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Environmental tax issues

Chapter 6 [Former Chapter 5]: Revenue Use

Handbook on Carbon Taxation for Developing Countries

Note by the Secretariat

Chapter 6 [Former Chapter 5]: Revenue Use of the Handbook on Carbon Taxation is presented to the Committee FOR DISCUSSION AND APPROVAL at its 22nd Session.

This chapter is intended to provide a guide to everyone involved in the implementation of a carbon tax, from policymakers to technical levels, to understand the complexities related to the use of revenues from carbon taxation, and what are the issues to be further investigated in their specific national framework.

The chapter starts by outlining how revenues from a carbon tax can fund the overall State budget, or finance specific items, and what are some of the mechanisms that countries can use to commit revenues from carbon taxation to a specific purpose (including earmarking and political commitments). Revenue raising is put in perspective with an overview of the current amounts raised by carbon taxes around the world, and their potential in different scenarios.

Finally, the chapter discusses some of the main destinations that countries can choose for revenues from a carbon tax, including compensation for affected households or industries, environmental spending and tax shifts; and some policy considerations that policymakers may want to take into account when designing policy packages, including the role that revenues can play in the acceptability of a carbon tax.

A first draft of the note was prepared and presented to the Committee at its 21st Session. Since then, it was revised and reviewed by the Subcommittee. The current text seeks to be richer in content and clearer, and it provides clarifications on items flagged during the 21st Session, including in section 6.2.1 (Current carbon tax revenue); the conclusions were also reworked for clarity and completeness.

The text now also contains box 6.1 on the potential role of specific purpose trust funds (environmental or other) in linking revenue sources to spending items; and box 6.2 on the price elasticity of demand. A box on carbon taxes and economic efficiency was removed from the text, following the Committee's suggestion that the text was overly complex, while not fully covering the vast implications of the topic. For easy reference and comparability with the previous version (E/C.18/2020/CRP.46), the current text in presented in track mode.

Last updated on 7 April 2021.

Please note that citations are included in non-final format, but rather in a way to make final editing (and alignment with rest of the Handbook) easier.

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~~6.~~1. Introduction

1. ~~As a~~In general,~~ rule~~ proceeds from taxes become part of general government revenue and are used to fund the public expenditures as stipulated in the budget. Considering the potentially significant amount of revenues ~~to~~that could be generated from carbon taxes, governments, particularly in developing countries with typically low tax-to-GDP ratios in comparison with developed countries,[1] may want to ~~look to~~consider the potential of carbon taxes as a source for domestic resource mobilization ~~and not just~~in combination with their principal role as an instrument for environmental protection.

2. There are several potential ways of using the revenue from carbon taxes productively. Given the specific political economy of carbon taxes, there are strong arguments for ~~using parts of the revenue for compensating affected~~combining their introduction with some form of compensation targeted at vulnerable industries and ~~low income~~ households that face strong cost increases as a result of the tax. Also, reflecting the particular nature of carbon taxes as both tax and environmental policy instrument, governments may choose to use ~~(~~part of the~~)~~ revenues for environmental spending, either for the reduction of carbon emissions, or (more rarely) for other environmental purpose altogether. Finally, some countries, particularly in the OECD, have used revenues from carbon and energy excise taxes to finance changes in overall tax policy, lowering other taxes simultaneously (~~tax shifts~~these are referred to as green tax shifts or environmental fiscal reforms), or for 'carbon dividends' (broad transfers).

3. Practically, ~~using~~allocating the revenue from carbon taxes ~~for~~to specific, pre-determined uses may come in the form of earmarking or political commitments.

4. Earmarking revenues entails legal prescriptions assigning revenues to specific spending purposes; these provisions can be included in primary or secondary legislation, depending on the country. ~~However, it should be noted that, while~~ While earmarking is standard practice in some jurisdictions, it is constitutionally prohibited in others~~;~~[2] ~~the latter may still allow for~~.[3] Where earmarking is prohibited, the creation of special destination funds~~, where~~ – environmental or

[1] World Bank data, Tax Revenue (% GDP) https://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS

~~[2] For example, in Chile earmarking revenues from any tax is prohibited by the Constitution, while British Columbia earmarked some revenues from their carbon tax to lower the energy costs of low-income households; and Denmark partially earmarked revenues for green spending, specifically for energy efficiency.~~

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

other – may be an option for ring-fencing revenues ~~are directed for~~ to specific purposes~~.~~, in cases where this is considered important for political reasons(see box 6.1).

5. ~~On the other hand, political~~Political commitments to specific forms of revenue use can come in forms of public statements on how certain amounts of tax revenues will be used, (e.g. as part of policy packages~~),~~) but do not involve legal prescriptions. Politically committing revenue to specific spending purposes as part of policy packages can have much the same effect as earmarking, but with more flexibility and the possibility to change the allocation of funds as environmental or social priorities change. Political commitments can therefore be useful both in jurisdictions that allow earmarking, and in those that do not. However, such flexibility might also result lower political thresholds in shifting of revenue use as a result of changing political priorities of different governments, and therefore in increased uncertainty for the industry or for citizens.[4]

6. The rationale for specific forms of revenue use, as opposed to contributing to general revenue raising, often lies in the quest for public support for a carbon tax. Where strong constraints on revenue use are needed to strengthen public support for carbon taxes, e.g. because of low trust in government, earmarking becomes more appealing. More generally, there is evidence that clear choices and communication on revenue use that are well adapted to local circumstances have the potential to garner public support.

Box 6.1. The potential role of specific purpose trust funds (environmental or other) in linking revenue sources to spending items

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

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

Revenues from carbon taxes and other environmental taxes can provide a source of funding to environmental funds, while allowing these independent structures to be long-lasting, to the extent they receive a steady incoming flow of revenue resources. This feature may be constrained by legal

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

impediments within a country's budgetary law and may require legislative oversight to operate independently.

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

Examples of successful environmental funds

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

- **Colombia:** 30% of the revenues accumulated via the carbon tax are geared towards a national environmental fund for coastal preservation (activities include protecting the erosion of coastal areas, fighting deforestation, monitoring forested areas, preserving water sources as well as other strategic ecosystems and fighting climate change).
- **Costa Rica**: the main source of funding for the Forestry environmental services program (FESP), is the revenue accumulated via a dedicated tax on the sale of fossil fuels. Over one third of the revenues accumulated via the tax, i.e. 5% of fuel sales, is earmarked to invest into forest reforestation, sustainable management of forests, and forest preservation (Chomitz, Brenes, & Constantino 1999).[5]

For more information about environmental funds, see UNDP (2017). Environmental Trust Funds. http://www.undp.org/content/sdfinance/en/home/solutions/environmental-trust-funds.html.

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6.2. Carbon tax revenue in perspective

7. While the first objective of carbon taxes is to provide incentives for cutting emissions, discussions on its timing and design may also be informed by the revenue that it could raise. This section discusses actual and potential revenue from carbon taxes, and compares to the revenue from excise taxes on energy use and from emissions trading systems.

6.2.1. Current carbon tax revenue

~~6.~~8. The World Bank's annual State and Trends of Carbon Pricing ~~reports~~Reports track the adoption and continued application of carbon taxes and emissions trading systems across the world. In addition to key statistics on the price level and the base covered, the reports provide estimates of the total annual revenue and the total annual value of carbon pricing.

[5] Kenneth M. Chomitz, Esteban Brenes, Luis Constantino (1999) "Financing environmental services: the Costa Rican experience and its implications", The Science of the Total Environment 240, Elsevier, 1999. https://www.researchgate.net/publication/222497679_Financing_Environmental_Services_The_Costa_Rican_Experience_and_its_Implications.

~~7.~~9. Table 1 collects revenue and value estimates from recent State and Trends reports.[6]

Table 6.1 Revenue from and value of carbon pricing through carbon taxes and emissions trading systems, billion USD[7]

	2015	2016	2017	2018	2019
Revenue (carbon tax and ETS)	26	22	33	44	45
Value (carbon tax and ETS)	48	49	52	82	98[8]

~~8.~~10. The table shows that *revenue* from carbon pricing – including both carbon taxes and emissions trading systems (ETS) – is considerably higher in ~~2018~~2019 than in 2015. The increase in ~~recent years~~2017 and 2018 is mostly attributable to rising allowance prices in the European Union's ETS, but rising carbon taxes, notably in France and in Alberta, also contribute to the increase. The total revenue of 45 billion USD in 2019 is only slightly higher than in 2018 as EU ETS allowance prices stabilised in that year.[9]

11. The *value* of carbon pricing differs from revenues in that it measures the economic size of pricing systems, which is larger than revenues in case not all pricing policies result in public revenues. In practice, the main reason why value exceeds revenue lies in the free allocation of tradable emission permits. These permits have economic value but do not generate public revenue. As can be seen in Table 1, the value of carbon pricing is around twice as large as the revenue that it generates.

[6] The table reports the revenues collected through carbon taxes and value of emission trading schemes (ETS), worldwide. While calculations for carbon tax revenue is straightforward (see chapter 3 for further guidance), the value of an emissions trading system is estimated by multiplying the number of allowances by the allowance price, whereas the value of carbon pricing is obtained from government budget documents. The value of an emissions trading is at least as large as the revenue that it generates, with the difference attributable to the allocation of free allowances and of permits below the auction price.

[7] World Bank State and Trends of Carbon Pricing Reports 2015 – 2019; https://www.worldbank.org/content/dam/Worldbank/document/Climate/State-and-Trend-Report-2015.pdf; https://openknowledge.worldbank.org/bitstream/handle/10986/25160/9781464810015.pdf?sequence=7&isAllowed=y; http://documents.worldbank.org/curated/en/468881509601753549/pdf/State-and-trends-of-carbon-pricing-2017.pdf; https://openknowledge.worldbank.org/bitstream/handle/10986/29687/9781464812927.pdf?sequence=5&isAllowed=y; https://openknowledge.worldbank.org/handle/10986/31755.

[8] This number is calculated from the downloadable Carbon Pricing Dashboard data - https://carbonpricingdashboard.worldbank.org/.

[9] World Bank. 2020. State and Trends of Carbon Pricing 2020. Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/33809 License: CC BY 3.0 IGO

12. In 2019, 53% of *revenues* come from carbon taxes and 47% from ETSs. The share of ETS revenues is higher than in earlier years because of higher prices in the EU ETS, and its large weight in the overall ETS landscape.[10]

13. The 2015 State and Trends of Carbon Pricing report[11] breaks down the 2015 *value* of carbon pricing~~. The value~~, estimating that it consists of 14 billion USD from carbon taxes (29%) and 34 billion USD from emissions trading systems (71~~%), suggesting that~~ %).

~~9.~~14. The high share of emissions trading systems in the value of carbon pricing indicates that these systems currently dominate the global explicit carbon pricing landscape in as far as incentives for cutting emissions (at the margin) are concerned. Carbon taxes raise relatively more revenue because of the common practice of free allocation of permits.[12]

~~10.~~15. To put the revenues from carbon taxes and emissions trading in perspective, Marten and Van Dender (2019)[13] also calculate the revenues from excise taxes on energy use. ~~They argue this~~This comparison is ~~particularly~~ meaningful because excise taxes on energy use implicitly price carbon, given the strict proportionality between emissions and fuel combustion for any given type of fuel. Even if the excise taxes were introduced for reasons unrelated to climate change, and even if the rates do not translate into uniform carbon prices~~, they effectively do result in a sort of price on carbon~~ or into prices that are aligned with climate damages or abatement objectives, these taxes are economically similar to a price on carbon. This is because they incentivize the reduction of fuel use and hence emissions (see OECD, 2018, and World Bank, 2019, for an elaborate discussion)[14]. Across the 40 OECD and G20 countries analysed, the

[10] Postic S, and M. Fetet, 2020, Global carbon accounts 2020, I4CE – Institute for Climate Economics, https://www.i4ce.org/wp-core/wp-content/uploads/2020/05/TarificationCarbone2020-VA.pdf.
[11] World Bank State and Trends of Carbon Pricing report 2015, footnote 15.
[12] Considering 40 OECD and G20 countries, Marten and Van Dender (2019: Marten, M. and K. van Dender (2019), "The use of revenues from carbon pricing", OECD Taxation Working Papers, No. 43, OECD Publishing, Paris, https://doi.org/10.1787/3cb265e4-en) estimate the combined revenue from carbon taxes and emissions trading systems at 21 billion EUR in 2016, consisting of 14 billion EUR of carbon tax revenue (33.3%) and 7 billion revenue of auction revenue (66.7%). These revenue proportions are opposite the value proportions, indicating the widespread practice in emissions trading systems of allocating allowances for free. ~~Whereas in the textbook case of a perfectly competitive economy where there are no lumpy assets, free allocation would not hamper the environmental effectiveness of emissions trading, there are strong reasons to believe that in reality free allocation does blunt abatement incentives~~" (Flues and Van Dender, 2017: Flues, F. and K. van Dender (2017), "Permit allocation rules and investment incentives in emissions trading systems", OECD Taxation Working Papers, No. 33, OECD Publishing, Paris, https://doi.org/10.1787/c3acf05e-en.)
[13] Marten, M. and K. van Dender (2019), "The use of revenues from carbon pricing", OECD Taxation Working Papers, No. 43, OECD Publishing, Paris, https://doi.org/10.1787/3cb265e4-en.
[14] OECD, Effective Carbon Rates 2018: http://www.oecd.org/tax/tax-policy/effective-carbon-rates-2018-brochure.pdf and WB State and Trends 2019 (chapter 5): https://openknowledge.worldbank.org/handle/10986/31755

revenue from excise taxes on energy use amounts to an estimated 420 billion EUR in 2016 – this is twenty times larger than the revenue from carbon taxes and emissions trading systems combined. Otherwise said, if the sum of excise taxes, carbon taxes, and emission permit prices is taken to be an effective price on carbon (an "effective carbon rate~~"),~~" in OECD terminology), then the revenue from effective carbon rates consists for 95.2% of excise tax revenue, 3.2% of carbon tax revenue, and 1.6% of revenues from emission allowances.[15, 16]

6.2.2. Potential carbon tax revenue

~~11.~~16. ~~Although carbon tax revenues currently account for less than 30% of total carbon pricing revenues worldwide, the instrument's potential for revenue raising is much larger. Currently, low~~Carbon pricing presently raises less revenue than it would if the instrument were deployed more in line with its climate policy potential. Low revenues from carbon taxes are mainly attributable to low tax rates and narrow bases; several studies have tried to estimate what is the potential increase in revenue collection, should ~~those~~ rates be set higher and bases broadened.[17]

~~12.~~17. ~~For example,~~ Marten and Van Dender (2019) take into account the potential increase in revenues from carbon taxes in 40 OECD and G20 economies. Their estimate is short-run, meaning that they consider an increase in tax rates, but not the reduction in tax base caused by behavioural responses (i.e. they do not take into account that polluters reduce emissions to the extent that it is more convenient than paying the tax~~),~~, even in the short run). According to their study, ~~increasing the effective carbon rate to EUR 30/tCO2 (i.e. implement~~implementing a minimum carbon price of EUR 30/tCO2~~,~~ (where pre-existing excise taxes, carbon taxes and emission permit prices are taken into account to calculate the required tax increase) would raise additional revenue worth 1.32% of GDP across the 40 OECD and G20 countries analyzed (0.72% for OECD only).

~~The IMF Fiscal Monitor,[18] on the other hand, takes into account behavioral responses (sector elasticities).~~

Box 6.2: Price elasticity of demand

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

[16] See World Bank Carbon Pricing Dashboard for country data: https://carbonpricingdashboard.worldbank.org/

[17] The studies quoted below take into account the potential increase in revenues based on an increase in tax rate~~,~~ that would also result in a smaller tax base as polluters reduce emissions to the extent that it is more convenient than paying the tax.

~~[18] IMF Fiscal Monitor October 2019 https://www.imf.org/en/Publications/FM/Issues/2019/09/12/fiscal-monitor-october-2019~~

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

Price elasticities are determined by various factors, including the untapped potential for using fuels more efficiently and the cost of tapping it, the availability and price of substitutes, and consumer knowledge. Hence, the price elasticity of demand can vary over time and geography, as well as by income level or even with the price of the good itself. For example, in chapter 3 (page 66, para 39), we discussed empirical studies that show that price elasticity of fuel products is higher in poor countries than in rich countries, meaning that demand reacts more strongly to price changes.

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

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

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

~~13.~~18. The 2019 IMF Fiscal Monitor[19], in contrast to the OECD study mentioned, takes into account behavioral responses (sector-elasticities) to carbon price increases. Table 6.2 summarizes the estimated impact on revenues of introducing a carbon tax of USD 25, 50 or 75/tCO2~~, in addition to~~ for a selection of countries and across the G20. The tax increase is over and above existing taxes on energy use ~~introduced for fiscal or domestic environmental reasons~~. The IMF estimates that a carbon tax of USD 75/tCO2 would reduce emissions by 35% in 2030 compared to 1990, which is sufficient to be on track for the Paris Agreement targets of limiting global average temperature increases to 2 degrees Celsius at most. For the G20, this tax would raise revenues worth 0.4% of GDP. Countries where current taxes are lower would collect proportionally more revenue.

[19] IMF Fiscal Monitor October 2019 https://www.imf.org/en/Publications/FM/Issues/2019/09/12/fiscal-monitor-october-2019

Table 6.2 Estimated revenue from carbon taxes, % of GDP, 2030[20]

	~~Carbon~~Revenue from carbon tax of $25/tCO2	~~Carbon~~Extra-revenue from carbon tax of $50/tCO2	~~Carbon~~Extra-revenue from carbon tax of $75/tCO2
G20 weighted average	0.7	0.5	0.4
Russia (largest increase)	1.7	1.4	1.3
France, UK (smallest increase)	0.3	0.2	0.2
India	1.1	0.7	0.6
Indonesia	0.7	0.6	0.5

19. The ~~two~~IMF and the OECD studies ~~above lead to the conclusion~~suggest that there is potential for considerable revenue increase over the next decades, particularly where carbon prices and energy taxes are currently low, and the base is narrow. However, they also ~~suggest~~indicate that higher carbon tax rates would likely not result in a deep structural impact on the composition of overall tax revenues of countries. ~~While a green tax shift can,~~Also, ultimately revenues should decline as the usage of carbon-based fuels declines. However, in the near to ~~some extent, help~~ medium run, this should not prevent countries ~~relax~~from integrating carbon tax revenue considerations into their ~~fiscal constraints,~~broader tax, climate and spending policy frameworks.

20. Recent OECD estimates of the carbon pricing ~~shows a modest~~ revenue potential for a selection of developing countries show strong variation.[21] For Egypt, the combined effect of removing fossil fuel subsidies and raising carbon taxes to a minimum rate of EUR 30/tCO2 could generate extra revenue worth 4.5% of GDP. In Ecuador, the potential is around 3.7%, in Morocco close to 2%, and in Nigeria, Sri Lanka and the Philippines around 1%. Jamaica, Côte d'Ivoire, Guatemala, Dominican Republic and Ghana could raise around 0.5% of GDP from a carbon tax of EUR 30/tCO2. Uruguay and Kenya might raise around 0.25% of GDP. In Uganda and Costa Rica, the revenue potential is very limited and almost negligible.

~~14.~~21. The revenue potential differs among countries for two main reasons. First, there are substantial differences in pre-existing carbon prices. In Uganda, for example, where most fossil fuel use occurs in the road sector, prevailing tax rates are already above the low-end carbon

[20] Source: IMF Fiscal Monitor October 2019, Figure 1.3

[21] See OECD, 2021 (forthcoming), Taxing Energy Use for Sustainable Development. These estimates account for the estimated demand reduction following the price increase.

benchmark. Second, the carbon intensity of energy use varies across countries. In countries that do not use coal at present, tax and subsidy reform, or even a simple ban[22] will provide incentives for skipping the coal phase in electricity generation and industry. According to the OECD analysis, candidate countries include Costa Rica and to a lesser extent Uruguay and Kenya. These estimates suggest that while rising carbon taxes can help some countries mobilize some revenue, the revenue potential is modest if compared to the total budget of most countries~~; therefore,~~, and it is unlikely that countries will be able to adopt fundamentally different domestic revenue mobilization strategies following the ~~interaction~~introduction of a carbon tax.

6.3. Destinations of revenue use and considerations for designing policy packages

6.3.1. Options for revenue use

22. The use of the revenues from carbon taxes co-determines their net economic benefits (beyond the direct environmental benefit), affects their distributional impact, and can strengthen support for their introduction or increase. Given the often challenging political economy of carbon taxes, there are strong arguments for reserving and using parts of the revenue from the introduction of a carbon tax to provide ~~(temporary and~~compensation targeted~~) compensation to affected~~ at vulnerable industries and ~~low income~~ households~~. Also, reflecting the particular nature of carbon taxes as both tax and environmental policy instrument, governments may~~ that face strong cost increases as a result of the tax. Governments may also choose to use ~~(~~part of the~~)~~ revenues for environmental spending. ~~Finally~~Alternatively, some countries, particularly in the OECD ~~world~~, have used revenues from carbon and energy excise taxes to finance tax shifts, e.g. changes in overall tax policy~~, lowering other~~ that combine higher carbon taxes with lower taxes on personal or corporate income (green tax shifts or environmental fiscal reform). A further option is to redistribute the revenue through transfers ('carbon dividends') that may be general or targeted to specific household types. Finally, carbon tax revenue can contribute to higher spending in general or to cutting debt. ~~simultaneously (tax shifts).Klenert (2018), following a very comprehensive literature review on revenue use from carbon pricing, gives an overview of how governments might want to decide on carbon tax revenue use based on their main concerns (an interesting shift in perspective, rather than looking at priorities), and addressing these appropriate mechanism. Quoting Klenert, "[...] when distributional concerns are the greatest obstacle to higher~~

[22] Collier, P. and A. Venables (2014), "Closing coal: economic and moral incentives", Oxford Review of Economic Policy, Vol. 30/3, pp. 492-512, http://dx.doi.org/10.1093/oxrep/gru024.

~~carbon prices, transfers directed to the poor outperform other recycling mechanisms. When efficiency and competitiveness concerns are the greatest obstacle and trust in the government is high, reimbursing firms through transfers or tax cuts can be superior. Earmarking the revenue for spending might be the option of choice if the main obstacle is that citizens are unconvinced of benefits of higher carbon prices. Uniform lump-sum recycling is favourable in more circumstances, as it may ensure broad public support through its salience and progressivity and due to its properties regarding the stability of carbon pricing policy."[23]~~

6.3.2. Compensation for ~~affected~~vulnerable industries

~~15.~~23. ~~In order to avoid unwanted effects on industry competitiveness and carbon leakage, it may be necessary to use~~Carbon pricing increases costs, particularly in energy-intensive industries, and this can trigger carbon leakage (production moving to places with lower carbon prices) and reduce the ability of firms to compete internationally. These effects may need to dampened, and this can be done by using part of the revenue to compensate trade-exposed industries after the introduction of a carbon tax or other carbon pricing instrument (industry competitiveness concerns are discussed in chapter 2.4.4).

~~16.~~24. Different mechanisms are possible to address competitiveness concerns:

- Revenue-recycling measures: direct financial transfers to companies based on output or financial support for efficiency improvements;
- Measures that imply some loss of revenue and of environmental effectiveness ~~and of revenue~~: reduced tax rates and tax exemptions.

~~17.~~25. In order not to compromise the environmental objective of the carbon tax, two principles of designing mechanisms to address competitiveness concerns should be followed:

- Compensations should only benefit companies (or industrial installations) which are highly exposed to international trade~~.~~ and that face significant cost increases as a result of the carbon tax. Compensations should be designed in a way that maintains the incentive to reduce carbon emissions.

~~18.~~26. To satisfy the second principle, having companies pay the full tax rate and recycling ~~(parts~~part of the~~)~~ revenues to those companies based on their output or for supporting efficiency improvements are better options in comparison with ~~tax~~ reductions of the carbon tax rate or exemptions. If revenue recycling is not feasible, tax reductions or exemptions can be an

~~[23] Klenert, David. 'Making carbon pricing work for citizens.' Nature Climate Change, Vol. 8, August 2018, 669–677~~

alternative but this should be limited in time and phased out. Additionally, these measures should be granted only in combination with a conditionality for companies to achieve efficiency improvements.

~~19.~~27. When designing compensation schemes for affected industries, governments will inevitably be confronted with significant industry lobbying for expanding the circle of companies or installations and for more generous compensation. While it is important in principle to limit the circle of benefiting companies or installations to those exposed to international trade and to maintain the incentive for reducing emissions, it ~~will~~may in practice also be necessary to strike a balance between these principles and the political feasibility of the carbon tax in light of industry pushback.

~~20.~~28. Instead of using tax exemptions or transfers, governments could also address the competitiveness concerns of industries through measures such as tariffs on imports of highly traded emission-intensive commodities.

6.3.3. Compensation for ~~low income~~ households

~~21.~~29. Carbon taxes, particularly if they include transport or heating fuels or fuels for electricity generation, result in a different relative burdens on households depending on their income.[24] A disproportionate burden on low-income households, or a reduction in energy affordability (irrespective of how the burden differs by income~~)~~), may be unacceptable from a social perspective and reduce public acceptability of the tax.

~~22.~~30. To mitigate unwanted negative effects of carbon taxes on ~~low income~~ households, governments may choose to use parts of the revenue for compensating ~~these~~some (usually low-income) households for the price increase. Country experience with compensation mechanisms in the context of a carbon tax is scarce, but there is ample experience in the context of reforming energy subsidies and energy taxes, which can be built upon.[25]

~~23.~~31. Similar to compensations for ~~affected~~vulnerable industries, mechanisms for compensating ~~low income~~ households should be limited to the households that actually need compensation and they should ideally deliver compensation without compromising the incentive of the tax to change consumption. Also similarly, ~~low income~~ households can be

[24] Potential distributive implications of carbon taxes are discussed in chapter 2.5.3
[25] Coady et al. 2015: https://www.imf.org/en/Publications/WP/Issues/2016/12/31/The-Unequal-Benefits-of-Fuel-Subsidies-Revisited-Evidence-for-Developing-Countries-43422

shielded from rising energy prices either through targeted transfers (revenue recycling) or through reduced rates or exemptions (forgone revenue).

~~24.~~32. ~~On the other hand~~In comparison with compensating vulnerable industries, it ~~is sometimes~~can be more difficult to design compensation mechanisms ~~for low-income households~~ which actually reach the targeted households. This ~~might be~~is due to two factors: the first one is ~~that~~, simply, that it might be difficult to understand which households are most affected by higher energy prices. Secondly, typical compensation measures such as tax deductions or tax credits might not be appropriate for low-income households, as they might not ~~pay tax in the first place. For this reason, when their beneficiaries are known and already part of the system, governments can choose to implement redistributive mechanisms such as direct transfers~~be obliged to pay tax in the first place. This problem is exacerbated where there is a large informal economy.

~~25.~~33. To avoid the second problem above, governments can choose to implement targeted transfers as redistributive mechanisms. Targeted transfers can take the form of cash transfers or near-cash transfers.[26] If a system to give direct cash transfers already exists and beneficiaries are already known and coincide with households that should receive compensation for increased energy prices, transfers from carbon tax revenues can be distributed by piggybacking on these systems. ~~Cash~~Targeted transfers can also be handed out conditional on specific behavior of the household (e.g. children going to school~~).~~), pursuing other policy objectives in addition to redistribution. In the case of carbon tax revenues, conditionality can be kept or removed; and existing beneficiaries can be reduced or kept the same size.

~~26.~~34. Cash transfers ~~are more effective~~or near cash transfers can be used to compensate households for the increased burden created by higher fuel prices, without reducing the incentive for increasing fuel efficiency or switching to low carbon fuels that is created by the carbon price. Near cash transfers or in-kind transfers directed at encouraging fuel efficiency or fuel switching would be even more effective in encouraging low-carbon behavior. Cash transfers are more effective from a social perspective when provided at regular intervals, for example as monthly dividends, to truly offset impacts on household income. ~~The question remains on whether cash transfers would somewhat counter the efforts to change societal behavior on environmental issues; on the other hand, near cash or in-kind transfers might be more effective in encouraging low-carbon behavior.~~

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

~~27.~~35. Sometimes, broad or universal cash transfers are used to compensate households after the introduction of a carbon tax (e.g. Switzerland, British Columbia) or the removal of fuel subsidies (e.g. ~~India). This is a delicate issue; while subsidies usually have some impact on low-income households, they favor middle- and high-income households much more. Therefore, the removal of subsidies would be per-se progressive.~~Iran in 2010[27]). In the ~~context~~case of a carbon tax, ~~revenues from the tax should be used~~this mechanism is also referred to ~~compensate for subsidies removal only if it~~as a carbon dividend. The benefit of such a compensation mechanism is ~~possible~~the salience and the inclusivity of the compensation, which is usually seen to ~~target low-income households~~help the acceptability of the tax among broad parts of the society significantly. This is particularly the case if the dividend is disbursed first, before the tax is introduced. The downside of using carbon tax revenue for universal cash transfers is that ~~were highly affected - for example, commuters that were dependent on private transport.~~this mechanism does nothing to improve the effects of the overall reform package on income distribution.

~~28.~~36. An alternative to cash-transfers can be the expansion of existing programs targeting low-income households (e.g. school meals, public works, reductions in education and health user fees, subsidized mass urban transport, subsidies for water and electricity connection costs~~).~~[28]. If transfers are not possible, alternative policy choices can be the granting of life-line tariffs, reduced rates for low-income households, or to provide vouchers.

~~29.~~37. Finally, pro-poor reinvestment of additional revenue can be an alternative, albeit not very targeted way of compensating low-income households.[29]

6.3.4. Environmental spending

~~30.~~38. Carbon taxes are a revenue-raising instrument and an environmental policy instrument at the same time. While the environmental objective of the carbon tax is achieved primarily through changing the relative price of carbon fuel consumption, governments may choose to

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

[28] For example, British Columbia uses part of the carbon tax revenue to grant non-energy related tax credits to low-income households, including a "children's fitness and arts" tax credit

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use ~~(~~parts of~~)~~ the revenues to further additional environmental objectives. This can strengthen support where the demand for more ambitious environment policy is high, and can be justified if spending needs for environmental policy priorities are not currently met.

~~31.~~39. In practice, there are examples of governments using revenue to finance environmentally related programs and projects, including promoting or subsidizing the use of renewable energies and low-carbon technologies, the conservation and protection of biodiversity, waste and water management, and other green programmes. Carbon tax revenues can also be used to fund energy efficiency and savings measures.[30]

~~32.~~40. Directing part of revenues towards promotion of low-carbon technologies and R&D can help address the issue of hard-to-eliminate emissions.

~~33.~~41. To reduce emissions, countries should aim at "filling-the-gap" policies, i.e. ~~direct~~use revenues to address emissions that the tax would miss, ~~and not~~while avoiding to reinforce behaviours that are incentivized by the tax anyway. For example, carbon tax revenues are often used to incentivize businesses to install solar panels; since many of those businesses would have likely installed the panels as a result of the tax anyway, it ~~is~~would not have been necessary to spend additional revenues to encourage them~~ to~~. The incentive would therefore be redundant, as the desired change ~~their~~of behaviour (for many businesses) would have already been stimulated by the tax; using carbon tax revenues to provide an additional incentive would be wasteful. "Filling-the-gap" policies, on the other hand, aim at targeting only those entities for which the tax would not be a sufficient incentive to change behaviour. With this approach, more revenues would potentially be available to spend to reduce emissions that would otherwise have been missed, ~~i.e.~~in our example small businesses that might not have the necessary capital to install solar panels.

~~34.~~42. For developing countries, investing in R&D might not be a priority in general; to further environmental protection, they might opt for measures that directly impact citizens instead, such as expanding low-carbon public transport infrastructure; or expand the public electric grid with renewable energy. These direct measures would also contribute to increasing political acceptance of the carbon tax, as citizens would be able to appreciate the visible results of the policy.

[30] Some examples include the carbon dioxide tax in Denmark, which uses part of revenues to fund business energy efficiency subsidies; the Slovenia emissions tax, where 1/3 of revenues are used for emissions mitigation;

6.3.5. Tax shifts

35.43. Revenues from carbon taxes can be used also to finance changes in the overall tax policy, e.g. by lowering other taxes simultaneously with the introduction or increase of carbon taxes. Typical examples include the simultaneous reduction in taxes on personal or corporate income (including social security contributions) or capital. In principle, also reductions on other taxes can be financed. The use of revenue from carbon or other environmental taxes to reduce other taxes is often referred to as a green tax shift or an environmental fiscal reform.[31]

44. The rationale for such tax shifts ~~is to avoid an increase in the overall tax burden in the country and~~can be to improve the overall efficiency of the tax system. ~~[32] However, policymakers should consider to what extent the~~ A more efficient tax system is one that raises the same amount of revenue at lower economic cost (i.e. with smaller economic distortions). While some taxes distort behavior, because the activity that is taxed becomes relatively less desirable (e.g. taxes on labor), others do not (e.g. lump-sum taxes). Pigouvian taxes like carbon taxes can reduce distortions in that they move the actual price of a consumed good (as a fuel in the case of a carbon tax) closer to the social cost of its consumption. Hence, in a country context where personal or corporate income taxes ~~have typically been combined with tax shifts~~are high and where carbon emissions are priced at a level below the social cost, using revenue from carbon taxes to lower income taxes can move the tax system closer to overall efficiency of the tax system. While such tax shifts may be an adequate choice in high ~~income countries with relatively high~~ income countries where levels of income taxation are comparatively high, they may be less relevant – and less recommendable – for developing countries with comparatively low overall tax-to-GDP ratios~~. Using carbon tax revenues for financing tax shifts is less relevant for developing countries with typically comparatively~~ and low ~~tax to GDP ratios, and generally not recommended~~levels of income taxation.

~~already "optimal" before the introduction the carbon tax in terms of overall economic efficiency, and whether the tax can provide an opportunity to correct some of the inefficiencies of the tax system. designing tax shifts, policymakers may face a tradeoff between economic efficiency and equity considerations. To encourage economic growth, revenue would have to be used to reduce most distortionary taxes. For example, taxes on capital are considered very distortionary; however, using~~

[31] The Swedish carbon tax is a notable example of this mechanism. Due to relatively high revenues from carbon taxes, the country has been able to lower other taxes, including personal income taxes, labor taxes and social security contributions, operating a green tax shift.

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~~carbon tax revenues to lower these taxes would not improve progressivity of the tax system. On the other hand, lump-sum transfers would improve equity, but not the efficiency of the tax system..~~

~~***Box xx. Carbon taxes and economic efficiency***~~

~~If implemented in isolation, a carbon tax can have negative impacts on macroeconomic variables (including labour markets and growth). In fact, one of the main criticisms of environmental taxation is that it can lead to an overall reduction in welfare, which is particularly problematic for developing countries and LDCs struggling with poverty reduction. However, a carbon tax can improve the efficiency of the tax system, as it lowers distortion and usually raises revenue at relatively low administrative costs; usually, carbon tax is also harder to evade than other taxes (especially positive for countries with high evasion). This instrument might also encourage the formalization of the economy by reducing the difference in tax burden between the informal and formal sector.~~

~~Therefore, it is possible that the introduction of a carbon tax will not pose significant overall efficiency concerns, and that the effects will offset each other (e.g. employment concerns will be offset by formalization of the economy). In this respect, options for revenue use should be considered taking into account the overall design of the carbon tax (i.e. tax base/point of taxation, tax rate etc.), as different design options affect the efficiency and regressivity of the tax.~~

~~While each country should consider their own tradeoffs and revenue recycling options, as well as their own administrative capacity, it is interesting to look at some of the conclusions of a Tax Foundation study (https://taxfoundation.org/carbon-tax/) , based on evidence from the United States:~~

- ~~A carbon tax paired with a lump-sum rebate would increase the tax code's progressivity significantly, but impact employment and output negatively.~~
- ~~A carbon tax paired with a cut in the employee-side payroll tax increases progressivity, output, and employment.~~
- ~~A carbon tax paired with a cut in the corporate income tax, permanent 100 percent bonus depreciation, and R&D expensing boosts output and pretax wages while decreasing progressivity and lowering employment.~~

6.3.~~5~~6. Communication of revenue use

45. When carbon taxes are introduced as part of a policy package and parts of the revenue are used to compensate vulnerable industries or households or for environmental purposes, the perception of the fairness and effectiveness of revenue use becomes an important factor for the political acceptability of the carbon tax. While the effects of the tax on the price of fuel products is usually felt directly by businesses and consumers as a more or less painful price increase, the (positive) effects of compensating measures addressing businesses or households or of environmental measures is often indirect and less salient. In this situation, deliberate efforts by governments to communicate and explain the design and purpose of the policy package including the use of revenue becomes an important factor for political acceptance of the tax. Revenue recycling mechanisms may not be self-evident. Governments should communicate clearly, what purpose revenues are used for and how these purposes are meant to address negative competitiveness or fairness concerns or further environmental objectives.

36.46. Trust in government is a relevant context variable for choosing and communicating revenue use. The lower the trust in government, the more important the salience of compensation measures becomes, when the policy objective of using revenues for compensating affected households is to increase public acceptability. In countries with high distrust, very salient options for revenue use like uniform lump-sum or other cash transfers are the use of revenues that generates more public support for a carbon tax.

37.47. Labelling/naming theThe labelling of a carbon tax is oftentimes quite important for political acceptabilitycan be part of a communication strategy. A 'fee-and-dividend' renaming (with lump-sum payments) has been found to be the most popularan effective labelling.. when credibility of revenue recycling for households and firms is chosen to increase political acceptance.

A way to increase public acceptance is to make the results of the tax visible, as discussed above; and to center the communication strategy on these highly visible effects.[33] The direct environmental effects of a carbon tax may not be evident in the short term. However, revenue recycling mechanisms can be evident, and should be communicated appropriately. Finally, the findings of Klenert (2018) suggest that lump-sum transfers can be a more politically acceptable and more stable mechanism than tax cuts or direct transfers,[34] especially in countries with high inequality and low political trust.

6.4. Conclusions

48. Carbon taxes haveWhile the doublefirst objective of raising revenues while protecting the environment; while their primary purpose is to reduce carboncarbon taxes is to provide incentives for cutting emissions, many countriesthey also considerraise revenue raising an important feature of this instrument. Currently, carbon taxes account for less than 30% of revenues from carbon pricing; however, studies show that their contributions to national budgets have. This chapter discussed several potential ways for using this revenue that are typically associated with the introduction of carbon taxes, namely the use of revenues 1.) for providing compensations for affected vulnerable industries; 2.) for compensating households, 3.) for environmental spending purposes, and 4.) for financing tax shifts. Of course, as a fifth way, which was not discussed separately in this chapter, tax revenue can also be used for financing additional spending or paying off debt.

38. potential for considerable increase and could make up for non insignificant shares of public revenues in the future.

[33] For example, British Columbia issues a public report outlining the intended use of revenues each year.
[34] Klenert, David. 'Making carbon pricing work for citizens.' Nature Climate Change, Vol. 8, August 2018, 669-677

~~39. Revenues from carbon taxes can be used for a variety of purposes, based on the priorities of each country. Destinations analysed in this chapter include the following:~~

- ~~Compensation for affected industries~~
- ~~Compensation for low-income households~~
- ~~Environmental spending~~
- ~~Tax shifts~~

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

50. There is no one-size-fits all solution or recommendation for carbon tax policy packages including revenue use. Instead, the right choice of revenue use depends on country circumstances including the pre-existing tax system, income distribution and consumption patterns, industrial structure and competitiveness, trust in government, understanding as well as acceptance of environmental taxes and environmental policy, to name the main ones. In the policy deliberation and design process leading up to a carbon tax, governments should be mindful of potential sources of political opposition towards the tax as well as key economic and social impact variables, assess the likely impact of different options of revenue use, and try to strike a balance between strengthening support and optimizing economic and distributional gains by choosing an appropriate form of revenue use or combination.

~~40.~~51. Practically, using carbon tax revenue for specific purposes can take the form of legal earmarking or political commitments. Earmarking is legally prohibited in some jurisdictions. When it is not possible, political commitments or concurrent measures can be used to direct revenues towards a specific priority. ~~Finally, revenue use can be a way to make the tax very visible to citizens, and therefore to increase public acceptance.~~ Where it is possible and where constraints on revenue are seen as conducive to strengthening public support for carbon taxes (e.g. because of low trust in government) earmarking can be advisable. Generally, clear commitments to a form of revenue use that is well adapted to local circumstances and their clear communication has good potential to secure public support.