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Environmental Taxation

Co-Coordinators' Report

Summary

This note is presented to the Committee for comment and guidance.

At its 24th Session, the Committee considered note E/C.18/2022/CRP.9, which, among other things, set out the proposed workplan for the Subcommittee on Environmental Taxation under the current mandate.

Per the Report of the 24th Session, the Committee approved the proposed workplan along four broad mainstreams. The workstreams are as follows, with the specific areas for consideration within each workstream summarized in the annex to CRP.9: (a) the interaction of carbon taxation with other national measures; (b) the role of carbon taxes and other measures in supporting energy transition; (c) the interaction between carbon taxes and carbon offsetting programmes; and (d) carbon border adjustment mechanisms and how developing countries can avoid undesired spillover effects from the implementation of such measures by other jurisdictions.

The Committee also approved an additional workstream on other environmental (tax) measures other than a carbon tax that are relevant for developing countries.

The Subcommittee presents this document to the Committee for **comment and guidance** on the progress of work under the above workstreams. The Subcommittee seeks guidance generally on the progress of the work and on some identified aspects in connection with Workstream 2 (energy transition) and Workstream 4 (carbon border adjustments) as set out in paragraphs 13 and 23 of this CRP) as follows:

1. Workstream 2 (energy transition): The Tax Committee's guidance is sought with respect to the following:

- Selection of archetypes in para 2.1. of Annex B*. Given that we may also wish to illustrate the work product with case studies based on the archetypes, which would require access to capable local resources, are there better candidates (with similar characteristics) than the ones we have shown in the current outline?*

- Archetype assessment in para 2.2. of Annex B*. Whether the Subcommittee should consider any additional aspects in the framework for the archetype assessment especially as regards the scope, and if any other considerations should be taken into account?*

- Options with respect to environmental taxation under different archetypes in section 3. of Annex B*: The scope of the information in the tables in that section (showing the outcome of the analysis of such options) and whether any other aspects should be taken into account?*

2. Workstream 4 (carbon border adjustments): *The Tax Committee's guidance is sought on the* ***outlines in Annex D (under Parts B and C)*** *on* ***whether or not anything is extraneous or missing****? This particular point is especially based on the fact that the Committee noted at the 24th Session that, given the current state of development of carbon border adjustment mechanisms, without endorsing or rejecting the carbon border adjustment mechanisms or other such mechanisms developed by other bodies, the Subcommittee would consider those mechanisms from the broader perspective of their implications for developing countries.*

Background

1. At its 24th Session, the Committee approved the proposed workplan of the Subcommittee on Environmental Taxation as laid out in E/C.18/2022/CRP.9 along four broad mainstreams, with an additional workstream whose further work would be determined upon consultation with developing countries. The four main workstreams are as follows: (a) the interaction of carbon taxation with other national measures; (b) the role of carbon taxes and other measures in supporting energy transition; (c) the interaction between carbon taxes and carbon offsetting programmes; and (d) carbon border adjustment mechanisms and how developing countries can avoid undesired spillover effects from the implementation of such measures by other jurisdictions. The additional workstream is set to consider other environmental (tax) measures other than carbon taxes that are relevant for developing countries.

2. The Subcommittee has met three times virtually since the 24th Session of the Tax Committee in April, with various side meetings also with the Subcommittee on Extractives Industries Taxation and the Subcommittee on Transfer Pricing, as the work of these three subcommittees is closely related in various aspects, which were identified and advised to coordinate.

3. The Subcommittee has progressed work under the four main workstreams mentioned above, as discussed hereunder. As will be seen in the discussions on the workstreams, especially on energy transition, the work of the Subcommittee is closely linked to broader contextual considerations of the **sustainable development goals (SDGs)**, specifically SDG 13 (Climate Action). SDG 13 interacts with multiple SDGs including SDG 7 (Affordable and Clean Energy). Energy transition plays a crucial role in balancing these SDGs. Furthermore, the other workstreams address critical points, ensuring that carbon taxes speak to other national measures, equipping tax authorities with requisite knowledge to tackled complex matters such as on carbon offsets and the impact of carbon border adjustments. Eventually, all these objectives work to ensure that governments are able not only to protect their tax bases but can do so while sustainably implementing measures that address climate change and promote financing for sustainable development.

Progress under the various Workstreams

Workstream 1: Interaction of carbon taxation with other national measures in the context of a broader tax reform and particular attention to fossil subsidies

4. As a carbon tax is introduced in the context of other national measures and not in a policy vacuum, its interactions with existing national measures should be carefully assessed especially in the context of a broader tax reform. The Subcommittee has identified three key elements to pursue the discussions under this workstream in the following parts:
   A. How to assess and correct the interaction between carbon taxes and other taxes.
   B. Interaction between carbon taxes and other environmental measures (emissions trading and climate policy).
   C. Phasing out fossil fuel subsidies.

5. The scope of this workstream is extensive and may later be narrowed down depending on the needs of developing countries. The Subcommittee has decided to commence work on Part B, 'the interaction between carbon taxes and other environmental measures (emissions trading and climate policy)'. Parts 'A' and 'C' will be addressed thereafter.

6. Part B 'Interaction between carbon taxes and other environmental measures (emissions trading and climate policy)' will draw inspiration from the 2021 Handbook on Carbon Taxation for Developing Countries (Handbook) on various elements already covered there. For example, the Handbook addresses aspects of the importance of policy considerations when setting up a carbon tax. Broadly speaking, the outline of the chapter is as follows:

   - *Section 1: Introduction*: adds on to the current provisions of the Handbook by providing a different perspective, taking incentives of market participants as a central theme.
   - *Section 2: Relation to the Handbook:* This section will first summarize the key elements of interaction between carbon taxes and other instruments as set out in chapter 10 of the Handbook and then proceed to highlight the value added and the distinctive features of this current work in subsequent sections.
   - *Section 3: Insights on Instrument choice:* Taking incentives of market participants as a central theme, this section examines the advantages and disadvantages of the various instruments.
   - *Section 4: Inventorying instruments employed for climate policy:* This part identifies instruments employed in various jurisdictions to combat climate change. It will strive to take stock of the diversity of instruments used in various countries and examine how these instruments are designed.
   - *Section 5: Interactions between instruments:* Building upon the preceding section, this section will outline the interactions between the various instruments, paying particular attention to the pitfalls to be avoided by policy makers.

Further information is provided in Annex A to this note, which contains an annotated outline of chapter B on 'interaction between carbon taxes and other environmental measures (emissions trading and climate policy)'.

Workstream 2: The role of carbon taxes and other measures in supporting energy transition

7. In tackling the topic under consideration, and as per the Subcommittee mandate, this workstream will cover and manage: (i) interactions with the corresponding work on energy transition being discussed by the Subcommittee on Extractive Industries Taxation, including interaction with other tax systems (other than the environmental tax regime), (ii) possibly certain elements of offsets for which it refers and interacts with other workstreams (particularly that on carbon credits and carbon offsets) of the Subcommittee on Environmental Taxation, and (iii) carbon capture and storage, with a focus on environmental tax aspects.

8. The purpose of this workstream is to share knowledge and build capacity on the link between environmental taxation and energy transition. Specifically, it will consider how [environmental] taxation can support behaviour and activities that support energy transition and outline considerations on what the role of environmental taxation could be for developing countries' fiscal policy in an energy transition-driven environment.

9. The proposed deliverable for this workstream will include high level analysis of relevance of environmental taxation for energy transition. Energy transition provides a broader context than just carbon reduction, as it will consider how to decarbonize existing/'old' energy production as well as how to ensure availability of "new"/renewable energy. The focus of this workstream will be on environmental tax related aspects and options that consider the broader context.

10. Whereas the Subcommittee on Extractive Industries Taxation's workstream on energy transition focuses on energy transition issues for countries involved in fossil fuel extraction and on production, the initial focus of the Subcommittee on Environmental Taxation's workstream will be the role of environmental taxation in energy transition for countries not involved in fossil fuel extraction and on consumption.

11. As the pathway for an energy transition will strongly depend on the availability and potential for development of existing and renewable resources as well as the energy needs of a jurisdiction, a "one size fits all" analysis will not be appropriate. The analysis will consider archetype countries to assess what environmental taxation options are available. Whereas examples of the use of environmental taxation in energy transition can be used from developed and developing countries alike, it is intended for the archetype countries to be developing countries.

12. The workstream will be broadly structured as follows:

    - *Section 1:* High level considerations and aspects of energy transition and environmental taxation
    - *Section 2:* Identifying archetypes
    - *Section 3:* Options with respect to environmental taxation under different archetypes
    - *Section 4:* Depending on the options and time permitting, elaborating on specific environmental tax aspects.

    Further information is provided in Annex B to this note, which contains annotated outline of Workstream 2 on the role of carbon taxes and other measures in supporting energy transition.

13. The **Committee's guidance** is sought with respect to the following, under Workstream 2 (energy transition):
    - *Selection of archetypes in section 2.1. of Annex B*: Given that we may also wish to illustrate the work product with case studies based on the archetypes, which would require access to capable local resources, are there better candidates (with similar characteristics) than the countries we have shown in this outline?
    - *Archetype assessment in section 2.2. of Annex B:* Whether the Subcommittee should consider any additional aspects in the framework especially as regards the scope, and if any other considerations should be taken into account?
    - *Options with respect to environmental taxation under different archetypes in section 3. of Annex B*: The scope of the information in the tables in that section and whether any other aspects should be taken into account.

Workstream 3: The interaction between carbon taxes and carbon offsetting programmes

14. This workstream will consider carbon offsets and their interaction with carbon taxes, especially with a view to supporting developing countries to navigate the various aspects that such regimes might present, and to be able to benefit from such measures. The workstream aims to: (1) offer an overview of what is happening and how it justifies the tax authorities' action; (2) raise awareness and understanding of the framework provided by Article 6 of the Paris Agreement; (3) capture current problems in taxation and point out the core issues to address; and (4) ensure a coherent approach in qualification and valuation of credits.

15. The Subcommittee on Environmental Taxation, in accordance with the mandate received, is mainly dealing with the carbon offset credits related to carbon taxes (and their eventual aspects in connection with other environmental taxes, carbon pricing instruments, or the energy transition). For example, when a country has introduced a carbon pricing mechanism, such as a carbon tax, the national carbon tax legislation may allow a taxable person to offset his/her CO2 emissions within its territory with a carbon offset credit that s/he has bought voluntarily, and thus use it to be exempt, or pay part of the amount due of the carbon tax. Of course, this country would need to lay down rules to precisely determine which carbon offset credits are accepted, to what extent, how the emission reductions are verified, etc.

16. Certainly, carbon offset credits may be also relevant in the framework of the corporate income tax regime, to the extent that they can lead to deductible expenses in the case of a company that has bought them (i.e. as business costs in the context of sustainable management when making climate claims[1]); or to taxable profits in the case of a company that has sold them. Hence, considering the complex (often cross-border) lifecycle of carbon offset credits, it is important to clarify who taxes what, and where[2]. This Subcommittee is working closely with the Subcommittee on Transfer Pricing to help tax authorities to better understand this process.

17. The Subcommittee on Transfer Pricing is primarily focusing on the angle of income taxation. In particular, it will pay attention to the entities performing activities to abate emissions (considering the assets, functions and risks allocated), the quantification of costs and return on investment for the creation and recognition of the carbon credits –verified after meeting certain quality standards; or profits when sold. It will analyze how to set the prices in transactions among related parties (bearing in mind that market fluctuations usually occur since the credit is generated, transferred or retired, even outdated). It will care for the avoidance of double taxation as well.

18. While taking into account the interconnectedness of this work with that of the Subcommittee on Transfer Pricing, the work on environmental taxation is proposed to proceed according to the following outline:

[1] White, C., "Voluntary carbon offsets: The evolution of a business expense", *The Tax Adviser*, Vol. 53, No. 1, American Institute of CPA's, 1 de enero de 2022, pp. 18–24.

[2] For an extended explanation in Spanish, Grau Ruiz, M.A. (2022) "Los créditos por compensaciones de emisiones de CO_2 a la hora de 'descarbonizarse': el complejo debate mundial sobre el régimen tributario aplicable a los *carbon offset credits*", *Revista Técnica Tributaria*, No. 138 https://revistatecnicatributaria.com/

- *Section 1:* Introduction and concept
- *Section 2:* Interpretation of Article 6 of the Paris Agreement
- *Section 3:* Current practical country approaches and experiences, with particular attention to resource rich countries
- *Section 4:* How to allocate carbon credits in intercompany arrangements

Further information is provided in Annex C to this note, which provides an annotated outline of Workstream 3 on the interaction between carbon taxes and carbon offsetting programmes.

Workstream 4: Carbon Border Adjustments: Impact and relevance for developing countries

19. At its 24th Session, the Tax Committee approved the Subcommittee's proposal to undertake an analysis of carbon border adjustments (CBA) and spillover effects to developing countries, to the extent that such work will not be viewed as the Committee's rejecting or endorsing any mechanisms established by countries or regions. As such, the annotated outline provided on this topic in Annex D to this note is not intended to either recommend or oppose any particular measures but to share knowledge and identify the potential impacts.

20. Accordingly, the main focus of the workstream is on the potential impact of CBAs on developing countries and how they can respond to maintain a level playing field – i.e. to ensure that their industries are not adversely affected and to protect their tax base. However, as CBA is not the only method that can be applied to address carbon leakage, the paper will also consider what other ways can achieve this aim. Furthermore, as more developing countries introduce or strengthen carbon pricing and emissions regulation, they will also be impacted by the issue of carbon leakage from their own territories. The workstream therefore considers what developing countries can do to protect themselves from its impact.

21. The overriding purpose of this workstream is, primarily, to outline and share knowledge on what types of CBA exist and their implications. It will: (1) consider the effect of CBAs on developing countries and how governments could respond to reduce any negative impact; (2) consider whether there are other ways apart from CBAs for countries to address carbon leakage; and (3) consider how developing countries could address carbon leakage where it impacts on their own decarbonisation path.

22. The workstream is divided into three parts (A, B and C). The Subcommittee has started to develop Part A, where Parts B and C remain in outline form; comments and guidance sought from the Committee on whether or not anything is extraneous or missing. The current work follows the following structure:

- **Part A: Carbon leakage and ways to address it**
  - *Section 1:* What is carbon leakage?
  - *Section 2:* Principles for addressing carbon leakage
  - *Section 3:* Measures to address carbon leakage

- **Part B: Carbon border adjustment measures and proposals**
  - *Section 4:* Existing CBA proposals

- *Section 5:* Specific consideration on how developing countries can protect themselves from carbon leakage

- **Part C: Potential responses to CBAs**
  - *Section 6:* Impact of various proposals on developing countries
  - *Section 7:* How to assess the impact of a CBA
  - *Section 8:* Policy measures to address the impact of CBAs
  - *Section 9:* Compliance with a CBA

23. Under Workstream 4 (carbon border adjustments), the **Committee's guidance** is sought on the outlines under Parts B and C (as set out in Annex D to this note), specifically on whether or not anything is extraneous or missing.

Additional workstream: Other environmental measures other than carbon taxes

24. During the 24th Session, the Coordinators of the Subcommittee on Environmental Taxation mentioned that the Subcommittee would carry out consultations on other topics of immediate relevance for developing countries that are already contemplated by the mandate. For example, one potential issue would be to analyse environmental taxes other than carbon taxes, such as taxes relating to deforestation, water management, waste disposal, wastewater, waste gas and plastics.

25. UNDESA/FSDO organized a **Workshop on Carbon Taxation and other Environmental Taxation (27-29 September) 2022** to disseminate the 2021 Handbook, with a dedicated session on other environmental taxes and measures (other than carbon taxes) that could be relevant for developing countries. The workshop was attended by over 200 participants from all regions across the globe. Preliminarily, participants indicated the need for comparative analysis on such measures across countries/regions and how they can be used not only as revenue generation mechanisms but also to address climate matters. Based on preliminary feedback from that session, and as already approved by the Tax Committee during its 24th Session (*see* especially paragraphs 46 and 51 of the Report of the 24th Session), the Subcommittee will proceed to consider this workstream, potentially from 2023.

Next steps

26. The Coordinators present this report to inform the Tax Committee of the progress of the various workstreams and seek further guidance on the work. The items for the Committee's guidance are set out in paragraphs 13 and 23 above.

27. The Subcommittee proposes to continue work on the streams as identified above, and based on the comments and guidance received from the Committee, in particular where guidance is sought on aspects of Workstreams 2 and 4 as indicated above. The idea is still that the outcome of the various papers will be published as they are finalized and upon approval by the Tax Committee (see para 12 of E/C.18/2022/CRP.9).

ANNEX A – Annotated Outline of Part B of Workstream 1

Interaction between carbon taxes and other environmental measures (emissions trading and climate policy)

This Annex provides an annotated outline of the initial work plan for the workstream on interaction of carbon taxation with other national measures in the context of a broader tax reform and particular attention to fossil fuel subsidies. It specifically focuses on Part B as discussed below.

Section 1: Introduction

Paragraph on the importance of policy interactions, already addressed in the 2021 United Nations Handbook on Carbon Taxation for Developing Countries (the Handbook) and that it is addressed in this chapter.

The current contribution seeks to add another layer of knowledge by offering a different perspective. It takes incentives of market participants as a central theme. The underlying theoretical idea is that laws/rules set incentives for actors to behave in a desirable (social welfare enhancing) fashion. The theoretical grounding for this lies in 'Law & Economics'. To elucidate this point: people may be aware of a municipal decree that they have to put money in a parking meter when they park their car. Yet individuals will often only be doing so if it is incentive compatible for them to do so, i.e. if they benefit from following the rules. If it is a cold and rainy day, risks of being detected and fined may be lower and hence many drivers might decide that adhering to rules may not be a in their self-interest. An incentive (Law & Economics) based approach can help to shape and design rules in such a way as to make them both effective and efficient.

The Handbook already contains a chapter on the interaction of carbon taxes and other instruments. This contribution therefore starts by briefly summarizing that chapter and by outlining the value-added of this contribution (section 2). Taking the incentives or market actors as a central theme, section 3 presents the advantages and disadvantages of carbon taxes and emissions trading systems. Section 4 identifies instruments that are employed in various jurisdictions to combat climate change. While striving for completeness is impossible within the scope of this contribution, our ambition here is more modest. We strive to take stock of the diversity of instruments used in various countries and examine how these instruments are designed. Building upon the preceding section, section 5 will outline the interactions between the various instruments, paying particular attention to the pitfalls to be avoided by policy makers.

Section 2: Relation to Handbook

The Handbook already highlights the importance of interactions between carbon taxes and other instruments in chapter 10. The chapter will be summarized in this section before highlighting the value added and the distinctive features of this contribution in its subsequent sections.

The objective of chapter 10 of the Handbook was to offer insights on the potential interactions between policies and instruments that affect carbon pricing and to discuss options on how these interactions could be addressed when designing and implementing carbon taxes.

Carbon reduction measures are implemented in a complex policy landscape characterized by a multitude of actors (e.g. different tax authorities, various government entities at various levels of government) which pursue a multitude of objectives (air pollution, energy security, revenue raising, economic growth, job creation, etc.). Carbon reduction measures can give rise to direct, indirect and unintended effects.

The chapter distinguishes between complementary, overlapping and countervailing measures. **Complementary measures** have different policy objectives, but they reinforce each other, making them more effective. **Overlapping measures** have similar objectives but create inefficiencies in the process. They can for example increase the social costs of achieving emissions reductions, increase the economic burden for the regulatee or the administrative costs for the regulator. Nevertheless, there may be situations where such policy overlaps may be helpful in achieving decarburization of a particular sector. **Countervailing measures** have adverse effects on decarburization measures but could still be justifiable as they pursue other important societal goals and objectives.
Phasing out coal-based energy generation for example would be complementary to a carbon tax. A carbon emissions trading scheme would be overlapping with a carbon tax. And tax rebates on (high emission) cars would constitute a countervailing measure to a carbon tax.[3]

Given the diversity in carbon sources, there are a multitude of policies and instruments that are employed to reduce carbon emissions and that form a complex policy landscape within which carbon taxes will need to operate and interact.

Carbon taxes are one of several explicit carbon pricing instruments (such as emissions trading or credit trading). On the other hand, implicit carbon pricing indirectly influences the price of carbon through fuel taxation, energy efficiency standards, fossil fuel subsidies removal or incentives for low carbon technologies. [4]

Policy makers should consider the interaction between carbon taxes and already existing tax schemes levied on the production or consumption of fuels or energy. Such taxes can be diverse in terms of their scope and tax rates and have often been introduced to raise revenue or to limit a country's dependency on energy imports rather than as an environmental tax. Once taxes reach a certain level, consumers may consume less, leading to reduced tax revenue. Fuel taxes infrastructure can often be used to implement carbon taxes, especially when a fuel approach is used. The benefit of adding a carbon tax on fuels is not only that it keeps administrative costs down, but it also adds a different focus to existing energy taxes: energy taxes generally affect volume rather than emissions while a carbon tax reduces carbon emissions. Coordination between both carbon and energy taxes are important because the instruments may not always reinforce each other. Sustainable and non-sustainable fuels can differ in terms of their calorific value (diesel vs. bio diesel) and hence fare differently under carbon taxes than under energy taxes.

Policy makers employ carbon taxes to reduce emissions and to incentivize the transition towards a low carbon economy. Where a carbon price as such is insufficient to incentivize market participants to employ low carbon alternatives, targeted subsidies or additional incentives may be necessary to facilitate the implementation of low carbon technology and innovation.

Fossil fuel subsidies target fuels directly or the electricity and heat generated by such fuels. They impact economic choices, the budgetary position of a country, and obstruct the transition to a low carbon economy. Hence, they are generally viewed as counterproductive. [5]

Especially overlapping and countervailing interactions of carbon taxes with other instruments should be addressed by:

1) *Adjusting the design of the carbon tax before implementation*
Carbon abatement costs can differ substantially between sectors and hence carbon pricing may be more difficult to introduce for some activities. Abatement opportunities and abatement costs should be tailored to the specific instrument that is chosen. Carbon taxation may for example be more easily

[3] Many more examples are enlisted in Table 9 on p. 174 of the UN Handbook.
[4] See UN Handbook, p. 175 and the World Bank's State and Trends of Carbon Pricing report, presenting the distinction between explicit and implicit carbon pricing (World Bank 2016).
[5] See UN Handbook, p. 177 and box 34.

applied and implemented for stationary installations but be impractical for private transport. Overlapping instruments such as fuel taxes could be used instead.

2) *Adjusting the design or implementation of the other policy measure*
Also, pre-existing policies can be adjusted to facilitate the implementation of carbon taxes. Especially in case of countervailing measures such as fossil fuel subsidies that would seem expedient. Policy makers should, however, be aware that even countervailing measures can have a positive impact on retaining the political acceptance for introducing carbon reduction measures. When phasing out fossil fuel subsidies for example, energy prices would increase due to the carbon tax. This would have regressive effects and hence hit low-income households harder, possibly necessitating income support schemes.

3) *Introducing complementary policies that address aspects of a carbon tax that might make it either less sustainable or more sustainable*
Existing measures could be adjusted so as to complement carbon taxes. Carbon taxes on high carbon content fuels (e.g. coal) could, for example, be complement volume-based energy taxes so as to offer a stronger incentive for innovation. Albeit potentially environmentally beneficial, introducing multiple instruments could lead to duplication of administrative and regulatory compliance costs.
Another example of overlapping and complementary measures is a combination of an ETS with a carbon tax, where the carbon tax can help to maintain abatement incentives if allowance prices are low.

4) *Incorporating carbon tax into other policies so as to create a hybrid system*
It is also possible to combine various instruments with different aspects of carbon taxes. One can for example combine carbon taxes with offsets[6] which are conventionally thought of as an element of emissions trading systems. Or one can combine an emissions trading system with a levy to establish a floor price.

A hybrid system can be an alternative to introducing an additional instrument, if it renders an already existing instrument more efficient and effective. It can, however, also complicate existing instruments, increasing their operational costs.

Chapter 10 of the Handbook thus discusses the different types of instruments and examined possible interactions between carbon taxes and other policy instruments. It emphasizes that clarity on the different interactions and challenges associated with interrelated policies and instruments is essential for effective policy implementation. It should therefore be closely examined by policy makers when designing and implementing carbon taxes.

Section 3: Insights on Instrument choice
Taking incentives of market participants as a central theme, this section examines the advantages and disadvantages of the various instruments.

Market actors are thought to be self-interested and that they act rationally to costs and benefits when they take decisions. In line with basic assumptions on demand and supply of goods, we can predict that if prices of goods are low, more of them will be used and if prices are high, less of them will be demanded. This insight is especially relevant when the production of goods is associated with carbon emissions or other forms of environmental pollution. If producers are not held accountable for the pollution, they will only take their own production costs into account when producing and hence offer the good for a price that is too low, not taking into account the cost of pollution. Consumers in turn enjoy a too low price and consequently demand too much of it. As a consequence of not taking due account of the social costs of pollution the market fails to deliver adequate information on the optimal

[6] Work-stream 3 of the Sub-committee on Environmental Taxation is dedicated to the study of offsets.

quantity that is to be produced and consumed by society. Too much is being produced and consumed and as a consequence environmental pollution is too high.

Whenever social costs of producing exceed the private costs of production, economists speak of ‘externalities’. Carbon emissions constitute a ‘negative externality’ leading to overprovision. By contrast the beautiful flowers in your neighbour’s garden constitute a positive externality, a situation where the societal benefits are not considered in production decisions leading to under provision of a good. This 'market failure' can be corrected by ‘internalizing the negative effects’, i.e. by bringing them into the market price mechanism by putting a price on carbon emissions. The price of the product should be inflated to adequately reflect social costs in order to create incentives to use less of the good. Via pricing instruments such as carbon taxation or emissions trading the absolute loss to society that stems from the excessive use of scarce resources is reduced to a socially desirable level.
Putting a price on pollution will thus lead to higher product prices and to less consumption. Despite this or rather precisely because of this, society is better off because the excessive consumption and production is associated with detrimental levels of pollution.

It bears mentioning that the optimal level of pollution is generally thought to be positive since pollution is associated with production and consumption and thus yielding benefits for society as well. This insight is particularly relevant in the context of Greenhouse gas emissions since many jurisdictions have recently set carbon neutrality goals for themselves, clearly underscoring the dramatic nature of the climate crisis we are already experiencing.

The lack of flexibility and incentives is often considered a disadvantage of traditional command and control type of approaches. They are often too general (‘one hat fits all’ approaches do often not work well) to allow for a differentiation between polluting firms’ abatement cost structures and potentials. Fine-tuned regulation such as permit schemes are expensive and require a lot of administrative work. Carbon pricing is one of the ways how emission reductions can be achieved. Following the economic insights that there is an interrelation between prices and quantity, both can be targeted to reduce emissions. Carbon taxation sets a price for emissions but how the market reacts to this price increase in reducing emissions is uncertain. A (cap-and-trade) Emissions trading sets a quantity of emission allowances but it is uncertain how prices will be responding. While in the former the prices are set but the environmental effectiveness is uncertain, in the latter the environmental effectiveness is certain but the price is uncertain.

The idea to tax externalities and bring them within the framework of the market price mechanism goes back to the British economist Arthur C. Pigou who developed this idea in 1920. Under a Pigou tax a firm´s marginal private costs are increased to reflect in proportion the social marginal cost of pollution (hence reflecting all externalities) and as a consequence firms will maximize profits by reducing activity levels to the social optimum.[7] This has the effect that the pollution and production is reduced, government revenue is generated, and that both the benefits accruing to producers and consumers (consumer and producer surplus) are lowered. Overall, the society is better off because of the reduced pollution.

To employ an optimal Pigou tax, the marginal production costs and marginal social costs (expressed in monetary terms) must be known, not only to producers but also to administration. Only then can a tax level be set for each level of output that is capable of internalizing the corresponding externality per unit of output. Since such information is difficult and expensive to obtain, Baumol and Oates proposed that governments could instead determine an acceptable (ideally optimal) level of pollution and set a tax that would give rise to this norm. The tax would then uniformly be applied to each level of production. This has the effect that the pollution and production is reduced, substantial government revenue is generated (more than under a Pigou tax), and that both the benefits accruing to producers

[7] Groosman 1999. See also Turner, Pearce and Bateman 1994.

and consumers (consumer and producer surplus) are lowered. Especially producers are losing to the government. Overall society is better off because of the reduced pollution.

(Note to the Tax Committee: we will include a text box addressing the Pigou tax and the Baumol & Oates tax)

Both taxes in the Pigouvian and the Baumol and Oates tradition set a price and leave the environmental effect to be determined by the market. Emissions trading by contrast sets a quantity and leaves the price to be determined by the market. Emissions trading can be traced back to Dales' (1968) idea on marketable emission permits (often referred to as 'emission allowances') that are issued to polluters. Polluters are only allowed to pollute if they hold such an emission allowance. Since the number of allowances issued by the government is predetermined, the environmental effectiveness of the emissions trading system is guaranteed (provided of course that it is based on a cap and trade design). The market price and polluters' individual abatement costs determine which actors will pollute and which actors will abate. Government revenue can be raised if emission allowances are for example sold at auction, but in practice several emission trading schemes allocate substantial amounts of allowances for free.

Both taxation and emissions trading can be used to increase costs for producers. The legal incident of increasing costs or levying taxes is, however, logically separable from its economic incident. Who actually bears most of the costs of an environmental measure – producers or consumers – does not depend on the policy instrument that is selected but is purely dependent upon demand and supply elasticity (i.e. the slope of the respective demand and supply curves). The economic costs will fall most heavily on the side that is least able to avoid it (i.e. the side that has the steeper demand or supply curve).

Below the advantages and disadvantages of taxation and emissions trading are presented.

Carbon taxation

Carbon taxation has a number of advantages and disadvantages that should be considered. This passage also pays due attention to the two generic tax designs, Pigou taxes and Baumol and Oates taxes.

Advantages of Carbon taxation

1) Carbon taxes provide clear and continuous price signals incentivizing the reduction of pollution. A clear price signal will reduce business uncertainty, help to avoid stranded assets[8] or technological log-ins, and offer the possibility to innovate and invest in abatement opportunities. If tax rates are known beforehand (e.g. when Baumol and Oates type of taxes are set for a multitude of years), the price signals are not suffering from volatility. Clear price information may incentivize investments in innovation and abatement technology. Though it needs to be pointed out that taxes in the pigouvian tradition are better than Baumol and Oates taxes in incentivizing the implementation of innovation and new technology.

2) Environmental taxes generate government revenues. These revenues address market failures and are thus welfare enhancing. If these revenues are used to reduce other market distorting taxes (such as income taxes), they can give rise to additional positive welfare effects for society (double dividend hypothesis). Baumol and Oates taxes generate higher tax revenues than Pigou taxes.

3), Taxes can be adjusted if environmental targets need be sharpened or reduced in case of economic strive.

[8] Stranded assets are investments (assets) that become obsolete prematurely as they are unable to earn earn enough economic return.

4) Carbon taxes apply in a similar fashion to both incumbent firms and new entrants. Domestically, they are thus not distorting competition on the merits between existing companies and new ones.

5) Carbon taxes are capable of setting a carbon price for both formal and informal sectors of the economy. This can be achieved by employing a carbon tax at the upstream level. Setting a single price also reduces the administrative complexity of the tax. This point is very relevant because developing countries often have large informal sectors.

6) Administrative simplicity: carbon taxes can be designed without being administratively burdensome. In case of resource rich countries for example, the tax can be employed in combination with other taxes levied on the extractive industries. This will be relevant for MICs and LDCs. A good example (discussed in section 4 below) of such a scheme is Norway. In the alternative, carbon taxes can also be employed at the import level, creating synergies with customs taxes.

The Handbook also distinguishes between the fuel approach (used for example by Sweden) and the direct approach (used for example by Chile). This may avoid having to put in place not only legal infrastructures but also technically well-equipped administrative machineries to do benchmarking, and measurement and monitoring of carbon emissions, that otherwise could present obstacles for developing countries. Such measures might, however, be necessary to be put into place to satisfy the reporting requirements of the UNFCCC.

7) Carbon taxes can be recalibrated to overcome social resistance against its implementation. Carbon taxes can address the whole economy (if applied upstream) or be re-signified to address certain sectors only when employed mid or downstream. It is also possible to start with a downstream tax and then work towards an upstream tax system, but the regulatory framework and the transition should be delineated from the start of the regime. For the latter case the carbon tax in Indonesia (discussed below in section 4 is insightful).

Disadvantages of Carbon taxation

There are also disadvantages associated with carbon taxation. These are listed below.

1) Pigouvian taxes are difficult to implement because of cost and information problems. Carbon taxes operate by putting a price on carbon emissions. The carbon tax burden is either determined by reference to the actual externality that is created for each unit of output (Pigouvian tax) or based on a set emission standard (Baumol and Oates tax) that is capable to internalize the externality. The tax is generally known to polluters so that they are incentivized to produce less and to pollute less. Since most of the time there is insufficient information to introduce Pigouvian taxes, or the costs of doing so are prohibitively high, environmental taxes are often set in the Baumol and Oates tradition. Here the price is known but the exact environmental impact is uncertain. To ensure that the environmental steering effect that we are after actually materializes, carbon taxes must be evaluated and adapted (often raised).

2) Setting optimal tax rates is challenging. In order to internalize all externalities, a tax should be set in such a way that marginal benefits and marginal costs of pollution equal each other. If that is not achieved, it would undermine the effectiveness of the tax. To set an optimal tax rate, governments require optimal information, which is not always likely to be available.[9] The problem of information availability is more grave under a Pigou tax than under a Baumol and Oates tax as the latter is only based on a uniform tax. This theoretical insight should, however, not be taken as a justification for inaction. The 'perfect is the enemy of the good'[10] and a carbon price is better than no carbon price even if the environmental steering effect is not optimal.

[9] See Fullerton, Leicester and Smith 2010 for an elaborate criticism.

[10] Different philosophers have expressed such ideas. Voltaire, in La Bégueule, writes 'Dans ses écrits, un sage Italien, Dit que le mieux est l'ennemi du bien' (In his writings, a wise Italian says that the best is the enemy of the good). Confucius states 'Better a diamond with a flaw than a pebble without'.

3) The environmental steering effect of taxes depends on the responsiveness of the demand and supply functions to the tax burden. Only if the functions are flat (elastic) will the introduction of a carbon price lead to a significant change in the consumption or supply patterns and render an environmental tax 'effective'. In case a carbon tax is levied upon an inelastic product or behavior, the environmental steering effect will be limited and the tax is primarily revenue raising.

4) A uniform rate tax in the Baumol and Oates tradition is inconsistent with the idea of the Pigouvian tax since different actors have different marginal cost functions and therefore a uniform rate will not give optimal incentives for emission reductions. Given the climate change crisis any action is better than no action at all.

5) Producers loose more producer surplus under Baumol and Oates taxes. This is because they pay a larger share in terms of the tax to the government. Producers might therefore prefer a Pigovian tax provided that administrative tasks for them are not too burdensome and costly.

6) Baumol and Oates taxes are not as good as Pigovian taxes in incentivizing the implementation of new environmentally friendly technology. The underlying intuition is that under a Pigou tax polluters pay for all the externality they generate and any technology reducing emissions will also reduce their tax burden. Under a Baumol and Oates uniform tax, polluters have to pay the uniform tax based on the amount of their activity or use of the tax base. Technology that reduces emissions but does not reduce the tax burden will not be implemented as it does not reduce the tax burden. Careful selection of the tax base is therefore critical.

7) Carbon taxes can be introduced downstream (addressing specific sectors) or upstream (addressing the whole economy). (Note to the Tax Committee: This point will be developed further.)

8) As with emissions trading systems distributional effects are important. A carbon tax leads to social welfare increases by raising production costs and product prices, incentivizing people to consume less, and thus by bringing negative externalities down to socially desirable levels. This restriction in consumption, albeit welfare enhancing, gives rise to socially undesirable effects in the sense that it hits low income groups of society harder by e.g. rising energy prices (regressive effects). Distributive effects should be carefully considered because they can undermine the political acceptability of carbon taxes.

Carbon Emissions trading

There are many different ways how an Emissions trading system can be designed. There is a substantial amount of literature discussing the various design features. Here we take a cap-and-trade ETS as a basis to show the advantages and disadvantages of an ETS.

Advantages of Emissions Trading

1) Under a cap-and-trade system the regulator determines directly the quantity of emission allowances that will be circulated. Since each polluter must surrender allowances equivalent to the amount of pollution, the environmental effectiveness of a cap-and-trade ETS is directly determined by the legislator.

2) Actual abatement costs of entities are generally not known to policy makers. They can better be determined by the regulatees themselves that possess better information about production processes. An emissions trading system creates tradable property rights (emission allowances) that can be traded among polluters. Polluters can thereby determine themselves who will abate pollution and sell emission allowances to those market operators that find it too expensive to abate to reduce emissions. Allowing for trade between operators that enjoy different abatement costs leads to significant cost advantages while ensuring the realization of the environmental target.

At the inception of the EU ETS for example it was estimated that the costs of conducting EU climate policy via an ETS amounted to 2.9 to 3.7 billion Euros, while without an ETS the costs were estimated to reach 6.8 billion Euros.[11]

3) Emissions trading allows for the market prices to be determined by demand and supply and prices thereby automatically adjusts for inflation.

4) Emission allowances are tradable permits. Such allowances may gain more political acceptance because regulators are already familiar with permits and other instruments such as taxation is often disliked by regulatees and citizens.

5) An emissions trading system functions as an automatic stabilizer. Automatic stabilizers reduce the fluctuations in economic activity, dampening the economy when it is overheating, and alleviating burden on citizens when it is in recession. The burden created by emissions trading systems is determined by the allowance prices, which are subject to the forces of demand and supply. When the economy is growing and a lot of pollution is created, emission allowances are in high demand, increasing the costs of pollution.

Disadvantages of Emissions trading systems
Emissions trading systems also have a series of disadvantages that should be considered.

1) Emission allowance prices are subject to the forces of demand and supply and hence function as automatic stabilizers. This 'strength', however, turns into a weakness if emission allowance trading systems are intended to attain other policy objectives such as incentivizing investments into abatement technology or incentivizing the economy to transition towards carbon neutrality. The price volatility that is inherent in the emissions trading system, undermines a long-term price signal that could incentivize long term investments. A good example of this problem can be seen in the price development of EU Emission allowances in the aftermath of the 2008 financial crisis. Due to a contraction of the economic activity, there was an oversupply of allowances and prices were low for several years. A reform of the EU ETS was necessary to avoid more than a decade of low allowance prices due to this oversupply situation.

2) For the operation of a cap-and-trade emissions trading system the setting of an emissions level is necessary. Setting an optimal level is, however, non-trivial. Greenhouse gas concentrations in the atmosphere are increasing ever more quickly. Countries have been responding by frequently updating their emissions targets. Several jurisdictions including the EU, Japan and Korea, have now committed themselves to attain carbon neutrality by 2050 or by 2060 in the case of China.

3) Putting a price on emissions increases production costs and can lead to a displacement of pollution to other jurisdictions that are not subject to similar environmental cost burdens. This is conventionally referred to ´carbon leakage´ and a problem that can exist also under tax schemes.

4) When emissions trading systems are introduced, political acceptability for stakeholders is often times increased by allocating allowances based on historic emissions for free to them (also referred to as 'grandfathering'). When covered entities face inelastic demand, they are able to pass on a larger share of the cost burden of an ETS on to consumers. Such companies will then increase prices to consumers even though they have received emission allowances for free. They are thus enjoying 'windfall profits'. While such transfers do not raise problems from an economic perspective, they are politically undesirable since they constitute wealth transfers to polluters.

[11] European Commission, (2005), p. 8.

5) Emissions trading systems often only raise limited amounts of revenues for the government. They can be based on full auctioning of allowances, but in practice large parts of allowances are allocated for free, via grandfathering or based on benchmarks. Such practices are particularly used for Energy Intensive Trade Exposed industries.

6) The market price for emission allowances can be inelastic. Covered entities may not be able to reduce their emissions quickly when allowance prices increase. In such situations small changes in the quantity can have substantial impacts on the allowance price. Allowance prices may be volatile. Volatility may lead to business uncertainty and prevent covered entities to undertake the necessary investments in abatement technology.

7) Emissions trading systems are costly to operate and set up. They require detailed information about emissions and covered entities incur transaction costs when buying and selling emissions allowances. All transactions and emissions must be monitored. Especially for emissions trading systems that not only cover fuel inputs but also process emissions (emissions created in the production process through chemical processes), monitoring and verification processes can be expensive. Given the high transaction and monitoring costs, emissions trading is best used for large emitters that stand to gain most from trading emission allowances. Monitoring and administrative costs can be reduced by limiting the scope of the trading system, by for example focusing on input emissions rather than process emissions.

8) Quantity based instruments may be particularly susceptible to congruent and overlapping policies that seek to achieve similar objectives. Policies such as phasing out coal for examples or efficiency measures in the building stock, can have repercussions on allowance demand. Falling demand will lead to reduced prices but not to a reduction in the pollution under a cap-and-trade emissions trading system. The literature describes this as a 'waterbed effect' when emission reductions realized in one sector or jurisdiction simply enable higher emissions elsewhere among the covered entities.

9) Emissions trading systems based on historic allocation (grandfathering) may set new market entrants at a comparative disadvantage if new entrants are not able to be allocated for free (e.g. via a new entrants reserve).

10) As with carbon taxation (discussed above) also when designing emissions trading systems distributional effects are important. Emissions trading leads to social welfare increases by raising production costs and product prices, incentivizing people to consume less, and thus by bringing negative externalities down to socially desirable levels. This restriction in consumption, albeit welfare enhancing, gives rise to socially undesirable effects in the sense that it hits low-income groups of society harder by e.g. rising energy prices (regressive effects). Distributive effects should be carefully considered because they can undermine the political acceptability of ETS.

(Note to the Tax Committee: Sections 4 and 5 are still under development.)

Section 4: Inventorying instruments employed for climate policy

This part identifies instruments employed in various jurisdictions to combat climate change. We strive to take stock of the diversity of instruments used in various countries and examine how these instruments are designed. The interaction between instruments is discussed in section 5.

Norway

Norway imposes a very diverse array of environmental taxes, covering Sulphur and Nitrate taxes, energy taxes and the CO_2 tax. The CO_2 tax, object of the present section, is levied on petrol, auto diesel oil, mineral oil (except fisheries) and on emissions deriving from offshore petroleum activities. Coal

and coke were subject to the CO_2 tax for 10 years (from 1992-2002), but the tax had to be dropped in 2004 due to EFTA's Surveillance Authority's more rigid control over state aid rules.[12]

The Norwegian CO_2 taxes are highly differentiated between sectors, fossil commodity sources and use. These taxes are unique in that they are levied on the petrol, mineral oils and natural gas extracted from the ground, rather than on the emissions. It therefore aims to tax the carbon dioxide component that is expected to be produced once the mineral ore is submitted to a combustion process.[13] It is the first and only observable country-experience that proposes to tax carbon dioxide on an upstream level, at the level of extraction. It therefore sets an important example of taxing method for resource rich countries with limited capacity to oversee complex application of a carbon tax. The Norwegian CO_2 tax has the effect of demonstrating that a long-term upstream CO_2 tax is feasible and is accepted by the oil and gas industry as an integrant element of the government rent.

Because of the upstream tax, Norway is capable of granting partial or total exemptions from the CO_2 tax to several (energy-intensive) industries that have to compete in an international market and would otherwise suffer from the harmful effects of having an additional tax driven cost inbuilt into its production price. The CO_2 tax has been successful in reducing CO_2 based emissions from oil-based sources[14] in a true feebate style. Feebates allow countries to cost the externality while at the same time providing an incentive for industry to shift towards more environmentally sound energy sources, by providing corresponding exemptions to the use of such products.

Overall, the CO_2 tax system in Norway is characterized by the imposition of high taxes on emissions from the oil and transport industries, and tax exemptions to the process industry. CO_2 taxes on mainland activities are generally levied on the use of mineral oils and petrol (more precisely purchase and import). As in most countries, diesel used in road transportation is taxed at a lower rate than gasoline, when compared on a per liter, energy content and CO_2 content basis.[15]

A specific CO_2 tax is levied per liter of oil and natural gas liquids and per cubic meter of gas burnt off or emitted to air on platforms, installations and facilities used in connection with the extraction or transportation of petroleum on the Norwegian continental shelf.[16] That is because the petroleum-producing industry is a significant player in the Norwegian economy and is responsible for a large portion of the emissions produced in the country. During the 1990s, emissions deriving from the petroleum industry were responsible for almost 30% of total CO_2 emissions in Norway.[17] The tax is a deductible operating cost associated with petroleum activities and therefore may be computed as a deductible expense which has the effect of reducing the ordinary tax regularly paid by oil companies.[18]

Norway has in 2013 increased the CO_2 tax rate, which was then charged at EUR55 per ton of CO_2 (USD 75.91 per tonne of carbon dioxide which equals USD 278.59 per ton of carbon), arguably one of the highest carbon tax rates in the world.[19]

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[12] See in this respect: Ministry of Finance of Norway, *The History of Green Taxes in Norway* (March 2007), p.3.
[13] A. Bruvoll, *Greenhouse gas emissions in Norway: do carbon taxes work?*, Energy Policy, No. 32 (2009), p.4.
[14] Contra, A. Bruvoll, *Greenhouse gas emissions in Norway: do carbon taxes work?*, Energy Policy, No. 32 (2009), p. 501.
[15] OECD (2013), *Taxing Energy Use: A Graphical Analysis* (OECD, Paris, 2013), p. 176.
[16] This tax is regulated by the Norwegian Petroleum Directorate, *Act of 21 December 1990 (No. 72) relating to tax on discharge of CO2 in the petroleum activities on the continental shelf*, available at: http://www.npd.no/en/Regulations/Acts/CO2-discharge-tax/.
[17] A. Bruvoll, *Greenhouse gas emissions in Norway: do carbon taxes work?* Energy Policy, No. 32 (2009), p. 497.
[18] As per: Ministry of Finance of Norway, *Taxation of Petroleum Activities* (October 2007).
[19] C. Schuetze, *Norway increases carbon tax on domestic production*, International Herald Tribune (15 October 2012), available at: http://rendezvous.blogs.nytimes.com/2012/10/15/norway-increases-carbon-tax-on-domestic-production/?_r=2.

Norway joined the EU ETS in 2008 and included aviation in the ETS in 2012 and as a result, many of the tax rates were revisited in order to take into account the interrelation between the EU ETS and CO_2 taxes. In the past, (before Norway joined the EU ETS) it used to be that companies paying the CO_2 tax were exempted from the Norwegian emissions trading scheme (which ran from 2005 to 2007). However, since Norway joined the EU ETS in 2008, the situation has reversed and industries covered by the EU ETS are allowed reductions or exemptions on their CO_2 taxes. This means that the tax is currently only fully fledged on non-energy intensive sectors. In 2013, the EU ETS is expected to account for 50% of Norway's GHG emissions. In light of that, the Norwegian government has proposed for the carbon price to provide the reference price for all fuel users in Norway.[20]

Indonesia

- A carbon tax applies as a carbon ceiling (and not a floor), in combination with the administration of an ETS. The carbon tax proposed to come into force in 2022 will initially only apply to the coal power plant sector, therefore its application is very restricted. There is no plans for expansion towards other sectors, and expansion may be difficult.
- The tax is applied at the downstream level, and therefore fails to address emissions from the upstream segments.
- The triggering event: consumption of carbon taxes by individuals or firms. Leads to substantial complexity in administration.
- The price of the tax is set at IDR 75,000 (or USD 5). This is a low tax rate but is compatible with the rates employed by other countries with similar levels of development in Latin America. 0Such a carbon tax level appears inconsistent with the significant administration and compliance costs from a downstream carbon pricing system.

Sweden

Example of an energy/carbon tax

Regional Greenhouse Gas Initiative (RGGI)

ETS instruments with a reserve price

EU ETS

The EU ETS an example for a **cap-and-trade** system setting a carbon price on **input and process emissions**. It extends to **many sectors and gasses**. It thus requires a lot of detailed information that is not always available to decision makers. The 'learning by doing' phase (2005-2007) of the EU ETS was therefore really needed to bring the amount of allowances and emissions into equilibrium (as elaborated below, this was not enough and a market stability mechanism had to be introduced).

The EU introduced its ETS in 2005. The ETS covers around 5000 operators and 11000 installations from energy, ferrous metals, minerals, pulp and paper, accounting for around 45% of EU's total GHG emissions. In 2012 it was extended to aviation emissions as well, and additional sectors (aluminium, CCS, petrochemicals and chemicals) were added during the third trading phase (2013-2020). The EU ETS does not only cover energy-using power stations and combustion installations in the EU but also those in Lichtenstein, Iceland and Norway with a thermal rated input exceeding 20 MW.

In terms of gases, it covers Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2 O), Sulphur hexafluoride (SF6), Perfluorocarbons (PFCs), Hydrofluorocarbons (HFCs) and input as well as process emissions. It is designed as a cap-and-trade system, (initially) without any type of price support system. The allocation was based on historic emissions (grandfathering) and to a very limited degree on auctioning. A new entrance reserve secured the allocation of allowances to new companies so as to maintain a level playing field between them and incumbent firms. During the 3rd trading phase (2013-

[20] OECD (2013), *Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels 2013* (OECD, Paris, 2013), p. 277.

2020) the allocation decisions that were formerly undertaken by Member States on the basis of predetermined criteria were centralized, putting the European Commission into the driving seat, and henceforth were based on benchmarking and auctioning for the electricity sector.

UK carbon levy
TAX and ETS in combination

Korean ETS
The Korean ETS is an example for a **cap-and-trade** system setting a carbon price that extends to **many sectors and gasses**. From the beginning it has introduced **market stabilization** measures.

The Korea ETS (K-ETS) started in 2015. It was the first nationwide ETS in East Asia. The K-ETS covers 684 of the country's largest emitters from six sectors (heat and power, industry, buildings, transportation, waste, and the public sector) and 69 sub-sectors, accounting for ~73.5% (during phase 3) of national GHG emissions. It covers direct emissions of six GHGs (CO2, CH4, N2O, PFCs, HFCs, SF6) as well as indirect emissions from electricity consumption. It is implemented in phases, phases 1 and 2 were 3 years long (2015-2017, 2018-2020) and as of phase 3 they are 5 years long (2021-2025). The K-ETS is designed as a cap-and-trade system. It has also an elaborate market stability instrument. In case of substantial price increases satisfying particular thresholds the minister may take measures for stabilizing the markets, by for example releasing additional allowances, setting a temporary price floor or ceiling, alter the offset quota, alter the borrowing rules or requiring compliance entities to hold a maximum or minimum number of allowances.[21] The ultimate decision whether or not market stabilization measures are implemented is subject to political decisions by the Minister and the EPAC, and hence neither entirely rule-based, nor discretionary. [22]

Regional Focus: Status of the Carbon Tax Regime in African Countries
A number of African countries are considering implementing a carbon tax. Among these countries are included Botswana, Burkina Faso, Côte d'Ívoire, Morocco, Nigeria, Rwanda and Senegal[23]. South Africa has already implemented a carbon tax in June 2021 and the rule of choice was for a downstream carbon tax, which limits the effectiveness and reach of the regime. Some African countries have what they term a carbon tax in their legislation, but it does not fit well in the standard and globally acceptable definition of a carbon tax. In addition, they have environmental related taxes, but in some cases, there are no legal provisions providing for those taxes and the revenue obtained from them is not ear-marked for improving the environment. The African Tax Administration Forum in collaboration with the University of Pretoria is working on an Environmental Fiscal Reforms project for African countries and have already administered a survey to gauge the status of environmental taxes in African countries who are African Tax Outlook (ATO)[24] members. (Results of the survey to be analyzed and a description of the status in relation to carbon tax to be provided later)

Section 5: Interactions between instruments
Building upon the preceding section, this section will outline the interactions between the various instruments, paying particular attention to the pitfalls to be avoided by policy makers.

Windfall profits
Several emissions trading systems are employing free allocation to bring emission allowances into circulation, frequently based on historical emissions. 'Grandfathering' is often more acceptable for the covered entities. It is therefore politically easier to implement such an allocation design. This allocation choice has, however, given rise to problems. In the EU ETS for example, power generators who

[21] Tiche, F.G. (2017) p. 82
[22] Tiche, F.G. (2017) p. 82
[23] World Bank Carbon Pricing Dashboard (2022)
[24] The African Tax Outlook is ATAF's flagship publication on macroeconomic, tax administration, domestic taxes and customs revenue data for 37 member countries.

received allowances for free on the basis of grandfathering still increased their prices to consumers. Both industrial customers and households found this 'unfair' and politicians found it difficult to explain to the general public why prices increased even though energy companies received the allowances for free. These profits were described as 'windfall' profits.

The reason why power generators are very well placed to pass-on the cost increases to their consumers is easily explained. Power generators face steeply sloped demand curves (economists say they face inelastic demand) entailing that even when electricity prices increase, consumers will only be able to reduce their consumption very little and hence pay higher energy bills. This is the reason why energy companies were able to swiftly pass-on the increase in production costs on to consumers, even though they had received allowances for free. Production costs increased because tradable allowances represent a production input and have a market value.

The problem of 'windfall profits' was addressed in the third trading phase (2013-2020) by obliging energy generators to purchase their allowances at auction. This thus turned the windfall profits into government revenue.

Price volatility and emission reductions
No market stability scheme and substantial free allocation to support energy intensive trade exposed (EITE) sectors/industries => hardly any decarbonization for industry (EU ETS). (Note to the Tax Committee: This point will be developed further.)

Waterbed effect
Carbon emission reductions undertaken by individual EU Member States and that are reducing the emissions of companies that are covered by the EU ETS have very little effect because the emission allowances that are 'saved' are used by other companies.
(Note to the Tax Committee: This point will be developed further.)

ETS and energy tax
The EU ETS has been introduced in 2005 to cover Greenhouse Gas emissions. The EU Energy Tax Directive (ETD) was introduced in 2003 to widen the scope of the minimum tax rate system of 50 Euro-cents per MWh on electricity out-put to all energy products, including coal, coke, natural gas and electricity so as to set incentives to enhance energy efficiency and to reduce emissions. The EU ETS thus puts a price on carbon emissions at the point of electricity generation while by contrast the ETD puts an excise duty on electricity output independent of the fuel inputs. Both instruments have the effect of increasing energy prices and are therefore to a certain degree overlapping in scope. A comparison of the cost burden created by the ETD and the EU ETS during the years 2008-2013, where the EU ETS allowance prices per ton of CO2-equivalent were around 13 Euros, shows that the ETD is an important complement to the ETS in setting a carbon price for electricity.[25]

Often the cost burden created by the ETD is that of the EU ETS. It has, however, also been shown that the cost burden of energy taxes is lower for countries with more carbon intensive electricity generation, especially in the case of large enterprises, thus failing to make polluters pay more. Here the EU ETS was clearly more successful. This example shows that even though combining two systems, an ETS on GHG emissions and an energy tax levied at consumption level, can have important synergy effects, even though of course it does lead to overall higher costs.

Section 6: Conclusion

[To be developed]

[25] This passage is based on Weishaar (2017)

ANNEX B – Annotated outline of Workstream 2: the role of carbon taxes and other measures in supporting energy transition

This chapter considers how environmental taxation is relevant for energy transition in developing countries.

The chapter is divided into the following main headings.

1. High level considerations and aspects of energy transition and environmental taxation

As outlined in the 2021 United Nations Handbook on Carbon Taxation for Developing Countries (the Handbook), environmental taxation and carbon pricing are relevant instruments that can contribute to Sustainable Development [SDG] Goal Nr 13 [Climate Action]. SDG13 interacts with various other SDGs, not in the least with SDG 7 [Affordable and Clean energy]. Energy transition plays a crucial role as an objective in balancing these SDGs.

1.1. Energy transition

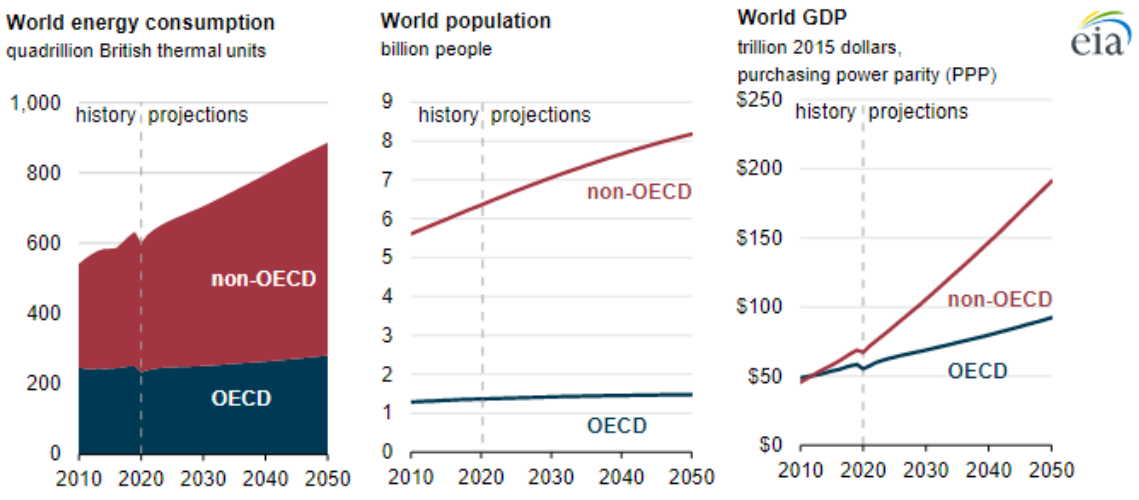
There is no single clear definition of the concept of energy transition.

Energy transition can be seen as a broader lens to put the requirement of decarbonisation in context:

In 2021, the UN Framework for Climate Change [UNFCC] measured worldwide carbon emissions at 36,3bln. More and more countries are setting net zero emission targets for 2045 or 2050, at which time emissions need to be reduced to zero.

The decarbonisation should be seen in the context of, inter alia:

- Global population is currently about 8bln but expects to grow to 9,7bln in 2050; and
- Global energy consumption is expected to grow significantly up to the same period [from about 600 exajoule in 2020 to nearly 900exajoule in 2050], with energy consumption growth in developing countries to almost double in certain sectors[26].



Source: U.S. Energy Information Administration, *International Energy Outlook 2021* (IEO2021) Reference case

[26] International Energy Outlook Consumption - By 2050, global energy use in the Reference case increases nearly 50% compared with 2020—mostly a result of non-OECD economic growth and population, particularly in Asia - U.S. Energy Information Administration (EIA)

A transition in the use and generation of energy will be required to balance these considerations. There are many aspects to energy transition, depending on the focus of analysis. These can be technical, e.g. choices on energy sources and novel ways to produce or consume energy products; societal, e.g. aspects of just transition, impact on employment; organisational, e.g. how to source material, how to organise energy markets; financial, e.g. how the costs of energy transition should be determined and allocated.

1.2. Aspects of energy transition

Energy transition analysis can be broken down along various lines.

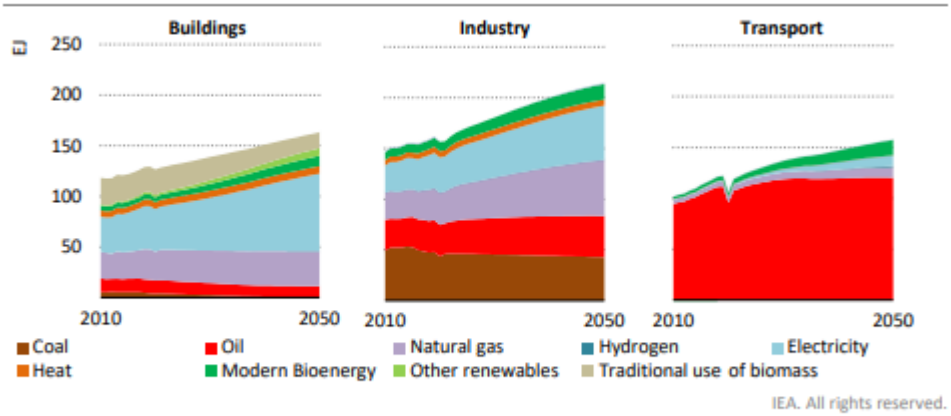
The International Energy Agency considers global and sectoral pathways to net zero emissions by 2050. Relevant pillars to transition to decarbonised energy are:

- Energy efficiency
- Behavioural change
- Electrification
- Renewables
- Hydrogen and hydro-based fuels
- Bio-energy
- Carbon capture, utilisation and storage.

The speed and scope with which the global energy system needs to transition in order to achieve decarbonisation by 2050 will require an integrated approach per sector, across the value chain, to ensure all pillars are addressed. The sectoral approach develops more in-depth pathways to transition for:

- Fossil fuel supply
- Low emissions fuel supply
- Electricity sector
- Industry
- Transport
- Buildings

Figure 1.7 ▷ Total final consumption by sector and fuel in the STEPS



Final energy consumption grows on average by 1% per year between 2020 and 2050, with electricity and natural gas meeting most of the increase

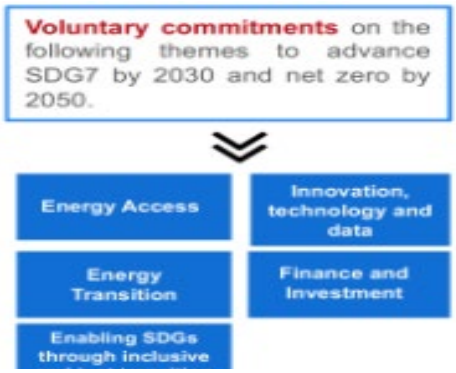
Net Zero by 2050 – A roadmap for the global energy sector – May 2021 [next report 2023]

Common aspects considered for energy transition appear to be:

- Managing carbon emissions from the current/"old", often fossil fuel based energy:
- Ensuring availability of the "new"/more renewable, low carbon energy:
- Facilitating "transition"

Most aspects of energy transition are covered under the UN SDG#7 "Affordable and clean energy". Besides Transition, the UN Energy Pledge under SDG7 includes improving access, resilience and finance.

A framework for Energy Compacts is set up to bring together voluntary commitments on all SDG7 target in support of achieving all SDGs by 2030 and net zero emissions by 2050. The UN Energy compacts compile information on ensuring access to affordable, reliable and modern energy systems, increase the share of renewable energy in the energy mix, enhance clean energy research and technology and expand infrastructure.



1.3. Taxation in the energy transition

To propose a framework to assess how [environmental] taxation can influence energy transition, it is important to assess how environmental taxation in general and carbon taxation in particular can balance the need for carbon reduction and climate change with a push towards ensuring affordable, reliable, sustainable and modern energy for all.

Considering this balance, [environmental] taxation in the energy transition can be relevant

a) to ensure additional costs are imposed on activities/behaviours that undermine energy transition [e.g. introduction of carbon taxation]
b) to support activities/behaviours that encourage/facilitate energy transition [e.g. use of targeted subsidies, tax exemptions etc.].
c) to determine the impact of energy transition on a country's fiscal budget. The Handbook outlines carbon tax as an instrument to reduce carbon on the one hand and as an instrument to raise revenue. As such, financing is an important aspect of energy transition.

The distinguishing factor of the workstream on tax and energy transition is to approach all the issues by applying a lens of relevance for developing country governments/tax authorities. The objective is to create a framework to allow tax authorities to consider the potential relevance of environmental or carbon taxation as well as potentially relevant features of such taxation to consider.

To test how taxation can influence these aspects, it is proposed to perform the analysis based on the characteristics of an archetype country. The use and relevance of carbon taxation in this space will be proposed through examples.

1.4. Potential boundary considerations

In most analyses, energy transition includes an aspect of energy efficiency. Energy efficiency implies reduction of energy use and therefore a reduction of carbon emissions. However, some levers and pathways to decarbonisation may actually imply increased use of energy. Any particular aspects of where the use of taxation or specific tax features of carbon or environmental taxation may negatively impact energy efficiency or energy transition, will be assessed.

Energy transition is likely to be a costly process. In this respect, there should be considerations around the cost allocation or cost burden like features striving for a just transition[27] or addressing regressivity and/or inflationary pressures from the taxation. As already mentioned in the Handbook, such issues are important to consider and address when proposing to introduce a carbon tax.

It is the intention of the Subcommittee to flag some of these considerations where appropriate but any in-depth analysis will not be the focus of the work at this stage.

2. Identifying archetypes

Considering the effectiveness of the Handbook, the workstream on energy transition will build on the work done and content provided in the Handbook and refer to the work done by other current and past Subcommittees, where applicable.

To come up with a framework to help tax policy makers assess where and how [environmental] taxation can be relevant in energy transition, the workstream would like to work with country archetypes to assess the environmental tax options available [whether specific instruments or design features].

Note to the Tax Committee

The Tax Committee's guidance is sought with respect to the selection of archetypes below. Given that we may also wish to illustrate the work product with case studies based on the archetypes, which would require access to capable local resources, are there better candidates (with similar characteristics) than the candidates we have shown in the current outline?

2.1. Archetypes

The main relevance of the archetypes will be specific characteristics of countries. For ease of reference and example, specific countries will be identified as reference countries [where possible and with potential for input from a [Sub]Committee member]. The country archetypes proposed are the following:

a. [Developing] Countries without significant extractive resources - potentially with significant agricultural or forestry resources [potential archetype Jamaica]
b. [Developing] Countries with large population and consumer base [potential archetype Indonesia]

[27] Just transition considerations are first and foremost focusing on allocation of the costs within the country. There are concerns about the allocation of the costs of energy transition between countries. Although relevant for developing countries, this will not be the primary focus of the analysis but could be considered in a later stage.

c. [Developing] Countries with mainly and significant fossil fuel resources [potential archetype Ghana or Nigeria]
d. [Developing] Countries with mainly and significant natural mineral resources, especially resources relevant for energy storage e.g. batteries or cooling like cobalt or lithium [potential archetype South Africa or Chile]

Each of these country groupings is faced with different risks and opportunities as they navigate their way through the energy transition. By using archetypes as a thinking tool and different lenses through which to look at the issues, we hope to create a product that all developing countries will find helpful.

It is possible for a country to have multiple characteristics. The analysis of archetype options could in second instance include considerations on aspects and approaches to consider on how to combine approaches in multiple characteristics.

The Subcommittee proposes to start analysis based on the countries without extractives. For the countries with extractives, proposal to cooperate with the Extractives Industry Taxation Subcommittee Energy Transition workgroup.

2.2. Archetype assessment

Note to the Tax Committee
The Tax Committee's guidance is sought regarding the framework below for assessment of the archetypes, especially as regards the scope, and if any other considerations should be taken into account.

The intention is to assess the options for the use of [environmental] taxation in the framework of energy transition, considering the specific requirements and characteristics of each archetype country.

Framework for the analysis to identify whether and what environmental taxation could be helpful could be:

A. Managing carbon emissions from the current/"old", often fossil fuel based energy:
    - Decarbonising existing energy production – reducing the use of carbon fuels and/the production of carbon emissions of existing energy and other production. This mainly pertains to managing Scope 1 and 2[28] emissions from energy production through emission reduction, energy efficiency or carbon storage or other sinks;
    - Efforts to reduce Scope 3[29] emissions from current/"old" energy, e.g. switching to less carbon intensive products or providing carbon capture and storage or sinks for scope 3 emissions;
B. Ensuring availability of the "new"/more renewable, low carbon energy:

[28] Scope 1 emissions: Green House Gas [GHG] emissions that a company generates directly, e.g. produced by running its boilers, machinery or heating its buildings; Scope 2 emissions: GHG emissions it generates indirectly, e.g. carbon generated in the production of electricity or energy it buys for heating or cooling buildings; Scope 3: all other emissions associated, not with the company itself, but for which it is indirectly responsible for up and down its value chain, e.g. generated when consumers of the company's products consumes these products.
[29] See 3.

- Enhancing production of low carbon fuels – ensuring investments are attracted to increase the capacity to generate low carbon fuels;

C. Facilitating "transition"
- Ensuring infrastructure is available to ensure customers have access and can consume lower carbon fuels – providing options for customers to switch to alternatives that reduce carbon;
- Developing a market and use for alternative, renewable and/or low carbon energy – moving customers to take the low carbon options.

Where possible the analysis should consider the general aspects of taxation and energy transition, whether/what tax instrument would be helpful; whether tax incentives or fiscal facilitation would be considered; and whether there are specific budgetary considerations to be considered.

Note to the Tax Committee
The Tax Committee's guidance is sought regarding the scope of the information in the tables below (showing the outcome of the analysis of options with respect to environmental taxation under different archetypes), and whether any other aspects should be taken into account.

3. Options with respect to environmental taxation under different archetypes

Next step for the workstream will be to identify possible options with respect to environmental taxation for the different archetypes.

The outcome of the analysis is proposed to take the form of an overview table.

THE OLD

Paragraph	Jamaica	Indonesia	Ghana/Nigeria	South Africa/Chile
Tax incentives/reliefs to encourage decommissioning and restoration			x	
Tax regime for end of field life: harvest or incentivise?			X	
Elimination of fossil fuel subsidies			x	
Plug the revenue gap			x	

THE NEW

Paragraph	Jamaica	Indonesia	Ghana/Nigeria	South Africa/Chile
Tax incentives for investment in renewables: direct tax and indirect tax regime	x		x	x
Tax incentives for investment in relevant mining activity: direct tax and indirect tax regime				x
Duties on road fuels	x		x	x
Incentivising Carbon Capture Use & Storage			x	
Incentivising research & development	x		x	x

Carbon pricing at the supplier level			x	
Carbon pricing at the consumer level	x		x	x
CBAM mechanism	x		x	x
Tax treatment of agriculture/forestry in the energy transition	x		x	x
Tax treatment of heat & buildings in the energy transition	x		x	x
Capacity building	x		x	x

TRANSITION

Paragraph	**Jamaica**	**Indonesia**	**Ghana/Nigeria**	**South Africa/Chile**
Tax incentives for investment in energy infrastructure/transition costs only				
Duties on infrastructure use – exemptions for renewables				
Duties on fuel use – differentiation on carbon content				
Capacity building				

4. Depending on the options and time permitting, elaborating on specific environmental tax aspects

[To be determined in due course]

ANNEX C – Annotated outline of Workstream 3 on the interaction between carbon taxes and carbon offsetting programmes

Overview

The Glasgow Climate Change Pact approved actions to operationalize Art. 6 of the Paris Agreement, which deals with carbon offset credits. To effectively lower greenhouse gas (GHG) emissions, prior mechanisms used in international carbon market-style arrangements and the UNFCCC Kyoto Protocol Clean Development Mechanism (CDM) are being improved (i.e., regarding bureaucracy, additionality, permanence, avoiding double counting, estimates of "legacy" credits). Developing countries should consider how these carbon offset credits contribute to lowering their carbon emissions and meeting their Nationally Determined Contributions (NDC) pledges under the Paris Agreement. There is a need to assess their appropriate tax treatment and cross-border impacts. These carbon offsets may be attractive in developing countries looking for ways to encourage investments that preserve the services of nature or reduce GHG. This workstream will work closely with the Subcommittee on Transfer Pricing and will aim to produce guidance that supports the capacity of developing countries to benefit from the new rules, considering measurement, accounting, and verification in the search of a fair taxation (including its revenue, regulatory and redistributive function).

Purpose

The purpose of this workstream is to: (1) offer an overview of what is happening and how it justifies the tax authorities' action; (2) raise awareness and understanding of the framework provided by Article 6 of the Paris Agreement; (3) capture current problems in taxation and point out the core issues to address; and (4) ensure a coherent approach in qualification and valuation

Scope

To carefully address this timely topic, semantics, policy considerations and implementation costs will be assessed. Different potential scenarios and actions at state and municipal level will be contemplated (e.g. MEXICO2 or city of Rio voluntary carbon market)..

Sections

1. Introduction and concept

1.1. Background

The rapid evolution of the compliance obligations and the voluntary market[30] shows the importance of clarifying the interactions between the carbon offset market and taxation. This phenomenon exceeds the sole perspective on corporate social responsibility. Many companies are not able to fully eliminate their emissions, because certain sources are inevitably involved at some businesses, or cannot do it speedily, because today's technologies may be too expensive. They can use carbon credits to offset

[30] Michaelowa, A. *et al.*, "Evolution of International Carbon Markets: Lessons for the Paris Agreement", *Wiley Interdisciplinary Reviews. Climate Change*, Vol. 10, No. 6, John Wiley & Sons, Inc, 2019. https://doi.org/10.1002/wcc.613.

them. The market has grown tenfold in the last year, and it is necessary to start reconciling the transactions in the voluntary field with what can be utilized for compliance purposes.

Changing rules may create expectations that may not be achieved in the future. The investors in this type of carbon credits require legal certainty. For a carbon market to exist, a monitoring, reporting and verification system for reductions is needed, as well as a reliable intermediary to record and verify the emissions reductions.

The carbon offset programs range from international or governmental regulatory bodies to independent non-governmental organizations (NGOs). Historically, governmental bodies certified offset credits for regulatory purposes ("compliance programs"), while NGOs primarily served voluntary buyers ("voluntary programs"); more recently, both types of programs have begun to serve both types of markets. Each carbon offset program issues its own labelled "brand" of credit. However, as well denoted in COP27, the prospect is that the rules for regulation of voluntary markets will only be concluded in 2030. This means that there is a significant manipulation of voluntary carbon markets. Many of these credits could over time have their eligibility questioned, and even eventually be disallowed.

The tax authorities should cautiously follow the progress in this area, as it can notably affect the design of carbon taxes or hybrid carbon pricing instruments.

1.2. Definitions

Given the specialist nature of the topic, definitions are crucial. The terms carbon offset and carbon offset credit (or simply "offset credit" or "carbon credit") are used interchangeably, though they can mean slightly different things. Basically, one can distinguish between:

(a) Carbon offset credit: A transferrable instrument certified by governments or independent certification bodies that represents emission reductions or removals measured against a counterfactual baseline.

These carbon credits are commonly used to "offset" emissions. The purchaser of an offset credit can "retire" it to claim the underlying reduction towards their own GHG reduction goals.

(b) Offsetting: The use of carbon credits generated from mitigation activities outside a country, jurisdiction, or company supply chain for which emissions are measured and accounted, toward a compliance obligation or voluntary pledge of a country, jurisdiction, or company.

2. Interpretation of article 6 of the Paris Agreement

2.1. Review of existing materials

A review of the drafting materials and recent publications, followed by consultations with experts involved in the climate negotiations, serves to better appreciate the checks and balances introduced on pricing and for the veracity of value to avoid fraud (i.e. really create offsets, do not double count). For example, a country can decide in its national legislation to allow for carbon offset credits considering emission reductions made in other countries to be used to fulfil its own NDC. In this situation, the corresponding adjustments should avoid double counting.

Countries have committed to reduce emissions according to their pledges under the Paris Agreement. Article 6 of this Agreement explicitly recognizes the possibility for international cooperation through the transfer of emission reductions. However, if a country allows an emission reduction to be claimed by another party (another country or some other entity), it should no longer be able to count the reduction towards its own GHG target in its pledged contribution (while a country receiving the transfer can apply the reduction to its own GHG balance sheet).

2.2. Obstacles to trade

In addition, the potential obstruction to trade might be taken into consideration. The tax aspects that restrict the creation and effectiveness of trading carbon offset credits must be prudently revised (even value-added tax (VAT) or goods and service taxes (GST) could be potential tax obstacles to trading them). One main concern is how prices are calculated. If a different method of calculation is used in the tax field, then the transfer pricing rules might generate an obstacle to the efficient carbon trade. The subsequent adjustments would require tracking and tracing certificates, what would undermine the market.

From a legal perspective, when a country aims to generate credits that will eventually be (traded and) offset against in compliance markets in a different country, if the compromise is different from what that country usually does, there is a risk that those credits will fall short and eventually become useless in the international community.

3. Current practical country experiences, with particular attention to resource rich countries

3.1. Country examples

One relevant issue is to have predictability around costs, both from a tax and an investor point of view. The tax systems should embrace what happens in the markets that are being developed right now.

The state of the art reveals how some tax authorities are already dealing with carbon offset credits[31]. Their actual needs deserve attention (with a special focus on the conditions imposed to the available tools for verifying the quantity and quality of emission reductions or removals related to the credits allowed in the tax system). Sharing comparative examples about various legal options in the life cycle of carbon offset credits will provide useful learning points for policymakers (i.e. how and when tax

[31] "Section 12K of the Income Tax Act is an incentive available for any person holding a CDM [Clean Development Mechanism] project registration while that person implements the project. Essentially, amounts received or accrued upon disposal of these CERs [Certified Emission Reductions] are exempt from normal tax and capital gains tax purposes". Steenkamp, L.A., "To incentivise or penalise: an analysis of the proposed carbon tax in South Africa", en Weishaar, Stefan, *et al.* (eds.) The Green Market Transition: Carbon Taxes, Energy Subsidies and Smart Instrument Mixes., Edward Elgar Publishing, 2017. p. 51. "Under the carbon tax policy framework, firms will be able to reduce their carbon tax liability by using offset credits up to a maximum of 5 or 10 per cent of their GHG emissions, depending on the time of emissions". Machingambi, M. "Is the use of carbon offsets in the South African carbon tax a smart mix?", en Weishaar, Stefan, *et al.* (eds.) The Green Market Transition: Carbon Taxes, Energy Subsidies and Smart Instrument Mixes., Edward Elgar Publishing, 2017, p. 69.

credits are being applied in practice by tax administrations, e.g., in South Africa, Mexico, Colombia and Chile[32]) and accordingly establish new opportunities to strengthen international tax cooperation[33].

In South Africa, the Carbon Tax Act promulgated in 2019 allowed companies to use carbon offsets to reduce their carbon tax liability by up to 5 to 10 per cent of their actual emissions. Carbon Offsets projects developed in South Africa using any one of the three standards namely CDM; Verified Carbon Standards and Gold Standards are eligible in the carbon offsets program. A fully functional Information Technology system was developed to manage these credits. South Africa Revenue Services requires taxpayers to submit carbon offsets retirement certificate for carbon tax purposes. Only carbon offsets listed in the Carbon Offset Administration System can be retired and a certificate be issued.

In Mexico the Special Tax Upon Services and Production can be paid through CDM offset credits. Since 2018, the Mexican government has accepted them to cover 20% of the tax payment, under certain conditions: they must be developed in Mexico and not emitted before 2014, they ought to be sold on the European Emissions Market, and they need to address post-Kyoto goals.

The government of Colombia also envisages an emissions compensation mechanism. In 2017, Decree 926 was approved, establishing the rules and conditions that allow certain entities to offset their obligation. The Decree specifies that the GHG emission reductions valid for the purpose of the carbon neutrality noncharge application must come from mitigation initiatives implemented in the national territory using certification programmes or certain carbon standards.

In Chile the 2020 tax reform provided that the taxpayers subject to the tax may offset all or part of their taxable emissions, for the purpose of determining the amount of tax to be paid, by implementing projects to reduce emissions of the same pollutant. This reform opened the door to a carbon pricing instrument system with offsets and the development of emission reduction projects.

3.2. Interaction with (existing) income tax rules

[To be completed]

4. How to allocate carbon credits in intercompany arrangements

The Subcommittee on Transfer Pricing will analyze the value allocation and how transfer pricing rules will apply to the creation of credits. To ensure the necessary consistency, enhanced coordination will be sought between the self-standing documents to be prepared by the two subcommittees offering a common understanding of facts.

In a situation where a company makes expenses and is entitled to carbon credits in one country, it may assign those credits to a related company in the same or a different country. Currently, companies should find ways in which to justify inter-corporate transactions and record those transactions in order to harness some level of legal certainty.

[32] Pizarro, R., “Sistemas de instrumentos de fijación de precios del carbono en América Latina y jurisdicciones de las Américas relevantes”, *Documentos de Proyectos* (LC/TS.2021/41), Santiago, Comisión Económica para América Latina y el Caribe (CEPAL), 2021, p. 70.

[33] For example, as noted by some commentators, "[T]he Canadian federal carbon tax and its various provincial surrogates would do well to consider the benefits of the South African offset allowance”. Gilder, Andrew, and Geoffrey Stiles. "Comparative Approaches to Carbon Taxation in Canada and South Africa." *Carbon & Climate Law Review* 13.4 (2019): 270-279.

There might be an opportunity for carbon offset credits planning to the extent that groups could organize themselves to acquire credits in jurisdictions where the price is the lowest, transferring it to other members of the group located in high pricing jurisdictions, or employing cheap credits against energy intensive businesses. Many questions arise, both from a costing and from a transfer pricing perspective, so governments should be prepared.

The assessment and attribution of value will be analyzed by the Transfer Pricing Subcommittee, that, in principle, proposes to apply the classic criteria along the value chain.

Note on other cross-cutting elements

The Subcommittee will consider other elements in the context of carbon offsets. For example, common approaches contributing to a country's NDC might consist of purchasing carbon offsets in its forests, peatlands, or wetlands. Also, the Annex to E/C.18/2022/CRP.9 contains *Extended description of (initial) work streams* with possible subtopics. We will be attentive to developing countries that set up a carbon tax while allowing to compensate part of the obligation with carbon offsets, and the trading of local projects on international markets, supporting local sinks. We will follow up the developments regarding Article 6 of the Rulebook methodology and their use in carbon taxation. Article 6.2, on bilateral actions, contains guidelines covering internationally transferred mitigation outcomes (like internationally traded carbon credits) that must be reported and recorded in registries. Article 6.4 establishes a multilateral mechanism with a Supervisory Board to approve projects adjusted to the circumstances. We will review the "share of proceeds" (an international tax on activities and/or emission credits generated by international market mechanisms for climate change mitigation) from carbon markets linked to this multilateral mechanism and the transfers to the Global Adaptation Fund. Article 6.8 addresses non-market international cooperation among governments. We will try to identify cases where taxpayers who pay a carbon tax should be eligible for reductions in their tax burden if they engage in other activities that offset taxed greenhouse gas emissions. We will consider the net balance with the absorption and reduction perspectives in mind.

ANNEX D – Carbon Border Adjustments: Impact and relevance for developing countries

Introduction

Note to the Tax Committee
This paper is work in progress. The first parts contain text which will need to be refined and expanded while the later parts contain an outline of the sections that will be developed.
The introduction serves both as an introductory briefing for the Tax Committee and will form the introduction for the final paper.

At the start of COP 26 in Glasgow in November 2021, Climate Action Tracker estimated that even if all the short-term carbon reduction goals announced by countries were implemented, global temperatures would rise by 2.4 degrees Centigrade by the end of the century. Following further and longer-term commitments made at that Conference, the International Energy Agency estimated that warming could be held to 1.8 degrees. Even that though is well above the safer limit of 1.5 degrees set out in the Paris Accord. It is clear that further decarbonisation measures will be required to keep the goal of holding global warming to 1.5 degrees alive. Such measures could include carbon pricing or regulation or (more likely) a mixture of both.

However, as countries and regions increase their decarbonisation ambitions there are growing concerns about carbon leakage. This occurs where customers shift sourcing, or producers move production, from higher aspiration areas to lower aspiration areas to reduce the costs associated with the decarbonisation measures (whether these are created by direct carbon pricing or by regulation). Carbon leakage both undermines attempts to reduce emissions, as they simply move from the higher aspiration area to the lower, and can negatively impact the economy of a country which is seeking to cut emissions. At least theoretically, it can even result in an overall increase in emissions if production is relocated to a jurisdiction with very low emissions regulation.

There are various ways to address carbon leakage. Where a country puts a price on carbon (for example through a carbon tax or an emissions trading system (ETS)) one possibility is for it to apply a charge or levy on certain imported goods from countries with a lower carbon price to ensure the cost of embedded carbon in imports is equal to that of domestically produced goods. The theory is that imposing such a charge reduces the incentive for goods to be sourced from lower aspiration countries. These mechanisms are generally referred to as a carbon border adjustment (CBA), border carbon adjustment (BCA) or a carbon border adjustment mechanism (CBAM). This paper will use the term CBA.

A CBA could be implemented in various different ways and its structure is likely to depend upon how the country introducing it prices carbon (e.g. whether it uses a carbon tax or an ETS). However, CBAs do raise various concerns about complexity, whether they are compliant with World Trade Organisation (WTO) rules, the possibility to spark trade wars and the impact on developing countries – especially certain low-income countries which are heavily reliant on exports of raw materials which may be covered by a CBA.

At the time of producing this paper, the EU is the only region to have draft CBA rules in place (referred to within the EU as CBAM) – although there are a number of other countries considering this approach.

In the light of the above the UN Tax Committee approved a proposal from the Environmental Subcommittee as follows:

"These developments make the Committee's role integral in providing guidance to help developing countries prepare for and understand the impact of CBAM on their economies. Accordingly, the Subcommittee proposes to start work on ***Carbon Border Adjustment Mechanisms and how developing***

countries can avoid undesired spillover effects from other countries applying those measures. For this priority area, the Subcommittee proposes to begin with an overview of the developments in different fora and the impact for developing countries. After 2023, the Subcommittee can undertake a more extensive analysis when further details are available on the subject."

Focus and structure of this paper

The main focus of this paper is on the potential impact of CBAs on developing countries and how they can respond to maintain a level playing field – i.e. to ensure that their industries are not adversely affected and to protect their tax base.

However, a CBA is not the only method to address carbon leakage. This paper also considers what other ways can achieve this aim.

Furthermore, as more developing countries introduce or strengthen carbon pricing and emissions regulation, they will also be impacted by the issue of carbon leakage from their own territories. This paper therefore considers what developing countries can do to protect themselves from its impact.

This paper is not intended to either recommend or oppose any particular measure but to share knowledge and identify the potential impacts.

Note to Tax Committee
The overriding purpose of this workstream is, primarily, to outline and share knowledge on what types of CBA exist and their implications. It will:

a) *Consider the effect of CBAs on developing countries and how governments could respond to reduce any negative impact;*
b) *Consider whether there are other ways apart from CBAs for countries to address carbon leakage; and*
c) *Consider how developing countries could address carbon leakage where it impacts on their own decarbonisation path.*

The paper has been split into 3 parts dealing with the "What" – what is carbon leakage and what are possible responses and their aims; the "How" – the detail on various CBA proposals and considerations for developing countries wishing to address carbon leakage; the "Response" – potential impacts on of CBAs on developing countries and ways to respond to CBAs.

Part A: Carbon leakage and ways to address it

1. What is carbon leakage?

Carbon leakage - theory

There are many measures which a country may take in order to reduce its overall emissions. These include regulations and emissions standards – which control permitted quantities of emissions – and carbon pricing. The latter could be through a carbon tax whereby a government puts a charge on the emission of a certain quantity of CO2 or an ETS whereby the government sets a cap on total emissions by certain industries and issues permits which are tradable. Under a carbon tax the government sets the

cost and the market regulates the amount of emissions in response to the cost; whereas under an ETS the total amount of emissions are controlled and the market sets the cost of such emissions.[34].

Whichever approach is used, there will be a cost implication for industry. This could be from paying the carbon tax or purchasing permits under an ETS or from modifying the production system to reduce emissions – whether in response to the cost of carbon or to comply with regulations restricting emissions. The cost could impact an industry directly – for example a steel producer which has in increased cost of carbon - or indirectly where it has caused an increase in component parts a manufacturer is producing. It will also impact many businesses through the cost of purchased energy.

It is this increased cost which gives rise to the concern about carbon leakage. The concern is that producers or end consumers in high aspiration countries – where there are stricter regulations or a higher cost of carbon - may source components and end products from lower aspiration countries where there are fewer regulations or a lower cost of carbon and so lower costs. Alternatively, producers in such high aspiration countries may transfer production to lower aspiration countries to reduce production costs.

Carbon leakage can have both an environmental and an economic impact. First, there is a concern that the emissions release simply shifts from one country to another – so undermining the reduction measures taken in the high aspiration country. It could even result in an overall increase in emissions depending upon the production standards in the lower aspiration country.

From an economic perspective the concern is that shifting production will result in reduced profitability for firms in the high aspiration country if they lose sales to foreign competition. This could lead to lower tax receipts and impact employment. If production is moved abroad there would be a corresponding reduction in employment.

Is carbon leakage a reality?

Despite concerns about the theory of carbon leakage, there is little empirical evidence to support it. This could be because energy costs are often a small part of overall production cost and so increase carbon pricing has a relatively small impact on pricing. It could also be because firms are able to adapt to carbon pricing. A World Bank 2019 study has looked at the impact of environmental taxes in general on competitiveness in developing countries[35]. This sets out a conceptual framework looking at a number of factors. These include first the cost pressure from taxation. Secondly, the sector including the energy intensity both of production and inputs and exposure to competition from imports and the mobility of operations. Thirdly, the response open to industry such as the ability to pass extra cost on to consumers, ability to absorb the cost, the possibility of substituting input, increases in efficiency, and innovation.

Research has also found that other factors such as sunk costs in infrastructure, transport costs, the availability of skilled labour, the investment climate, governance and political stability, exchange rate fluctuations, and an industry's overall "footlooseness" may influence investors' location decisions more than the differential in energy or carbon taxation so limiting the impact of carbon leakage[36].

Nevertheless, concerns remain backed up by various theoretical studies. This is particularly true in sectors which are energy intensive – and so an increase in the carbon price will have proportionately greater impact on the ultimate price – and which are exposed to trade competition. Such sectors are

[34] See 2021 UN Handbook on Carbon Taxation for Developing Countries, Chapter 2, Part 4 for a fuller explanation of Carbon Pricing
[35] Antoine Coste, Massimiliano Cali, Nicola Cantore and Dirk Heine in Pigato 2019
[36] Jeppesen, List, and Folmer 2002; Ederington, Levinson, and Minier 2005; PMR 2015

referred to energy intensive trade exposed sectors (EITE) and include iron and steel, aluminium, cement, fertilizer and glass.

A further reason why empirical studies have not shown a significant issue of carbon leakage could be that, historically, carbon prices have been relatively low and leakage has been addressed by other means. For example, since the introduction of the EU ETS in 2005, the European Union (EU) has addressed leakage in the most exposed sectors by issuing free permits. As part of its Green Deal and Fit for 55 Package, the EU is aiming to reduce and eventually eliminate fee allowances and to increase the carbon price so as to cut emissions in 2030 by 55% in comparison with 1990 levels. According to the Explanatory Memorandum COM (2021) 564:

"…as the Union increases its climate ambitions, the divergence with third countries' level of climate action is expected to widen, with an increased risk of carbon leakage for the EU. This would stem from the EU's increasingly ambitious GHG emissions reduction targets that should reduce the overall number of ETS allowances. As a consequence, the carbon price signal from the EU ETS is strengthened, incentivising Union producers to reduce their emissions, but widening the difference with countries without carbon pricing mechanisms. Moreover, overall free allocation will also decline over time, in line with the reduction of the emission cap."

The European Commission (EC) has therefore proposed introducing a carbon border adjustment mechanism (CBAM) to cover iron and steel, aluminium, cement, fertiliser and electricity. The EC's impact assessment found that the CBAM should bring carbon leakage down to -29% by 2030 and lead to a 1% emission reduction in the EU[37].

2. Principles for addressing carbon leakage

Overview

Measures to address leakage may have a number of objectives. These include:

a) support the overall aim to reduce emissions;
b) provide a level playing field for domestic producers and importers;
c) provide a level playing field for exporters and foreign produced goods;
d) not create distortions in international trade or be considered as discriminatory.

Consideration could also be given to ensuring there is not a negative impact on inflation and employment – although such impacts would tend to follow from the carbon pricing itself rather than the measures taken to reduce leakage.

Measures will also need to be compatible with World Trade Organisation (WTO) rules. This paper includes a brief outline of relevant WTO rules but does not go into a detailed analysis of whether or not any specific type of measure does or does not respect the rules.

Outline of WTO considerations

[To be completed]

[37] Insert link to source

3. Measures to address carbon leakage

There are various ways to address carbon leakage. This chapter sets out some of the measures which have already been introduced to address or prevent leakage such as issuing free permits under an ETS, reduced rates of carbon tax, and output based pricing systems such as in Canada. It also outlines new proposals, specifically CBAs and the idea of a carbon club. Finally, this chapter briefly compares these various measures with the principles and objectives set out in chapter 2 above.

3.1 Free allowances under an ETS

Summary: This is the method which the EU has used so far. While it protects the competitiveness of domestic products both as regards imports and exports, it reduces the carbon price and so does not support decarbonisation aims.

3.2 Reduced carbon tax rates

Summary: Certain countries with a carbon tax have used lower rates to protect EITE industries. Sweden had a lower rate of tax when it introduced carbon tax although this was phased out over time. Mexico also proposed using a lower rate. Such reduced rates help protect the competitiveness of domestic industry both as regards imports and exports but do not support the overall decarbonisation aims of a country.

3.3 Output-Based Pricing System (OBPS) in the Canadian Federal Backstop

[To be developed]

3.4 Carbon Border Adjustments

Summary: This will include brief references to existing proposals such EU CBAM and proposals in Taiwan/Canada. While CBAs address leakage and level the playing field as regards imports, they do not (usually) provide relief for exports. They also need to be applied in non-discriminatory way to be WTO compliant and probably need to focus on environmental protection not economic goals. CBAs have been criticised as being green protectionism.

3.5 Carbon clubs

Original proposals

Different proposals to create some kind of carbon club have been put forward. One of the first people to suggest this was William Nordhaus, Sterling Professor of Economics at Yale University. The purpose of the club was to address concerns about countries which were perceived as not addressing climate change quickly enough and effectively "free-riding" on the efforts of others. Member countries of the club would agree a minimum carbon price - which would be increased over time - and countries which did not sign up to it would be subject to a general tariff on imports. Such a club would not, therefore, avoid the need for some kind of border tariff. It would, however, act as an incentive for club members to accelerate decarbonisation and further countries to join the group. Nevertheless, such proposals have been criticised on a number of grounds.

Firstly, there are social and political reasons why certain countries may not be able to increase carbon pricing in line with expectations of the club and may need to rely on alternative measures. It may not therefore work in practice to bring countries together.

Secondly, it may pose WTO issues.

Thirdly, such a club could undermine the collective agreement through the UNFCCC and in particular the concept of common but differentiated responsibilities.

G7 Statement of 28 June 2022

A different version of a Carbon Club was initially mooted by German Chancellor Olaf Scholz. His idea was to create a coalition of countries willing to work together on decarbonisation rather than try to use the more adversarial approach of carbon tariffs and the idea was given high priority during the German Presidency of G7 in 2022. G7 leaders issued a statement at their Summit in Elmau, Germany in June 2022 on the creation of a Climate Club. However, this statement did not include any clear details about further steps.

[To be developed further]

Note for Tax Committee
Parts B and C will be worked up as soon as possible and the current intention is to have a draft ready for the first meeting in 2023

Part B: Carbon border adjustment measures and proposals

4. Existing CBA proposals

4.1 A more detailed analysis of the EU proposal and how it might be extended
4.2 What other developments are there – e.g. UK, Canada and Taiwan have talked about introducing CBAM; US has raised the possibility of a CBAM but not based on a tax
4.3 Key design issues emerging from the above

5. Specific consideration on how developing countries can protect themselves from carbon leakage

This section will outline the alternatives which developing countries could use to address carbon leakage where they want to increase their emissions reduction aspirations.

Part C: Potential responses to CBAs

6. **Impact of various proposals on developing countries**

6.1 Potential impact on trade
6.2 Effectiveness of CBAs in reducing emissions globally
6.3 Other concerns expressed about CBAs

7. How to assess the impact of a CBA

Practical guidance on how to assess the impact of a CBA on the national economy, for different economic sectors and industries. [Query if we can do this and we'll definitely need collaboration with 3rd party]

8. Policy measures to address the impact of CBAs

This chapter will contain practical suggestions on policy measures for developing countries to avoid revenue leakage and protect trade-exposed local industries where they are likely to be adversely impacted by a CBA introduced by another country.

8.1 Introduce a carbon tax
8.2 Introduce ETS
8.3 Other pricing measures

9. Compliance with a CBA

This chapter will contain practical guidance on administrative requirements for exports to countries with a CBA.

9.1 Measurement, Reporting and Verification in Carbon Pricing (MRV)
9.2 Challenges in implementing MRV in developing countries
9.3 Internationally recognised verification processes
9.4 Possibilities to include scope 3 emissions (ie indirect emissions other than imported energy)
9.5 Possibilities to include carbon credits