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Item 3(h) of the provisional agenda
Environmental tax issues
Chapter 6: Carbon Taxation: Interaction with other instruments
Carbon Taxation Handbook

Note by the Secretariat

Summary

Chapter 6, **Carbon Taxation: Interaction with other instruments,** is presented to the Committee FOR DISCUSSION at its 21st Session.

The Committee has been updated, in previous session, of the status of the Chapter outline, although the current 21st Session is the first time that the Chapter is presented in draft form.

When introducing a carbon tax, policymakers should not do so in a vacuum; rather, they should take into consideration the existing policy framework in their jurisdiction, and assess which other policies might interact with a new carbon tax. Different specific features of the new carbon tax, or of any existing instrument, can determine whether the effects of the interaction will be positive, negative or neutral.

Chapter 6 aims to address the interaction between a carbon tax and a range of other instruments that (implicitly or explicitly) put a price on carbon, or conversely that reduce the cost of products that contain carbon, including (i) other carbon pricing instruments (both explicit, such as emission trading schemes, and implicit, such as emissions standards); (ii) other taxes, in particular energy taxes (excises and consumption taxes); and (iii) instruments that reduce the price of carbon, such as subsidies.

The effects of these interactions can range from influencing the effectiveness of the carbon tax, to influencing the administrative implementation aspect of the carbon tax and the burden that it puts on the implementing authorities, collectors and payers.

The Chapter assesses those interactions by using a goal-oriented approach, i.e. for each instrument, the chapter discusses whether introducing a new carbon tax would reinforce or weaken the intended policy goals that the tax intends to achieve. For example, considering that a carbon tax aims to reduce carbon emissions, policymakers should think about how this goal would be affected if they introduce a carbon tax within an existing framework of fossil fuel subsidies.

With respect to Chapter 6, the Subcommittee would like to hear the views of the Committee

in particular on four issues:

1) The scope of the Chapter as outlined in section 6.1.1 (i.e. what is covered or not covered), namely:

   The Chapter covers the interaction between a carbon tax and:

   (i) other carbon pricing mechanisms (e.g. emissions trading systems);
   (ii) other mechanisms taxing carbon or fuels (e.g. fuel levies); and
   (iii) instruments reducing the price on carbon (e.g. fossil fuel subsidies).

   The Chapter does not cover:

   (i) administrative issues (covered in Chapter 4);
   (ii) interaction with other policy drivers of an economic and social nature, e.g. competitiveness; distributional equity; carbon leakage; etc. (covered, to some extent, in Chapters 2, 3C, and 5);
   (iii) interaction between the carbon tax and other incentives to support research, development and innovation (because of the complexity of the subject).

   Does the Committee agree with the proposed scope?

2) The approach used to assess the interaction between a carbon tax and existing instruments as outlined in section 6.1.2. The Chapter currently assesses, for each instrument, what are the potential consequences of introducing a carbon tax with different approaches:
   - without taking into consideration the existing policy framework;
   - to supplement existing instruments;
   - to complement existing instruments; or
   - to establish a hybrid form of carbon pricing (e.g. additional to an ETS).

   An alternative approach could be to classify the policy interaction as complementary, overlapping and countervailing.

   Does the Committee agree with the proposed approach, or would it prefer the use of an alternative approach?

3) Does the Committee agree with the level of detail in Sections 6.2.1-6.2.2, i.e. the discussion of the main characteristics of an ETS, and its advantages/disadvantages as compared to a carbon tax?

4) The scope of Section 6.3, which currently discusses the interaction between a carbon tax and energy taxes (on the production or consumption of fuels or energy). The Subcommittee would like to hear the Committee's views on whether the interaction with any additional taxes, besides energy taxes, should be considered.

5) The scope of Section 6.4, which intends to cover the interaction between a carbon tax and fossil fuel consumption subsidies. The Subcommittee would like to hear the Committee's views on whether the section should include:

   (i) Views on whether a fossil subsidies reform is needed prior (or in conjunction to) introducing a carbon tax, to avoid negative interactions; or whether a carbon tax can be introduced first, and subsidies phased out more gradually;

   (ii) Discussion about the concrete policy and implementation aspects that developing countries might want to consider, when introducing a carbon tax in conjunction with a more fundamental reform of fossil subsidies.

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Chapter 6: Carbon Taxation: Interaction with other instruments

6.1 Carbon tax: to be considered in context

1. A carbon tax does not exist in isolation, and therefore it should not be considered, designed or introduced in a policy vacuum. Various rules and regulations (also related to other taxes) could have an impact or relevant interaction with a carbon tax. The interactions can range from influencing its effectiveness, to influencing the administrative concerns and requirements that will be needed to implement the carbon tax and the burden that it puts on the implementing authorities, collectors and payers.

2. When considering introducing a carbon tax, it is relevant to consider what other instruments are already in place that could influence the effect of a carbon tax, by putting a price on carbon or placing a burden on products that generate carbon emissions; some examples of this are energy taxes, emission trading schemes, fuel taxes etc. On the other hand, there might be instruments in place that achieve the opposite result of a carbon tax by reducing the final-user cost of products containing carbon (e.g. fossil fuel subsidies).

3. Carbon taxes contribute to the cost-efficient reduction of carbon emissions. They can be effective even if other instruments are already in place that regulate, price or tax carbon or fuels. Key interactions should be taken into account in the policy design process to ensure good results.

4. The interaction between a carbon tax and other instruments can be positive or neutral, in that the various rules and regulations reinforce or support each other. The interaction could also be negative, when various rules are designed or applied in a way that they adversely affect each other; or where the carbon tax undermines the effectiveness of other instruments set up for achieving the same or even different policies, and *vice versa*.

5. The objective of this Chapter is to outline the main instruments that could be already in place to put a price on carbon or energy or that subsidize the price of fossil fuels; and to outline some considerations on their interaction with a carbon tax. Policymakers should approach the following sections by considering what instruments are already in place; what is the overall objective they are trying to achieve (i.e. carbon emissions reduction; revenue raising; and/or technological development), and whether a carbon tax can be appropriately combined with existing instruments to help achieve those objectives. Overall, a carbon tax can successfully be introduced even when pre-existing instrument are already in place, as long as those instruments are duly identified, understood and their interaction considered in the design as well as the implementation of a carbon tax.

6.1.1. In scope: carbon tax to carbon taxation

6. In general, a carbon tax can interact with a broad range of rules and regulations, related with energy, carbon, the environment as well as economic development and the treasury. This chapter will not consider interactions with all these rules and regulations; it focuses on how a carbon tax fits into the larger context of carbon taxation – i.e.:

- other carbon pricing mechanisms (e.g. emissions trading systems),
- other mechanisms taxing carbon or fuels (e.g. fuel levies); as well as
- instruments reducing the price on carbon (e.g. fossil fuel subsidies).

7. Besides interactions of design, there are certain interactions that could improve or undermine effective administration of a carbon tax system. Since administrative interaction is largely covered in Chapter 4, it will not be the focus of this chapter. *[Interaction with other Chapters still to be further updated and reviewed.]*

8. As elaborated in Chapter 2, the main motive for the introduction of a carbon tax should be to achieve a reduction of carbon emissions. The implementation of a carbon tax might also be driven by the intention to raise revenue and the objective to support innovation and investment in low carbon options. Other considerations could influence specific design features of a carbon tax, such as ensuring a competitive investment climate, avoiding carbon leakage, addressing potential adverse effects on low income households or other distributional effects. To support these drivers, specific design features can be introduced in the carbon tax itself; or otherwise, policymakers can introduce additional complementary policies. For example, carbon leakage can be avoided by reducing the carbon tax rate for specific sectors, or exempting specific activities at risk of carbon leakage; alternatively, a separate instrument could be implemented to compensate firms for the negative impact. Interactions with such policy drivers will not be covered in this Chapter.

9. As for the innovation and support for investment in low carbon options, a well-designed carbon tax should drive energy users and consumers to lower-carbon products and services; this will not only support carbon reduction but also generate revenues to be invested in low-carbon solutions and innovations. Depending on how the carbon tax is set up and on the low-carbon options available,

the introduction of a carbon tax may not be sufficient. Targeted [tax] subsidies or incentives[1] may be needed to support investment in low carbon technology and innovations. These tax subsidies will not be covered in this Chapter.

6.1.2. Assessing the interaction

10. Policy development without considering context can lead to multiple instruments being applied to the same sector, often set up by different policy makers, and in some case with adverse impacts. In fact, environmental and carbon-related policies are often designed and implemented by different government entities, and often at various levels of government; ensuring consistency requires active coordination. Careful policy design and implementation is required to understand the potential for overlap so it can be avoided where appropriate. For example, overlapping policies might impose a carbon price on end users (while policymakers intended firms to bear the carbon price), or vice versa; this will in turn force economic actors to make choices that may not be the most cost effective, considering the available resources and technology, thus driving up the total cost of the solution for the economy as a whole.

11. On the other hand, no single policy may be able to achieve all the desired objectives of policy makers for the economy as a whole or for specific sectors. In practice, policymakers resort to different policy approaches to achieve decarbonisation, often alongside separate but linked policy objectives on air pollution, energy security, revenue raising, economic development and job creation.

12. The solutions to achieve policy coordination will vary by country. Different countries have different needs depending on local circumstances and these different needs will be balanced in different ways: their development priorities, types of economy, domestic energy resources, ability to invest and national energy policies. Hence, a multitude of interactions can exist. To allow a

[1] In the framework of energy transition, subsidies and tax incentives seem most sustainable if they meet a number of 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 focused 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]

meaningful assessment of these interactions, the chapter will focus on how the main types of carbon tax [*see Chapter 3*] interact with instruments [*as limited in 6.1.1*.] in the following ways:

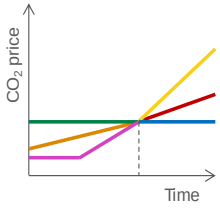
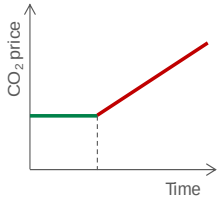
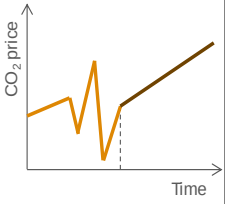
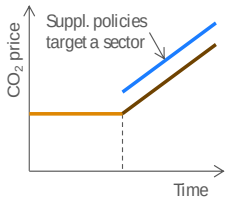
- there is a multitude of interacting measures, with the carbon tax introduced on top;
- the carbon tax is introduced as a supplementary measure;
- the carbon tax is intended to complement existing measures; or
- the carbon tax is intended as a hybrid form of carbon pricing.

13. Supplementary measures are measures applied on top of a main instrument of carbon pricing, already available within a sector. They have the potential to undermine that main policy instrument if they push economic actors away from the least-cost carbon mitigation options. Complementary measures, on the other hand, are instruments with additional components that reinforce the intended policy approach within a sector. Examples of complementary and supplementary measures can be found in figure 6.1. A hybrid option would be to set up the carbon tax with non-standard features, so that it can morph into another instrument at the occurrence of certain conditions, and achieve deeper decarbonization. Such conditions might be the occurrence of a certain price stability, the lapse of a certain amount of time to adjust to the price signal, or other pre-determine signals.

14. These types of interaction will be considered in view of whether they hinder or support the policy goals identified in chapter 2 as the main motives for the introduction of a carbon tax: carbon reduction, the support for investment in low carbon options and carbon reducing technologies and the generation of revenue. In different cases, introducing a carbon tax on top of another pre-existing system can give rise to positive interactions for one of the motives, whilst not giving rise or even give rise to negative interactions for another motive. The assessment should allow policy makers, who are clear about their motives for introducing an additional instrument, to assess what kind of interaction would be preferred.

[Figure 6.1 below gives an indication of how policymakers around the world are increasingly using multiple, hybrid, complementary and supplementary policy approaches with regard to carbon and decarbonization. As the figure below comes from an older publication with incomplete references, the Subcommittee proposes to redo the figure by keeping the top 2 rows (they explain interactions well) and adding different examples at the bottom, once additional input is gathered and/or a more recent reference to similar material can be used]

Figure 6.1 Types of policy approaches used to support decarbonization around the world

Policy archetype	"Multiple"	"Hybrid"	"Complementary"	"Supplementary"
				
Description	Testing different policies in different regions and sectors to determine most effective policy measures	Begin with early impact policy; then ramp up into policy that delivers more reductions	Complementary measures enhance the effectiveness of main policy approach within a sector	Supplementary measures appear outside of the main policy approach to target a sector
Examples	▪ United States (state led climate policies, regional carbon trading, federal GHG emission standards) ▪ China (CO_2 tax, energy intensity goals, renewable mandates, regional and city carbon markets trials) ▪ Brazil (carbon trading being trialled in State of Rio with potential for a national carbon market, large scale biofuels deployment, forestry) ▪ India (expanding energy efficiency trading system to transportation fuel efficiency; solar cities plan)	▪ Australia (carbon tax starts in 2012 with a rising price over 3 years, then transitions into a 'cap and trade' system with a price cap and allowing for import of international UNFCCC credits) ▪ New Zealand (fixed fee today, moving to potential open market with Australia, farming emissions remain an issue) ▪ South Africa (2011 National Climate Change Response Paper recognizes mix of economic instruments including carbon taxes and ETS)	▪ Europe exploring ways to reduce price volatility in EU ETS carbon market and support low-carbon economy investment via an auction reserve price or a carbon price floor ▪ California exploring an alternative compliance "buy out" mechanism for its Low Carbon Fuel Standard to generate a steady forward price signal for biofuel investors ▪ NER300 crediting mechanism for CCS demonstration is funded through the auctioning of EU ETS credits	▪ Emissions Performance Standards are being proposed in Europe for the power sector on top of the EU ETS ▪ Clean energy standards and renewable energy mandates provide an implicit CO_2 price but may not enable least cost GHG pathways in their sectors ▪ Energy efficiency mandates being proposed in Europe will overlap with the EU ETS and depress CO_2 price ▪ EU energy tax / carbon tax will overlap with GHG approach of Fuels Quality Directive for road transport

6.2. Interaction with other carbon pricing policy instruments

15. Imposing a carbon price[2] throughout an economy is a powerful mechanism to reduce carbon emissions.[3] It will put a price on the carbon involved to produce a product or service, explicitly or implicitly. The pricing is delivered:

- Explicitly, through direct instruments, as an emissions trading scheme or a carbon tax;

[2] 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, how various organisations and economic participants internalise the Price of carbon in their economic decisionmaking.

[3] See Chapter 2 – additional information and references can be provided

- Implicitly, through indirect means, e.g. command-and-control instruments such as emissions performance standards, clean technology mandates or energy efficiency standards.

16. The focus of this subchapter will be on the explicit pricing schemes – emission trading systems and carbon tax and how they could interact. It intends to assess the case where a carbon tax would be considered or implemented in countries or areas where another explicit carbon pricing scheme already exists. It does not cover how and whether to make a choice between various instruments[4].

17. Other instruments, for example energy taxes, could also put a price on carbon in an indirect way. The interaction with energy taxes is therefore very important to consider when introducing a carbon tax and is further elaborated on in section 6.3.

6.2.1. Explicit carbon pricing schemes

18. There are two main approaches to delivering an explicit carbon price:

- through emission trading systems [ETS]; or
- through a carbon tax.

The differences between them and their potential interactions are explained in the table below.

Policy	Description
	PRICE-BASED INSTRUMENTS
	Emissions Trading Systems (ETS)
Cap and trade	A form of ETS where total carbon emissions are capped. "Allowances" to emit carbon dioxide are allocated or auctioned up to the cap[5], and a market allows participants to buy and sell allowances in line with their emissions. The cap determines the supply of

[4] The WorldBank Group monitors and reports on carbon pricing introduced and choices made between instruments in "State and Trends onCarbon pricing"

[5] The cap: The principal objective of an ETS is to place a cap on the amount of carbon which can be emitted from entities in scope of the legislation in order to meet a specified limit on CO2 emissions. In most cases the cap reduces year on year. The overall cap is accounted for by issuing a corresponding number of allowances, whereby one allowance is equal to one tonne of CO2 emitted. Allowances are issued by and must be surrendered to the regulating authority for each tonne of CO2 emitted. Allowances can be traded between the regulated entities that are in scope for the carbon pricing scheme. Those with abatement costs lower than the prevailing allowance price will reduce their emissions and either sell or not be required to buy allowances. Those with abatement costs higher than the market price will purchase CO2 allowances to cover their emissions and surrender them to the authorities.

Policy	Description
	allowances[6], which is fixed, and as such the cap, when set consistent with the target reduction, would be the primary method of creating scarcity for the permission to emit carbon dioxide. The trade aspect[7] allows flexibility in the system, to apply the cap where abatement costs[8] are lowest. Project mechanisms - such as the -now defunct- UNFCCC Clean Development Mechanism (CDM) can provide participating entities with cost-effective offsetting opportunities (see chapter 2.2.3 for more details on the benefits of integrated markets).
Baseline and credit	This is another form of ETS[9], in which a baseline is set for emissions. If point source emissions are below a CO_2 benchmark, a tradable credit is issued. If emissions are above the benchmark, the entity must either purchase credit to account for the emissions and surrender it to the regulator or pay a $/tonne CO_2 fee. Unlike a C&T system, it does not set an environmental goal. As the participants in this system only includes the participants exceeding the baseline, this system generally reduces the number of market participants, which may reduce the liquidity and flexibility in the system.
	Carbon tax
Carbon tax	A carbon tax is levied on CO_2 emissions and is a form of explicit carbon pricing. In general terms, a carbon tax fixes the price of CO_2 and allows the amount of carbon emissions to vary, whereas in C&T, a cap places a limit on CO_2 emissions, letting the market price of allowances vary. A carbon tax misses the absolute cap and therefore has no direct link to the targeted CO2 reduction. It does offer more stability in the pricing.

[6] Under an ETS, allowances are either sold via auctions or distributed for free. Trade exposed industries, which operate in international markets and face competition from installations not covered by CO2 regulation, are generally given free allowances to account for the asymmetry in regulation and associated costs across jurisdictions, in particular when these trade-exposed sectors are energy intensive. Increasingly, the power sector is required to buy all of its allowances because electricity is a mostly local, non-exported product for which, therefore, less risk of carbon leakage exists. Over time, as CO2 policy becomes more widespread, the degree of free allocation is expected to reduce in trading schemes in place. Benchmarking is often used to set the level at which sites get 100% free allowances and installations receive free allowances with respect to this level, but in principle any number of rules could be used to allocate allowances.

[7] Allowances are traded either bilaterally, directly between compliance entities, or via an exchange. Most trading occurs on the derivative products such as futures or forwards, i.e. a price is agreed today for delivery of an allowance at a point in the future, which normally corresponds to when the exposure will occur. As an example, in the EU, power companies purchase allowances under the EU ETS to cover their emissions exposure for up to four years ahead.

[8] Carbon abatement costs refer to the cost of replacing higher carbon emission choices with lower carbon emission choices. A “negative” carbon abatement cost exists when low-carbon choices actually cost less than high-carbon choices. A ‘positive” carbon abatement cost exists when low-carbon choices cost more than high-carbon choices.

[9] E.g. the Canadian province of Alberta uses this type of system.

19. Hybrid systems exist as well, introducing tax systems linked to emission allowances or credits. One example would be a linked fee, which is a tax linked to the carbon price in an ETS in the same economy. The linked fee covers targeted entities that lie outside of the ETS, and the fee is determined by an historical value of the carbon price under the ETS, and adjusted on a periodic basis. A linked fee might occur as a result of a compromise between regulators who wish to put a sector under an ETS and the regulated party who advocates for a straight tax. Other examples of such systems will be discussed when dealing with the interaction between explicit pricing schemes.

6.2.2. Interaction between main explicit pricing schemes

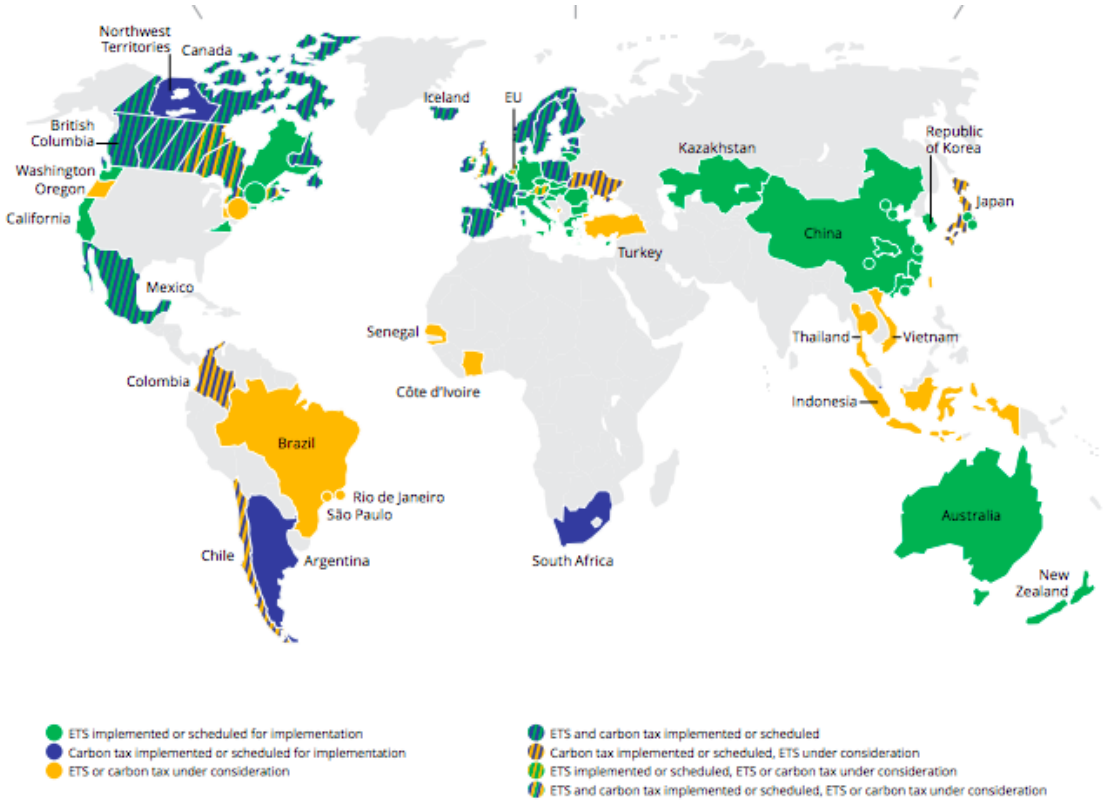
20. Public policy to impose a cost on CO2 emissions is used (or under consideration) in many countries to achieve the goal of limiting global warming and climate change[10].

21. Governments in many parts of the world have introduced, or are considering, carbon pricing as a key climate policy tool. Whilst in several countries the chosen approach has been an emissions trading system (ETS), other countries have introduced a carbon tax, or both[11].

Figure 6.2 Carbon pricing initiatives implemented, scheduled for implementation and under consideration

[10] In line with Sustainable Development Goal [SDG] 13 to take urgent action to combat climate change and its impacts.

[11] Graphs and overview on Worldbank carbon pricing website https://carbonpricingdashboard.worldbank.org/map_data



Source: World Bank State and Trends of Carbon Pricing 2020

6.2.2.1. Main similarities and differences between ETS and carbon tax

22. ETS and carbon taxes are broadly similar in producing an explicit price of carbon, and hybrid systems (which include features from both) are increasingly common. However, there are some differences in the main motives behind a carbon tax, as compared to an ETS. An awareness of these differences will be relevant to assess the interaction between carbon tax and ETS.

a) Carbon reduction

23. Carbon pricing stimulates the reduction of greenhouse gas (GHG) emissions at least cost to industry and society (i.e. cost efficiency). As both set an explicit price to carbon, both ETS and a carbon tax will contribute to transparent carbon pricing, inducing carbon emissions reduction.

24. In addition to a price, an ETS – especially cap & trade systems – will also set a cap to emissions, adding an additional carbon reduction feature within the core of its design. A carbon tax does not provide a cap but is dependent on the price it sets. Nevertheless, a carbon tax rate trajectory can mimic the cap tightening effects of an ETS.

25. Considering the current framework of the Paris Agreement, most carbon policies are being formulated at country or regional levels, rather than being driven by global approaches. As part of the Paris Agreement, countries outlined pledges to cut their energy-related anthropogenic emissions through their own nationally determined contributions (NDCs). As a tax is inherently local, it can be more suitable to ensure the swift introduction of a national price. This will be especially true in the case a country ETS would only be able to have limited trading because of a small market, limiting liquidity.

26. In line with the Paris Agreement, countries will require reporting with respect to their own NDCs, reporting that will likely be more linked to a national trading system than to carbon tax reporting. Whilst considering nationally determined reduction targets and relating pricing instruments, there are various examples of national and subnational ETS markets linking internationally. Creating a global market would create a level playing field for industry and consumers around the world and would stimulate cost-efficient CO_2 reduction. A global carbon tax would achieve the same end result. Linking national or subnational carbon tax systems has not occurred but carbon tax systems can be set up in a way that they consider the interaction between other national or subnational carbon tax systems.

27. As for the price, an ETS price is set by the market. Compared to a carbon tax, an ETS price will generally be less stable. Situations like the carbon reduction currently achieved through less economic activity as a consequence of COVID19 will automatically adjust the carbon price in the market. For a carbon tax, the price level adjustment will need to be legislated and is therefore the introduction of adjustments may take longer. More flexibility in carbon price under a carbon tax, for example through the possibility to update the tax rate, can be given to the Government under certain circumstances, by including a price path for adjusting the tax rate or certain features that would trigger automatic upward or downward revision.

28. A carbon tax will be legislated to occur at a certain point in the value chain, whereas an ETS tends to provide more flexibility as to where in the value chain the carbon reduction will be achieved.

b) Revenue raising

29. By setting an explicit price, both ETS and a carbon tax can effectively raise revenue. Both can be designed to recycle generated revenue, which can be used to support the deployment of low-

carbon technology, to contribute to general government budget, to support vulnerable households and businesses, or to reduce other taxes[12].

30. The revenue may not enter the national budget in the same way. A carbon tax will generally come into Treasury directly[13]. The revenue from the sale of allowances or credits on an ETS will generally be managed by different institutions, not resorting under Treasury or the Ministry of Finances. This management and need for additional transfer towards Treasury will require specific attention, especially with respect to national institutions low on resources.

31. Both an ETS and a carbon tax can deal with concerns from local trade exposed industries, e.g. by limitations of scope. ETS systems can consider free allowances, whereas a carbon tax can consider reductions in rates or exemptions. The options for protecting trade exposed industries under a carbon tax have been discussed in chapter 3C.

c) Support for investment in low carbon options and carbon reducing technologies

32. For carbon pricing to be effective in stimulating the uptake of low carbon energy options, as well as provide a price signal to develop low carbon technologies, the price needs to be sufficiently strong and stable.

33. As mentioned above, both instruments can recycle revenue[14]. In addition to the recycling of revenue raised by the instruments, an ETS has, in many schemes, offered the additional potential to raise additional revenue generated from auctioning additional free allowances to support low carbon technology demonstration.

6.2.2.2. Assessing interaction

34. When introducing a carbon tax, other types of carbon pricing mechanisms certainly need to be considered, especially when already in place.

a) Multiple instruments

[12] See Chapter 5 for interaction with social considerations.

[13] There are carbon tax systems that are managed outside Treasury as well, e.g. the Singapore carbon tax system. Alternatively, some carbon tax systems exist that allow contribution to a fund rather than paying the tax to Treasury.

[14] In the case of the EU ETS, programs like the NER300 directed auction revenues to help support low CO2 technologies.

35. Introducing a carbon tax without consideration on top of an existing ETS is likely to create unintended consequences. An uncoordinated combination of various instruments may impact the cost efficiency of these instruments and could give rise to unintended differences in carbon cost.

36. Policymakers should consider whether this is their intended objective, by taking into consideration whether a higher carbon price would achieve emissions reduction targets (at the lowest cost for society) and whether it is sustainable for economic actors. On the other hand, the carbon price from a single instrument may not be sufficient to stimulate investment in low-carbon technologies. In any case, introducing multiple instruments without consideration for interaction will duplicate the effort for government and taxpayers. The cost and resources that industry requires in order to comply with overlapping policies can be broadly grouped into two areas: administrative costs, which include the regulatory compliance costs, and the $/tonne price of CO_2.

37. Rather than introducing a carbon tax on top of another carbon pricing instrument without consideration, a more coordinated approach could be considered where instruments can reinforce the intended consequences, rather than exacerbate unintended consequences.

b) Hybrid system

38. A hybrid system is a carbon pricing system that has aspects of various types of carbon pricing instruments. The combination can be the result of policy design, where a system is set up with aspects of various types of carbon pricing instruments from the start. It can also be the result of an initial implementation of one system, e.g. because the features of one system were considered more appropriate to introduce a carbon pricing instrument, with later adjustments morphing or adapted the system into another system.

39. One of the first hybrid systems to be set up was the Australian carbon tax. The explicit carbon pricing instrument was introduced as an ETS, with certificates and allowances set up but with the trading of the certificates being unavailable for the first 5 years. In absence of a market, the price per tonne/carbon was pre-set by the issuing authorities in the first 5 years. Once the market would be established, the price would be released, and trading would set that price. The priced carbon was linked to carbon emitted. As the carbon pricing was set up as an ETS, arrangements had been made for the Australian carbon market, once established, to be linked 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, the price was released and the link became effective.

40. When considering the motives for introducing a carbon tax:

- The carbon reduction would be achieved through the one hybrid system. Rather than adding an additional instrument to a pre-existing instrument, the existing system could be adapted with features from another instruments.
- There would be no additional revenue raising. However, short term revenue raising could be more stable. Especially when setting up a hybrid system in order to link to other systems, the longer-term revenue raising could be increased as less benchmarking and carbon leakage adjustment would be necessary.
- The innovation support would have to be dealt with through the one system. However, in case the carbon tax would become more of a market-based pricing instrument, additional free allowances could be used for innovation support, creating additional funds.

41. Most other hybrid systems have been similar to the Australian system, setting up a certificates-based carbon pricing system without immediately setting up the certificates trade. Such systems would be generally more similar to an emissions-based carbon tax than to a fuels based carbon tax. When introducing an emission-based carbon tax, considerations for a hybrid system make sense as efficiency gains could be made in linking to carbon reporting. Especially in case there is an interest to link the national carbon pricing system to other carbon pricing systems [e.g. because of competition considerations], a hybrid approach could be of interest.

42. Recently, Germany has introduced an explicit carbon pricing instrument which also covers fuels.

c) Complementary approach

43. There are instances where alternative policies can complement an explicit CO_2 price signal from an ETS. Complementary measures can be defined as those which align with and reinforce a CO_2 price signal by addressing barriers to companies and individuals responding to the CO_2 price signal.

44. An example of a complementary approach would be a carbon tax, introduced as a bottom price for an existing ETS. Rather than intending to morph one system of explicit carbon pricing into another system, a complementary introduction of a carbon tax would reinforce or stabilise the price signal from the ETS. Overall, the abatement options would influence the carbon price in the ETS but in order to ensure a minimum price, an additional carbon tax instrument would be set up. The way the ETS price and the tax interact needs to be considered (price floor, additional, component of a minimum price), as the interactions will differ depending on the set up of the pricing instrument

already in place. This is relevant to policy as ETS's increasingly consider solutions to excessive price volatility, which can include combining them with taxes[15]. The UK has introduced such a tax[16]. The carbon pricing system for industry, currently considered in the Netherlands, is equally taking consideration of the EU ETS price in order to set the effective rate of the eventual tax, which would only be due to the extent the EU ETS price would dip below a certain pre-set level.

45. When considering this approach against the motives for introducing a carbon tax:

- The carbon reduction would be incremental from the introduction of a bottom price. The main instrument would drive the bulk of the carbon reduction. However, if the total permits in the system remain the same number, there might not be any change in emissions reduction.
- From a revenue raising point of view, it would only incrementally raise revenue (or not raise them at all). The carbon tax would largely not be due in case the other instrument would set a higher price. The compliance burden on the other hand would likely be increased for the country as well as for the taxpayers.
- Innovation and investment in new technologies would likely be boosted significantly as a minimum price would create a more predictable path for investment in carbon reducing technology.

46. A complementary approach for different instruments would be superior to just introducing multiple instruments without consideration. Considering the pressure on resources in developing countries, a more supplementary approach may be more interesting.

d) Supplementary approach

47. Where a complementary approach will see two instruments cover the same activities, the same carbon emissions, a supplementary approach would see a carbon tax introduced for activities, sectors, emissions not covered by another pre-existing instrument. Certain types of carbon pricing instruments may be more problematic to introduce for certain types of activities, e.g. an instrument

[15] https://www.oecd-ilibrary.org/taxation/carbon-pricing-design-effectiveness-efficiency-and-feasibility_91ad6a1e-en

[16] http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=COM/ENV/EPOC/CTPA/CFA(2007)31/FINAL&docLanguage=En
This document, written by Prof. Stephen Smith of University College, London, discusses the economic efficiency and practical use of environmentally related taxes, with some differentiation in tax rates, versus tradable permit systems, with some element of grandfathering of permits.

based on measuring specific emissions would be more complex to apply for carbon emissions resulting from private transport. Also, carbon abatement costs are not the same for all kind 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 supplementary instruments.

48. An example would be when a carbon tax is introduced for sectors which have not been covered by another carbon pricing instrument. Whilst an ETS works well for stationary emitters, it is more problematic to introduce for the transport sector. A carbon tax could work supplementary[17]. Its efficiency would depend on what sectors are to be covered and what fuels are used. E.g. a fuels-based carbon tax taxes the carbon content of a certain fuel. If a certain type of fuel is only used for a certain type of sector [e.g. kerosene being mainly used in aviation], a supplementary carbon tax could be very relevant. 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 the double taxation of the fuel used in the sector. Facilitating two different tax rates for the same fuel tends to be fraud prone.

49. When considering the motives for introducing a carbon tax:

- Supplementary introduction of a carbon tax would increase the overall carbon reduction in a country as it would increase the scope of carbon pricing;
- The revenue raising capacity would increase as long as the supplementary system would not target the same carbon within the same value chain;
- The support for innovation coming from the introduction from a carbon price would cover more sectors and would apply broader.

50. Introducing a carbon tax in a supplementary way could be very effective. Consideration would need to be given to the design to avoid overlap of the instruments. Cooperation with the policy makers responsible for other instruments as well as expected taxpayers would help to identify potential overlap in the design face when connecting early on.

[17] Michael Skou Anderson, "Europe's experience with carbon-energy taxation" – Veolia Environnement 2010 file:///C:/Users/An.M.L.Theeuwes/AppData/Local/Microsoft/Windows/INetCache/Content.Outlook/I3M0U0B8/sapiens-1072-3-2-europe-s-experience-with-carbon-energy-taxation.pdf

6.2.3. Implicit carbon pricing schemes

6.2.3.1. Implicit carbon pricing schemes and interaction with explicit pricing schemes

51. The alternative to an explicit carbon price would be rules and regulations such as emissions performance standards (EPS) or other prescriptive regulations resulting in implicit costs for carbon reductions, such as energy efficiency measures, energy mix targets and mandates.

52. EPS can be applied on stationary assets, as seen in the power sector in the USA, or to fuels (e.g. the California Low-Carbon Fuel Standard and the EU Fuel Quality Directive). Prescriptive regulations tend to be costlier for the industry because they require similar actions of multiple entities even if marginal abatement costs are different, and even if some entities could find cheaper methods of abating carbon. They provide little incentive for industry to innovate beyond the current requirement. However, standards and mandates can be a step forward towards market-based/explicit carbon pricing. This will be particularly relevant for non-OECD countries that have less capacity/capability to implement an ETS or a carbon tax mechanism.

6.2.3.2. Assessing interaction

53. Governments are continuing efforts to create explicit carbon price signals through market mechanisms. However, faced with the reality that the level of "effective" CO_2 price needed to drive the necessary changes may not be politically achievable, these efforts are being strengthened by less transparent measures such as technology mandates, emission performance standards and energy efficiency measures to create an implicit, less transparent and high CO_2 price.

54. Implicit carbon pricing policies have the potential to undermine an explicit carbon price, e.g. from an emissions trading system. In the context of explicit CO_2 pricing mechanisms like an ETS or a carbon tax, an overlapping policy can be described as any policy which results in additional emissions reductions beyond what would have been intended to and is driven by the ETS or tax. Distortions could include additional renewables targets, mandates or subsidies which support high cost renewable energy, badly designed energy efficiency measures and energy taxes and levies that alter the economics of investments, such as building a new CCGT. These policies will be more costly

in terms of reducing CO_2 emissions, compared to emissions reductions driven by an ETS[18] or carbon tax that reflects the marginal cost of abatement.

55. In the case of a carbon tax, overlapping policies undermine the carbon tax price signal, and lead to less cost-effective CO_2 abatement measures being undertaken compared to what would have been undertaken under the carbon tax.

56. Many of these actions are underpinned by a tacit expectation that, once sufficient momentum for change is generated, alignment of the objectives will result in harmonisation of policies under an explicit carbon price regime.

6.3 Interaction with other taxes

57. A carbon tax will generally be introduced within an existing tax framework which may include taxes on the production or consumption of fuels or energy[19], The forms of taxation that are most closely related to the carbon tax on fuels or emission, include types of indirect taxation on the use or consumption of energy and energy products, be it through excises, energy taxation or sales and consumption taxes on energy products or their consumption. When introducing a carbon tax, the interaction with energy taxation, with excises as well as with specific energy consumption taxes should certainly be considered.

58. Other forms of taxation could be relevant to the extent they impose an additional burden on energy and carbon throughout the value chain of producing and distributing energy and energy products. This subchapter will focus on the more indirect forms of taxation on transfer and consumption of energy. [*Need for contribution on these other forms of taxation to be assessed at this time]*

6.3.1. Energy tax, excises and consumption taxation

59. Levying taxes on energy products is fairly common. The tax can cover excise type levies, which are indirect taxes on the sale or use of specific [energy] products, or energy taxation which cover energy products, used for heating, transport or other purposes, as well as electricity.

[18] In the case of ETSs, overlapping policies reduce demand for tradable allowances under the cap causing the allowance price to fall meaning that the prevailing market price in the ETS could cease to be the primary driver of abatement action, since more expensive abatement options occurred, driven by the overlapping regulation;

[19] Further elaborated in Chapter 3A

Consumption taxes like value added taxation, sales taxes can also be levied on the sale of energy products for consumption. The scope and rates from such taxes are diverse[20].

60. Certain countries have a long history of taxing energy products[21]. When implemented in the past, these types of taxes were generally not introduced for environmental reasons, but rather as a fiscal instrument used to raise tax revenue or to limit dependency on energy imports.

61. Whether a long or a more recent history, having the infrastructure in place for taxing energy products, will generally provide a helpful framework for taxing carbon. Potential gains from interaction on the choice of type carbon tax or the collection of carbon tax will not be covered in this chapter[22].

6.3.1.1. Taxation of energy

62. Fuel excise taxes tend to form the most common type of energy taxation. In several countries[23], it is the main or only tax specifically covering energy use. Electricity excise taxes, levied on electricity consumption by end users, are also widespread.

63. As revenue raisers, energy taxation – in particular excise duties on petroleum products – continues to be a relevant and stable instrument. E.g. in the EU countries, energy taxation on fossil fuels constitute on average nearly 5% of their total tax revenue[24]. Estimates for OECD countries are similar[25].

64. Apart from being an effective revenue raiser, there is ample evidence that energy taxation has improved energy efficiency and reduced demand for energy. Once energy taxation attains a certain level, it tends to affect consumer behavior. E.g. since the introduction of the EU Energy Tax Directive, aligning energy taxation on fuel products in the 1990's, it has had influence on energy

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[20] The OECD monitors the use of energy taxation on a regular basis. https://www.oecd-ilibrary.org/sites/058ca239-en/1/1/1/index.html?itemId=/content/publication/058ca239-en&_csp_=733ba7b0813af580090c8c6aac25027b&itemIGO=oecd&itemContentType=book
"Taxing Energy Use in 2019: Using taxes for climate action" is one of the more recent overviews.

[21] E.g. Sweden has taxed petrol since 1924, diesel since 1937, and coal, oil and electricity for heating purposes have been taxed since the 1950's.

[22] Relevant interactions in this respect included in Chapter 3A

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

[24] https://ec.europa.eu/energy/data-analysis/energy-prices-and-costs_en?redir=1

[25] http://www.oecd.org/environment/indicators-modelling-outlooks/policy-instrument-database/

efficiency in Europe. The car market moved to more energy efficient cars in EU member states, rather than Europeans driving less.

6.3.1.2. Assessing interaction

65. Overall, a carbon tax will impose an additional cost burden on energy products. The additional burden will be immediately obvious when introducing a fuel-based carbon tax. The impact may be slightly more indirect when introducing an emissions-based carbon tax, especially to the extent that an emissions-based carbon tax could put an additional burden on products that are not immediately covered by an existing energy tax. The interaction between taxation on energy and a carbon tax can be assessed along the same lines as the interaction between carbon tax and other carbon pricing instruments.

66. Therefore, when a carbon tax is introduced, other existing taxation per unit of production, distribution and consumption of energy needs to be considered.

a) Multiple instruments

67. Introducing a carbon tax without consideration for 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 volumes rather than carbon. In the total absence of coordination between the different types of taxation, the effect of both instruments will not necessary be re-enforcing carbon reduction. A number of 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. E.g. running a car on biodiesel for 100km will require a higher volume of biodiesel than the volume of diesel required to run a car for 100km. The introduction of a carbon tax on top of an energy taxation without further consideration may therefore have contradictory effects.

68. When considering the motives for introducing a carbon tax:

- Multiple instruments without coordination will not likely provide an efficient price signal to ensure carbon reduction;
- The revenue raising capacity may increase by introducing an additional taxation. The long-term effects of uncoordinated combination of multiple instruments are unclear;
- The support for innovation coming from the uncoordinated introduction from a carbon tax on top of an energy tax may not be efficient. The price signals may provide contradictory

effects and not create a sustainable support for innovation as approaches supporting volume reduction may not align with approaches supporting carbon reduction.

b) Hybrid system

69. A carbon tax may be introduced by converting a pre-existing energy tax system to reflect a more carbon-based system of taxation. Especially a fuel-based carbon tax would lend itself to a hybrid form of carbon taxation. The energy tax would continue to tax energy used or sold per volume but rather than carrying a certain tax rate per volume of energy product or electricity, the tax rate could be based on the carbon content per volume of energy product sold or used.

70. When considering the motives for introducing a carbon tax:

- A hybrid system, moving a purely volume-based energy taxation into a carbon content based energy taxation, would likely provide a more effective price signal to carbon reduction than an ordinary energy tax system;
- The revenue raising capacity may or may not increase by morphing an energy tax system into a carbon content-based energy tax system. The increase will likely depend on the tax rates introduced, their relative difference, especially for no-carbon fuels. E.g. will no-carbon fuels carry a zero-rate energy taxation in the long term? If decarbonisation is mainly pursued through carbon taxes or similar price-based policies, then prices per tonne will need to be pushed up and revenues would rise in the short and medium run. However, in case of significant decarbonisation of fuels developed and used, a carbon content-based energy tax would eventually lose its tax base;
- Transforming a conventional energy tax system into a carbon-based energy taxation would support the innovation and investments in low-carbon initiatives. Low and zero-carbon initiatives would carry a lower energy tax burden than their carbon content rich fossil fuel alternatives, therefore stimulating the development of a market for such alternatives which carry a higher cost of production than conventional [fossil fuel] energy.

c) Complementary system

71. In case of there is a pre-existing energy tax framework, a carbon tax may be introduced in a complementary way. The carbon tax would be integrated in the energy tax framework and would become a carbon tax component of the overall taxation of energy products.

72. Carbon taxes in several countries are integrated with the excise tax system for energy products. E.g. this is the case in the Nordic countries, France and Mexico as further elaborated in Chapter 3A. In some cases, the carbon component is entirely additional to pre-existing excise taxes, whilst in other cases the carbon component would partly [or even fully replaces] excise taxes. Generally, one levy would be due on energy, comprising of various components. The various components and how much of the tax burden on the energy would relate to carbon would not necessarily be visible to the user. A system complementing an energy tax with a carbon tax component would be more easily applicable for a carbon tax based on the Fuel approach.

73. When considering the motives for introducing a carbon tax:

- A complementary system, where a carbon tax component is added to a pre-existing energy tax system, may not necessarily be a more effective tool for carbon reduction. It tends not to expand the tax base of the existing tax. Very often the various components of the tax on energy is not clear or detailed to the fuel user, often while administratively burdensome. This would constitute a less transparent price signal. Depending on the ultimate level of the total taxation and difference in total taxation between high and lower carbon fuels, the difference may not be sufficient to instigate a move to lower carbon options.;
- The revenue raising capacity of a complementary system may become more sustainable though. With the main objective of a carbon tax being carbon reduction, significant decarbonisation would eventually eliminate most of the tax base for a carbon tax. As the assumption would be that energy will be needed long after carbon is mitigated in energy products, a complementary system would retain at least part of its taxable base;
- Whether a complementary system would improve the support for innovation and investments in low-carbon initiatives depends on the composition of the overall burden as well as the transparency of the price signal. The effect on innovation from a complementary system would likely be better than uncoordinated multiple systems though.

d) Supplementary system

74. Under a supplementary system, carbon taxation would be introduced for energy production or the use of energy products that are not covered by energy taxation. Energy taxation systems can be fairly static as far as scope and taxable base is concerned. Often significant volatility exists with respect to the rates though.

75. The static approach with respect to scope would keep innovative uses of existing energy sources as well as new energy sources out of the scope of energy taxation. In order to steer new energy products like hydrogen or innovative uses of existing energy sources towards lower carbon options, it could be considered to keep such products out of scope for energy taxation whilst introducing a carbon tax for such new fuels.

76. When considering the motives for introducing a carbon tax:

- A supplementary system would have effect towards carbon reduction, E.g. where new – lower carbon - energy products would become subject to a carbon tax rather than an energy tax, but equally when some high carbon fuels, like coal would be covered by an additional carbon tax. It would steer innovation primarily to lower or even zero carbon alternatives. On the other hand, by keeping a solely volume-based energy taxation in place for existing energy products, existing energy use may not receive significant price signals to reduce carbon;
- The revenue raising capacity of a complementary system depends on the scope and framework of the existing energy taxation. Setting up a different system for different fuels, especially when focusing the carbon tax on low carbon fuels, may only slightly increase tax revenue whilst creating the need to expand the existing collection system as well as MRV requirements. However, in countries where energy taxation does not include high carbon fuels (such as local coal or petroleum production), or in countries with low and narrow energy taxes, a supplementary carbon tax could generate significant additional revenue;
- A supplementary system would improve support for innovation and investments in low carbon initiatives for the energy products coming in scope of the supplementary system. No such effect would become available for energy products solely covered by a traditional volume-based energy taxation.

6.4 Instruments reducing price on carbon, subsidies and incentive policy

77. When considering introducing a carbon tax, it is relevant to consider whether other energy policies are in place that reduce the cost and price burden on carbon or carbon products.

78. The carbon tax will explicitly put a price on carbon. The goal of carbon pricing is to create a change in the economy, whereby the market begins to differentiate between goods and services on the basis of the carbon released in their production or use. The carbon price, initially experienced by the producer or fuel provider, eventually reaches the consumer of the products provided and used.

Products with a high carbon footprint in production or use will become less competitive, either forcing their removal from the market or driving the manufacturer to invest in projects to lower the carbon footprint of production.

79. This subchapter considers instruments that interfere with the pricing of carbon or with the price of carbon reaching the consumer.

6.4.1. Fossil fuel subsidies

80. An important energy policy to evaluate when introducing a carbon tax in developing countries is the existence of consumption subsidies on fossil fuels. The interaction between such subsidies and carbon pricing is indeed especially relevant for developing countries that have still significant fossil fuel subsidies, and fundamental for their policy makers to address it and make a case on whether they should keep such subsidies. The introduction of a carbon price while still maintaining subsidized fuels could result mainly in significant and unnecessary complexity, and ineffectiveness of the carbon price.

[For consultation and feedback from the Tax Committee. Based on the considerations discussed in the Subcommittee, the intended introduction of a carbon tax in a country with consumption fossil fuel subsidies is expected to be hampered, unless accompanied or preceded by fossil fuel subsidy reform. The Subcommittee will formulate more specific recommendations to policy makers in case the Tax Committee agrees with this conclusion. In order for the Tax Committee to make an informed decision on the subject, the current section on Fossil Fuel Subsidies contains more background and technical information in its present form that the ultimate section on the subject in the Handbook would.]

6.4.1.1. Outlining and quantifying fossil fuel subsidies

81. More often than not, citizens have inadequate information about the scale of the subsidies; and the effects of fossil fuel subsidies on their countries' government expenditures and economies, and to climate change. By September 14, 2020, citizens of Venezuela and Iran pay US$ 0.02 and US$ 0.08 per liter of gasoline, respectively; while in Hong Kong, the liter of gasoline costs US$ 2.23 (GlobalPetrolPrices.com). Table 1 indicates that countries in the MENA region have the lowest average prices of gasoline. They are also the countries with significant economic (low growth and high unemployment among the youth), political and geopolitical problems.

Table 1. Average price of gasoline in September 2020 by Region. US$ per liter

LAC	*MENA*	*AFRICA*	*SOUTH ASIA**	*ECA*	*EAST ASIA*
0.88	0.60	0.90	0.86	1.02	0.84

* Excludes Hong Kong. LAC: Latin America and the Caribbean countries. ECA: Europe and Central Asia, excludes EU countries. MENA: Middle East and North African countries, excludes Israel

82. There are several ways to define and measure fossil fuel taxes and subsidies[26]. There is one well-known and useful method: Koplow's "price gap" method (Koplow (2009)). It quantifies deviations in energy prices within a country from world energy competitive prices. For fossil fuel importers, Koplow's price gap is equal to the domestic fuel retail price minus the average U.S. retail price, minus 10 US$ cents per liter. For the fossil fuel exporters, the price gap is equal to the domestic fuel retail price minus the average U.S. retail price, but now minus 20 US$ cents per liter. The price gap is negative when fuel is subsidized, or positive when fuel is taxed. As we will show, several countries tax their consumption of fossil fuels, but many subsidize fossil fuels, which means that their domestic fossil fuel prices are too low relative to international prices.[27]

83. This price gap is useful because it measures the size of the net tax or subsidy, even in the presence of i) government policies that affect fossil fuels at different points in the supply chain: taxing or subsidizing the extraction, import, refining, or transportation of fuel, in ways that ultimately affect the retail price; and/or ii) direct changes in the retail price by governments that are not necessarily taxes. The Koplow's measure renders an estimate of the aggregated effects of these policies (Mahdav et al. (2020)).

84. Certain countries kept their fossil fuel prices more or less fixed between 1998 and 2013, if one considers that oil prices before 2003 were relatively low. The gasoline subsidies in these countries

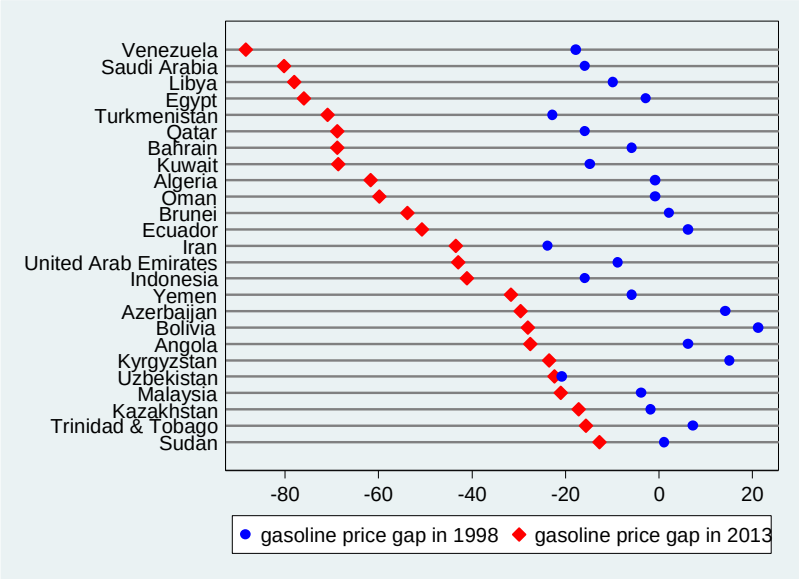
[26] For more information, the International Energy Agency systematically tracks energy subsidies and reports annually https://www.iea.org/topics/energy-subsidies. The OECD's work on fossil fuel support takes a more budgetary approach: http://www.oecd.org/fossil-fuels/

[27] Taking into account that the U.S. retail price data includes 10 US$ cents average gasoline tax, and the costs of transportation and distribution in the U.S. (U.S. Energy Information Administration), this "price gap" as measure of subsidies, is very closed to the IMF's "pre-tax" subsidy (see Footnote 1). This price gap considers the US prices as the international price and subtract the average taxes of 10 US$ cents to obtain the price gap for the importing countries of petroleum products. The price gap for exporters will subtract not only the 10 US$ cents taxes, but also the costs of transportation and distribution which we approximate to be 10 US$ cents in similar fashion as the IMF estimates its price gap for exporters of the petroleum product.

rose 142% over the period. It is also the case that for these countries, their average price gaps were more negative in 2013 than in 1998. See Figure 6.3.

85. Important reductions in fuel consumption and consequently CO2 emissions can be achieved by reducing fuel subsidies, and thus increasing domestic fuel prices. Such fuel policy reforms can be a significant instrument of climate policy. This is especially crucial for countries with high energy subsidies. Assuming a scenario with an increase in the price of diesel and gasoline by 20 US$ cents per liter, the reductions in the consumption and CO2 emissions can be from 90% to 10%, depending on the country and type of fuel. For example, Iran and Saudi Arabia can reduce their average annual CO2 emissions by 50% and 40%, respectively (see Mundaca (2017b)). Coady et al. (2015) also find that the MENA region as a whole could reduce on average CO2 emissions by 36%.

Figure 6.3. Koplow's fossil fuel gap prices ($ cents/liter). Subsidies (-) Taxes (+) 1998 & 2013



Source: Mundaca (2017b).

6.4.1.2. Main interaction with carbon tax

86. For certain governments, it is easier to subsidize fossil fuels, because it requires lesser administration and effort, than to design effective policies and develop institutional capacity to achieve more critical and necessary economic or social objectives (Pritchett and de Weijer (2010), Commander (2012), OECD (2007), Victor (2009), Whitley and van der Burg (2015)). To achieve meaningful CO2 emission reductions, also requires careful drafting of effective and efficient carbon tax policies. In view of the well-documented expected dramatic climate change with a business-as-usual policy, governments worldwide cannot afford to further sustain fossil fuel subsidies even when

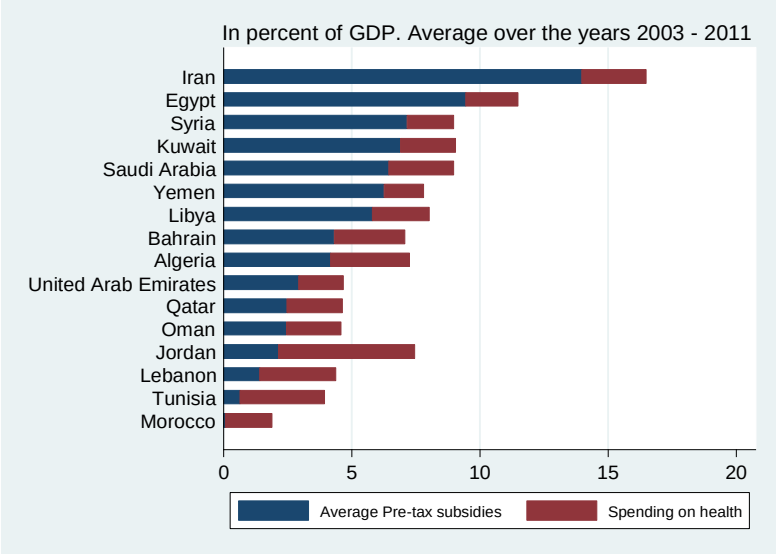
they are the easiest to implement and keep the citizens gratified. Growing fiscal deficits will have detrimental effects for the long-run economic development of the countries.

87. Any attempt to have fossil fuel subsidies and carbon taxes co-existing will be misleading and confusing to the public. Fossil fuel subsidies often are basically negative carbon taxes: with subsidies, one encourages citizens to consume fossil fuels at levels that are higher than optimal. Implementing subsidies and taxation at the same time, will only make the citizens uncertain about the actual goals and credibility of their governments. The removal of fossil fuel subsidies and implementation of carbon taxes should have the same purposes: to reduce CO2 emissions and all possible environmental externalities caused by fossil fuel consumption. Both policies should have the clear message: that the governments cannot afford unnecessary fiscal deficits; that the poor will be compensated to maintain their overall spending power; and that the environment needs to be protected.

6.4.1.3 Impact on government finances

88. The MENA countries have had, on average between 2003 and 2011, higher total expenditures on pre-tax fossil-fuel energy subsidies (to petroleum, electricity, natural gas and coal) than public expenditures on health. There should not be any doubt that these MENA countries will gain from reducing their fiscal costs due to energy subsidies, and spend more on public goods such as infrastructure, education and health. See Figure 6.4.

Figure 6.4. MENA Countries. Pre-Tax Subsidies and Spending in Health



Source: Mundaca (2017a)

89. The International Monetary Fund (2013) reports that on a "pre-tax" basis[28], subsidies to petroleum products, electricity, natural gas, and coal reached $480 billion in 2011 (0.7 percent of global GDP or 2 percent of global government revenues). The costs of subsidies are even higher among oil exporters. On a "post-tax" basis, subsidies are much higher at $1.9 trillion (2½ percent of global GDP or 8 percent of global government revenues).

90. Energy subsidies on imported fuels could be especially detrimental for governments' fiscal budgets since they in addition have to face the volatility of global oil prices and foreign currency.

6.4.1.4 Political concerns around fossil fuel consumption subsidy reform

91. In spite of these high costs and the ineffectiveness of using resources that could be otherwise used in productive public investments and lead to higher economic prosperity, governments are often reluctant to undertake fossil fuel price reforms. The reasons given are:

- Subsidies alleviate energy poverty, but in reality, it is only a small percentage of the population or specific economic sectors (certain industries, exports) that benefit from fossil fuel subsidies, and not always the poor population (Kirit Parikh Report (2010), Kitschelt and Wilkinson (2007); Van de Walle (2003); Ogbu (2012); Del Granado et al., (2012); Oosterhuis and Umpfenbach (2014)).
- Fear of mass unrest or violence should subsidies be removed (Cox, North, and Weingast (2013); North et al. (2007)).
- Scarce need of raising revenues from other sources, including fuel taxes, when hydrocarbon wealth produces large government revenues (Ross, 2012).
- The oil wealth in oil-exporting countries, is believed to belongs to the nation and its citizens, and confers on them a right to purchase fuel without paying more than the marginal supply cost, even when their disposable incomes rise (Beblawi and Luciani (1990); Hertog and Woertz (2013); El-Katiri (2014); Krane (2018); Mahdav et al. (2020).

[28] The IMF defines and constructs the "pre-tax" subsidy as the transfer to bridge the gap between domestic and supply cost. Coady et al. (2016) argue that since petroleum products are internationally tradable products, the supply cost when the petroleum product is imported is equal to the international fob price of the product plus the domestic transport and distribution costs. If the petroleum product is exported, the supply cost is the revenue forgone by not exporting the product, which is then the international fob price minus the cost of transporting the product abroad and domestic distribution costs. The IMF also calculates the post-tax subsidy that includes in addition an estimate of negative externalities from energy consumption, known as the Pigouvian tax. See also Parry and Small (2005) and Clements et al. (2013) for further details.

6.4.1.5 Political economy around fossil fuel subsidy reform

92. Persistence in keeping fossil fuel subsidies create and establish in citizens suboptimal consumption patterns of fossil fuels, especially for high-income citizens. Such behaviors are only exacerbated when they are not well informed about the costs of these subsidies to their governments. Consumption habits can become so deep-rooted that any attempt to remove subsidies, cause indeed immediate political instability. According to Mahdav et al. (2020) between 2006 and 2019, attempts to raise gasoline prices were followed by protests in at least 24 countries. The 1999 overthrow of Indonesia's Suharto government, Myanmar's 2007 “Saffron Rebellion," and France's 2018-19 “Gilets jaune" movement were results of resisting higher gasoline prices. In October 2019, a swiftly increase in fuel prices caused large protests in Quito, Ecuador which only led its President to back down and reverse the policy. Recently, in September 2020, protesters decried the recent hike in petrol prices and electricity tariff in the suburban city of Ojuelegba, Lagos, Nigeria.

93. Strand (2016) finds that when politicians expect to stay on power only for a short time, and rely on a small group of persons to be elected, energy subsidies will be high and public investments in infrastructure low. Misaligned electoral institutions that deliver policies to favor only special interest groups instead of the general public (Strand (2013); Armijo, Biersteker, and Lowenthal (1994), Bueno de Mesquita et al. (2004); Keefer (2011)); or allows clientelism (Kirtschelt and Wilkinson (2007)).

94. Fossil fuel subsidy reform, carbon pricing and regulations, can all lead to a period of economic adjustment that sees prices rise — at least in the short-term — while technology and innovation engulfed. The poorest need to be compensated with the losses that they will be incurring. In the meantime, citizens will find meaningful to switch to greener and viable consumption alternatives, and governments can use their savings from subsidies to make investment in for example education, health, and research.

95. If fossil fuel price reforms are not directly linked to environmental and credible fiscal policies, these reforms could go wrong if these reforms are poorly implemented, and not consulted and explained to the public. It is also most of the time desirable to implement fossil fuel price reforms in a gradual, predictable, incremental roll-out manner. Slow, continuous, and secure actions are highly likely posed to success.

96. Fossil fuel reforms could also become easier to implement if governments pay closer attention when world fossil fuel prices are low to facilitate phasing out subsidies. Most subsidizing countries keep the same level of subsidies even when world petrol prices are low. In parallel,

government should develop other programs that could contribute to reduction of fossil fuel consumption with the goal of reducing fiscal deficits and target the environment. For example, governments could invest in improving public transport or making low-carbon vehicles more accessible and affordable. Eventually, the removal of fossil fuel subsidies will stimulate innovation, and change the citizens' consumption patterns. The money saved on subsidies can also be used to fund climate-friendly programs that boost energy efficiency or renewable energy.

6.4.1.6. Assessing interactions

97. Any arrangement to reduce carbon emissions, either nationally or internationally, should consider the removal of fossil fuel subsidies. In contrast to reforms to substantially reduce carbon emissions, phasing out fossil fuel subsidies does not involve immediate significant technological challenges. Fossil fuel price reforms, together with the provision of economic safety nets to the poorest countries, can benefit the subsidizing countries overall in terms of higher economic growth and welfare, and reduction of CO2 emissions (Mundaca (2017 a,b).

98. Harmful fossil fuel subsidies create unnecessary fiscal and CO2 burdens on governments, can give rise to illegal activity and market distortions, and cause major environmental and economic problems. These subsidies also contribute to fiscal insolvency; divert resources away from productive public investment; lead to major distortions in the production structure; encourage wasteful fossil fuel consumption; benefit mostly high-income households who constitute a small proportion of the population; discourage investment in renewable energy; and increase fuel consumption to suboptimal levels. The latter critically contributes to global warming and environmental pollution. Such impacts are likely to affect the overall long-run economic performance and economic growth.