. Policy interactions refer to how policies, that may or may not have been conceived as a package, achieve their objectives in the context of other relevant policies or instruments.

545. It is, therefore, necessary to consider how policy instruments in place, or considered for introduction, can influence the effectiveness and goals of a carbon tax. Examples of such instruments include energy or fuel taxes, emission trading systems (ETS) and fossil fuel subsidies, as well as regulatory measures, such as renewable portfolio standards (RPS). Combining various instruments that are implemented with different policies and approaches, in order to reduce carbon emissions, may be a process that requires systematic adjustments. Moreover, defining upfront the timeline and scope for any needed adjustment can reduce the uncertainty.

3. Assessing the interaction

546. Environmental and carbon-related policies are often designed and implemented by different government entities, and at various levels of government. Policy consistency across different authorities will be important for both the effectiveness and efficiency of the carbon tax.

547. On the other hand, no single instrument may achieve all policy objectives. In practice, policymakers often resort to a combination of different policy approaches, or policy mixes, to achieve decarbonisation objectives, in combination with other

linked policy objectives such as air pollution reduction, energy security, revenue raising, economic development, and job creation. For instance, a carbon tax can be the cornerstone of a jurisdiction's climate policy, while other instruments may be complementary and deal with unintended consequences. Policy interactions may have intended direct and indirect effects, as well as unintended effects. For example, considering available resources and technologies, economic agents may make choices that are not cost-effective, thus driving up the total costs of implementation.

548. An effective and coordinated policy will vary across countries. Different jurisdictions have different needs depending on local circumstances, such as their development priorities, types of economy, domestic energy resources, ability to invest and national energy policies. Different needs will be balanced in different ways; hence, a multitude of combinations can exist.

549. To provide policymakers with a meaningful framework of how to assess interactions, this chapter will focus on the main types of interactions; for this, the terminology and conceptual framework developed by the World Bank is considered²²⁶, where relevant types of policies are defined as:

- Complementary, in the sense that the various policies enhance each other's performance.
- Overlapping, in that they run parallel to each other, with similar objectives.
- Countervailing, in which case they give rise to adverse or contradictory effects.

3.1 Complementary policies

550. Complementary policies are those that can be introduced and applied together, with one policy improving the performance of the other. Complementary policies may have different objectives and generate different consequences. However, their combined effect is considered superior to the effect of one single policy.

551. Policies complementary to a carbon emission reduction policy may be less focussed on reinforcing the carbon price signal, but rather address potential barriers that prevent companies and individuals from responding to the carbon price signal given by the tax. See, for example, the case of Chile presented in Box 32. Complementary policies ensure that both producers and consumers are responding to the compliance costs of their actions, including climate impacts.

552. Complementary policies may help make revenue raising more sustainable.

226 See methodology and further examples further elaborated in World Bank, 2016

Since the main objective of a carbon tax is emissions reductions, significant decarbonisation will reduce the tax base and, therefore, revenues. Therefore, taxes on energy consumption can be developed as a complementary instrument, to retain at least part of the taxable base.

553. Depending on the features of the carbon tax, as well as of the other policies and instruments, this combination can also be overlapping or even countervailing. Often, a switch to low carbon fuels will require more energy for the same process (because fossil fuels are very energy-dense). If the energy tax increases the price of fuels by volume, but obtaining the same amount of energy from renewables is more expensive, decarbonisation may not occur.

Box 32. Complementary energy policies in Chile

Key policies in the energy sector in Chile that complemented the carbon tax and incentivised an energy transition include:

- **The Renewable Energy Law (Law No. 20.257):** The first important reform of the renewable energy sector was the approval of a Renewable Energy Law, which included a RPS. This is a quota system that encourages renewable energy generation by setting the proportion of electricity supply that must be produced from eligible renewable energy sources. The law aims to support the generation of electricity by renewable sources such as biomass, small hydraulic energy (capacity of less than 20 MW), geothermal, solar, wind power and marine energy. This law was amended in 2013 (Law 20,698, better known as “Law 20/25”) stating that by 2025, 20 percent of the energy matrix in Chile must be composed of renewable energy.
- **Restructuring Public Auctions:** Another important reform in Chile was to improve renewable energy generators' ability to compete in energy auctions. Renewable energy projects without a power purchase agreement (PPA) used to face significant obstacles in obtaining funding from commercial banks. In Chile, PPAs can be achieved by bilateral negotiations or through participation in “power auctions”—carried out by the National Energy Commission (CNE)—for regulated consumers served by the distribution grid. Since 2005, Law 20.018 requires electricity distribution companies to contract their energy requirements by means of competitive non-discriminatory auctions (thus including renewables). A submitted bid with the lowest price is awarded a long-term contract (typically, a PPA) for the project. In 2014, three-time blocks were established in the bidding process, one block covering from 11 pm to 8 am, a second from 8 am to 6 pm, and a third at the time of peak demand between 6 pm and 11 pm. This change in the structure of the auction scheme has favoured renewable generators since they can supply during the times of the day when they are producing energy.
- **Energy Transmission:** Law 20,936, on electricity transmission, aims to create a robust interconnected transmission system allowing the unification of Chile's power grid connecting the Northern Interconnected System (SING) with the Central Interconnected System (SIC). The interconnection of the northern and central grid systems merges two medium-sized markets, not only forming a more competitive marketplace, but also allowing the energy generated from large solar potentials in the north to be distributed to the central and southern part of the country.
- **Distributed Energy:** The key regulatory instruments are Laws 19.940 and 20.571. The first grants rights to connect distribution projects, creating the small energy generators market (bigger than residential, but have facilities with an installed capacity of up to 9MW).²²⁷ The second is a system of net billing of residential generators. Essentially, the law regulates energy self-generation from non-conventional renewable energy (NCRE) sources, and efficient cogeneration. The law gives users the right to sell their surplus directly to the electricity distributor at a regulated price, through net-billing.

227 Regulated by D.S. N° 244 of Ministry of Economy D.S. N°101 of the Ministry of Energy.

3.2 Overlapping policies

554. While complementary policies may have different objectives but reinforce each other, overlapping policies will, in practice, try to achieve the same goals while creating inefficiencies, such as higher costs. Overlapping policies that pre-exist or are considered together with the introduction of a carbon tax, might therefore create parallel carbon pricing. Tax design should consider policy interactions to avoid overlap across policy instruments. Cooperation with the policymakers responsible for other instruments, as well as expected taxpayers, can help identify the potential overlap across policies early on.

555. In the context of a carbon tax, an overlapping policy can be described as any policy which has similar objectives to the carbon tax, but unnecessarily raises the total social costs of achieving emissions reduction, thus creating cost-inefficiencies. For example, cost inefficiencies can arise in the case of additional renewables targets, mandates or subsidies which support high-cost renewable energy, because these duplicate the price signal provided by the carbon tax and lead to less cost-effective abatement measures.

556. There might be cases where having partially overlapping policies are useful, for example, to ensure decarbonisation in a certain sector; however, in general, policymakers should manage overlapping policies to avoid an excessive economic burden on economic agents, or an administrative burden on governments, while the same decarbonisation result could have been achieved with the carbon tax alone.

557. When a carbon tax is introduced, existing taxation per unit of production, distribution, and consumption of energy needs to be considered, generated through a pre-existing (and/or overlapping) ETS, energy-related tax or other implicit pricing instrument. For example, Argentina reformed its fuel taxes and adopted a carbon tax that maintained the same revenue. While the full mitigation effect is yet to be determined, the relevance of the policy is that it gave an important price signal, and changed the relative prices of fuels consistently with their carbon content.²²⁸

558. Introducing a carbon tax where overlapping policies exist should be managed carefully. However, a carbon price from a single instrument may not be sufficient or broad enough to stimulate investment in low-carbon technologies. For carbon pricing to be effective in stimulating the uptake of low-carbon energy options and technologies, the price needs to be appropriately strong and stable.

559. In countries and situations where the carbon price needed to drive the necessary changes is not politically achievable, a carbon tax may be strengthened by instruments such as technology mandates, emission performance standards and

228 OECD, 2019b.

energy efficiency measures, creating an implicit, higher CO₂ price, which may not be as transparent and evident as the carbon tax rate. If overlap from such measures on a carbon tax is not considered, these policies have the potential to undermine an explicit carbon price through the tax.

Box 33. Introducing carbon taxation in Mexico

In Mexico, the 2012 General Climate Change Law paved the way for a reform of fuel taxes, and for the introduction of the carbon tax. In 2013, as part of a comprehensive tax reform, Mexico became the first Latin American country to impose a carbon tax. The tax was implemented through a reform of the Law on Special Tax on Production and Services (LIEPS, 1980).

The initial tax was set at Mexican Peso (MXN\$) 39.80 (approximately US\$ 3.2) per tCO₂. It is an upstream tax on fuels, with a rate based on their carbon content. It provides exemptions for gas production and imports, and it establishes a price cap on some high carbon intensity fuels. Since its implementation, the tax has been adjusted annually for inflation, but it is still low, approximately US\$ 3 per tCO₂. In addition, the tax rate was limited to 3 percent of the sale price of the fuel.

The Mexican carbon pricing policy is interesting because it was conceived from the beginning as a strategy to develop an ETS and link with the Western Climate Initiative (WCI). Although the tax is relatively simple, there are a series of additional features that have been implemented with the ETS and the WCI in mind. To this effect, memoranda of understanding were signed with the State of California in United States of America, and the provinces of Ontario and Quebec, in Canada.

Among the most important aspects of the carbon pricing policy, the Law on the Special Tax on Production and Services permits tax-crediting by using carbon credits from Certified Emission Reductions of Mexican projects approved by the United Nations Framework Convention on Climate Change (UNFCCC). The new legislation also included provisions for entities subject to the tax to deliver certified emission reductions (CER) from Mexican projects in lieu of the tax (CDC, EDF and IETA 2015; IEPS Law 2013). In December 2017, the CER regulations were published, allowing for credits of up to 20 percent of the carbon tax obligation.

Furthermore, in November 2013, a voluntary carbon exchange, MEXICO₂, was established to trade carbon credits as a potential means of complying with the carbon tax. In August 2016, the Ministry of Environment (SEMARNAT) and the Mexican Stock Exchange agreed to implement a simulation exercise for an ETS, to develop capacities and generate more information.

In parallel, the authorities have been developing the National Emissions Registry (RENE). The 2015 RENE requires companies or facilities that emit more than 25,000 tCO₂e / year to report their greenhouse gas (GHG) emissions from the previous year. The registry includes nearly 3,000 companies from various sectors, and will be the basis for the reporting system under the linked ETS. Although the system has experienced delays, the ETS started its three-year trial period in January 2020.²²⁹

3.3 Countervailing policies

560. Countervailing policies have contradictory objectives with respect to the carbon tax, or adverse effects on decarbonisation, hence undermining the effectiveness of the carbon tax. These kinds of policies are not necessarily bad per se, and in fact may have important goals. For example, policies aimed at supporting lower income groups, geographic regions, or strategic economic sectors, might be very effective in reaching their objectives, but end up increasing carbon emissions.

561. When considering introducing a carbon tax, it is crucial to determine the policies or instruments that subsidize and encourage carbon emissions, both at the

²²⁹ ICAP, 2020. See also the background information by the Mexican Secretariat of Environment and Natural Resources (SEMARNAT): <https://www.gob.mx/semarnat/acciones-y-programas/programa-de-prueba-del-sistema-de-comercio-de-emisiones-179414>

consumption and production levels. The co-existence of such subsidies or incentives, together with carbon pricing, needs to be evaluated by the country's policymakers to avoid undermining the effectiveness of the carbon pricing policy, as well as its public acceptability.

4. Policies and instruments interacting with a carbon tax

562. Given how deeply economies currently rely on processes that generate carbon emissions, jurisdictions have many policies and instruments that deal with energy, environment, or income support, that potentially interact with carbon pricing. A carbon tax will, therefore, be embedded in a complex policy landscape. Table 9 presents examples of policies and instruments that can interact with carbon taxes.

Table 9. Examples of policies that may interact with a carbon tax

Complementary	Overlapping	Countervailing
<ul style="list-style-type: none"> Electric energy reform Energy efficiency packages, allowing for fuel switching Facilitating energy trade and daily contracts Regulate and incentivize smart grids Flexible demand side response Encourage electricity storage Policies that support the quality and availability of weather forecasting to make renewable generation more predictable Regulating methane emissions in the oil and gas sector Phasing out coal-based energy production Incentives for electric vehicles (EVs) Vehicle emission standards Subsidies/investment in the charging stations and other infrastructure needed to support wide-scale adoption of transformative zero-emission options. Standards for energy efficient buildings Regulations or incentives on land management practices Offset markets for GHG reductions from waste sites 	<ul style="list-style-type: none"> Emission trading systems Fuel and energy taxes Renewable energy support measures Vehicle fuel efficiency standards Feed-in tariffs or green certificates Environmental emissions regulations and standards Social carbon price in investment projects Internal carbon price in businesses Taxes on high emission cars Payments for ecosystem goods and services (e.g., paying farmers to retire marginal agricultural land) 	<ul style="list-style-type: none"> Fossil fuel subsidies Fuel taxes that create a price wedge across fuels which is not proportional to their carbon content Land use change (forest clearing) subsidies Private car and transport subsidies Tax rebates on high emission cars (e.g. diesel) Public transport taxes

4.1 Carbon tax as one of the carbon pricing mechanisms

563. For the effective assessment of policy interactions, it is necessary to understand the policies or instruments that are often considered in combination with the carbon tax.

564. A carbon price²³⁰ is a powerful mechanism to reduce carbon emissions. There are several instruments that can put an explicit or implicit price on carbon emissions. Explicit carbon pricing includes carbon taxation, emissions trading, carbon crediting, and, under certain conditions, results-based climate financing. On the other hand, implicit carbon pricing influences the price of carbon in a more indirect way, through policies such as fuel taxation, energy efficiency standards, fossil fuel subsidy removal and incentives for low carbon technologies.²³¹

4.2 Fuel and energy taxation

565. Carbon taxation may be introduced within an existing tax framework that includes taxes on the production or consumption of fuels or energy,²³² with diverse scope and rates.²³³ When introducing a carbon tax, the interaction with these taxes should be considered. Other forms of taxation could be relevant when they impose an additional burden on energy and carbon throughout the value chain of production and distribution of energy and energy products.

566. Some countries have a long history of taxing energy products.²³⁴ In several countries, it is the main or only tax specifically covering energy use.²³⁵ These types of taxes were generally not introduced for environmental reasons, but to raise tax revenue or limit dependency on energy imports. For example, in the European Union (EU) countries, energy taxation on fossil fuels constitutes, on average, around 5 percent of their total tax revenue.²³⁶ Estimates for Organisation for Economic Co-operation and Development (OECD) countries are similar.²³⁷

230 The World Bank features considerable information on carbon pricing. Its website on the subject, <https://carbonpricingdashboard.worldbank.org/what-carbon-pricing>, explains concisely what carbon pricing is, the main types of carbon pricing, international aspects of carbon pricing, as well as national and regional initiatives. It also covers forms of internal carbon pricing, as well as how various organisations and economic participants internalise the price of carbon in their economic decision-making.

231 The World Bank's State and Trends of Carbon Pricing report presents the distinction between explicit and implicit carbon pricing. See World Bank, 2016.

232 Further elaborated in Chapter 4

233 The OECD monitors the use of energy taxation on a regular basis and often in a context of assessing carbon pricing. See OECD, 2019a.

234 E.g., Sweden has taxed petrol since 1924, diesel since 1937, and coal, oil and electricity for heating purposes since the 1950s.

235 The OECD overview on Taxation of Energy Use 2019 considers countries like Australia, China, Indonesia, Israel, Republic of Korea, New Zealand, Russian Federation, and the United States as only having fuel excise duties burdening the use of energy.

236 The European Commission publishes a biennial report on energy prices, available at: https://ec.europa.eu/energy/data-analysis/energy-prices-and-costs_en?redir=1

237 The OECD Policy Instrument Database provides a comprehensive dataset on energy and environmental taxation: <http://www.oecd.org/environment/indicators-modelling-outlooks/policy-instrument-database/>

567. Once energy taxation attains a certain level, it tends to affect consumer behaviour. For example, building on the Mineral Oils Directive from the 1990s, the introduction of the EU 2003 Energy Taxation Directive has influenced a reduction in overall energy consumption by incentivising more energy efficient cars in EU Member States, rather than by encouraging Europeans to drive less. Therefore, the effect on consumer behaviour from taxes may not materialise the way that it is expected.

568. The institutional infrastructure for taxing energy products will generally provide an appropriate framework for implementing carbon taxation, especially in the case of the Fuel Approach. Potential gains from the interaction on the choice of carbon tax approach or the collection of carbon taxes will not be covered in this chapter.²³⁸

569. Introducing a carbon tax without consideration of pre-existing energy taxation will increase the cost of energy and energy products. Where a carbon tax intends to focus on stimulating the reduction of carbon emissions, an energy tax affects volume rather than emissions. In the total absence of coordination between different types of related taxation, the effect of both instruments will not necessarily reinforce the incentive for carbon emissions reductions. As discussed, low-carbon fuels tend to have a lower energy content than more conventional fossil fuel alternatives. Switching to a lower carbon fuel alternative may require the use of a higher volume of energy for the same effect. For example, running a car on biodiesel for 100 km will require a higher volume of biodiesel than the volume of diesel required to run a car for 100 km.

4.3 Investment incentives

570. A well-designed carbon tax should generate incentives for businesses and households to move towards lower-carbon products and services. It should support innovation and investment in low carbon options. However, depending on how the carbon tax is set up and the options available, the introduction of a carbon tax may not be sufficient. Targeted [tax] subsidies or incentives,²³⁹ using tax revenues, may be needed to support investment in low carbon technology and innovation.

238 Relevant interactions in this respect included in Chapter 6.

239 In the framework of energy transition, subsidies and tax incentives seem most sustainable if they meet several conditions:

- They should be targeted to support investments that seek to reduce carbon emissions whilst being technology neutral (i.e. carbon reduction standards are set by the regulator, but firms are free to adopt the most cost-effective or otherwise appropriate technology that can meet those standards);
- Besides being focussed on a specific objective, they are limited in time and gradually expire under a predictable time schedule;
- They support the discovery, development, demonstration, and deployment of carbon reducing investments and innovations. They are not intended to subsidise end-users, certainly not in the long run (i.e., the new technologies must have a horizon to be self-sustainable).

4.4 Fossil fuel subsidies

571. Fossil fuel subsidies are policy instruments that target fuels directly, or electricity and heat generated from fossil fuels through monetary transfers, lowering the cost of fossil fuels and/or energy. These have many effects that impact carbon emission reduction objectives.²⁴⁰

572. Fossil fuel subsidies can have significant effects on overall economic choices and a country's financial position. By incentivising the use of fossil energy sources, they contribute to global warming, environmental pollution, and other environmental problems, all of which can have significant economic consequences.²⁴¹ See Box 34 for more details.

Box 34. The principal impacts from fossil fuel subsidies

The principal impacts associated with fossil fuel subsidies include:

1. Encourage energy intensive economic activities leading to increases in carbon dioxide (CO₂) emissions.
2. Encourage excessive, wasteful, and inefficient fossil fuel consumption.
3. Generate deficits in fiscal budgets, and public debt.
4. Generate adverse effects in the balance-of-payments of oil-importing countries; and lost opportunity of raising revenues in oil-exporting countries, especially when international oil prices are high.
5. Divert resources away from productive public investment.
6. Lead to major distortions in the production structure.
7. Foster inefficient allocation of resources in economic activities that are more capital-intensive (i.e. fossil fuel production), but do not spur growth of productive employment. This challenge is exacerbated in countries endowed with relative abundant labour force.
8. Potentially benefit mostly high-income households who constitute a small proportion of the population.
9. Discourage investment in renewable energy.
10. Create incentives for smuggling.

Source: Mundaca, 2017 a,b

5. Addressing interactions

573. Carbon taxing policy will be more effective if it is aligned with the broader policy landscape. Once there is an overview of which policies interact with the carbon tax, consideration should be given to how to address them, especially overlapping and countervailing interactions. Cooperation with policymakers responsible for other instruments, as well as expected taxpayers, can help to identify potential overlap in the design phase.

574. To ensure effectiveness and efficiency, the interaction should be considered

240 Kojima and Koplow, 2015.

241 Mundaca, 2017 a,b.

both in the design and implementation phases. When considering the interaction in design, it can be addressed by:

- Adjusting the design of the carbon tax before introduction. For example, the scope, taxable base, or rate of the carbon tax can be adjusted to avoid overlapping policies.
- Adjusting the design and/or implementation of the other policies. For example, fossil fuel subsidies can be reduced in scope or phased out to avoid the countervailing interactions.
- Introducing complementary policies to address aspects of a carbon tax that might make it less sustainable, e.g. introducing social measures that address the potentially regressive nature of a carbon tax.
- Incorporating the carbon tax into other policies, by creating a hybrid tax or other pricing system.

5.1 *Adjusting the carbon tax*

575. To avoid overlapping with a pre-existing system, the carbon tax can be designed to focus on sectors that are not affected by other carbon pricing instruments (CPI). Certain types of CPIs may be more difficult to introduce for certain types of activities, for example: an instrument based on measuring specific emissions would be more complex to apply for carbon emissions resulting from private transport; and an ETS, while it works well for stationary facilities, is more problematic to introduce in the transport sector.

576. Also, carbon abatement costs are not the same for all kinds of carbon generating activities. It may be more effective to look at the abatement opportunities and associated costs for different activities, and tailor the policies to elicit the desired response. This could be done by introducing overlapping instruments. By focussing the carbon tax through a reduction in scope, a negative effect of the overlap can be reduced.²⁴² For example, the Fuel Approach taxes the carbon content of fuel; however, if a certain type of fuel is only used for a certain type of sector, an additional carbon tax on that specific fuel could enhance the decarbonisation signal in that sector, by moving the total burden on the fuel closer to the carbon abatement cost for that sector (i.e. it would become more convenient for producers to make the investment to stop using the fuel or improve their technological efficiency, rather than paying the carbon tax).

577. On the other hand, in case the same fuel is used in different sectors, the new carbon tax would need to include specific features to avoid double taxation in one

242 Andersen and Mainguy, 2010.

sector, whilst working effectively in the other. However, imposing two different tax rates on the same fuel may incentivise fraud; therefore, managing these overlapping instruments would be more challenging.

5.2 *Adjusting pre-existing policies*

578. To avoid undesirable types of interaction, pre-existing policies can be reviewed, rather than adjusting the carbon tax.

579. For example, fossil fuel subsidies are a countervailing policy. Ideally, they should be removed before carbon taxes are introduced to avoid confusion, uncertainty, and potential rejection from the public.

580. The gradual removal of fossil fuel subsidies and the implementation of carbon taxes should both have the same goals, namely, to reduce carbon emissions and price environmental externalities caused by excessive fossil fuel consumption.

581. Nevertheless, even when fossil fuel subsidies have not been completely phased-out, governments can introduce carbon taxation. To improve public acceptance of this reform, it is crucial to inform the public that a carbon tax will be gradually introduced and that this will imply a reduction in fossil fuel subsidies, that over time the subsidies will be removed, and a positive carbon tax will be in place.²⁴³

582. Institutional development facilitates the design of effective carbon tax policies and plans, to phase-out fossil fuel subsidies and achieve critical and necessary economic, social, and environmental objectives (i.e., meaningful carbon emission reductions). This is especially true in resource-rich countries where fossil fuel subsidies have been an instrument for sharing the revenues from local fossil fuel production.

583. Policymakers must be aware of the trade-off between the long-term climate change effects of maintaining fossil fuel subsidies, and the short-term expediency of retaining political acceptance by keeping fossil fuel subsidies. Fossil fuel price reforms will be more likely to be successful and effective if there is extensive consultation, as informed citizens are more likely to accept carbon tax policies (see Chapter 3).

584. Clarity on the scale and scope of fossil fuel subsidies informs policymakers and relevant stakeholders. Tools for fossil fuel subsidy assessment and review have been developed by several international organisations.²⁴⁴ Governments and other stakeholders can use this information to evaluate the environmental and economic effects, and design effective fossil fuel subsidy reforms (See Appendix 4).

243 See Chapter 3.

244 See for example UNEP, 2019.

585. However, fossil fuel subsidy reform and carbon pricing will increase energy prices; therefore, targeted compensation for low-income households may be necessary. Cash transfers, investment in public services or environmental investments may be considered.²⁴⁵

586. Interactions with potentially overlapping policies, for example, through a pre-existing energy taxation, could also be managed by adjusting the energy taxation.

5.3 Ensuring policies are complementary

587. Adjusting existing energy taxation can become complementary to carbon taxation policies, for example, by substituting energy taxation with a carbon tax for specific products.

588. Carbon taxation can support innovation and investment in low-carbon technologies. Volume-based energy taxation may not be a sufficient price signal to reduce carbon emissions, since installations may generate the same result with less volume. When high carbon content fuels, such as coal, are covered by a carbon tax, complementary to an energy tax, there is a stronger incentive for innovation towards lower carbon emission fuel alternatives.

589. Policymakers should consider whether a higher carbon tax can increase the incentive to reduce carbon and if it is economically sustainable. In case the carbon cost from the overlapping instruments is considered excessive, mitigating instruments are available and can be included in the carbon tax when it is introduced.

590. However, introducing multiple instruments may duplicate efforts. The cost and resources that industries require to comply with overlapping policies can be broadly grouped into two areas: administrative costs that include the regulatory compliance costs, and the carbon price.

591. An example of an overlapping approach, that ends up working as a complementary policy, is a carbon tax set at the minimum price for a pre-existing ETS. Abatement options will be determined by carbon price signal through the ETS; however, the carbon tax will reinforce or stabilise the price signal and ensure a price floor. Moreover, the tax can positively influence excessive price volatility which can be a problem with an ETS.²⁴⁶ The United Kingdom has taken this approach with the introduction of its carbon tax.²⁴⁷

245 See Chapters 7 and 9 for a discussion.

246 Fluesand van Dender, 2020.

247 Smith, 2008.

6. Hybrids

592. Interacting policies can also be combined into one instrument, creating a hybrid instrument. Hybrids can be created by combining various instruments and different aspects of carbon taxation. For example, a hybrid option can introduce a carbon tax system linked to emission allowances or credits through a linked fee, which is a tax linked to the carbon price in an ETS in the same economy²⁴⁸. It is also possible to introduce a carbon tax with features of an ETS with offsets, for example.

593. One of the first hybrid systems to be set up was the Australian carbon tax. This explicit carbon pricing instrument was introduced as an ETS, with certificates and allowances set up, but trading of the certificates was unavailable for the first 5 years. In absence of a market, the carbon price per tonne was pre-set by the issuing authorities in the first 5 years. However, once the market is established, trading sets the price. As carbon emissions are priced in the market, the expectation was to link the ETS to the EU ETS market. The system came into effect in 2012 but was repealed in 2014, having never reached the stage where the market was established and the link became effective.

594. In case there is a pre-existing energy tax framework, a carbon tax can be integrated in the energy tax framework and can become a carbon tax component of the overall taxation of energy products. Carbon taxes in several countries are integrated with the excise tax system for energy products. For example, this is the case in the Nordic countries, France and Mexico as is further discussed in Chapter 4.

595. The main advantage of using a hybrid system is that rather than adding an additional instrument to a pre-existing policy, the existing system can be adapted with features from the carbon tax. A hybrid system can be a more effective use of resources, as it does not require a duplication of implementation and administration. However, adding features of other instruments may complicate an existing instrument unnecessarily, therefore it can be easier just to introduce the second instrument.

7. Conclusion

596. A carbon tax is implemented in the context of a sophisticated and interrelated policy landscape. Policies and regulations already in place may, therefore, have considerable interactions with the tax and enhance or inhibit its effectiveness, or even prompt additional administrative requirements for effective implementation.

248 The linked fee covers targeted entities that lie outside the ETS, and the fee is determined by a historical value of the carbon price under the ETS, adjusted on a periodic basis. A linked fee might occur because of a compromise between regulators who wish to put a sector under the ETS, and the regulated party who advocates for a straight tax.

597. This chapter discussed the different types of instruments and examined possible interactions between the carbon tax and other policies and instruments. It also explored different approaches and challenges to deal with these interactions. Clarity on the different interactions and challenges associated with other interrelated policies and instruments is essential for effective policy implementation and should be one of the central issues assessed by policymakers in the design and implementation of a carbon tax.

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